**Intergovernmental Oceanographic Commission**

*Reports of Governing and Major Subsidiary Bodies*

**Logo, company name

Description automatically generatedIntergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System   
(ICG/PTWS)**

**Thirtieth Session**

Nuku’alofa, Tonga  
11–15 September 2023

**UNESCO**

IOC/ICG/PTWS-XXX/3

Paris, March 2025

English only[[1]](#footnote-1)

**TABLE OF CONTENTS**

page

[TABLE OF CONTENTS i](#_Toc191134290)

[page i](#_Toc191134291)

[Executive summary iii](#_Toc191134292)

[Résumé exécutif vii](#_Toc191134293)

[Resumen dispositivo xii](#_Toc191134294)

[Рабочее резюме xvi](#_Toc191134295)

[1. WELCOME AND OPENING OF SESSION 21](#_Toc191134296)

[2. ORGANIZATION OF THE SESSION 23](#_Toc191134297)

[2.1 ADOPTION OF AGENDA 23](#_Toc191134298)

[2.2 DESIGNATION OF THE RAPPORTEUR(S) 24](#_Toc191134299)

[2.3 CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION 24](#_Toc191134300)

[3. REPORT ON INTERSESSIONAL ACTIVITIES 27](#_Toc191134301)

[3.1 CHAIRPERSON'S REPORT 27](#_Toc191134302)

[3.2 SECRETARIAT REPORT 30](#_Toc191134303)

[3.2.1 SUMMARY OF THE 8TH JOINT ICG/PTWS-IUGG/JTC TECHNICAL WORKSHOP 30](#_Toc191134304)

[3.3 TOWS WG REPORT 31](#_Toc191134305)

[3.4 TSUNAMI SERVICE PROVIDERS REPORTS 33](#_Toc191134306)

[3.4.1. Pacific Tsunami Warning Centre (PTWC) 33](#_Toc191134307)

[3.4.2. Northwest Pacific Tsunami Advisory centre (NWPTAC) 36](#_Toc191134308)

[3.7 WORKING GROUPS AND TASK TEAM REPORTS 50](#_Toc191134309)

[3.8 REPORT OF PACIFIC WAVE EXERCISE 2022 61](#_Toc191134310)

[3.10 REPORTS FROM UN AND non-UN ORGANIZATIONS 66](#_Toc191134311)

[3.10.1 SPC 66](#_Toc191134312)

[4. POLICY MATTERS 70](#_Toc191134313)

[4.1 PTWS STATUS REPORT 70](#_Toc191134314)

[4.2 TSUNAMI READY RECOGNITION PROGRAMME 71](#_Toc191134315)

[4.3 MINIMUM COMPENTENCIES FOR NTWCs 73](#_Toc191134316)

[4.4 INTEGRATION OF PTWS SENSORS NETWORKS FOR TSUNAMI DETECTION AND CHARACTERISATION 74](#_Toc191134317)

[4.5 EXPANSION OF PTWS EARTH SOURCE ZONE 75](#_Toc191134318)

[4.6 PROVISION OF TSUNAMI INFORMATION SERVICES FOR THE MARITIME COMMUNITY 76](#_Toc191134319)

[4.7 REVISED USER’S MANUALS AND SERVICES OVERVIEW DOCUMENT 78](#_Toc191134320)

[4.8 PACIFIC WAVE EXERCISE 2024 79](#_Toc191134321)

[4.10 OCEAN DECADE TSUNAMI PROGRAMME (ODTP) 80](#_Toc191134322)

[4.11 TSUNAMI GENERATED BY VOLCANOES 81](#_Toc191134323)

[4.11.1 PTWS PROCEDURES AND PRODUCTS FOR THE NEXT HTHH EVENT 81](#_Toc191134324)

[4.11.2. MONITORING AND WARNING SYSTEM AGAINST A TSUNAMI GENERATED BY VOLCANOES IN THE PACIFIC 83](#_Toc191134325)

[*6.* NEXT SESSIONS 87](#_Toc191134326)

[6.1 CONFIRMATION OF DATE AND PLACE OF ICG/PTWS XXXI 87](#_Toc191134327)

[6.2 TARGET DATE FOR ICG/PTWS XXXII 87](#_Toc191134328)

[7. ELECTION OF OFFICERS 87](#_Toc191134329)

[8. ANY OTHER BUSINESS 88](#_Toc191134330)

[10. CLOSURE 89](#_Toc191134331)

[ANNEX I 90](#_Toc191134332)

[ANNEX II 92](#_Toc191134333)

[ANNEX III 1](#_Toc191134334)

[LIST OF PARTICIPANTS 1](#_Toc191134335)

[ANNEX IV 1](#_Toc191134336)

# Executive summary

1. The Thirtieth Session of the UNESCO-IOC Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS) took place during 11–15 September in 2023 in Nuku’alofa, Tonga. The session was held in hybrid format (in-person and online) and was attended by 62 delegates from 16 Member States in the Pacific Ocean region (Australia, Canada, Chile, China, Ecuador, France, Indonesia, Japan, Malaysia, New Zealand, Nicaragua, Republic of Korea, Solomon Islands, Tokelau, Tonga, and United States of America). Fourteen observers from 5 countries (Bangladesh, France, India, Russian Federation and United States of America) also attended the session. The session was the first in-person session of the ICG/PTWS since 2021 and was therefore an essential opportunity to catalyse existing and new activities. Some of the key outcomes of the session included:

(i) strengthening the mandate and the ability of the Steering Committee to deliver on the UN Ocean Decade goals;

(ii) establishment of WG2 Task Team on Tsunami Generated by Volcanoes, WG2 Task Team on Forecasting from Ocean Observations, WG3 Task Team on Tsunami Ready and Pacific Island Countries and Territories Working Group Task Team on Information Sharing Platforms;

(iii) establishment of a permanent Hunga Tonga-Hunga Ha'apai (HTHH) monitoring and warning procedures based on the products and methods in use by PTWC since March 2022;

(iv) expansion of the PTWS Earthquake Source Zone to include an area from 63° to 52° S and from 72° to 18° W to include the Scotia Arc and its adjacent seismic zones, and consequently to update the PTWS Earthquake Source Zone map; and

(iv) decision to admit the start of Central America Tsunami Advisory Centre’s (CATAC) full functionality with a starting date to be agreed in coordination with the ICG/CARIBE-EWS (Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions), to be approved by the IOC Executive Council in June 2024.

1. **The ICG decided** to continue: Working Group 1 Understanding Tsunami Risk; WG2 Tsunami Detection, Warning and Dissemination; WG2 Task Team on the Integrated PTWS Sensor Networks for Tsunami Detection and Characterisation; Task Team on Seismic Data Sharing in the Southwest Pacific under the Pacific Island Countries and Territories; Working Group on Tsunami Warning and Mitigation System; WG3 Disaster Risk Management and Preparedness; and Sub-Regional Working Groups (Regional Working Group on Tsunami Warning and Mitigation System in the South China Sea Region; Regional Working Group on Tsunami Warning and Mitigation System on the Central American Pacific Coast; Regional Working Group on Tsunami Warning and Mitigation System in the Southeast Pacific Region; Pacific Island Countries and Territories Working Group on Tsunami Warning and Mitigation System); and Task Teams (Task Team on Capacity Development and Services under the Regional Working Group on Tsunami Warning and Mitigation Systems in the South China Sea Region and Pacific Island Countries and Territories; Working Group Task Team on Capacity Development). *(See* [*ICG/PTWS Organisational Structure*](https://oceanexpert.org/document/34493) *(15 September 2023))*
2. **The ICG decided** to continue PTWS Steering Committee with revised Terms of Reference in order to strengthen its mandate and ability to deliver on the UN Ocean Decade goals.
3. **The ICG decided** to continue the Task Team on PacWave Exercises and Task Team of the Tsunami Service Providers (TSPs) under Working Group 2.
4. **The ICG decided** to dissolve the Task Team on UN Ocean Decade, the Task Team on Future Goals and Performance Monitoring, and WG2 Task Team on the Minimum Competency Levels for National Tsunami Warning Centre (NTWC) Operations Staff.
5. **The ICG decided** to establish aWG2 Task Team on Tsunami Generated by Volcanoes (TGV, a WG2 Task Team on Forecasting from Ocean Observations (TT-FOO), a WG3 Task Team on Tsunami Ready and a Pacific Island Countries and Territories Working Group Task Team on Information Sharing Platforms.
6. **The ICG decided** to carry out an eleventh Pacific Wave Exercise in 2024 (PacWave 24) in the months of September through to November 2024 to support International Disaster Risk Reduction Day (13 October) and World Tsunami Awareness Day (5 November).
7. **The ICG accepted** **with appreciation** the kind offer of China to host the 31st Session of the ICG/PTWS in Beijing in April 2025.
8. **The ICG agreed** to support a scientific meeting of experts on the New Hebrides Trench; a meeting of Scientific Experts on the New Hebrides Trench would allow better assessment of uncertainties in tsunami hazard associated with this Subduction Zone and Back Arc.
9. **The ICG requested** WG1 to continue to support Tsunami Hazard Assessment (THA) studies in the Pacific as part of comprehensive risk assessment, consistent with the first objective of the UN Ocean Decade Tsunami Programme (UN ODTP), to achieve 100% coverage for coasts at risk of tsunamis and **encouraged** use of THA results for use in various IOC programmes such as ITIC training, Tsunami Ready Program, IOC/ICG/PTWS WG2 and WG3 activities and UN Ocean Decade Tsunami Programme.
10. **The ICG** **decided** to establish permanent HTHH monitoring and warning procedures based on the products and methods in use by PTWC since March 2022 and presented in IOC Circular Letters [2882](https://oceanexpert.org/document/30136) and [2902](https://oceanexpert.org/document/30759).
11. **The ICG** **considered** that the seismic zone in the Scotia Arc region is very active and have produced 33 earthquakes of magnitude 6.5 or greater since the year 2000, 13 of which were magnitude 7.0 or greater. It **decided** to expand the PTWS Earthquake Source Zone to include an area from 63o to 52o south latitude and from 72o to 18o west longitude to include the Scotia Arc and its adjacent seismic zones, and **requested** the IOC to change the PTWS Earthquake Source Zone map in IOC Technical Series [130](https://unesdoc.unesco.org/ark:/48223/pf0000246931.locale=en) (*Tsunami watch operations: global service definition document)*, accordingly.
12. **The ICG** **noted** advances in SMART Cable efforts in the Pacific and globally; **further** **noted** the advances in GNSS instrumentation and real-time processing and noting the possibility of these advances to contribute to PTWS Tsunami Early Warning goals; **recommended** WG2 continue to work closely with the Joint Task Force (JTF) for SMART Cables and the IUGG GTEWS\_Oceania project to utilize monitoring data from these efforts when they become available.
13. **The ICG noted** the challenges of telefaxing messages and the request from Task Team Tsunami Service Providers presented in the WG2 report to ICG/PTWS-XXX; **requested** the Secretariat to write to Member States to request feedback on the proposed changes to Telefax messaging, and also to request Member States to indicate whether the proposed changes pose an unacceptable risk to their respective National Tsunami Warning Centres and, if so, to recommend those Member States to work with their Tsunami Service Provider (TSP) to identify alternative methods for receiving TSP messages.
14. **The ICG noted** recommendations arising from the TT Minimum Competencies, and noting the submission of a Minimum Competency Framework to the IOC for consideration, and in anticipation that conditions around assessment of efficacy have been met, and **further noted** the instruction of the Working Group on Tsunamis and Other Hazards related to Sea-Level Warning and Mitigation Systems (TOWS-WG) at its 16th meeting in 2023 to the regional ICG, notably the PTWS, and the ITIC to pilot the PTWS National Tsunami Warning Centre (NTWC) Competency Framework for endorsement by ICG/PTWS with the goal to develop a global framework for all ICGs to use.
15. **The ICG approved** the PTWS National Tsunami Warning Centre competencies framework, and training requirements, and **welcomed** the ITIC proposal to pilot the PTWS Minimum NTWC Competency Framework through the development and conduct of a training course during the intersessional period, and report back on its outcome to the ICG/PTWS at its 31st session.
16. **The ICG noted** the vast amount and variable nature of non-earthquake tsunami sources in the historical record, and the challenge of forecasting most non-earthquake tsunamis; and **decided** to establish: (i) a WG2 TT on Tsunami Forecasting from Ocean Observations (TT-FOO) to investigate the use of TEW strategies based on direct ocean observations from available and emerging technologies; (ii) a WG2 TT to explore options for developing alternative warning strategies for tsunamis generated by volcanoes (TT-TGV).
17. **The ICG** **noted** that the PTWC proposed some changes to its text product and **agreed** that PTWC implement these changes following notification to Member States by circular letter three months in advance in accordance with the change process put in place by the ICG/PTWS in 2015.
18. **The ICG** **recalled** the TOWS-WG approved the proposal on TSP Messages for the Maritime Community and requested the Intergovernmental Coordination Groups to consider the proposal for implementation in their respective basins in the TOWS-WG-XII meeting.
19. **The ICG further** **recalled** IOC Assembly instructed the regional Intergovernmental Coordination Groups (ICGs) TSPs in collaboration with NAVAREA operators of the International Hydrographic Organization (IHO) to test the tsunami maritime safety products in 2023/24, with a view to operationally implementing them in 2024–2025 (Decision A-32/3.4.1).
20. **The ICG** **recommended** the Pacific Tsunami Warning Center (PTWC) to finalize necessary preparations to provide special tsunami maritime safety products specifically for ships for all NAVAREA Coordinators in the Pacific and in the Southwest Atlantic (e.g. NAVAREAs VI, X, XI, XII, XIII, XIV, XV, and XVI) to transmit to the NTWCs to be forwarded to the NAVAREA Coordinators of their countries, or upon their request directly to the NAVAREA Coordinators in the absence of a NTWC.
21. **The ICG** **requested** the PTWS Steering Committee to finalise its decision at its next meeting on the provision of these products for a period of testing to be followed by a full operational implementation by the PTWC in 2024–2025.
22. **The ICG** **encourages** Member States to continue to share outcomes and progression towards 100% Tsunami Ready goal with WG3, including communities that are already considered compliant through national standards and **mandated** ITIC to continue to facilitate implementation and data collection regarding Tsunami Ready compliance in PTWS.
23. **The ICG** **recalled** the ICG/PTWS-XXIX.1 recommendation for WG3 to explore ways to recognize communities that choose not to implement the UNESCO-IOC Tsunami Ready Recognition Programme as compliant with the Tsunami Ready Indicators and **noted** **with appreciation** the work of WG3 through its Information Document [*Recognition in Countries with existing Tsunami DRR Programmes*](https://oceanexpert.org/document/33205), proposing a Tsunami Ready Equivalency Approach that seeks to enable reporting of tsunami preparedness in a manner compatible with the UNESCO-IOC Tsunami Ready Recognition Programme, using existing national administrative frameworks and reporting requirements, and without requiring formal UNESCO-IOC recognition.
24. **The ICG endorsed** the proposed approach, **established** a Task Team for Tsunami Ready, and **recommended** WG3 to develop formal guidance for ICG/PTWS on the application of the proposed Tsunami Ready Equivalency Approach, led by WG3 TT on Tsunami Ready, in consultation with Regional Working Groups.
25. **The ICG decided** to support the efforts and progress made by Nicaragua in the creation of the Central America Tsunami Advisory Centre (CATAC), as a tsunami service provider (TSP) within the framework of the ICG/PTWS and **recalled** Recommendation ICG/PTWS-XXIX.5, which noted that the approval of both the ICG/CARIBE-EWS and IOC are necessary for the official full functional operations of CATAC.
26. **The ICG decided** to admit the start of the official full functional operations of CATAC, starting after the IOC Executive Council session in 2024, with the specific starting date to be **decided** after coordination with the ICG/CARIBE-EWS.
27. **The ICG noted** the need for coordination between the ICG/PTWS and its working groups in order to fulfil the UN ODTP goals for the PTWS, and **further noted** the strong leadership and strategic oversight required to implement the UN ODTP.
28. **The ICG recognised** that its Steering Committee has responsibility for strategic direction and coordination across all PTWS activities, including Ocean Decade, and **recommended** strengthening the mandate and ability of the Steering Committee to deliver on the Decade goals by modifying its Terms of Reference as contained in Appendix 1 to [Recommendation ICG/PTWS-XXX.1](https://oceanexpert.org/document/33418).
29. **The ICG recognised** the scope and scale of the tasks ahead, decided to increase the number of ICG/PTWS Vice-Chair positions to three, and elected Mr Yuji Nishimae (Japan) as the Chair, Mr Dakui Wang (China), Mr Wilfried Strauch (Nicaragua), and Mr ‘Ofa Fa’anunu (Tonga) as the Vice-Chairs of the ICG/PTWS.

# Résumé exécutif

1. La trentième session du Groupe intergouvernemental de coordination du Système d’alerte aux tsunamis et de mitigation dans le Pacifique (GIC/PTWS) de la COI de l’UNESCO s’est tenue du 11 au 15 septembre 2023, à Nuku’alofa (Tonga). La session s’est tenue en format hybride (en présentiel et en ligne) et 62 délégués de 17 États membres de la région de l’océan Pacifique y ont participé (Australie, Canada, Chili, Chine, Équateur, États-Unis d’Amérique, Fidji, France, Îles Salomon, Indonésie, Japon, Malaisie, Nicaragua, Nouvelle-Zélande, République de Corée, Tokélaou et Tonga). Quinze observateurs de six pays (Bangladesh, États-Unis d’Amérique, Fédération de Russie, Fidji, France et Inde) ont également assisté à la session. La session était la première session du GIC/PTWS tenue en présentiel depuis 2021 et a ainsi constitué une occasion essentielle pour catalyser les activités existantes et les nouvelles activités. Parmi les principales conclusions de la session figuraient notamment :

(i) le renforcement du mandat et de la capacité du Comité directeur afin d’atteindre les objectifs de la Décennie des Nations Unies pour les sciences océaniques au service du développement durable ;

(ii) la création de l’Équipe spéciale sur les tsunamis d’origine volcanique, sous l’égide du Groupe de travail 2 ; de l’Équipe spéciale sur la planification sur la base des observations océaniques, également sous l’égide du Groupe de travail 2 ; de l’Équipe spéciale sur le programme de certification Tsunami Ready de l’UNESCO/COI, sous l’égide du Groupe de travail 3 ; et de l’Équipe spéciale sur les plates-formes d’échange d’informations, sous l’égide du Groupe de travail des pays et territoires insulaires du Pacifique ;

(iii) la conception de procédures de suivi et d’alerte Hunga Tonga-Hunga Ha’apai (HTHH), fondées sur les produits et les méthodes utilisés par le Centre d’alerte aux tsunamis dans le Pacifique depuis mars 2022 ;

(iv) l’élargissement des foyers de séismes du PTWS pour inclure une région comprise entre 63° et 52° de latitude sud et entre 72° et 18° de longitude ouest, y compris l’arc de la Scotia et ses zones sismiques adjacentes, et la révision en découlant de la carte des foyers de séismes du PTWS ; et

(v) la décision d’admettre le lancement de l’ensemble des fonctionnalités du Centre consultatif sur les tsunamis en Amérique centrale (CATAC) à compter d’une date qui devra être déterminée en coopération avec le Groupe intergouvernemental de coordination du Système d’alerte aux tsunamis et autres risques côtiers dans la mer des Caraïbes et les régions adjacentes (GIC/CARIBE-EWS), qui sera présentée au Conseil exécutif de la COI pour approbation en juin 2024.

2. **Le GIC a décidé** de proroger : le Groupe de travail 1, Comprendre le risque de tsunami ; le Groupe de travail 2, Détection des tsunamis, alerte et diffusion ; l’Équipe spéciale du Groupe de travail 2 sur les réseaux intégrés de capteurs du PTWS pour la détection et la caractérisation des tsunamis ; l’Équipe spéciale sur la mise en commun des données sismiques dans le Pacifique Sud‑Ouest, sous l’égide des pays et territoires insulaires du Pacifique ; le Groupe de travail sur le Système d’alerte aux tsunamis et de mitigation ; le Groupe de travail 3 sur la gestion des risques de catastrophe et la préparation aux catastrophes ; et les Groupes de travail sous-régionaux (Groupe de travail régional sur le système d’alerte aux tsunamis et de mitigation dans la région de la mer de Chine méridionale ; le Groupe de travail régional sur les systèmes d’alerte aux tsunamis et de mitigation sur la côte Pacifique de l’Amérique centrale ; le Groupe de travail régional sur les systèmes d’alerte aux tsunamis et de mitigation dans la région du Pacifique du Sud-Est ; le Groupe de travail des pays et territoires insulaires du Pacifique sur les systèmes d’alerte aux tsunamis et de mitigation) ; et les équipes spéciales (Équipe spéciale sur le renforcement des capacités et les services, sous l’égide du Groupe de travail régional sur le système d’alerte aux tsunamis et de mitigation dans la région de la mer de Chine méridionale et des pays et territoires insulaires du Pacifique ; l’Équipe spéciale du Groupe de travail sur le renforcement des capacités) (Voir[*ICG/PTWS Organisational Structure*](https://oceanexpert.org/document/34493)(15 septembre 2023)).

3. **Le GIC a décidé** de proroger le Comité directeur du PTWS avec un mandat révisé afin de renforcer son mandat et sa capacité pour atteindre les objectifs de la Décennie des Nations Unies pour les sciences océaniques au service du développement durable.

4. **Le GIC a décidé** de proroger l’Équipe spéciale sur les exercices Vague du Pacifique (PacWave) et l’Équipe spéciale des prestataires de services relatifs aux tsunamis (TSP), placée sous l’égide du Groupe de travail 2.

5. Le **GIC a décidé** de dissoudre l’Équipe spéciale sur la Décennie des Nations Unies pour les sciences océaniques au service du développement durable, l’Équipe spéciale sur les objectifs futurs et le suivi des résultats, et l’Équipe spéciale du Groupe de travail 2 sur les niveaux de compétence minimum pour le personnel opérationnel du Centre national d’alerte aux tsunamis (NTWC).

6. **Le GIC a décidé** de créer une équipe spéciale sur les Tsunamis d’origine volcanique, placée sous l’égide du Groupe de travail 2 ; une équipe spéciale sur la planification au départ des observations océaniques, également placée sous l’égide du Groupe de travail 2 ; une équipe spéciale sur le programme de certification Tsunami Ready de l’UNESCO/COI, placée sous l’égide du Groupe de travail 3 ; et une équipe spéciale sur les plates-formes d’échange d’informations, placée sous l’égide du Groupe de travail des pays et territoires insulaires du Pacifique.

7. **Le GIC a décidé** d’effectuer un onzième exercice Vague du Pacifique en 2024 (PacWave 24) entre septembre et novembre 2024, pour marquer la Journée internationale pour la réduction des risques de catastrophe (13 octobre) et la Journée mondiale de sensibilisation aux tsunamis (5 novembre).

8. **Le GIC a accepté avec gratitude** la généreuse proposition de la Chine d’accueillir la 31e session du GIC/PTWS à Beijing, en avril 2025.

9. **Le GIC a accepté** de soutenir une réunion scientifique d’experts sur la fosse des Nouvelles‑Hébrides ; une réunion d’experts scientifiques sur la fosse des Nouvelles-Hébrides permettrait une meilleure évaluation des incertitudes relatives au risque de tsunami lié à cette zone de subduction et d’arrière-arc.

10. **Le GIC a demandé** au Groupe de travail 1 de poursuivre son soutien aux études d’évaluation du risque de tsunami dans le Pacifique, dans le cadre d’une évaluation globale des risques, conformément au premier objectif du Programme relatif aux tsunamis de la Décennie des Nations Unies pour les sciences océaniques, afin de parvenir à une pleine couverture des côtes exposées à un risque de tsunami, et **a encouragé** l’utilisation de ces études d’évaluation du risque de tsunami dans divers programmes, tels que la formation du Centre international d’information sur les tsunamis, le programme de certification Tsunami Ready de l’UNESCO/COI, les activités des groupes de travail 2 et 3 du GIC/PTWS de la COI, et le Programme relatif aux tsunamis de la Décennie des Nations Unies pour les sciences océaniques.

11. **Le GIC a pris la décision** de créer les procédures permanentes de suivi et d’alerte Hunga Tonga-Hunga Ha’apai (HTHH), fondées sur les produits et les méthodes utilisées par le Centre d’alerte aux tsunamis dans le Pacifique depuis mars 2022 et présentées dans les lettres circulaires de la COI n° [2882](https://oceanexpert.org/document/30136) et [2902](https://oceanexpert.org/document/30759).

12. **Le GIC a considéré** que la zone sismique dans la région de l’arc de la Scotia est très active et a provoqué 33 séismes de magnitude 6.5 ou plus depuis l’an 2000, parmi lesquels 13 étaient de magnitude 7.0 ou plus. Il **a décidé** d’élargir les foyers de séismes du PTWS pour inclure une région comprise entre 63° et 52° de latitude sud et entre 72° et 18° de longitude ouest, y compris l’arc de la Scotia et ses zones sismiques adjacentes, et **a prié** la COI de réviser en conséquence la carte des foyers de séismes du PTWS dans le n° [130](https://unesdoc.unesco.org/ark:/48223/pf0000246931.locale=en) de la Série technique de la COI (*Tsunami watch operations: global service definition document*).

13. **Le GIC a pris note** des progrès accomplis en ce qui concerne les câbles SMART dans le Pacifique et à travers le monde ; **a également pris note** des avancées en ce qui concerne les instruments du Système mondial de navigation par satellite (GNSS) et le traitement en temps réel, ainsi que la capacité de celles-ci à contribuer aux objectifs d’alerte rapide aux tsunamis du PTWS ; **a recommandé** au Groupe de travail 2 de poursuivre son étroite collaboration avec le Groupe d’action mixte UIT/OMM/UNESCO-COI pour l’initiative des câbles SMART et le projet GTEWS Oceania de l’Union géodésique et géophysique internationale (UGGI), afin d’utiliser les données de suivi issues de ces actions lorsqu’elles seront disponibles.

14. **Le GIC a observé** les difficultés d’envoi de messages par télécopieur et a noté la demande de l’Équipe spéciale des prestataires de services relatifs aux tsunamis présentée dans le rapport du Groupe de travail 2 lors du GIC/PTWS-XXX ; **a prié** le Secrétariat d’écrire aux États membres afin de leur demander un retour sur les propositions de modifications concernant l’envoi de messages par télécopieur, ainsi que de demander aux États membres d’indiquer si les propositions de modification représentaient un risque inacceptable pour leur centre national d’alerte aux tsunamis respectif et, le cas échéant, de recommander à ces États membres de coopérer avec leur prestataire de services relatifs aux tsunamis (TSP) afin de recenser d’autres méthodes pour recevoir les messages du TSP.

15. **Le GIC a pris note** des recommandations formulées par l’Équipe spéciale sur les niveaux de compétences minimum, ainsi que de la soumission à la COI, pour examen, d’un cadre de compétences minimum, et dans l’attente que les conditions relatives à l’évaluation de l’efficacité soient remplies, et **a en outre pris note** des instructions données par le Groupe de travail sur les systèmes d’alerte aux tsunamis et autres aléas liés au niveau de la mer, et de mitigation (TOWS‑WG) à sa 16e réunion en 2023 aux GIC régionaux, notamment du PTWS, et au CIIT pour piloter le cadre de compétences du Centre national d’alerte aux tsunamis (NTWC) du PTWS en vue de son approbation par le GIC/PTWS, l’objectif étant d’élaborer un cadre mondial à l’usage de tous les GIC.

16. **Le GIC a approuvé** le cadre de compétences et les exigences de formation du PTWS pour les centres nationaux d’alerte aux tsunamis, et **s’est félicité** de la proposition du CIIT de mettre à l’essai le cadre de compétences minimum du PTWS pour les centres nationaux d’alerte aux tsunamis au cours de la période intersessions, et d’en exposer les conclusions au GIC/PTWS, à sa 31e session.

17. **Le GIC a pris note** de la grande quantité des sources de tsunamis non sismiques et de leur nature variable dans les données historiques, ainsi que de la difficulté de prévoir la plupart des tsunamis non sismiques ; et **a décidé** de créer : (i) une équipe spéciale sur la planification au départ des observations océaniques, placée sous l’égide du Groupe de travail 2, afin d’examiner l’utilisation des stratégies d’alertes rapides aux tsunamis en s’appuyant sur les observations océaniques directes obtenues à l’aide des technologies disponibles et émergentes ; (ii) une équipe spéciale placée sous l’égide du Groupe de travail 2 pour étudier les possibilités de concevoir d’autres stratégies d’alerte pour les tsunamis d’origine volcanique.

18. **Le GIC a noté** que le Centre d’alerte aux tsunamis dans le Pacifique avait proposé quelques modifications à son texte et **a convenu** que ce dernier mettrait en application ces changements après en avoir averti les États membres par voie de lettre circulaire, trois mois au préalable, conformément au processus de changement mis en place par le GIC/PTWS en 2015.

19. **Le GIC a rappelé** que le TOWS-WG avait approuvé la proposition concernant les messages des TSP à la communauté maritime, et demandé aux Groupes de coordination intergouvernementale d’examiner cette proposition en vue de la mettre en œuvre dans leurs bassins respectifs, lors de la 12e réunion de ce dernier (TOWS-WG-XII).

20. **Le GIC a également rappelé** que l’Assemblée de la COI avait chargé les TSP des groupes de coordination intergouvernementale régionaux, en collaboration avec les coordinateurs NAVAREA de l’Organisation hydrographique internationale (OHI), de tester les produits de sécurité maritime relatifs aux tsunamis en 2023-2024, en vue de les rendre opérationnels en 2024-2025 (Décision A‑32/3.4.1).

21. **Le GIC a recommandé** au Centre d’alerte aux tsunamis dans le Pacifique (PTWC) d’achever les préparatifs nécessaires pour fournir des produits spéciaux de sécurité maritime relatifs aux tsunamis spécialement destinés aux navires, à tous les coordinateurs NAVAREA du Pacifique et de l’Atlantique du Sud-Ouest (par exemple NAVAREA VI, X, XI, XII, XIII, XIV, XV et XVI), afin qu’ils les transmettent aux NTWC qui les feront suivre aux coordinateurs NAVAREA de leurs pays, ou, à leur demande, directement aux coordinateurs NAVAREA en l’absence d’un NTWC.

22. **Le GIC a prié** le Comité directeur du PTWS de finaliser sa décision à sa prochaine réunion en fournissant ces produits pour une période de test qui devra être suivie par une pleine mise en œuvre opérationnelle par le Centre en 2024-2025.

23. **Le GIC encourage** les États membres à continuer de partager, avec le Groupe de travail 3, les conclusions et la progression vers l’objectif d’une certification Tsunami Ready pour 100 % des communautés, y compris les communautés qui sont déjà considérées conformes par le biais de normes nationales, et **a chargé** le CIIT de continuer à faciliter la mise en oeuvre et la collecte de données en ce qui concerne la conformité avec la certification Tsunami Ready dans la zone du PTWS.

24. **Le GIC a rappelé** la Recommandation ICG/PTWS-XXIX.1 de faire en sorte que le Groupe de travail 3 puisse étudier des façons de reconnaître les communautés qui choisissent de ne pas mettre en œuvre le programme de certification Tsunami Ready de l’UNESCO/COI, conformément aux indicateurs Tsunami Ready, et **a pris note avec satisfaction** des travaux du Groupe de travail 3, au moyen de son document d’information [*Recognition in Countries with existing Tsunami DRR Programmes*](https://oceanexpert.org/document/33205), qui propose une méthode d’équivalence Tsunami Ready visant à permettre l’établissement de rapports sur la préparation aux tsunamis d’une manière compatible avec Tsunami Ready, en s’appuyant sur les exigences de rapport et les cadres administratifs nationaux existants, sans qu’une reconnaissance formelle par la COI ne soit nécessaire.

25. **Le GIC a approuvé** l’approche proposée, **a** **créé** une équipe spéciale pour Tsunami Ready et **a recommandé** au Groupe de travail 3 d’élaborer une orientation formelle destinée au GIC/PTWS portant sur l’application de la méthode d’équivalence Tsunami Ready proposée, qui serait menée par l’Équipe spéciale du Groupe de travail 3 sur Tsunami Ready, avec le concours des groupes de travail régionaux.

26. **Le GIC a décidé** d’appuyer les efforts et les progrès accomplis par le Nicaragua dans la création du Centre consultatif sur les tsunamis en Amérique centrale (CATAC), en tant que prestataire de services relatifs aux tsunamis (TSP), dans le cadre du GIC/PTWS, et **a rappelé** la Recommandation ICG/PTWS-XXIX.5, qui indiquait que l’approbation du GIC/CARIBE-EWS et de la COI étaient nécessaires pour lancer pleinement et officiellement les opérations du CATAC.

27. **Le GIC a décidé** de lancer officiellement et pleinement les opérations du CATAC, après la session de 2024 du Conseil exécutif de la COI, la date précise de démarrage devant être **décidée** après coordination avec le GIC/CARIBE-EWS.

28. **Le GIC a pris note** de la nécessité d’une coordination entre le GIC/PTWS et ses groupes de travail afin d’atteindre les objectifs du Programme relatif aux tsunamis de la Décennie des Nations Unies pour les sciences océaniques, et **a également pris note** de la direction ferme et de la supervision stratégique nécessaire pour concrétiser ces objectifs.

29. **Le GIC a reconnu** que le Comité directeur avait pour responsabilités la coordination et la direction stratégiques dans l’ensemble des activités du PTWS, y compris la Décennie de l’Océan, et **a recommandé** le renforcement du mandat et des capacités du Comité directeur afin d’atteindre les objectifs de la Décennie en modifiant le mandat, tel qu’énoncé à l’appendice 1 de la [Recommandation ICG/PTWS-XXX.1](https://oceanexpert.org/document/33418).

30. **Le GIC a reconnu** la portée et l’ampleur des tâches à venir ; **a décidé** d’augmenter le nombre de postes de vice-président du GIC/PTWS, le faisant passer à trois ; et **a élu** M. Yuji Nishimae (Japon) Président, ainsi que M. Dakui Wang (Chine), M. Wilfried Strauch (Nicaragua) et M. ‘Ofa Fa’anunu (Tonga) Vice-Présidents du GIC/PTWS.

# Resumen dispositivo

1. La 30ª reunión del Grupo Intergubernamental de Coordinación del Sistema de Alerta contra los Tsunamis y Atenuación de sus Efectos en el Pacífico (ICG/PTWS) de la COI-UNESCO se celebró del 11 al 15 de septiembre de 2023 en Nuku'alofa (Tonga). La reunión se realizó en formato híbrido (presencial y virtual) y contó con la participación de 62 delegados de 17 Estados Miembros de la región del océano Pacífico (Australia, Canadá, Chile, China, Ecuador, Estados Unidos de América, Fiji, Francia, Indonesia, Islas Salomón, Japón, Malasia, Nicaragua, Nueva Zelandia, República de Corea, Tokelau y Tonga). También asistieron 15 observadores de seis países (Bangladesh, Estados Unidos de América, Federación de Rusia, Fiji, Francia e India). Dado que fue la primera reunión presencial del ICG/PTWS desde 2021, representó una oportunidad esencial para catalizar las actividades existentes y otras nuevas. Algunos de los principales resultados de la reunión fueron los siguientes:

i) el refuerzo del mandato y la capacidad del Comité de Dirección para cumplir los objetivos del Decenio del Océano de las Naciones Unidas;

ii) la creación del equipo de tareas sobre tsunamis generados por volcanes del grupo de trabajo 2, del equipo de tareas sobre previsiones realizadas a partir de observaciones oceánicas del grupo de trabajo 2, del equipo de tareas sobre Tsunami Ready del grupo de trabajo 3 y del equipo de tareas sobre plataformas de intercambio de información del grupo de trabajo regional de los países y territorios de las islas del Pacífico;

iii) el establecimiento de un procedimiento permanente de vigilancia y alerta del Hunga Tonga-Hunga Ha'apai basado en los productos y métodos utilizados por el Centro de Alerta contra los Sunamis en el Pacífico (PTWC) desde marzo de 2022;

iv) la ampliación de la zona de origen de seísmos del PTWS para incluir una zona de 63° a 52° S y de 72° a 18° O y así integrar el Arco de Scotia y sus zonas sísmicas adyacentes, y la consiguiente actualización del mapa de las zonas de origen de seísmos del PTWS; y

iv) la decisión de aceptar el inicio de la plena funcionalidad del Centro de Asesoramiento sobre los Tsunamis de América Central (CATAC), en una fecha que deberá acordarse en coordinación con el ICG/CARIBE-EWS (Grupo Intergubernamental de Coordinación del Sistema de Alerta contra los Tsunamis y otras Amenazas Costeras en el Caribe y Regiones Adyacentes) y que deberá aprobar el Consejo Ejecutivo de la COI en junio de 2024.

1. **El ICG decidió** mantener el grupo de trabajo 1 sobre comprensión del riesgo de tsunamis; el grupo de trabajo 2 sobre detección de tsunamis, alerta y difusión; el equipo de tareas sobre las redes integradas de sensores del PTWS para la detección y caracterización de tsunamis del grupo de trabajo 2; el equipo de tareas sobre intercambio de datos sísmicos en el Pacífico sudoccidental del grupo de trabajo regional de los países y territorios de las islas del Pacífico; el grupo de trabajo sobre el sistema de alerta contra los tsunamis y atenuación de sus efectos; el grupo de trabajo 3 sobre gestión del riesgo de desastres y preparación; los grupos de trabajo subregionales (el grupo de trabajo regional sobre el sistema de alerta contra los tsunamis y atenuación de sus efectos en la región del Mar de China Meridional, el grupo de trabajo regional sobre el sistema de alerta contra los tsunamis y atenuación de sus efectos en la costa centroamericana del Pacífico, el grupo de trabajo regional sobre el sistema de alerta contra los tsunamis y atenuación de sus efectos en la región del Pacífico sudoriental y el grupo de trabajo sobre el sistema de alerta contra los tsunamis y atenuación de sus efectos en los países y territorios de las islas del Pacífico), y los equipos de tareas (equipo de tareas sobre desarrollo de capacidades y servicios del grupo de trabajo regional sobre el sistema de alerta contra los tsunamis y atenuación de sus efectos en la región del Mar de China Meridional y el equipo de tareas sobre desarrollo de capacidades del grupo de trabajo regional de los países y territorios de las islas del Pacífico) *(*[*véase la estructura organizativa del ICG/PTWS*](https://oceanexpert.org/document/34493)*, 15 de septiembre de 2023).*
2. **El ICG decidió** mantener el Comité de Dirección del PTWS con un mandato revisado fortalecido que le daría mayor capacidad para cumplir los objetivos del Decenio del Océano de las Naciones Unidas.
3. **El ICG decidió** mantener el equipo de tareas sobre los ejercicios PacWave y el equipo de tareas de proveedores de servicios sobre tsunamis (TSP) del grupo de trabajo 2.
4. **El ICG decidió** disolver el equipo de tareas sobre el Decenio del Océano de las Naciones Unidas, el equipo de tareas sobre objetivos futuros y seguimiento del desempeño, y el equipo de tareas sobre los niveles mínimos de competencia del personal operativo de los centros nacionales de alerta contra los tsunamis del grupo de trabajo 2.
5. **El ICG decidió** crear un equipo de tareas sobre tsunamis generados por volcanes del grupo de trabajo 2, un equipo de tareas sobre previsiones de tsunamis realizadas a partir de observaciones oceánicas del grupo de trabajo 2, un equipo de tareas sobre Tsunami Ready del grupo de trabajo 3 y un equipo de tareas sobre plataformas de intercambio de información del grupo de trabajo regional de los países y territorios de las islas del Pacífico.
6. **El ICG decidió** realizar el undécimo ejercicio Pacific Wave (PacWave 24) de septiembre a noviembre de 2024 en apoyo del Día Internacional para la Reducción del Riesgo de Desastres (13 de octubre) y del Día Mundial de Concienciación sobre los Tsunamis (5 de noviembre).
7. **El ICG aceptó con reconocimiento** la amable propuesta de China de acoger la 31a reunión del ICG/PTWS en Beijing en abril de 2025.
8. **El ICG acordó** apoyar una reunión científica de expertos sobre la fosa de las Nuevas Hébridas, ya que permitiría evaluar mejor las incertidumbres sobre el peligro de tsunami en relación con esta zona de subducción y al arco posterior.
9. **El ICG pidió** al grupo de trabajo 1 que siguiera apoyando los estudios de evaluación del peligro de tsunamis en el Pacífico como parte de una evaluación completa de los riesgos, en consonancia con el primer objetivo del Programa de Tsunamis del Decenio del Océano de las Naciones Unidas de lograr una cobertura de la totalidad de las costas con riesgo de tsunami, y **alentó** a que se usaran los resultados de la evaluación del peligro de tsunamis en diversos programas de la COI, como la formación del Centro Internacional de Información sobre los Tsunamis (ITIC), el Programa Tsunami Ready, las actividades de los grupos de trabajo 2 y 3 del ICG/PTWS de la COI y el Programa de Tsunamis del Decenio del Océano de las Naciones Unidas.
10. **El ICG decidió** establecer procedimientos permanentes de vigilancia y alerta del Hunga Tonga-Hunga Ha'apai basados en los productos y métodos utilizados por el PTWC desde marzo de 2022, los cuales se presentan en las circulares de la COI nº [2882](https://oceanexpert.org/document/30136) y nº [2902](https://oceanexpert.org/document/30759).
11. **El ICG consideró** que la zona sísmica de la región del Arco de Scotia era muy activa, ya que había producido 33 seísmos de magnitud 6,5 o superior desde el año 2000, 13 de los cuales habían sido de magnitud 7,0 o superior. **Decidió** ampliar la zona de origen de seísmos del PTWS para incluir una zona de 63º a 52º de latitud sur y de 72º a 18º de longitud oeste y así integrar el Arco de Scotia y sus zonas sísmicas adyacentes, y **solicitó** a la COI que modificara en consecuencia el mapa de las zonas de origen de seísmos del PTWS en la Colección Técnica de la COI nº [130](https://unesdoc.unesco.org/ark:/48223/pf0000246931.locale=en) (*documento de definición de los servicios mundiales de operaciones de vigilancia de tsunamis*).
12. **El ICG tomó nota** de los avances en las actividades relativas a los cables SMART en el Pacífico y en todo el mundo; **tomó nota además** de los avances en las herramientas del Sistema Mundial de Navegación por Satélite (GNSS) y el procesamiento en tiempo real, teniendo en cuenta la posibilidad de que estos avances contribuyeran a lograr los objetivos de alerta temprana de tsunamis del PTWS, **y recomendó** al grupo de trabajo 2 que continuara colaborando estrechamente con el equipo de tareas conjunto para los cables SMART y el proyecto GTEWS\_Oceania de la Unión Internacional de Geodesia y Geofísica (UIGG) para utilizar los datos de seguimiento de estas iniciativas cuando estuvieran disponibles.
13. **El ICG tomó nota** de las dificultades para enviar mensajes por fax y de la solicitud del equipo de tareas de proveedores de servicios sobre tsunamis presentada en el informe del grupo de trabajo 2 a la 30ª reunión del ICG/PTWS, y **solicitó** a la Secretaría que pidiera por escrito a los Estados Miembros que formularan observaciones sobre los cambios propuestos en el envío de mensajes por fax e indicaran si los cambios propuestos planteaban un riesgo inaceptable para sus respectivos centros nacionales de alerta contra los tsunamis (NTWC), y, de ser así, que recomendara a dichos Estados Miembros que colaboraran con su TSP para encontrar métodos alternativos para recibir sus mensajes.
14. **El ICG tomó nota** de las recomendaciones del equipo de tareas sobre los niveles mínimos de competencia, así como de la presentación de un marco de competencias mínimas a la COI para que lo examinara, expresando su deseo de que se hubieran cumplido las condiciones relativas a la evaluación de la eficacia, y **tomó nota** **además** de que el Grupo de Trabajo sobre los Sistemas de Alerta contra los Tsunamis y Otros Peligros relacionados con el Nivel del Mar y Atenuación de sus Efectos (TOWS-WG) había encargado en su 16ª reunión en 2023 a los ICG regionales, en particular el PTWS, y al ITIC que pusieran a prueba el marco de competencias para los NTWC del PTWS para que el ICG/PTWS lo aprobara, con el objetivo de elaborar un marco global que usarían todos los ICG.
15. **El ICG aprobó** el marco de competencias y los requisitos de formación de NTWC del PTWS, y **acogió con beneplácito** la propuesta del ITIC de poner a prueba el marco de competencias mínimas de NTWC del PTWS mediante la preparación e impartición de un curso de formación durante el periodo entre reuniones, e informar sobre sus resultados al ICG/PTWS en su 31ª reunión.
16. **El ICG tomó nota** de la gran cantidad y la naturaleza variable de las fuentes de tsunamis de origen no sísmico en el registro histórico, así como del desafío que suponía predecir la mayoría de los tsunamis no provocados por terremotos; y **decidió** crear i) un equipo de tareas sobre previsiones de tsunamis realizadas a partir de observaciones oceánicas del grupo de trabajo 2, para que estudiara el uso de estrategias de alerta temprana contra tsunamis basadas en observaciones oceánicas directas a partir de tecnologías disponibles y nuevas; y ii) un equipo de tareas sobre tsunamis generados por volcanes del grupo de trabajo 2, para que estudiara opciones para elaborar estrategias alternativas de alerta.
17. **El ICG tomó nota** de que el PTWC había propuesto algunos cambios en su producto de texto y **convino** en que el PTWC aplicara estos cambios previa notificación a los Estados Miembros por medio de una circular con tres meses de antelación, de conformidad con el proceso de cambio establecido por el ICG/PTWS en 2015.
18. **El ICG recordó** que el TOWS-WG había aprobado en su 12a reunión la propuesta relativa a los mensajes del TSP para la comunidad marítima y había pedido a los ICG que examinaran la propuesta con miras a aplicarla en sus cuencas respectivas.
19. **El ICG recordó además** que la Asamblea de la COI había encargado a los TSP de los ICG regionales que, en colaboración con los operadores de las zonas NAVAREA de la Organización Hidrográfica Internacional (OHI), probaran los productos de seguridad marítima frente a tsunamis en 2023-2024, con vistas a su aplicación práctica en 2024-2025 (decisión A-32/3.4.1).
20. **El ICG recomendó** al PTWC que ultimara los preparativos necesarios para proporcionar productos especiales de seguridad marítima en caso de tsunami, específicos para los buques, a todos los coordinadores NAVAREA del Pacífico y del Atlántico Sudoccidental (NAVAREA VI, X, XI, XII, XIII, XIV, XV y XVI) para que los transmitieran a los NTWC a fin de que estos los remitieran a los coordinadores NAVAREA de sus países o, a petición de estos, directamente a los coordinadores NAVAREA cuando no existiera un centro nacional.
21. **El ICG solicitó** al Comité de Dirección del PTWS que finalizara en su próxima reunión su decisión sobre el suministro de estos productos durante un periodo de prueba, al que seguiría una aplicación plenamente operativa por parte del PTWC en 2024-2025.
22. **El ICG alentó** a los Estados Miembros a seguir informando al grupo de trabajo 3 sobre los resultados y los avances hacia el objetivo de una acreditación del 100 % de Tsunami Ready, incluidas las comunidades que ya se consideraban conformes a normas nacionales, y **encargó** al ITIC que siguiera facilitando la aplicación de Tsunami Ready y la recopilación de datos conexos en el PTWS.
23. **El ICG recordó** la recomendación ICG/PTWS-XXIX.1 en la que se pedía al grupo de trabajo 3 que estudiara la manera de reconocer a las comunidades que optaran por no aplicar el Programa de Reconocimiento Tsunami Ready de la UNESCO/COI como conformes con los indicadores de Tsunami Ready, y **tomó nota con reconocimiento** de la labor realizada por el grupo de trabajo 3 plasmada en su [documento de información sobre el reconocimiento en países que tienen programas de reducción de riesgo de tsunamis](https://oceanexpert.org/document/33205), en el que se proponía un enfoque de equivalencia de Tsunami Ready que tenía por objeto facilitar la presentación de información sobre la preparación para casos de tsunami de manera compatible con Tsunami Ready, utilizando los marcos administrativos y los requisitos de presentación de informes nacionales existentes, sin necesidad de un reconocimiento formal de la COI-UNESCO.
24. **El ICG aprobó** el enfoque propuesto, **creó** un equipo de tareas sobre Tsunami Ready y **recomendó** al grupo de trabajo 3 que elaborara orientaciones oficiales para el ICG/PTWS sobre la aplicación del enfoque de equivalencia propuesto de Tsunami Ready, bajo la dirección de su equipo de tareas sobre Tsunami Ready, en consulta con los grupos de trabajo regionales.
25. **El ICG decidió** apoyar los esfuerzos y progresos realizados por Nicaragua para la creación del CATAC, en calidad de TSP dentro del marco del ICG/PTWS, y **recordó** la recomendación ICG/PTWS-XXIX.5, en la que se señalaba que era necesaria la aprobación tanto del ICG/CARIBE-EWS como de la COI para que el CATAC pudiera ponerse plenamente en funcionamiento.
26. **El ICG decidió** aceptar la plena puesta en marcha oficial del CATAC, después de la reunión del Consejo Ejecutivo de la COI en 2024. La fecha concreta de inicio se **decidiría** en coordinación con el ICG/CARIBE-EWS.
27. **El ICG tomó nota** de la necesidad de establecer la coordinación entre el ICG/PTWS y sus grupos de trabajo para cumplir los objetivos del Programa de Tsunamis del Decenio del Océano de las Naciones Unidas para el PTWS, y **tomó nota además** del firme liderazgo y la supervisión estratégica necesarios para ejecutar dicho Programa.
28. **El ICG reconoció** que su Comité de Dirección era responsable de la dirección estratégica y la coordinación de todas las actividades del PTWS, comprendido el Decenio del Océano, y **recomendó** que se fortalecieran el mandato y la capacidad del Comité de Dirección para alcanzar los objetivos del Decenio, modificando su mandato de conformidad con el apéndice 1 de la recomendación [ICG/PTWS-XXX.1](https://oceanexpert.org/document/33418).
29. **El ICG reconoció** el alcance y la magnitud de las tareas pendientes, decidió aumentar a tres el número de vicepresidentes del ICG/PTWS y eligió al Sr. Yuji Nishimae (Japón) como Presidente y al Sr. Dakui Wang (China), al Sr. Wilfried Strauch (Nicaragua) y al Sr. 'Ofa Fa'anunu (Tonga) como vicepresidentes del ICG/PTWS.

# Рабочее резюме

1. 30-я сессия Межправительственной координационной группы по Системе предупреждения о цунами и смягчения их последствий в Тихом океане (МКГ/СПЦТО) состоялась 11-15 сентября 2023 г. в Нукуалофе, Тонга. Сессия проходила в гибридном формате (очно и в режиме онлайн), в ней приняли участие 62 делегата из 17 государств-членов региона Тихого океана (Австралия, Индонезия, Канада, Китай, Малайзия, Новая Зеландия, Никарагуа, Республика Корея, Соединенные Штаты Америки, Соломоновы Острова, Токелау, Тонга, Фиджи, Франция, Чили, Эквадор и Япония). На сессии также присутствовали 15 наблюдателей из шести стран (Бангладеш, Индия, Российская Федерация, Соединенные Штаты Америки, Фиджи и Франция). Эта сессия стала первой сессией МКГ/СПЦТО с 2021 г., которая проводилась в том числе в очном формате, что имело крайне важное значение для активизации работы по уже осуществляемым и новым инициативам. Ключевые результаты сессии включают:

(i) укрепление мандата и расширение возможностей Руководящего комитета по достижению целей Десятилетия океана ООН;

(ii) создание целевой группы РГ-2 по цунами вулканического происхождения, целевой группы РГ-2 по прогнозированию на основе наблюдений за океаном, целевой группы РГ-3 по программе сертификации готовности к цунами и целевой группы по платформам обмена информацией при рабочей группе по тихоокеанским островным странам и территориям;

(iii) создание постоянной процедуры мониторинга и оповещения для вулкана Хунга-Тонга-Хунга-Хапай (ХТХХ) на основе продуктов и методов, используемых СПЦТО с марта 2022 г.;

(iv) расширение зоны цунами сейсмического происхождения СПЦТО с целью включения в нее района протяженностью от 63° до 52° ю.ш. и от 72° до 18° з.д., в том числе Южно-Антильского хребта и прилегающих к нему сейсмических зон, и, соответственно, обновление карты зоны цунами сейсмического происхождения СПЦТО;

(v) решение о полноценном вводе в действие Консультативного центра по цунами для региона Центральной Америки (КЦЦЦА) с датой начала работы, которая должна быть согласована в координации с МКГ/КАРИБ-СРП (Межправительственная координационная группа по Системе предупреждения о цунами и опасности других бедствий в прибрежных районах Карибского бассейна и прилегающих регионов) и утверждена Исполнительным советом МОК в июне 2024 г.

1. **МКГ постановила** продолжить работу: рабочей группы 1 по разъяснению риска цунами; РГ-2 по обнаружению, оперативному оповещению и распространению информации о цунами; целевой группы РГ-2 по комплексным сетям датчиков СПЦТО для обнаружения и определения характеристик цунами; целевой группы по обмену сейсмическими данными в юго-западной части Тихого океана при рабочей группе по островным странам и территориям Тихого океана; рабочей группы по Системе предупреждения о цунами и смягчения их последствий; РГ-3 по управлению риском бедствий и обеспечению готовности к ним и субрегиональных рабочих групп (региональная рабочая группа по Системе предупреждения о цунами и смягчения их последствий в регионе Южно-Китайского моря; региональной рабочей группы по Системе предупреждения о цунами и смягчения их последствий на тихоокеанском побережье Центральной Америки; региональной рабочей группы по Системе предупреждения о цунами и смягчения их последствий в юго-восточной части Тихого океана; рабочей группы по Системе предупреждения о цунами и смягчения их последствий для островных стран и территорий Тихого океана) и целевых групп (целевая группа по развитию потенциала и услугам при региональной рабочей группе по Системам предупреждения о цунами и смягчения их последствий в регионе Южно-Китайского моря и для островных стран и территорий Тихого океана; целевая группа при рабочей группе по развитию потенциала). *(См.* [*организационную структуру МКГ/СПЦТО*](https://oceanexpert.org/document/34493) *(от 15 сентября 2023 г.))*
2. **МКГ постановила** продолжить работу руководящего комитета СПЦТО с пересмотренным кругом ведения в целях укрепления его мандата и расширения возможностей по достижению целей Десятилетия океана ООН.
3. **МКГ постановила** продолжить работу целевой группы по учениям «Тихоокеанская волна» и целевой группы по поставщикам данных слежения за цунами (ПДСЦ) при рабочей группе 2.
4. **МКГ постановила** распустить целевую группу по Десятилетию океана ООН, целевую группу по будущим целям и мониторингу эффективности, а также целевую группу РГ-2 по минимальным уровням компетентности оперативного персонала национальных центров предупреждения о цунами (НЦПЦ).
5. **МКГ постановила** учредить целевую группу РГ-2 по цунами вулканического происхождения (ЦВП), целевую группу РГ-2 по прогнозированию на основе наблюдений за океаном (ЦГ-ПНО), целевую группу РГ-3 по программе сертификации готовности к цунами и целевую группу по платформам обмена информацией при рабочей группе по тихоокеанским островным странам и территориям.
6. **МКГ постановила** провести 11-е учения по проверке готовности к цунами («Тихоокеанская волна-2024»), которые пройдут в сентябре-ноябре 2024 г. и будут приурочены к Международному дню по уменьшению опасности стихийных бедствий (13 октября) и Всемирному дню распространения информации о проблеме цунами (5 ноября).
7. **МКГ с признательностью приняла** любезное предложение Китая о проведении 31‑й сессии МКГ/СПЦТО в Пекине в апреле 2025 г.
8. **МКГ согласилась** поддержать проведение совещания экспертов по Ново-Гебридскому желобу; совещание научных экспертов по Ново-Гебридскому желобу позволило бы лучше оценить факторы неопределенности в отношении риска цунами, связанного с этой зоной субдукции и тыловой дугой.
9. **МКГ просила** РГ-1 продолжать оказывать поддержку исследованиям по оценке опасности цунами (ООЦ) в Тихом океане в рамках комплексной оценки рисков в соответствии с первой целью Программы по цунами Десятилетия океана ООН, заключающейся в обеспечении готовности к цунами всех прибрежных районов, подверженных риску цунами, и **призвала** использовать результаты ООЦ для различных программ МОК, в частности для проводимой МЦИЦ подготовки специалистов, программы сертификации готовности к цунами, мероприятий РГ-2 и РГ-3 МКГ/СПЦТО МОК и Программы по цунами Десятилетия океана ООН.
10. **МКГ постановила** учредить постоянные процедуры мониторинга и оповещения для вулкана ХТХХ на основе продуктов и методов, используемых СПЦТО с марта 2022 г. и описанных в циркулярных письмах МОК №№ [2882](https://oceanexpert.org/document/30136) и [2902](https://oceanexpert.org/document/30759).
11. **МКГ полагает**, что сейсмическая зона в регионе Южно-Антильского хребта в настоящее время весьма активна, ведь с 2000 г. в ней произошло 33 землетрясения магнитудой 6,5 баллов или выше, при этом магнитуда 13 из них превышала 7 баллов. **Она постановила** расширить зону цунами сейсмического происхождения СПЦТО с целью включения в нее района протяженностью от 63° до 52° ю.ш. и от 72° до 18° з.д., в том числе Южно-Антильского хребта и прилегающих к нему сейсмических зон, и **просила** МОК внести соответствующие изменения в карту зоны цунами сейсмического происхождения СПЦТО в № [130](https://unesdoc.unesco.org/ark:/48223/pf0000246931.locale=en) Серии технических публикаций МОК (документ «Операции по наблюдению за цунами: определение глобальных услуг»).
12. **МКГ приняла к сведению** успехи в работе по прокладке подводных кабелей системы СМАРТ в Тихоокеанском регионе и во всем мире; **приняла к сведению также** достижения в области оснащения приборами ГНСС и обработки данных в режиме реального времени, а также возможность использования этих результатов для достижения целей раннего оповещения о цунами СПЦТО; **рекомендовала** РГ-2 продолжать тесное сотрудничество с объединенной целевой группой (ОЦГ) по подводным кабелям системы СМАРТ и проектом МГГС «Океания» по функциям ГНСС для систем раннего оповещения о цунами, с тем чтобы использовать полученные в ходе их работы данные мониторинга, когда они будут доступны.
13. **МКГ приняла к сведению** проблемы, связанные с передачей сообщений по факсимильной связи, и просьбу целевой группы по поставщикам данных слежения за цунами, представленную в докладе РГ-2 для 30-й сессии МКГ-СПЦТО; **просила** Секретариат направить государствам-членам письма с просьбой высказать свое мнение относительно предлагаемых изменений в передаче сообщений по факсимильной связи, а также указать, связаны ли предлагаемые изменения с возникновением неприемлемого риска для их соответствующих национальных центров предупреждения о цунами, и, если это так, рекомендовать этим государствам-членам провести работу с их поставщиками данных слежения за цунами (ПДСЦ) с целью определения альтернативных методов получения сообщений ПДСЦ.
14. **МКГ приняла к сведению** рекомендации целевой группы по минимальным требованиям к уровню компетентности кадров, **отметив** представление системы минимальных требований к уровню компетентности на рассмотрение МОК, и, в ожидании того, что условия оценки эффективности будут выполнены, **приняла к сведению также,** что Рабочая группа по системам раннего предупреждения о цунами и других опасных явлениях, связанных с океаном, и смягчения их последствий (РГ-СПЦО) на ее 16-й сессии в 2023 г. поручила региональным МКГ, в частности СПЦТО, и МЦИЦ, провести тестирование рамочных требований к уровню компетентности сотрудников национальных центров предупреждения о цунами (НЦПЦ) СПЦТО для последующего их утверждения МКГ/СПЦТО с целью разработки глобальных рамок для использования всеми МКГ.
15. **МКГ одобрила** рамочные требования к уровню компетентности и подготовке кадров для национальных центров предупреждения о цунами СПЦТО и **приветствовала** предложение МЦИЦ об экспериментальном тестировании минимальных рамочных требований к уровню компетентности персонала НЦПЦ СПЦТО путем разработки и проведения в межсессионный период учебного курса и представления доклада о его результатах МКГ/СПЦТО на ее 31‑й сессии.
16. **МКГ отметила** колоссальное количество и разнообразный характер источников зарегистрированных ранее цунами несейсмического происхождения, а также сложность прогнозирования большинства цунами несейсмического происхождения и **постановила** учредить: (i) ЦГ РГ-2 по прогнозированию цунами на основе наблюдений за океаном (ЦГ-ПНО) в целях изучения использования стратегий раннего оповещения о цунами, основанных на непосредственных наблюдениях за океаном с помощью имеющихся и новых технологий, а также (ii) ЦГ РГ-2 для изучения вариантов разработки альтернативных стратегий предупреждения о цунами вулканического происхождения (ЦГ-ЦВП).
17. **МКГ отметила**, что ТЦПЦ предложил внести некоторые изменения в текст своих сообщений, и **согласилась** с тем, чтобы ТЦПЦ внес эти изменения после уведомления об этом государств-членов циркулярным письмом за три месяца в соответствии с процедурой внесения изменений, принятой МКГ/СПЦТО в 2015 г.
18. **МКГ напомнила**, что РГ-СПЦО одобрила предложение по сообщениям ПДСЦ для морского сообщества и на своей 12-й сессии попросила межправительственные координационные группы рассмотреть это предложение для реализации в их соответствующих бассейнах.
19. **МКГ напомнила также**, что Ассамблея МОК поручила ПДСЦ региональных межправительственных координационных групп (МКГ) в сотрудничестве с операторами системы NAVAREA Международной гидрографической организации (МГО) провести в 2023/24 гг. тестирование продуктов по безопасности на море в случае цунами с целью их практического внедрения в 2024-2025 гг. (решение A-32/3.4.1).
20. **МКГ рекомендовала** Тихоокеанскому центру предупреждения о цунами (ТЦПЦ) завершить необходимые приготовления для обеспечения всех координаторов системы NAVAREA в Тихом океане и Юго-Западной Атлантике (в частности, координаторов районов NAVAREA VI, X, XI, XII, XIII, XIV, XV и XVI) специальными сообщениями для судов относительно безопасности на море в связи с цунами, которые будут передаваться в НЦПЦ с последующим их препровождением национальным координаторам NAVAREA, либо, в отсутствие НЦПЦ, непосредственно национальным координаторам NAVAREA по их запросу.
21. **МКГ просила** руководящий комитет СПЦТО на следующем заседании доработать решение о предоставлении этих продуктов на период тестирования, после чего СПЦТО в 2024-2025 гг. приступит к их полноценному внедрению.
22. **МКГ призвала** государства-члены продолжать делиться с РГ-3 результатами и информацией о работе по достижению цели обеспечения готовности к цунами 100% общин, включая общины, которые уже были признаны соответствующими национальным стандартам, и **поручила** МЦИЦ продолжать содействовать реализации программы сертификации и сбору данных о соответствии ее требованиям в СПЦТО.
23. **МКГ напомнила** об адресованной РГ-3 рекомендации ICG/PTWS-XXIX.1 относительно изучения возможностей признания соответствия общин, которые не присоединились к программе сертификации готовности к цунами МОК ЮНЕСКО, показателям готовности к цунами, и **с удовлетворением отметила** проведенную РГ-3 работу по подготовке информационного документа «[Признание готовности в странах с существующими программами по снижению риска цунами](https://oceanexpert.org/document/33205)», в котором предлагается методика признания соответствия требованиям программы сертификации готовности к цунами МОК ЮНЕСКО, цель разработки которой заключалась в создании условий для представления отчетности о готовности к цунами в соответствии с вышеупомянутыми требованиями с использованием существующих национальных административных рамочных документов и требований к отчетности и без обязательного официального признания со стороны МОК ЮНЕСКО.
24. **МКГ одобрила** предложенную методику, **учредила** целевую группу по программе сертификации готовности к цунами и **рекомендовала** РГ-3 разработать официальное руководство для МКГ/СПЦТО по применению предложенного подхода к признанию эквивалентов сертификатов готовности к цунами под руководством ЦГ РГ-3 по программе сертификации готовности к цунами в консультации с региональными рабочими группами.
25. **МКГ постановила** поддержать усилия Никарагуа и прогресс, достигнутый в создании Консультативного центра по цунами для региона Центральной Америки (КЦЦЦА) в качестве поставщика данных слежения за цунами (ПДСЦ) в рамках МКГ/СПЦТО, и **напомнила** о рекомендации ICG/PTWS-XXIX.5, в которой отмечается, что для официального и полного ввода в действие КЦЦЦА необходимо одобрение как со стороны МКГ/КАРИБ-СРП, так и со стороны МОК.
26. МКГ **постановила** официально объявить о начале полноценного функционирования КЦЦЦА после сессии Исполнительного совета МОК в 2024 г., а конкретную дату **определить** после согласования с МКГ/КАРИБ-СРП.
27. **МКГ отметила** необходимость координации между МКГ/СПЦТО и ее рабочими группами для достижения целей ПЦДО ООН для СПЦТО и **отметила также** необходимость авторитетного руководства и стратегического надзора для реализации ПЦДО ООН.
28. **МКГ признала**, что ее руководящий комитет отвечает за стратегическое руководство и координацию всех мероприятий СПЦТО, включая Десятилетие океана, и **рекомендовала** укрепить мандат и расширить возможности руководящего комитета по достижению целей Десятилетия путем изменения его круга ведения в соответствии с приложением 1 к [рекомендации МКГ/СПЦТО-XXX.1](https://oceanexpert.org/document/33418).
29. **МКГ признала** масштаб и охват предстоящих задач, **постановила** увеличить число заместителей председателя МКГ/СПЦТО до трех и **избрала** своим председателем г-на Юдзи Нисимаэ (Япония), а заместителями председателя – г-на Дакуи Ванга (Китай), г-на Вильфрида Штрауха (Никарагуа) и г-на Офа Фаануну (Тонга).

# WELCOME AND OPENING OF SESSION

1. The Thirtieth Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS-XXX) was held on 11th – 15th September 2023 in Nuku’alofa, Tonga.
2. Per Tonga’s protocol the welcoming session began with a welcoming by the Director of the Tonga Meteorological Services followed by a devotion by a member of the Clergy, Father Langilua Kivalu. This was followed by the opening statement of Mr Yuji Nishimae, the Chair of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (PTWS).
3. Mr Yuji Nishimae, Chairperson of ICG/PTWS, opened the meeting on the 15th of September 2023 at 22:00 UTC. Mr Nishimae welcomed ICG/PTWS the representatives of the Member States and expressed his appreciation for this first face-to-face meeting of the ICG/PTWS since the COVID-19 pandemic.
4. Mr Nishimae expressed his deepest sympathy to the Government of Tonga and its citizens for all the challenges they experienced in responding to and recovering from the Hunga Tonga Hunga Ha’apai disaster on 15th January 2022. He was grateful that despite the continuous reconstruction efforts from the disaster, Tonga was still able to host, and Joint Tsunami Workshop held on Monday 10th September, and the ICG/PTWS-XXX Meeting.
5. Mr Nishimae also expressed his gratitude that the Hon. Prime Minister and Acting Minister for the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC) was able to participate in the ICG/PTWS-XXX opening session.
6. Mr Nishimae gave a brief history of the establishment of the PTWS which was first established in 1965 as a response to the 1960 Chile earthquake and tsunami. Since its establishment, the PTWS has contributed to the tsunami disaster reduction in the Pacific region. He further pointed out that in addition to the Pacific Tsunami Warning Center (PTWC), the PTWS has advanced in the provision of tsunami threat products with the new regional Tsunami Service Providers (TSPs) such as the Northwest Pacific Tsunami Advisory Centre (NWPTAC), South China Sea Tsunami Advisory Centre (SCSTAC), and Central American Tsunami Advisory Centre (CATAC) since the establishment of the ICG/PTWS.
7. Mr Nishimae stated that he strongly believed that the tsunami information provided by TSPs is useful to the National Tsunami Warning Centres (NTWCs) of the Member States. He reminded everyone of the challenges faced by the ICG/PTWS among other ICGs with regard to non-seismic tsunamis such as the HTHH volcanic eruption on the 15th of January 2022, the earthquake near Bali in Indonesia in 2018 and consequent landslide tsunami and the Krakatau volcanic eruption in 2018. Mr Nishimae highlighted that the development of a tsunami mitigation system for such known tsunamis should be done through cooperation between tsunami research, warning and disaster management communities. He believed that preparedness and resilience against tsunamis are critically important in order to mitigate tsunami disasters.
8. Mr Nishimae outlined the focus of the PTWS which were on the promotion of the Tsunami Ready Recognition Programme and the recent element for the ICG in the next ten years in the United Nations Decade of Ocean Science for Sustainable Development. He went on to state that the UN Ocean Decade was adopted through an assembly in 2017 despite the fact that it started in 2021 followed by the establishment of the UN Ocean Decade Tsunami Programme in 2022.
9. Mr Nishimae stated that the UN Ocean Decade Tsunami Programme, IOC Tsunami Ready Recognition Programme, and tsunami generated by volcanoes among other important issues will be discussed in the ICG/PTWS-XXX.
10. Mr Nishimae closed his statement by expressing his wishes for a fruitful and successful ICG/PTWS session.
11. After the opening statement of Mr Yuji Nishimae, a short video from Tonga titled “HTHH From Ashes We Rise” on what Tonga experienced about the aftermaths of the unprecedented eruption of the HTHH volcano and Tsunami during the 15th of January 2022 eruption was presented. The video was compiled by Tonga Tourism Authority.
12. The Guest of Honor for the welcoming and opening ceremony was the Honourable Minister for Foreign Affairs, Ms. Fekita ‘Utoikamanu. The Hon. Minister began by first acknowledging the presence of God on this momentous occasion, the King and Queen of Tonga and their household, Prime Minister and Cabinet Ministers, Chair of the ICG/PTWS, representatives of the Member States, Scientists, Experts, and the member of the clergy present. She warmly greeted and welcomed all to the Kingdom of Tonga followed by begging their pardon and seeking permission to let her continue with her keynote remarks.
13. Hon. ‘Utoikamanu began her remarks by stating that the Government of Tonga recognizes and acknowledges the work of the UNESCO-IOC ICG/PTWS. She stated that their work supports the 46 Member States of the Tsunami Warning and Mitigation System that was established 58 years ago in 1965.
14. Hon. ‘Utoikamanu stated that the fateful event on the 15th of January 2022 with the Hunga Tonga Hunga Ha’apai (HTHH) unprecedented volcanic eruption and tsunami are still fresh in the minds of Tongans. She said that Tonga had mourned the loss of lives and loss of livelihoods. She also remarked that the significant damage to properties is also still fresh in their minds.
15. Hon. ‘Utoikamanu stated that the Government of Tonga is responsible for safeguarding the people of Tonga from the threats of nature. She thanked UNESCO-IOC for accepting their invitation to host this important meeting in Tonga for the first time.
16. Hon. ‘Utoikamanu remarked that she understood that the ICG/PTWS had a successful scientific workshop based on the Hunga Tonga Hunga Ha’apai Volcanic Eruption on the 10th of September 2022. She said that Tonga highly values the meetings and are keen to learn and better understand with the tsunami volcanic expert scientific community and the nature of submarine volcanoes and their capabilities in generating new disaster risks in the future which will allow the government to better prepare their people to be volcano and tsunami ready.
17. Hon. ‘Utoikamanu stated that she understands that 80% of tsunamis happens within the Pacific Ocean Ring of Fire, 90% of deaths being caused by local or regional tsunamis. She went on to say that she believes that as a coastal community within the Pacific Ocean, they need to build greater resilience through better awareness and preparedness strategies that can protect lives, livelihoods, and properties from tsunami events in the different regions of our ocean basin.
18. Hon. ‘Utoikamanu, said that Tonga recognizes that there is great unpredictability and the challenges in the effort that they (participants) all faced in ensuring communities at risk to tsunami are prepared and warned in a timely manner. She further stated that these were challenges faced by Tonga during the 15th of January 2022 HTHH volcanic eruption and tsunami. She reminisces on the actions of the people of Tonga where they had to quickly adapt by literally thinking on their feet as new limits of their resilience were tested as they respond and recover from these volcano and tsunami events. She went to remark that a key component was the swift response from neighbouring countries and development partners as their assistance resulted in the recovery of Tonga’s national seismic network which is now connected to the Oceania Regional Seismic Network and the Pacific Tsunami Warning Centre (PTWC) to strengthen our Multi-Hazard Early Warning System (MHEWS).
19. Hon. ‘Utoikamanu commented that on behalf of the Government of Tonga wishes to acknowledge the efforts of our global tsunami community under the auspices of the Intergovernmental Oceanographic Commission of UNESCO and the intergovernmental coordination group for the Pacific Tsunami Warning and Mitigation System. She also remarked that the Ocean Decade Tsunami Programme and the coordinated effort under the IOC Tsunami Ready Recognition Programmes are flagships to strengthen global, regional, and national tsunami monitoring and detection.
20. Hon. ‘Utoikamanu thanked the donors and partners for their continued support and investment towards national and regional end-to-end people centered multi-hazard early warning system. She further elaborated that the Pacific Island leader’s commitment is strong and manifested through the Pacific Disaster Risk Reduction Declaration of Actions at the inaugural Pacific Disaster Minister’s meeting in Fiji, in September 2022 and the 3rd Pacific Island Meteorological Minister’s meeting through the Namaka Declaration in Nadi Fiji in August committing towards a safer and more resilient region in the face of natural disaster and climate change. She outlined that the commitment includes support towards the Weather-Ready Pacific Decadal Programme of Investment that received the approval of the Pacific Islands Leaders in 2021. She added that all this commitment aligns with the United Nations Early for All by 2027 Initiative Commission at the 27th conference of the party’s Egypt last year and the Sendai Framework.
21. In closing Hon. ‘Utoikamanu on behalf of the leaders of the Pacific thanked the Member States of the ICG/PTWS for their tireless efforts towards building a tsunami resilient Pacific Ocean. She also stated that the Tongan Government is committed to the leaders of the 46 Member States of the Pacific Tsunami Warning and Mitigation System to support this important forum and its activities. She ended her remarks by saying that it was a pleasure for her to have an official open for the thirtieth session of the UNESCO-IOC ICG/PTWS-XXX. She also encouraged the Member States to also take time to experience the culture and hospitality of the Kingdom of Tonga and that she hoped everyone all the best in their deliberations in the coming days.

# ORGANIZATION OF THE SESSION

## ADOPTION OF AGENDA

1. The Chairperson informed the Plenary that the [Provisional Agenda](https://oceanexpert.org/downloadFile/54455) was discussed at the meeting of the ICG/PTWS Steering Committee in March 2023, taking into account the Recommendations and instructions given at ICG/PTWS-XXIX, as well as the relevant parts of the IOC Rules of Procedures.
2. Mr Nishimae offered the floor to the Delegates to comment on the Provisional Agenda. No comments or questions were raised from the floor on the agenda.
3. Mr Öcal Necmioğlu, Technical Secretary of the ICG/PTWS, reminded the Delegates that the agenda was also part of the Circular Letter.
4. Mr Nishimae stated that the agenda item 4.10 Ocean Decade Tsunami Programme and 4.11 Tsunami Generated by Volcano will be added to the agenda item. With no further comments from the floor the Chair declares that Provisional Agenda is now adopted.
5. **The ICG approved** the [Agenda](https://oceanexpert.org/event/3920#agenda) with changes as proposed by the Chair.

## DESIGNATION OF THE RAPPORTEUR(S)

1. The Chairperson requested the Delegates to propose candidates for the Rapporteur of the meeting and to choose one rapporteur for each of the languages of this meeting which are English and Spanish who will be supported by the Secretariat as customary. He also noted that the designation of an online Rapporteur is available, and that the Rapporteur will be provided with video recordings of the ICG daily.
2. When nomination was not forthcoming from the floor; the Chairperson designated the Rapporteur of the English Language to Tonga and the Spanish Language to Chile. These nominations were accepted by the delegations of Tonga and Chile.
3. **The ICG approved** the nominations, and the Chairperson thanked to Tonga and Chile.

## CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION

1. The Chairperson recalled that the IOC Secretariat organised the session with online interpretation English/Spanish with a private company using a UNESCO Zoom account and for delegates to keep to the allotted time, as session must end at 18:00hrs according to the timetable. He also noted that the online session is organized with for 4 days with a field trip visit planned for Thursday after lunch. The Chairperson also informed the delegates that the host country has prepared a cultural event and that the details will be provided at the end of the day.
2. Mr Nishimae also informed the Plenary that in order to facilitate the proceedings of the meeting a [Provisional Timetable](https://oceanexpert.org/downloadFile/54545) has been prepared by the Secretariat in coordination with the Chair and the host country.
3. Mr Nishimae welcomed the recently appointed ICG/PTWS Technical Secretariat Mr Öcal Necmioglu.
4. Mr Necmioğlu greeted the participants of the ICG/PTWS-XXX and stated that he was appointed as Technical Secretariat for ICG/PTWS and ICG/CARIBE-EWS as of 1 September 2023 and it is an honour for him to be appointed to this position and to assist the IOC Member States and the Pacific Ocean towards achieving the strategic objectives defined for the period of 2022-2030 and hopefully beyond. He added that he is aware of the challenges ahead that he is counting on the Member State representatives for their support. He added that he was most grateful to the Members of the Tsunami Resilience Section in Paris and here for their efforts and realization of this ICG and well as his expressed his gratitude to his colleagues in Tonga for their endless efforts in organizing the logistics of this meeting. Finally, he gave a brief background on his academic qualifications as well as past working experiences.
5. Mr Necmioğlu, Technical Secretariat of ICG/PTWS, provided details on technical arrangements for the running of the meeting, as follows:

Online participants could connect to the Zoom platform and chose at any time the output language. They should have their cameras and microphones turned off for the duration of the meeting when they do not have the floor.

Online presenters should turn on their camera at least 1 minute before their agenda item, to facilitate their identification by the Chair.

In order to take the floor, online participants must request the floor by raising their hand (icon available on Zoom).

The Chairperson will request interventions from the Plenary in a specific order, by first requesting interventions from Heads of Delegations (HoD), followed by Members of Delegations (MoD) and Observers (Obs). If time for the item is exhausted preference will be given to Heads of Delegations.

Participants onsite and online should therefore only raise their hand when their specific group (HoD, MoD, Obs) is solicited for interventions.

If online participants are experiencing technical challenges, they can ask for support in the chat. Any questions about presentations or interventions should be addressed verbally requesting interventions in the room or in the Zoom Chat. The Q&A section of the Zoom should be used only in case of technical issues preventing verbal interaction.

1. Mr Necmioğlu reminded the Delegations that in order to avoid additional costs for the translation services, the Secretariat would like to urge all Speakers and presenters to respect the intervention times and limit the debating time according to the timetable.
2. The Technical Secretariat next introduced the documentation and other logistical details for the meeting, indicating the following:

The meeting website includes all the documents required for the meeting, [under the respective agenda items](https://oceanexpert.org/event/3920#agenda).

All documents and PPTs can be downloaded from the meeting website, preferably one-by-one when working with low-speed connections. He stated that the Secretariat will continue to upload PPTs and working documents as soon as it was received. Mr Necmioğlu stressed the critical importance of the timely availability of all PPTs and relevant documents to ensure the smooth run of the ICG.

Candidatures for elections must be submitted until the second day of the meeting by close of business. Mr Necmioğlu reported that one candidate for the Vice-Chair has been received thus far officially, and that he will report on the number of candidatures already received for Chair or Vice-Chair before the start of the meeting

1. The Chairperson opened the floor for comments from delegates on the [Provisional Timetable](https://oceanexpert.org/document/33256).
2. **The ICG approved the timetable** with no comments from delegations.
3. Mr Nishimae indicated that for the smooth work of the session and to facilitate the generation of recommendations and agreements, the plenary is asked to set up intra-sessional Working Groups. According to the Statutory, 2 intra-sessional committees and 4 Working Groups needs to be established, as follows:

* **Elections Committee:** (Statutory could be composed by 3 members). *Technical Secretariat*: Öcal Necmioglu (IOC)
* **Recommendations Committee:** (Statutory could be composed by 3 members). *Technical Secretariat*: Bernardo Aliaga (IOC)
* The Chairperson also proposed four intra-sessional Working Groups;
* **PacWave 2024**: (tentatively 14 September before morning coffee break). *Technical Secretariat*: Öcal Necmioglu (IOC)
* **UN Decade of Ocean Sciences for Sustainable Development and Tsunami programme**: \* (tentatively 14 September before morning coffee break
* **Tsunami Ready Programme Implementation** – flexible measures\* (Dr Kong and Ms Ashleigh Fromont). *Technical Secretariat*: Jiuta Korovulavula (IOC) (tentatively 14 September after the morning coffee break)
* Tsunami Generated by Volcano (TGV) – monitoring and warning systems\* (François Schindelé, France). *Technical Secretariat*: Öcal Necmioglu (IOC) (tentatively 14 September after the morning coffee break)

1. The Secretariat informed delegations that in the interest of time of Delegation Nomination Form has been prepared for the nominations and for nominees which will be found on the registration table. Mr Necmioglu also stated that delegations indicated their possible participation in the intra-sessional Working Groups namely the 4 ones which the Chair just mentioned. He introduced a tentative plan for the Working Groups during the preparation meetings with stakeholders. He also stressed that the Secretariat will be available to provide support as necessary. He requested permission from the Chair to provide the delegations to nominate experts of election and recommendation committees.
2. Mr Necmioglu explained that tentative planning for the Working Groups per the request from the Chair. He stressed that during the preparation meeting with several stakeholders, the need to avoid overlapping in the meeting of Working Groups has been identified.
3. Dr Bill Fry (New Zealand) asked whether virtual participants will be able to join the intrasessional working groups. The Secretariat clarified that the intra-sessional WGs are allocated only for in-person participants, and online participants are not able to join.
4. The Chair called upon the delegations that he would like to decide the members for the Election Committee and Recommendation Committee to be made. He instructed the delegations to raise their hands in order to indicate which committee they would like to participate in.

* **Election Committee**: New Zealand, China, and the Solomon Islands. *Technical Secretariat*: Öcal Necmioğlu (IOC)
* **Recommendations Committee**: New Zealand, Australia, and France. *Technical Secretariat*: Bernardo Aliaga (IOC)

1. Following the summary provided by the Secretariat, there were calls from clarifications from the floor namely:
   * + - Mr Roger Ball (New Zealand) asked for clarification on whether the appointment was made by a country or by an individual. He further asked that if it was made by the country, the Chair expected to provide the name of a specific individual from them.
       - The Chair confirmed that it is by an individual and that it is only for those who are present. He further elaborated that the language used will be English.
       - Mr Necmioğlu indicated that a logistics note will be provided later with the allocation of rooms for the intersessional WGs.
       - The Chair announced that the deadline for the draft of the Decisions and recommendations is 18:00 hrs (local time in Tonga) on Thursday, 14th September.
2. Mr Nishimae asked Member States to nominate members to the intra-session WGs.
3. Mr Nishimae recalled that as customary each of the intra-session Working Groups will report to the plenary session under their respective agenda items. He indicated that intra-sessional WGs will be limited to onsite participants (English only). He also asked the Technical Secretariat to indicate logistics for the intra-session Working Groups on Thursday.
4. Mr Nishimae requested that the intra-sessional WGs produced a recommendation for discussion by the ICG or re-draft recommendations included under the intra-sessional WGs and TTs reports, as needed. These recommendations should be available for endorsement by all delegates on the last day of the meeting (Monday, 15 September 2023).

# REPORT ON INTERSESSIONAL ACTIVITIES

## 3.1 CHAIRPERSON'S REPORT

1. The Chairperson of ICG/PTWS, Mr Yuji Nishimae, presented his report, available as ([Presentation](https://oceanexpert.org/downloadFile/54452)).
2. The Chairperson recalled the PTWS activities during the inter-sessional period between the ICG/PTWS 29th session and ICG/PTWS 30th session, including major meetings which are related to the ICG/PTWS activities from December 2021 to 2023. Firstly, Mr Nishimae recalled that the previous session was held in December 2021, followed by 3 online meetings in January-February 2022 in relation to the Hunga Tonga-Hunga Ha'apai Volcano eruption and Tsunamis. Other major events included 15th Session of the TOWS-WG and TOWS-WG TT-TWO and TT-DMP online meetings (21-22 February 2022), 55th Session of the IOC Executive Council (13-17 June 2022), PTWS Steering Committee (online) Meeting (12 July 2022), PacWave22 (September-November 2022), PacWave 22 Live Communication Test (13 October 2022), TOWS-WG TT-TWO and TT-DMP meetings (27-28 February 2023), 15th Session of the TOWS-WG (2-3 March 2023), PTWS Steering Committee Meeting (6-9 March 2023) and 32nd Assembly of the IOC (21-30 June 2023.
3. Four Tsunami Service Providers (TSPs) are currently in operation (PTWC, NWPTAC, SCSTAC, CATAC). Mr Nishimae reminded the recommendation of the ICG/PTWS 29th session through which CATAC was admitted starting full functionality on the interim service as of 17 January 2022. A similar Recommendation was approved at the 16th Session of the ICG/CARIBE-EWS, which recommended the start of CATAC's full functionality in an interim manner for the Caribbean coast of Central America, starting in June 2023. The ICG/CARIBE-EWS further recommended the consideration of Central America Tsunami Advisory Centre (CATAC) as a Tsunami Service Provider (TSP) at its 17th session in 2024 to enable the IOC Executive Council to consider the final admission of CATAC as TSP in June 2024.
4. Mr Nishimae explained that in the Pacific region, there has been 14 significant earthquakes over 7.0 during the period of December 2021 to August 2023. Among them, 9 earthquakes resulted in tsunamis. However, none of these events resulted in very high tsunami heights. The maximum height reached during the 19th of September 2022 event was 0.79 meters according to the National Centres for Environmental Information World Data System Global Historical Tsunami database.
5. Mr Nishimae underlined HTHH Eruption and Tsunami are the most significant event in the Pacific region that year. Tsunami caused by these events were observed along the coastal areas not only in Pacific but also other regions such as Caribbean and MediterraneanSea. Tsunami heights over 1 meter were observed in California of USA, Chile, and Japan. PTWS urgently held for this event an online briefing meeting organized by the International Tsunami Information Center on 20th January and 3&10 February. The purpose of these meetings was developing interim volcanic tsunami SOP for what happened during the HTHH event and shared experience and identified the gaps and lesson learned. Mr Nishimae expressed his expectation that the corresponding interim procedure will be approved officially at this session.
6. Mr Nishimae reminded the delegations on the discussions related to non-seismic tsunamis in the TOWS-WG at its 15th session, in which The Group decided to establish a specific Ad Hoc Team on Meteo-tsunamis under the Task Team on Tsunami Watch Operations (TT TWO) chaired by Mr Mike Angove (USA), and an Ad Hoc Team on Tsunamis Generated by Volcanoes chaired by Dr Francois Schindelé (France). He further added that the Group acknowledged that meteotsunamis are a meteorological driven phenomenon, and as such, better clarifying the roles of NMHS and WMO will be critical in supporting the development of any potential future detection and alerting service for meteotsunamis, and that the Group decided to continue the Ad Hoc Team on Meteotsunamis to finalise its report, recommended that WMO experts be engaged to assist in this task, also acknowledging that WMO requests the WMO-IOC Joint Collaborative Board to discuss tsunami related issues with respect to meteotsunami, to clarify the roles and responsibilities for the WMO and UNESCO/IOC, and how best to strengthen collaboration for supporting Member States. Mr. Nishimae thanked Mr Mike Angove and Dr Francois Schindelé for their hard work
7. The first Intra-sessional ICG/PTWS SC meeting was held on 12 July 2022 (online), during which HTHH PTWC Interim Procedures and PTWS Products – User’s Guide was discussed and the conduct of the 30th Session of the ICG/PTWS in Tonga in September 2023 was officially endorsed. The seconf Meeting of the ICG/PTWS Steering Committee took place in person during 6-9 March 2023 in Paris, which resulted in the following:
   * + - The Group instructed the ICG/PTWS TT on Minimum Competency Levels for NTWC Operational Staff to finalize the draft Global Competency Framework for NTWCs to be presented at ICG/PTWS-XXX.
       - The Group recommended that the issue of expanding the PTWS earthquake source zone into the southern Atlantic Ocean to cover the seismicity associated with the Scotia Subduction Zone be discussed at ICG/PTWS-XXX in Tonga. If the ICG agrees with the expansion, then it will instruct the IOC to change the PTWS earthquake source zone map in the TS 130 (2016 version) and this decision will be reported back to the TT-TWO and the TOWS-WG.
       - The Group recommended the establishment of a TT on the provision of tsunami information of the TSPs to the maritime community for navigational warning with the following membership: All TSPs (PTWC, NWPTAC, SCSTAC), Chile, Peru and Australia. The Group instructed the Secretariat to send an email to formally launch the TT and support holding of a TT meeting before September 2023. The Group agreed that a final version of the TSP User’s Guide Table of Contents would be prepared for approval or modification by ICG/PTWS-XXX in September 2023 in Tonga. The Group also agreed that, following ICG/PTWS-XXX, the TT TSP will work with each ICG/PTWS TSP [PTWC, NWPTAC, SCSTAC, CATAC (interim service)] to determine a timeline for creating an updated version of each of their User’s Guides. The Group further agreed that each TSP will then work with its regional WG on approving updated versions of its User’s Guides; for PTWC, the Steering Committee will review and approve. Once the User’s Guides are updated and approved regionally, they will be submitted to the ICG/PTWS for endorsement.
       - The Group agreed for the full operation of CATAC to discussed and endorsed at the ICG/PTWS-XXX in Tonga. The Group also requested CATAC to prepare a report about the full operation of CATAC and propose a start date for the full operation of CATAC, at ICG/PTWS-XXX.
       - The Group agreed for WG3 to prepare in collaboration with the TT UN Ocean Decade for ICG/PTWS-XXX an Information Document exploring the potential governance structure for Tsunami Ready within the PTWS, considering sustainability beyond the UN Ocean Decade. The Group also agreed that this document should be disseminated to WG 1, WG 2, TT Future Goals and Performance Monitoring and all Regional WGs in advance of ICG/PTWS-XXX (via the ICG/PTWS Secretariat) to receive and incorporate feedback into the Information Document.
       - The Group recognized the importance of incorporating countries with developed preparedness programmes but are not involved in UNESCO/IOC Tsunami Ready into the UNESCO/IOC Tsunami Ready recognition programme. The Group agreed for WG3 to prepare in collaboration with the TT UN Ocean Decade for ICG/PTWS-XXX an Information Document exploring suggestions for incorporating these countries into the UNESCO/IOC Tsunami Ready recognition programme. The Group also agreed that this document should be disseminated to WG 1, WG 2, TT Future Goals and Performance Monitoring and all Regional WGs in advance of ICG/PTWS-XXX (via the ICG/PTWS Secretariat) to receive and incorporate feedback into the Information Document.
       - The Group also agreed the ICG/PTWS Secretariat, with support from WG3, would encourage additional membership to WG3 through an email sent to ICG/PTWS TNCs.
       - The Group recognized that the Scientific Symposium is a collaboration between the IUGG Joint Tsunami Commission, UNESCO/IOC and the host country (here, the Kingdom of Tonga). The Group emphasized the importance of engaging with representatives from the Kingdom of Tonga to organize the Scientific Symposium, including within the Organizing Committee. This would provide the opportunity for establishing dates and duration of, and funding for, the event. The Group agreed that the ICG/PTWS Secretariat would discuss logistics and costs with representatives from the Kingdom of Tonga. The Group also agreed that the ICG/PTWS Chair, Mr Yuji Nishimae, would reach out to the IUGG Joint Tsunami Commission Chair, Dr Yuichiro Tanioka, to initiate engagement on organization of the Scientific Symposium.
8. Regarding IOC/UNESCO TRRP, in the PTWS region, there are currently 14 tsunami communities across 7 countries. One of the goals of United UN Decades Tsunami Programme adopted 100% of communities to be prepared to resilience tsunami by 2030 and TRRP should play the important role for achievement of the goal.
9. The PacWave 2022 exercise was held on October to November 2023. The live communication was conducted by TSPs, on the 13th October 2022. The result of the PACWAVE 2022 will be reported in the ICGPTWS 30th session.
10. In the ICG/PTWS 29th session, the ICG/PTWS decided to expand the PTWS earthquake source zone to include the southernmost Atlantic seismic region. The decision of the ICG/PTWS 29th session was submitted to the TOWS-WG 15th session in February 2022 and then was submitted to the IOC 55th Executive Council through discussion at the TOWS-WG 25th session. However, the PTWS’s decision was removed from the IOC decisions and expansion of the PTWS Earthquake source zone has not yet realized. In the PTWS SC, it was held in March 2023 and the PTWS SC decided the recommendation related to this issue.
11. In the IOC 32nd Assembly, the UN Ocean Decade Tsunami Programme was established, and the scientific committee also established to develop the research and development implementation plan for UNODTP. The Scientific committee submitted the draft research and the development implementation plan for TOWS-WG in the 16th session in March 2023. TOWS-WG approved the draft research and development implementation plan submitted to IOC UNESCO and the chairperson of the TOWS-WG reported the outline of the plan of the IOC 32nd assembly that IOC approved the UNODTP research and Development Implementation Plan in June 2023.
12. The 16th Session of the TOWS-WG decided to hold the second international tsunami symposium in ache Indonesia in 2024 that Government of Indonesia hosted the symposium to commemorate the 20th anniversary of the Indian Ocean Tsunami of 2004. Indonesian Government organized a responsible Committee composed of two Co-chairs nominated by TT-TWO and TT-DMP, the Chair of the UN-ODTP-SC, a representative from the Indonesian Agency for Meteorology, Climatology, and Geophysics (BMKG), a representative of the IUGG-Joint Tsunami Commission, and a representative of each of the TICs. He expressed his gratitude for the Indonesian government’s hard work at the 2nd symposium.
13. Mr Nishimae presented future events during the period of 2023 to 2024 related to the ICG/PTWS activities. He mentioned that the results of the 30th session will be reported on TOWS-WG and IOC Executive Council in 2024. If the full operation of the CATAC in the next IOC Executive Council would be approved, CATAC will be able to begin to officially provide information in both the Pacific and Caribbean. He stressed that regarding the PACWAVE 2024, the PACWAVE was downsized due to COVID-19 and he hoped that the scale of the PACWAVE 2024 will be the same scale before COVID-19. In addition, He expected to discuss the agenda for PACWAVE 2024 with the international working group session.
14. Mr Michael Angove (USA) thanked the Chair for his presentation and requested the Secretariat to update on the publication status of the Research, development and implementation plan for the Ocean Decade Tsunami Programme. Mr Necmioğlu responded that he will follow up on offline and will report later.

## 3.2 SECRETARIAT REPORT

1. The Technical Secretariat for ICG/PTWS, Mr Öcal Necmioglu, presented the Report of the Secretariat, available as a [Presentation](https://oceanexpert.org/downloadFile/54600).
2. Mr Necmioğlu presented the current structure of the Secretariat and overview of the meetings, workshops, trainings, and events supported by Technical Secretariat since 2019. He informed the participants that despite the pandemic, the Secretariat through the dedicated efforts of the previous Technical Secretary, Mr Bernardo Aliaga, managed to maintain the support the level of governing bodies and technical/regional working group and teams, most notably by holding frequent online meeting, one full online session of the ICG/PTWS and one in person meeting of the PTWS SC in March this year in preparation to the current ICG. Operational conditions are going back to normal, and the Secretariat expects to see some improvements also in relevant supporting activities.
3. The **ICG noted** the report of the Secretariat.

## 3.2.1 SUMMARY OF THE 8TH JOINT ICG/PTWS-IUGG/JTC TECHNICAL WORKSHOP

1. Dr Bill Fry (New Zealand) presented a summary of the [8th Joint ICG/PTWS– IUGG/JTC Technical Workshop](https://oceanexpert.org/event/3982) “Understanding and lessons learned from the tsunami generated by the Hunga Tonga-HungaHa'apai volcano eruption on 15 January 2022 for development of Tsunami Warning and Mitigation System for tsunamis generated by volcanoes and other non-seismic sources”.
2. Dr Fry commented that non-seismic sources are generally larger but more localised meaning that they reach their shores within the first hour after generation and therefore extremely dangerous to proximal communities. Alot of complexity exists in non-seismic tsunamis and the challenge that non-seismic tsunamis have on their warning system is that they are predicated and understood on the mechanisms by which an event generates a tsunami. In the case of non-seismic tsunamis, the concepts of source identification and monitoring applicable to the earthquake generated tsunamis are not necessarily applicable. There was a discussion about the predictability of a volcanic event based on precursors. There is a wealth of research in both the volcano and landslide research communities that points to possible useful parameters. One of the highlights from the workshop was lessons-learned from the HTHH response with respect to the local and international response. The main challenges in NTWC response in Tonga were limited knowledge of volcanic tsunami behaviours, as most of the NTWC training addresses tsunami generated by earthquakes. Furthermore, lack of monitoring for equipment, expertise for this typical type of event, national & global SOPs, and communication outages were elements that had an impact on the response to this event.
3. Dr Fry commended Kingdom of Tonga for their pre-event preparation and event response and pointed out the main NTWC operational challenges, such as limited knowledge of volcanic tsunami behaviours, lack of monitoring equipment and expertise, National SOPs not covering tsunami risk, and communication outages. He highlighted the recommendations for the NTWC as the need for more and sustained public education, inclusion of more details in SOPs for volcanic tsunamis, volcanology training for personnel, improvement of volcanic monitoring equipment, establishment of tsunami competency framework for NTWCs, better communications redundancies and better warning dissemination systems to get the message across the people that previously educated on what to do with those messages.
4. Dr Fry informed the delegations that the greatest takeaway for him were pre-event education, especially knowledge of the process and outcomes. In addition, he added that concerning what happens after tsunami, how to respond and when to do, coastal communities’ preparedness is crucial because after tsunami happens their timeline to respond might be very short. The second takeaway was the need to focus on the sea-level monitoring rather than source monitoring and sharing all available (DARTs, IMS, local and regional networks) data, and pointed out that non-seismic TEWS probably calls for more sensors - detection systems and new applications of technology.
5. Following the presentation by Dr Bill Fry, the Chairperson commented that he expects active and useful discussion on Tsunami Generated by Volcanoes (TGV) under the agenda item 4.11. Dr Bill Fry informed the Chair and delegates that a short-written report will be prepared and submitted on Friday to cover the Symposium.
6. The **ICG noted** the summary of the 8th Joint ICG/PTWS– IUGG/JTC Technical Workshop.

## 3.3 TOWS WG REPORT

1. On behalf of the TOWS-WG, the Chair presented about the discussion of the TOWS-WG XVI session, as available under the [report of the session](https://www.oceanexpert.net/document/32673). Mr Nishimae summarized in his [presentation](https://oceanexpert.org/downloadFile/54570) the main recommendations addressed to the IOC 32nd Assembly and the ICGs.
2. Mr Nishimae explained that the most challenging issue is the development of the Tsunami Warning System and Mitigation System for the TGV. He added that it is difficult to forecast TGV because the sources are different, and they are not able to immediately characterize tsunami sources after the event.
3. He summarized the next action items, as follows;

* To make a list of the volcano observatories that monitor and warn of volcanoes that may generate tsunamis.
* To send to the volcano observatories a specific questionnaire on the issue.
* To develop best practice guidelines of how to warn communities at risk of the threat from tsunamis generated by volcanic-related sources.
* To increase public awareness of tsunamis generated by volcanic phenomena and earthquakes.

1. Mr Nishimae emphasized role of the public education, especially noting that while an earthquake can be easily associated with a possibility of a tsunami, such logical connection may not be established by the public for a volcano event. UN Ocean Decade Tsunami Programme Research and Implementation was approved in the IOC Assembly in June 2023 and is awaiting publication. Besides the UNODTP Scientific Committee, a Tsunami Ready Coalition to be chaired by Dr. Laura Kong was also established under the TOWS-WG to promote UNESCO-IOCs Tsunami Ready Recognition Programme. A symposium to commemorate the 20th anniversary of the 2004 Indian Ocean tsunami will be held in 2024 in Banda Aceh, Indonesia. The Symposium will be followed by the 14th session of ICG/IOTWMS in Jakarta.
2. The following key recommendations from the TOWS-WG were made to the IOC Assembly a its session in 2023.

* To decide that warning systems for Tsunamis generated by volcanoes should be considered and coordinated as part of the UNESCO/IOC Global tsunami, other Ocean-related Hazards Warning and Mitigation System and when possible be part of a MHEWS.
* To endorse 10-year Research, Development, and Implementation Plan of the Ocean Decade Tsunami Programme as presented in document IOC-32/3.4.1.2.Doc(1).
* To encourage MSs to provide voluntary financial contributions to the IOC special account and in-kind contributions to support the Ocean Decade Tsunami Programme and UNESCO/IOC Tsunami Ready Recognition Programme.

1. Mr Nishimae added that the group recommended the IOC Assembly at its session in 2023 to instruct the regional ICGs among others,

* to encourage sea level data is sampled at one-second intervals and with the highest available accuracy and transmitted in real-time as a matter of priority
* to add the task to the Terms of Reference of the ICGs and TICs to facilitate the implementation and functioning of the UNESCO/IOC Tsunami Ready Recognition Programme.
* to add the role of ICGs as a regional Steering Committees for the ODTP in their Terms of Reference.

1. Regarding the 2nd and 3rd recommendation, they planned to discuss in Agenda Tsunami Ready and UN Ocean Decade.
2. Following the Chair’s Presentation, Dr Alexander Rabinovich (Russian Federation) commented that he is very sceptical with regard to the recommendation on sea-level measurements in 1 second resolution, as deep-water measurements cannot be obtained in such high-resolution, also complicating the operations. Mr Nishimae responded that 1-second sampling rate is not established in most of the coastal tide-gauges and emphasized the need to put further efforts to reach this requirement*.*

## 3.4 TSUNAMI SERVICE PROVIDERS REPORTS

3.4.1. Pacific Tsunami Warning Centre (PTWC)

1. Dr Charles “Chip” McCreery (USA) Director of the PTWC, presented a report of the PTWC, available as a [Presentation](https://oceanexpert.org/downloadFile/54579).
2. Dr McCreery began with an overview of the seismic and sea-level network available to the PTWC, which is comparable to the last ICG for the seismic network but with considerable improvements in the sea-level network, especially in term of DART data availability.
3. Dr McCreery briefed that 110 tsunami information statements and 35 Threat Message sequences were issued since April 2019, most of them being not significant events. While the HTHH event on 15 January 2022 resulted in 12 messages, the Kermadec event on 3 May 2021 was widely recorded across the pacific resulting in 20 messages.
4. Dr McCreery presented various Key Performance Indicators (KPIs), which are elapsed time, earthquake location, hypocentre depth, Mw from Mwp, and Mw from CMT. The Epicenter Location and Hypocentre Depth errors are based on the comparison with the parameters published by the USGS with a target of <30km. Mw from Mwp is in the boundary of 0.3 magnitude units, noting a bias where Mwp calculation tends to be 0.1 or 0.2 magnitude higher as a result of the conservative approach adopted. Mw from CMT is received after approximately 20 mins from the earthquake origin time.
5. Dr McCreery informed on the previous changes in the PTWC products and recalled that at its 26th Session, ICG/PTWS that the mechanism to address proposed changes to the PTWC Enhanced Products for PTWS is the intersessional Task Team on Enhancing Products and reaffirmed that any change to the products should be informed to all Member States by Circular Letter three months in advance of implementing the changes. At the same session, ICG/PTWS also decided that to avoid misunderstandings the words “No threat” should be indicated for all countries with inundation below 0.3 metres, and the list of countries falling under this category should be removed from the message. All such changes were communicated to the Member States through a Circular Letter. He presented proposed changes in the text products, to be shared with the Member States similarly. The proposed changes are as follows:

* In initial threat messages, prior to having a quantitative forecast, alphabetize the list of countries and territories with a possible tsunami threat.
* Organize the list of expected times of arrival (ETA) of the first tsunami wave by country or territory.
* Organize the list of observed tsunami wave maximum amplitudes by country or territory.
* Include an indicator for the type of measurement made on each gauge.
* Remove the forecast category label “less than 0.3 meters” and replace it with the label “no threat”.

1. PTWS used to have an intra-sessional team under enhancing products which do not exist anymore, but they have a kind of substitute WG 2 for this purpose. Regarding these changes, all Member States received the CL three months in advance of implementing the changes, as described in WG2 report. One of the proposed changes was the listing of the Tsunami Forecast points in an order in which the countries are alphabetically ordered. In terms of the tsunami observation recommendations, the gauges themselves are listed just in the order the PTWC has read, but the recommendation is to have them organized by country. In addition, another change of tsunami observations is that the PTWC measured tsunami amplitude on the record, but sometimes they measured sea level or maximum trough in mean sea level to the maximum crest and maximum crest dividing by 2. He stressed that this could cause some confusion to those who are measuring the same gauges as the measurements may not agree, and the suggested recommendation stressed that it would be good to indicate exactly what has been measured in the messages themselves. In the presentation, there are letters as H, C, and T, which could be found in the description part. A final proposed change was the re-classification of less than 0.3m forecasted tsunami height as no threat in the bulletins issued.
2. At the end of his presentation, Dr McCreery also shared that in the event of the Hunga Tonga Hunga Ha’apai event, PTWC got alerted by a special sea-level detection algorithm that they had implemented in their centre a few years ago because of concerns about volcanoes in the Caribbean. When the HTHH started erupting on the 14th of January, it created tiny tsunami waves which resulted in triggering the gauges around this area.
3. The Chair commented that there is a proposal for the change in the format of the PTWC product. He believed that the changes are to be affected by MSs; mainly the MSs systems for the issuance of tsunami warning.
4. Dr Bill Fry (New Zealand) raised a question about the change related to the 0.3 meters threshold. He wanted to know if there was any previous confusion about the less than 0.3 meters being no threat or no land-threat whether Mr Chip McCreery thought there was a need for a concern or the clarification within users that 0 – 0.3m might still be a threat abnormal currents in the water, as there were times that some Member States might still consider below 0.3 as a concern. He said that it was taken out partly because of the recommendation made by the previous ICG. However, he also said that part of the reason the letter was sent out three months in advance was to get feedback in case there is some objection to some change which can also be voiced here as well. He ended by saying that if there is still a concern, PTWC would be looking for suggestions on what would be appropriate.
5. Mr Oxley (Chile) thanked Dr McCreery for his presentation. He started his question with a reminder that Antarctica is under specific Antarctic Treaty and he was not able to see the sea level gauges in Antarctica in the pictures that were shown in the presentation. Dr McCreery answered that it just did not appear because of the order of the pictures in his presentation, but PTWC do still receive that data.
6. Dr Rabinovich believed that Dr McCreery indicated an important question related to the measurement of tsunami amplitudes and tsunami wave heights as there is a real ambiguity on this point and the terminology of this point. Normally, a wave height is from trough to crest, but it is common to use from mean sea level and each countries have different traditions. An example is the Chilean tsunami in 1960, they couldn’t find the reason why they have some big difference between which showed a discrepancy in the USA data and the Canadian data. It was later found out that the Canadian data measure wave height from trough to crest whereas the US data measure from mean sea level to crest. He also pointed out that if one were to go to the glossary, one of the definitions of tsunami amplitudes is just the mean between trough and crest. He emphasized that there is a need to organize this in better way just in case the parameters of tsunami wave amplitudes such as giving both definitions and to indicate the correspondence time. Dr McCreery responded that it is a significant problem in historical catalogue of events is knowing exactly what was measured as there are lot of different ways people can measure things.
7. Mr François Shindelè (France) commented that the parameters of the high point of to the depth of the earthquake. The depth is important between 0-50km. However, most of the event is more than >30km which is deep earthquake and it’s not a problem. When reverse to less than 30km, it would be good to have a 10km accuracy depth. Dr McCreery agreed with that comment, and he informed the ICG that at the next session the centroid depth which presents better accuracy will be presented.
8. Dr Miao (Australia) commented that the changes introduced are largely good. However, he shared Australia’s concerns regarding the change of less than 0.3 to be no threat, as the national warning or disaster management authority may prefer avoiding references to no threat, as within the 0.3m threshold there may still be anomalies that may cause concern and therefore may necessitate some caution. Dr McCreery thanked Dr Miao of his comment saying that originally PTWC had 0.3 threshold in because they thought that every MS would want to know more specifically. However, for many of the places with expected wave height of less than 0.3m, the expected wave height may be as low as 0.01m. He concluded, while the reason of the proposed change was the discussions that took place at the last ICG, PTWC is ready to implement any solution that is considered to be most useful creating least amount of confusion.
9. Dr Kong (ITIC) raised a question of pertaining to history of the Pacific Tsunami Warning Centre (PTWC) and whether all MSs have agreed that it is important to put either the 0.3m as or no threat as the countries listed, as opposed to only utilizing the category of 0.3m and above. Dr McCreerycommented that the reasons why the countries are listed are because it means that the model was done for that coast. He stated that if the countries are not listed than it would mean that the model show that there is no threat or the threat level is below 0.3m.
10. The Chairperson, Mr Nishimae, commented to the question from ITIC that as he understood, the threat level is dependent on the criteria for the tsunami warning or the tsunami advisory of the MS. He used Japan as an example, stating that in Japan tsunami advisory will be issued when it exceeds the estimated tsunami height of 0.2 meters. Dr McCreery inquired whether a new recommendation need to be formulated at this ICG to either overwrite the previous recommendation and continue with the past practices. In answer to Mr Chip McCreery’s recommendation, the Chair pointed out that the PTWC products are used by the NTWCs and Disaster Management authorities and it’s important to avoid any possible source of confusion for them.
11. Mr Necmioğlu pointed out that key several performance indicators were mentioned in PTWC’s presentation with elapsed time to initial product, epicenter location error, and hypocenter error and inquired if there is any trend between elapsed time and errors of the other parameters. McCreery responded that he suspects that there is a correlation.
12. Dr Miao (Australia) commended that Dr McCreery asked for the directions which is valid and in terms of what the PTWC is proposing and those changes. In his viewpoint, he accepted all changes proposed. However, he stressed that the only contentious point is that changing below 0.3 as “no threat” and that a “no threat” is a decision that he argued it should be left with the country. He also noted the factor of error where people can have a factor of 0.2 at a minimum which means while they are providing one prediction, others may provide other predictions. He stated that it is important not to err on the side of being cautious to not to go very deterministic about the threat or no threat. He recommended people who need to have clarification, should look up the table on their own country like what regional SOP trainings trying to advocate, also noting the differences between marine warning or land warnings. He also emphasized that Australia supports all the changes proposed with the exception of the no-threat recommendation for less than 0.3m.
13. Mr François (France) commented that France supports the remarks made by Australia. Mr John Niroa (Vanuatu) conveyed Vanuatu's endorsement of Australia's observations. He stated that 0.3 is off normal already for small island states. He emphasized Vanuatu's preference for maintaining the threshold of less than 0.3 meters, citing its greater informational value compared to categorizing it simply as 'no threat.' He noted that perceiving a 'no threat' designation might signal anomalies beyond the typical parameters, thus advocating for the retention of the existing criteria.
14. Mr Dennis Sinnot (Canada) commented that he agreed with all the comments. However, he noted one of the statements argued that more than 3 meters might be possible and then the next statement is 0.3 to 1 meter might be possible, but then the – lower ones talk about threats whereas none of the 2 above talks about threats except, for example, if people live in island countries which are a place for the closest to the sea-level, it was 10 meters up there will be no threat but there is no wording about the threat in the 2 previous scenarios so then to suddenly no threat on the final scenario. He found it interesting that a threat is put in the first scenario and then the last 2 scenarios does not a have a threat. He included the possibility of chaining the words/ semantics.
15. Mr Necmioğlu pointed out that a total assessment would require to what level does forecast of less than 0.3 match the observation or the instrumental recordings, which could give a success rate of the forecasts and a confidence level.
16. Mr Roger Ball (New Zealand) commented that it seems to him that there are questions around the 0.3m issue that need to be resolved rather than figuring that out in this session. He then proposes to leave it to the Task Team on Tsunami Service Providers to re-consider that particular issue and report back. He stated that he is willing to be guided by the Secretariat on what the best way to go about it. The Chair thanked New Zealand. He commented that there is no current task team about PTWC 15th or 16th session shown by the PTWC presentation. He proposed that the matter should be discussed by the WG 2. Mr Bill Fry (New Zealand), the Chair of WG 2 agreed, and the Chair then delegated for this item to be deliberated on by the WG 2.

3.4.2. Northwest Pacific Tsunami Advisory centre (NWPTAC)

1. Mr Shingo Ushida (Japan), Scientific Officer for International Tsunami Information of the Japan Meteorological Agency (JMA), presented a report on the Northwest Pacific Tsunami Advisory Center (NWPTAC) which was available as [Presentation](https://oceanexpert.org/downloadFile/54543). Following his presentation, the floor was opened to comments from Delegates.
2. NWPTAC have conducted 3 communication tasks since last PTWC meeting. NWPTAC started to operate a new system (Earthquake Phenomena Observation System - EPOS). A new system (EPOS6) has been installed at the Tokyo Headquarters These two systems have the same functions. In the case of Tokyo system is down, they can issue NWPTAs using the Osaka system from Tokyo.
3. The Area of Service (AoS) of NWPTAC was changed when the full operation of SCSTAC started in November 2019. The number of recipient countries of NWPTA products also changed from 16 countries to 10 countries, according to the area of AoS. Seismic and sea level monitoring systems are the same for for NWPTAC and NTWC products. On the other hand, the tsunami prediction using sea level monitoring network data are used only for NTWC’s products, not for NWPTAC’s products so far. Hence, further studies are necessary the improve NTPTAC products.
4. There were 16 events during the intersessional period but none of them were tsunamigenic. NWPTAC conducts communication tests basically twice a year since 2012. He added that thanks to the coordination of the Secretariat and the MSs, the situation seems to be becoming better. But in fax transmission test, in the NWPTAC has repeatedly failed to deliver some the messages to fax numbers. NWPTAC asked for confirmation of the fax receiving system, or notification of the end of the reception by the fax next test.
5. There were no comments or questions from the delegations

3.4.3. South China Tsunami Advisory Centre (SCSTAC)

1. Mr Peitao Wang (China), National Marine Environmental Forecasting Center (NMEFC), presented a report on the South China Sea Tsunami Advisory Centre SCSTAC, which was also available as a [Presentation](https://oceanexpert.org/downloadFile/54590). The floor was then opened to comments from Delegates after this report.
2. South China Sea Tsunami Advisor Center (SCSTAC) has been in operation since November 5th, 2019. Over the past 2 years, SCSTAC issued 19 bulletins for 17 earthquake events, and most of the first bulletins were issued in less than 8 minutes from earthquake origin time, including the Mw 7.0 event occurred in the Philippines on the 27th of July 2022 which generated a tsunami of 8cm amplitude. From last year, tsunami products of SCSTAC have been released simultaneously to the SCSTAC and BSCSTAC websites. Tsunami warning services are installed in the Smart Tsunami Information Process System (STIPS). The new system has advantages such as user-friendly, comprehensive, well-maintained, and open-source software.
3. A backup tsunami warning system has also been established in Huairou District in Beijing, China. Additionally, Hongkong Observatory had implemented the establishment of a backup of the South China Sea Tsunami Advisory Center. The backup of the South China Sea Tsunami Advisory Center has commenced its full operations since March 29, 2023. BSCSTAC will be activated in 2 ways, including scheduled activation and non-scheduled activation.
4. SCSTAC conducts communication Tests 4 times each year. MSs were required to respond for providing information. According to the results, some MSs can’t normally receive the test information, and the fax number and email address need to be further confirmed and/or updated.
5. SCSTAC conducted a tsunami exercise in the SCS region on the 13th of October 2022. Over the past 2 years, SCSTAC has organized 3 times regional training and workshops that focused on topics such as training SOPs for seismic and tsunami warnings and non-seismic on complex tsunamis on the applied technologies for earthquake and tsunami monitoring, early warning, and disaster mitigation.
6. In 3 years, SCSTAC continued to conduct 2 training workshops on tsunami forecasting and risk assessment for tsunami warning operators and continued to provide opportunities for in-person education and training other activities. In addition, they continued to develop new tsunami warning skills to improve responsiveness to unusual tsunami events.
7. There were no following comments or questions from the delegates.

3.5 THE INTERNATIONAL TSUNAMI INFORMATION CENTRE (ITIC) REPORT

1. Dr Kong (Director of the International Tsunami Information Centre-ITIC) presented her report on the Intersessional Activities of ITIC covering 2021 – 2023, available as a [Presentation](https://oceanexpert.org/document/33231).
2. Firstly, she informed about the status of current staffing and expressed ITIC’s appreciation to Government of Chile and SHOA for providing an Associate Director to ITIC since 1998 and reminded the delegations on the mandate of ITIC as established in 1977.
3. ITIC was involved along with Mr Korovulavula, TSR National Professional Officer based in Suva to help support Tonga after the 15th of January 2022 event. Concerning the 3 PTWS Briefs, ITIC was able to work with the PTWC and Tonga for the implementation of the interim products through this. At the same time, the IOC issued a post-event assessment request through CL 2877, and near the final draft that probably be publicized soon. In addition, ITIC one of the first to be able to reach out to the Tonga Meteorological Services to try to help them as much possible. Especially, GNS of New Zealand provided some briefings. There are requests by the governments of Australia and New Zealand to re-strengthen through the installation of the new sensors or repair of the sensors for seismic and sea-level monitoring, for which ITIC provided some support. Dr Kong informed that unlike in the past, post-tsunami filed survey was not executed through the participation of international survey teams, but remotely through local support, as a result of COVID restrictions and limitations.
4. Concerning the tools ITIC distributed, California Integrated Seismic Network (CISN) notification no longer includes the PTWC observatory message which usually comes 1 or 2 minutes before the official products. She stressed that they would like to do it re-instated but it’s a work in progress. Tide tool continues to be improved, and the new version will come online in the next 6 months, which will have an ability to play back historical data to support training activities which would be an important contribution for competency building.
5. Dr Kong explained that IOC Sea Level Monitoring web site is continuing to do well and added many stations through user group’s meeting last year in South America and a tide tool is available dedicated to tsunami warning.
6. TsuCAT version 4.3.2 is available. The biggest change is not only to put PTWC messages but also be availability to customize index.
7. ITIC-IOC capacity building activities continued, mostly virtually during 2021-2022 because of COVID. In 2023, funding is available to support TRRP implementation in Fiji, Micronesia (Chuuk, Pohnpei, Yap), Marshall Islands (Majuro) and Palau. Cook Islands Review and update of TWC and TER SOPs and a regional training on TRRP in PICT took place in January 2023. ITP-2023 hosted 36 trainees from 29 Member States of the PTWS. The first week of the training focused on procedures, warning center operations and PTWC operations, and the second week focused more evacuation exercise.
8. Most of the trainings are based on MG-76 (Plans and Procedures for Tsunami Warning and Emergency Management) and MG-82 (Preparing for Community Tsunami Evacuations - From Inundation to Evacuation Maps, Response Plans, and Exercises). ITIC is more focusing on evacuation of creating maps, and they did an update of the QGIS Manual. The goal is to cover all indicators of the TRRP program.
9. ITIC is trying to get a wider reach through online platforms. They hope to do general awareness which is almost finished the introduction for tsunami ready and the materials have already been piloted in some of their training. In addition, ITIC is trying to develop the self-pace online and hybrid training which includes a test which needs to be passed to get a certificate. There are various training videos created during the last years, but are password protected as the enhanced products are not meant for public.
10. To support the PacWave22, ITIC created the video for the website and supported the Task Team for the post exercise evaluation. Similar video is available for the CARIBEWAVE. In addition, ‘Get Pacific Tsunami Ready Shout-outs’ with the motto of ‘Be aware, be prepare be Tsunami Ready’ are also uploaded.
11. Under the UN Ocean, ITIC supports SMART Cable and TRRP implementations. In terms of the support to tsunami warning system in the Pacific, currently they have some funds from USAID, and they hope there will be additional other funds for Kiribati, Samoa, Solomon Islands, and Vanuatu.
12. ITIC will in Coral Coast of Cuvu District in Fiji next week to support the TRRP recognition. The process of TRRP certifications of Chuuk, Pohnpei, and Yap in Micronesia are halfway. ITIC also hosts the Tsunami Ready Website to try to capture the overall status of the communities that are recognized as Tsunami Ready.
13. Manuals and Guides 86 on Multi-Annual Community Tsunami Exercise Programme Guidelines, focusing directly to the communities, has been made available in CARIBE-EWS in EN and FR in 2022, and ES version is expected to be made available soon. Tsunami Glossary 2019 has been updated in 2023 through TOWS-WG in February and will be translated into all UN languages. For the awareness materials, Global Tsunami Sources, Significant Earthquakes, and Significant Volcanic Eruptions were updated in 2022 and will be revised in 2023 to be printed in 2024.
14. IOC post-assessment process for HTHH was triggered by CL 2877 and the report has been drafted. Almost every country responded with their timeline. The post-tsunami survey was coordinated by the Tonga Geological Service and ITIC provided technical remote support of COVID. SPC group stepped up with some funding, New Zealand donated some equipment some equipment and USA support was received for the whole process. As a result, all the data is collected and is available on their website, including some images taken by drones. A scientific publication is available on Pure and Applied Geophysics (2022).
15. As the Chair of the Tsunami Ready Coalition, the priority is to focus on the implementation of the TRRP, especially noting that some countries do not necessarily implement the TRRP but have their own national programs. TIC mandate is focusing on building resilience capacity.
16. ITIC will work with Japan International Cooperation Agency (JICA) volunteers in collecting survivor stories from HTHH and identify the future neds for community preparedness, to be captures in a book-publication. ITIC hopes that the ITP-Hawaii program can be held in Chile again in 2024 as follow up of the previous program in 2018, which would facilitate the participation of Central and Latin American countries.
17. The biggest effort invested so far was for the competencies related to agenda 4.3. ITIC proposed to conduct a pilot about how to do training, focusing the non-national specific part for the competency and they proposed some fund which is still pending. She also mentioned there is still a need to work on what assessment means.
18. Dr Miao (Australia) expressed appreciation to ITIC for its work in the Pacific, including trainings, updated capacity development materials, and the coordination of post events. He mentioned that it’s an enormous amount of work and challenge in including 38 participants from 26 countries and the effort to move them around, especially during the Maui wildfires. The Australian participant reported that thanks to his participation at the ITP-Hawaii, he is now fully into the end-to-end working system, and he is enthusiastic about doing more which is one of the examples of how much the ITP-Hawaii affected people and capacity development. Dr Kong thanked Dr Miao for his comments and stated that it was the result of all the support received from many stakeholders, especially from PTWC and he University of Hawaii. 26 Countries is a lot of countries especially coming into the US with a VISA. Dr Kong thanked all the participants who assisted in the specific forms, the logistics, and visa applications.
19. Mr ‘Ofa Fa’anunu (Tonga) expressed his thanks to ITIC for the support in leading Tonga in the HTHH event together with PTWC, GA Australia, GNS New Zealand, and the counterparts from SPC. It was a difficult time trying to get things together and the surveys done, and their assistance and timely support were welcomed. Also, he wanted to thank Geoscience Australia (GA) and the Government of Australia for the upgrade of the seismic network after the event as) well as the replacement of the AWS that was washed away in the HTHH tsunami. In terms of the HTHH itself, he believed that there is a need to capture some survival stories into a publication which is important to flag because it happens often in terms of volcanoes and tsunami world. He stressed that the world has to learn a lot from the HTHH.

**3.6 NATIONAL PROGRESS REPORTS**

1. The chair reminded the delegations that written reports have been requested in a standard format and have been received in advance of the Session. They have been made available through the meeting website. In addition, he asked the Delegates to make short statements of under 5 minutes focusing on key points of their National Reports that may have implications for the policy discussion and to not use PPTs as far as possible.
2. A total of 14 Member States ([Australia](https://oceanexpert.org/document/33209), [Canada](https://oceanexpert.org/document/33056), [Chile](https://oceanexpert.org/downloadFile/54427), [China](https://oceanexpert.org/downloadFile/54589), [Colombia](https://oceanexpert.org/document/32993), [Ecuador](https://oceanexpert.org/document/32994), [Japan](https://oceanexpert.org/downloadFile/54542), [France-French Polynesia](https://oceanexpert.org/event/3920#documents:~:text=NATIONAL%20REPORT_France%2DFrench%2DPolynesia_without%20pers.info), [France-New Caledonia](https://oceanexpert.org/document/33174), [Malaysia](https://oceanexpert.org/document/32995), [New Zealand](https://oceanexpert.org/document/32996), [Republic of Korea](https://oceanexpert.org/document/32962), [Russian Federation](https://oceanexpert.org/document/33001), [United States](https://oceanexpert.org/document/33090)) have submitted National Reports.
3. The Chair invited the Member States that submitted presentations to present their national progress reports first to be followed by the oral statements of the remaining MSs, these presentations will be followed by the online oral statements, all to be delivered in alphabetical order.
4. The Chair announced that there will be 3 groups presenting on their national reports; those who submitted their PowerPoint presentations, those who will have an oral report, and those who are online and wish to present. He stated that due to time constraints, each is to have 10 minutes to present.
5. The Chair asked to delegations if they would like to present their ppt. Overall, France Chile, China, France, Japan, Tonga, and the USA expressed to present their report with their own PPTs.

1. CHILE REPORT

1. The national report of Chile was presented by Rear Admiral Arturo Oxley (Chile), the Head of the Chilean Navy Hydrographic and Oceanographic Service (SHOA), responsible for the Tsunami Warning System in Chile (SNAM). For the near-field tsunami threat, SNAM has its own assessment capability, supported by the PTWC. When source information regarding big events is available, SNAM performs its own analysis and issues bulletins at the appropriate level. After this, further processing is done by the National Disaster Management Office, Maritime Authority, and Coast Guard. At the same time, information is also shared with the South-east Pacific Regional Cooperation. After issuing the second bullet with ETAs of the first waves to arrive to the 21 blocks defined in Chile. Instrumental observations are done through 5 DART buoys and 48 sea-level gauges. Since COVID, Tsunami Field Observers are being used, which are mainly trained Coast Guard Officers who would be able to report tsunami observations directly. SHOA is located in Valparaíso, which consist of two operations rooms and another back-up in Viña del Mar to ensure redundancy in their operations.
2. Chile’s system is tailor-made and designed by their own scientist with a lot of institutions, some universities in Chile, Germany and JICA from Japan. Technology they implemented called SIPAT, based on pre-calculated tsunami scenarios. This system was implemented in 2016 and before 2016, threat assessment was done for the whole country, just like the 8.4 event in 2015 which resulted in the evacuation of the whole coastline. The new systems allow better sub-regional threat assessment, eliminating the need for a full-scale evacuation. Additionally, PHASE-W threat assessment is now in place to better characterize the seismic event in the near-field. For the far-field events, SNAM relies on PTWC but will keep monitoring different tide gauges and DART buoys within their responsibility as the NTWC.
3. One of the key elements is training and preparedness. All equipment is checked on a daily basis and drills are conducted on a daily basis. In addition to the two watch officers on shift, 12 watch officers will assist the operations for 24/7. Institutional exercises based on realistic scenarios are conducted on a monthly basis to ensure mission capability of all personnel and equipment. Sea-level gauge monitoring and seismic event simulators are available to train the operators. Observers from other agencies are invited to SNAM to perform quality assurance for its operations. Currently, there are 5 DART buoys and 48 tide gauges, including Antarctica, Eastern Islands and Robinson Crusoe Island.
4. So far 70 tsunami tailor made flood charts have been produced based on probable extreme events, which can include both seismic and non-seismic sources. These flood charts are now mandatory to be considered for all new constructions, including critical infrastructure, which are located within the flood zone.
5. In response to Mr Angove’s (USA) inquiry on the staff turnover period of the watch standers at SNAM, noting that they are military personnel, RA Oxley responded that among the 300 personnel of SHOA, half of them are civilian personnel, including Oceanographers, Geophysicists and IT support, not subject to rotation, thus ensuring continuity. All personnel assigned to operations required to have a diploma to address the specific requirements of the post they are assigned to. The person in charge of the watch is normally a Lieutenant Commander or a Commander who must also have obtained the diploma and passed drills to be able to take responsibilities attached. It takes 4-6 months to get an Officer fully ready to be part of SNAM operations.
6. Dr Rabinovich (Russian Federation) inquired whether there was any collaboration with Universities. SNAM has a strong collaboration with the National Seismological Centre located at the University of Santiago
7. Mr Oxley (Chile) commented that they have a national seismological centre which is located in the University of Santiago and an annual tsunami expert symposium is organized to receive feedback on operations and improvements, such as addressing volcano-origin tsunami threat, which is currently limited to video-surveillance capabilities.

2. CHINA REPORT

1. Global seismic station network consisted by more than 700+ international shared station and 54 stations from CEA, and 27 coastal stations from China. Fast earthquake parameters are obtained automatically through Antelope, SeisComp3, WCMT, CEA and PTWS/USGS websites. Real-time sea-level data from nearly 600 functional tide gauges and DART buoys are available via GTS and from the IOC Sea-Level Monitoring Facility. Additional sea-level data from 130 tide-gauges from China is available, out of which data from 5 stations are shared via GTS for the South-China region. Tsunami modelling capability exist for all basins. A fully self-developed tsunami warning and decision-making system based on Python is available (Smart Tsunami Information Processing System - STIPS). Similarly, a self-developed Global Earthquake Automatic Detection System is running on 24/7 basis providing automatic earthquake parameters for events with M>6.
2. SCSTAC have the tsunami information processing system called as STIPS. It is fully self-developed tsunami warning by college with the Python languages on the it has been put into cooperation over the end of last year. Also, they developed the global earthquake automatic detecting and location system which can keep 24/7 a day and 7days a week running and rely automatically location of the global earthquake with the magnitude greater than 6. After that, it created to represent the SP3.
3. After the HTHH event, a volcanic eruption monitoring system is introduced into operations, which displays information such as eruption time and type. A back-up system is established in Hong-Kong (BSTAC) and is full operations since 29 March 2023. Another back-up center exists in Shunyi District of Beijing.
4. SCSTAC participated in both the online NMEFC-BMKG international conference on non-seismic tsunamis & complex tsunami and 2022 international online symposium on applied technologies for earthquake and tsunami monitoring, early warning and disaster mitigation in SCS region. SCSTAC has connected various science activities, both online and in-person, such as National Disaster Prevention and Mitigation Dat, World Earth Day at the National Maritime Museum and Beijing Science Center.

3. FRANCE REPORT

1. Dr François Schindelé (France) explained that France is representing the three different territories: French Polynesia from west to east, Wallis & Futuna and New Caledonia in the Pacific.
2. France contributes to many Working Groups and Task Teams of the PTWS. Particular activities focused on the HTHH event. CPPT in French Polynesia is acting as the NTWC. Events occurred in Kermadec Island, Loyalty Islands, and Vanuatu has the potential to impact French territories in the Pacific, and in fact, small tsunami was observed in New Caledonia after the magnitude 8.1 event, which also resulted in the triggering of the sirens. In the case of the May 2023 event in the southeast of Loyalty Islands, sirens were triggered again in New Caledonia but there was no tsunami impact.
3. Dr Schindelé provided a summary of events tsunami events that effected in French Polynesia and New Caledonia. Most of earthquake occurred in Kermadec Island, Loyalty Islands, and Vanuatu events. Among them, there was an event with – tsunami threat due to the earthquake magnitude 8.1 in March 2021. In New Caledonia, there was the triggering of sirens. The last event is also in southeast of loyalty islands in May 2023 no threat in French Polynesia but in New Caledonia, they had the triggering of sirens again.
4. Mr Stéphane Quema (France) continued with the presentation. CTTP in French Polynesia is responsible for tsunami forecast and detection, and information is sent to the NDMO in the French Polynesia. Efforts are in place to develop specific tools, such as Wphase automatic processing to assist the modulization of the tsunami height forecast in French Polynesia.
5. CTTP focuses on the collection of more bathymetry data and improve the bulletins with some more information for arrival times for max tsunami height and end of impact. Further work includes forecast for major harbours, efficient use of GPU systems, and French Polynesia Seismic Network update. Wphase module has been shared with New Zealand and Portugal, and collaborations exists with GNS New Zealand and Australia. Data from 2 new tide gauges and 3 seismic stations are available. Wphase solutions can be obtained within 10 mins after the origin time.
6. Concerning the activities related to NDMO, they have done enlarged exercises in the 13th of June 2023, involving the administrative, infrastructure, and emergency services. During these exercises, there were some school evacuations and at the end of the day, there was a media press conference to improve population awareness. Regularly they raise awareness of different components of the Tsunami Ready Programme and tsunami risks with schools and communities.
7. Ms Celine Barre (France/New Caledonia) presented the progress made for tsunami resilience in New Caledonia. 96 warnings from 2 different PTWC and IRD/ORSNET were received during the last 2 years. 12 events required actions from civil security, ranging from press release to triggering of sirens. Additional 3 major events were March 04,2021 Mw 8.1 Kermadec Islands event combined with the Niran Cyclone; 15 January 2022 HTHH event, and 19 May 2023 Mw 7.7 Southeast Loyalty Islands event.
8. Three events were organized in relation to the PACWAVE22 that took place in October 13, November 9 and November 22. Concerning the collaboration and sharing, since 2021 they are more involved in WGs and TTs with also share the data with the Oceania Regional Seismic Network (ORSNET). In addition, there are collaborations in progress with Vanuatu and New Zealand for the temporary seismic network via the Pacific fund.
9. For alert reception, lessons learnt demonstrated the need to improve the products to fulfil the requirements of both NMDO and NTWC. So, it’s the duty officers who are in charge of looking at the alert reception and they have some experts in IRD, not necessarily always available. From PTWC and IRD, there are improvements in 2023 to have more specifically alert reception or duty officers.
10. Currently there are 7 tide-gauges, but efforts are in place to improve the network to 9 tide-gauges. Out of 7 seismic stations, 6 are now in operations and funding options are being explored to improve the seismic network.
11. TsuCAL decision making tool for tsunami warning management and committee of tsunami experts are in place since June 2023.
12. Concerning the crisis management tools, it’s the big modularization comes to be operational in June of this year which is 2-years’ work between Institut de Recherche pour le Développement (IRD) and the government of New Caledonia and this modularization is the into 2-3 scenarios and they are trying to see at the moment they can see the maximum height but trying to find funding for data resource and higher resolution of satellite. New Caledonia is working closely with Nouméa to address tsunami mitigation needs. 73 sirens are in place to warn the public and subject to budget availability 2-3 sirens per year are being added. In the case of Nouméa, 7 sirens are being planned to be installed in 2024 through an agreement between the municipality and the Government. These sirens will be used both for the tsunami and shark risks. A warning tool developed by France (FRAlert) allows the use of cell-broadcast technology in 4G/5G and is currently being tested.
13. A conference on tsunami risk was organized on 6 September 2022 and another conference is being planned for 12 October 2023. Regarding TRRP, work is in progress to put in place a national committee to meet all 12 indicators, and 3 municipalities are being targeted (one on the East Coast, one in the Loyalty and Nouméa). Improvements in the use of social media accounts for public awareness has been achieved. The possibility of PacWave field exercises is being explored.
14. Mr Angove (USA) inquired on the dual use of the sirens and wanted to know if different sounds were used to differentiate the warnings. Ms Barre responded that a dedicated Working Groups is working on this task and technology allows to have to different type of sound at a given siren. Moreover, while the triggering of the tsunami siren will be centralized, the triggering of the shark siren will be through the firefighters at the municipalities.
15. Dr Bill Fry (New Zealand) commented that he wondered about the upcoming deployment of the Smart Cable and whether there is any activity or anticipation that the cable will also be utilized by the NTWC. Dr Schindelé (France) commented that the specific ToR of the system is currently being developed.

4. JAPAN REPORT

1. Mr Ushida Shingo gave an overview of the basic disaster management system. Japan has a basic disaster management plan, which defines the responsibility of each entity such as the national government, local governments, public cooperation, and others. They consisted of various plans for each type of disaster. The order of disaster management phases is presented according to the disaster management phase or prevention/preparedness, emergency responses, and recovery/reconstruction. He added that each local government has its own Disaster Management Plan based on the Basic Disaster Management Plan.
2. In terms of Tsunami Mitigation Activity in Japan, he mentioned that World Tsunami Awareness Day, 5th November, is the Tsunami Disaster Prevention Day in Japan. Earthquake and tsunami disaster drills are held in country every year. In 2022, about 2 million people participated in tsunami drills.
3. In 2022, JMA has established the Tsunami Flag as a means of visually communicating tsunami warnings. The design of the tsunami flag features a red and white checked pattern as a meaning of visually communicating tsunami warnings. JMA has been conducting activities to promote and raise awareness of the Tsunami flag corporation with organizations such as Japan Lifesaving Association. In terms of the recent development of tsunami warning systems since the 2022 eruption of HTHH, Japan has faced the problem to issue timely warnings for volcanic tsunamis. Therefore, Japan convened the science committee of experts. Taking into account their discussion, JMA established a new procedure to announce the possibility of a tsunami and major eruption of the sea.
4. In Japan, the responsibilities of JMA are clearly stated in the Meteorological Services Act. The DG and all the employees hold their duty according to the act. He added that in 2023, the Meteorological Services Act was revised to clarify that JMA issues tsunami warnings concerning volcanic tsunamis. As another example of the recent development of a tsunami warning system, JMA developed a method called tFISH to project the coastal tsunami height using offshore observations. This method estimates the initial tsunami height in the tsunami sources, using inversion analysis offshore of tsunami waveform data and simulating tsunami propagation. This method has been used operationally since 2019.
5. Japan is supporting many countries in terms of capacity building in Tsunami Warning System and Tsunami Mitigation through projects implemented by Japan International Cooperation Agency (JICA). The project for capacity building of CATAC in Nicaragua was implemented from 2016 to 2019. CATAC has operated to functioning interim matter since January 2022.
6. JICA capacity building projects in Vanuatu and Indonesia are currently under way.
7. Mr Angove (USA) asked the status of the meteotsunami warnings, whether there is any relationship between that threat and tsunami services or are they strictly handled within the weather services of the JMA. Mr Shingo responded that JMA has service division, volcanic observed division, oceanographic division and tsunami division. But, for the whole HTHH event, there was a huge discussion about volcanic tsunami in JMA regarding the HTHH event. Japan has its own meteorological research division in the institute, which includes experts in storm surge and oceanographic modelling.

5. TONGA REPORT

1. Mr Fa’anunu apologized that they didn’t submit the written report. He stated that the team is working on that and if it’s ready they will upload it.
2. In terms of the progress this year, he informed about the training conducted by Dr Kong in Hawaii, to which some officers from the warning centre and the national emergency management office were sent. He informed on the preparations and planning of their national drills in late this year.
3. Mr Fa’anunu informed on the progress in terms of their other activities, including the installation of infrasound and seismic stations as well as the seismic network upgrade.
4. In terms of the Pacific Resilience Project, Tonga is also planning to install the two-volcano monitoring networks. One is in Tofua volcano which is an active volcano, and another one is in Niuafo’ou to the north. Some other active plans for this year or next year are that they are looking to install some GNS in stations under the climate and ocean Science funded by the government of Australia. They have also installed the tide gauges in HTHH.
5. Tonga is also developing a mobile application for the youth to disseminate the warnings and also provide cross-sourcing for the reporting of earthquakes. He believed that the current 10 minutes threshold they have to respond to a local tsunami is not good enough, so they are looking for huge cloud-sourcing to improve this situation.
6. Through WMO assistance, they are working to establish cell broadcasting capability which is under the World Bank project, and it is on the progress. In 2022, the response for the HTHH event, all response agency was busy that time, however, in the end of this year, they were able to host the 7th ORSNET meeting in Nuku’alofa. In addition, he stated that they haven’t had much success using the 9 buoys deployed as most of them broke up as a result of vandalism or picked up by fisherman.
7. Tonga commissioned their national siren system in September of last year, Tonga installed two sirens crossing the whole country so they can turn them on at any time. When there was an event of 7.2 magnitude last November, they were able to use the sirens even if the earthquake happened midnight. They continue to provide awareness of using the siren systems. In addition, he added that they test the system on the last Friday of every month.

6. USA REPORT

1. Mr Michael Angove (USA) briefly introduced the US Delegation. He stressed the primary focus area of the US advancing their tsunami detection measurement and techniques. Currently, the US recapitalizing the DART network of 39 stations along the west coast of the US and throughout the Pacific North-South Pacific. In addition, they are recapitalizing all of the 4th generation DARTs, but it doesn’t mean they are employing the band pass filters to do near-field detection.
2. Mr Angove informed the participants on the operational GNSS application GFAST and the GUARDIAN which is the ionospheric Total Electron Content (TEC). Mr Angove gave a quick introduction about how that technique works and what some of the capabilities coming through there are. In addition, he added that they help the smart repeater that Mr Bruce Howe will provide the overview later.
3. Mr Angove stressed they are still advancing seismic techniques and commented that in terms of the investment of detection, they should decide if they’re going to measure the tsunami proxy or to measure it directly. He added that there is the value to both of those. For instance, the GFAST is still a proxy measurement for the earthquake itself. It does not mean directly measure the tsunami, but a large percentage of dangerous tsunamis are generated by that mechanism which is worthwhile. He stated that with this idea, people can still have a strategy for non-seismic sources and still due direct detection and measurement.
4. Mr Angove mentioned the deployments by New Zealand on Kermadec Islands, and stated that when put instruments were deployed, typical sources were considered. It turns out they happen to be in exactly the right spot to be able to support all that great modeling and eventually, early warning.
5. Mr Angove added that they have two tsunami warning centers, one in Honolulu and another one in Palmer Alaska as the national center. In principle, they both should be capable of backing up each other, but the center in palmer does not necessarily have the same systems, analytical capabilities, and architecture. There is work in progress to ensure full back-up capabilities.
6. The third focus area is the preparedness metric, which is the US Tsunami Ready program. There are over 200 communities designated as Tsunami Ready and many of those are in the Pacific.
7. USGS is very active, and they’ve installed new instruments in Fiji and Tonga. Mr Michael highlighted that the Real time GNSS will be a major player in the next generation of detection. They still have gaps which are not always instrument gaps sometimes it is a matter of finding data sources and being sure that they shared so that everyone can use them and take advantage. NOAA is actively engaged with the UN Decade of Ocean Science noting that there is no fund that can support the UN Decade. NOAA is looking to advance in advancing UNODTP objectives through ICG/PTWS engagement. In terms of the ICG structure, Mr Michael stated that this brings in a lot of different scientists and concepts which ultimately require everyone’s skin in the game. He argued that it would be an interesting discussion regarding what everybody can contribute to this. They will be laid out and the goals will be going to be established but it’s up to each one of them as they represent their countries to decide what they can or can’t contribute to achieve some of those goals. As Dr Kong mentioned earlier, he would like to especially underline the detection, measurement, and readiness.
8. Mr Sifon (Chile) queried whether the NTWC acts as the backup for PTWC, and vice-versa when that happens, they are capable of acting as the Tsunami Warning Centre. Mr Angove (USA) responded that NTWC indeed acts as the backup for PTWC and vice-versa and they are currently acting as the tsunami warning centre for the extreme near field on the US west coast. Mr Sifon (Chile) asked if PTWC acts as the national tsunami warning centre for the United States and if it is still capable acting as a TSP. Mr Michael (USA) answered that the US National Tsunami Warning Center covers national responsibilities all the time for the US territories such as Hawaii, Guam, and Puerto Rico. If there are events for some reason, and the other center is down, they will handle the US responsibility for that as well as internationally.
9. The Chairperson mentioned before the coffee break, that there is an offer by NASA about the presentation of the GUARDIAN project presented by Mr Michael Angove on behalf of Timothy Melbourne (Central Washington University, the USA). Mr Angove (USA) briefly explained the project is about how the technique uses the Total Electron Content (TEC) and can be applied to many disasters, not only for earthquakes but for volcanic eruptions. The GUARDIAN takes signals generated by the natural phenomena and is capable of producing information in near real-time.

7. MALAYSIA REPORT

1. Ms Azahani (Malaysian Meteorological Department, MET Malaysia) stated that MET is an organization responsible to identify and characterize tsunamigenic events. MET continuously monitors seismic activities in and around Malaysia. When an earthquake takes place, MET immediately determines the hypocentre and magnitude of the quake. Other than that, they also monitor the tsunami arrival at the coast of Malaysia and tsunami-categorize as by magnitude and tsunami height at the coast area of Malaysia. For local events, MET Malaysia issues a tsunami warning when the depth is less than 100 km, the magnitude is more than 7.5 and the forecasted tsunami height at coastal area of Malaysia is more than 0.5 m. When the magnitude is between 6.5 and 7.5 and tsunami height at coast area is less than 7.5, a tsunami advisory will be issued.
2. In terms of a distant tsunami, if there is any possibility of tsunami generation, MET will immediately conduct the tsunami forecast operation in the same manner and criteria as the local tsunami procedures. Data of tsunami observations from foreign countries and historical records are also considered for the forecast of tsunami height along Malaysia coasts. The threshold or criteria for declaring a potential tsunami emergency is 0.5 or more for the potential height.
3. Concerning the national sea level network, Malaysia has 25 tide gauges stations located all over Malaysia and use Very Small Aperture Terminal (VSAT) for the communication to make sure the stability in receiving and transmitting the data every minute.
4. Regarding information on Tsunami occurrences, in 2004, Malaysia was also affected by tsunami Aceh which reached from Aceh to Langkawi in about 3 hours, resulting in around 68 casualties. After that, under the Malaysia plans, they continuously put their efforts to improve the Tsunami Early Warning System. Until now, under the Malaysia plans, they have 18 unit of seismic station 25 location of tide gauges, and 83 units of tsunami sirens installed all over Malaysia. Last year tsunami observation and simulation terminal (TOAST) were installed the tsunami simulation software. The target dissemination time for tsunami alerts are within 8 mins from the time detection of earthquake events.
5. Public awareness campaigns have been carried out at tsunami high risks areas since 2007. The awareness campaigns also include extreme weather awareness and are held at various location throughout Malaysia 6. Around 75,000 participants all together have participated in these campaigns so far.

8. NEW ZEALAND REPORT

1. Mr Roger Ball (National Emergency Management Agency, NEMA) stated that New Zealand tsunami risk management continued to progress in the inter-sessional period, managed across the workstreams of several partner agencies in national and local governments. The work, as integrated into the National Disaster Resilience Strategy, falls across 3 major objectives.
2. First Objective is on managing risk: Important research programmes have continued to progress with the rapid characterisation of earthquakes and tsunami research programme and probabilistic tsunami hazard modelling, led by Dr Bill Fry of GNS. In addition, Toka Tū Ake EQC and GNS science have completed a national exposure assessment for tsunami hazard and risk in 2022. The study found that 9.1 % of buildings in New Zealand are exposed to credible tsunami events equating to NZ$67 billion replacement value. The results from this study will be used to inform future investment in more detailed tsunami impact studies to reduce risk in areas of high exposure. In addition, improved loss modelling continues in order to further develop an evidence base to inform land-use planning decision-making with regard to reducing tsunami risk.
3. Second major national objective is effective response to and recovery from Emergencies. He added that 24/7 tsunami warning operations with transitioning from on-call duty arrangements were established at NEMA in 2022. The accomplishment exists 24/7 capability for GNS sign, tsunami monitoring, and threat assessment and completed the key recommendation from the review of the 2016 Kaikoura Earthquake and Tsunami. Work towards key elements of national consistency regarding tsunami response, including nationally consistent and locally appropriate boundaries for tsunami evacuation zones has progressed. This has been formed by national science research and the public perception and awareness of evacuation behaviors in New Zealand. In addition, the role played by a response by HTHH volcano-tsunami event network expedited the termination of tsunami warnings and advisories in New Zealand. Detection and observation of first-wave arrivals on the network also had a direct role in the issuing of a National Advisory before the first arrival at the New Zealand mainland coastline. He mentioned an update of the New Zealand National Tsunami Advisory and Warning Plan is expected by the end of 2023.
4. Third national major objective is enabling, empowering and supporting Community resilience. Public education campaigns, including a national earthquake and tsunami drill, continue with a growing level of engagement. He stated NEMA runs large tsunami awareness campaigns over the summer holidays in New Zealand and promote tsunami hikoi (evacuation walk) as part (New Zealand) ShakeOut every year. He raised an example that in 2022, over 700,000 people signed up for New Zealand ShakeOut increasing year and year. The National Get Ready website, which includes information for the public on what to do before, during and after emergencies, has been translated into 15 languages to date. In addition, in late 2022, NEMA launched the first version of the National Aotearoa Tsunami Evacuation Map. This is an interactive map tool that allows people to search their home, work, or school address to find out if it’s in a tsunami zone. The map is informed by data provided by CDEM Groups and councils, including tsunami zone areas and advice specific to each region. Finally, New Zealand’s first National Natural Hazards Portal will launch in 2023. This is a government initiative to improve access to data and information about natural hazards, supporting risk-informed choices about property and land. He ended his presentation by looking forward to colleagues in the future.

9. INDONESIA REPORT

1. Mr Januar Arifin (Indonesian Agency for Meteorology, Climatology, and Geophysics (BMKG)) stated that the BMKG is the government agency in Indonesia responsible for monitoring and providing information about earthquakes and tsunami early warnings. In addition, BMKG has become the focal point of the Indonesia Tsunami Early Warning System (InaTEWS) to detect and respond to potential tsunamis in the region. BMKG also acts as the Tsunami Service Provider (TSP) for the Indian Ocean region in collaboration with India and Australia. BMKG’s main products are earthquake information and tsunami early warning with a target dissemination time within 4 minutes after earthquakes.
2. By 2023, BMKG has 438 seismic sensors of earthquake monitoring, and will add more 83 stations. For Tsunami monitoring, there are 382 sea-level stations already integrated in the InaTEWS. BMKG is also trying to improve the quality of the earthquake parameters by utilizing seismic data sharing.
3. For the earthquake processing system, BMKG is using SeisComp5. For the tsunami operations, BMKG relies on TOAST.
4. Mr Arifin presented the system developed by BMKG specifically designed to monitor non-seismic tsunamis that emphasize and direct sea-level observation as their existing tsunami early warning system. In addition, they integrated many sea-level stations to domestic from international data exchange.
5. In terms of the area of monitoring for the tsunami, the BMKG addresses potential distant tsunami threats based on predefined cluster areas, each of which has distinct response times and handling procedures. The decision to issue early tsunami warnings relies on the outcomes generated by the Decision Support System TOAST based on detected earthquake events with appropriate magnitude as an input. There are 4 kinds of tsunami dissemination bulletins. Bulletin 1 or PD1 contains earthquake parameters and tsunami potential, estimation of tsunami arrival, and estimation of tsunami height, to be released within 4 minutes from the earthquake origin time. This is then followed by bulleting 2 or PD 2, which included updates on earthquake parameters, estimated tsunami arrival times and threat level, to be issued within 10 minutes. Bulletin 3 or PD3 will be issued within 30 and 60 minutes in case of observations. Bulletin 4 or PD 4 will declare the termination of tsunami early warning.
6. In terms of SOPs for atypical tsunamis, BMKG will receive information about increased sea volcano activity with tsunami potential from PVMBG (Indonesian Center for Volcanology and Disaster Mitigation). If there is a notification or alert from the InaTEWS Sea Level Monitoring System or waves captured by CCTV or officers receive information from people/community, then the officers will check whether there are sea level rise anomalies observed at the nearest location. Official data is confirmed with additional data like seismic, CCTV, oceanic radar, volcanic activities, or event community reports and even local/regional officer report. In case of a tsunami, PD3 will be issued.
7. BMKG is in the process of obtaining IO 9001:2015 certification for both its Regional Earthquake Center IV in Makassar and Regional Earthquake Center VII in Yogyakarta.
8. BMKG has advocating the implementation of the TRRP in 9 vulnerable communities (Tnjung Benoa, Glagah, Kemadang, Pangandaran, Panggarangan, Tambakerjo, Kuta Mandalika, Purus and Lolong Belanti.)
9. In order to enhance tsunami preparedness within at-risk communities and support the UN Ocean Decade Science target of “100% community at risk is prepared and resilient”, BMKG played a role as a speaker in the Ocean Teacher Global Academy Tsunami Community Preparedness Training Course which held in 4-11 December 2022 with 30 participants from Indonesia, Thailand, Seychelles, Philippines, Malaysia, and Bangladesh for the topic was Tsunami Community Preparedness.
10. In terms of the upcoming plans, to enhance the tsunami warning evacuation system, they aim to expand the tsunami scenario database as well as improve bathymetry and topography data. In addition, they explore utilization of GNSS data for earthquake magnitude calculation, focal mechanism determination, and verification of tsunami sources. BMKG works on integration accelerometer data to enhance hypocenter accuracy and develop new magnitude formula for earthquakes taking into account the tectonic characteristics of the region and seismic network and dissemination system. In addition, they developed a New Earthquake and Tsunami System Processing for InaTEWS. According to the tectonic characteristics of Indonesia, they developed the magnitude new formula. In addition, they established an MT analysis catalog and added tsunami measuring equipment in each warning segment. Also, BMKG will host the Tsunami symposium to commemorate the 20th anniversary of the Indian Ocean tsunami in Aceh in 2024.

10. REPUBLIC OF KOREA REPORT

1. Korea Meteorological Administration (KMA) operates Tsunami Early Warning system in 24/7. If an earthquake with a magnitude of 5.0 or higher occurs, KMA issues automatic earthquake early warning within 5-10 seconds. Since 2015, KMA has successfully issued earthquake early warning system in 5 times. The tsunami warning system has been progressed extensively since 2017. When an earthquake with a magnitude of 6.0 or higher occurs in the vicinity of the Korean peninsula, KMA calculates the magnitude and location of the earthquake and assesses the impact of the tsunami using a pre-calculated scenario database. Based on the results, a tsunami warning is issued if the expected tsunami wave height is more than 1.0m and a tsunami advisory is issued if it is between 0.5 and 1.0m. Also, tsunami information is issued if the tsunami wave height is expected between 0.2 and 0.5 m. In areas where warnings are issues, a tsunami alert message is automatically sent to the public by the Cell Broadcasting System (CB). This information is disseminated to the public through KMA website, TV broadcasts, portals, YouTube, and SNS. Also, national and local authorities receive them via text messages, fax, email and computer messages.
2. When a warning is issued, additional information is made on tsunami and observed data is provided for forecast points within the warning area. If necessary, the numerical model is used to obtain more accurate tsunami forecast information using earthquake parameters. The arrival time and maximum height of the tsunami is observed by applying tsunami detection algorithms to observed sea level data in real-time. The cancelation of tsunami warning is considered if the tsunami height remains below 0.2m for more than two hours. NWPTAC and PTWC forecasts the impact to the Korean peninsula and KMA can issue tsunami information as well.
3. In terms of Tsunami observation, KMA collects sea-level data from various organizations. 26 sea-level stations are owned by the KMA, and 55 stations belongs by Korea Hydrographic and Oceanographic Agency (KHOA). In addition, sea-level data from 22 tidal stations of Japan Meteorological Agency (JMA) are collected in real time and used for monitoring tsunamis.
4. KMA is conducting various technological development and research to enhance the tsunami prediction capabilities. To strengthen observation capability of the tsunami, KMA develop technical to use the Real Time Kinematic-GPS method. In addition, KMA conducts the tsunami training to improve its ability to respond to the tsunami and conducts joint training in cooperate with disaster management agencies and local governments every year.
5. The Secretariat stated there was a question in the Zoom which addressed to the US about whether 4th generation Tsunami DART Buoys have been deployed in the Pacific for mitigation purposes. Mr Charles McCreery answered that they are recapitalizing all of the legacy systems and that it will be a multi-year process to go through and upgrade the hardware. They are still in their original dart position, but they will be updated with DART 4 hardware and software. He stated that several such systems have been deployed already.

**3.7 WORKING GROUPS AND TASK TEAM REPORTS**

3.7.1 WORKING GROUP 1: UNDERSTANDING TSUNAMI RISK

1. Dr Vasily Titov (Lead Scientist, NOAA Centre for Tsunami Research – Pacific Marine Environmental Laboratory, the USA), presented a report on behalf of Christopher Moore (USA) Co-Chair of WG1, available as a [Presentation](https://oceanexpert.org/document/33225) (It was noted that the responsibilities of Diego Arcas (USA) as the WG1 Co-Chair were transferred to Christopher Moore (USA) during the intersessional period.)
2. Dr Titov briefly explained the effect of understanding tsunami risks including hazards. He mentioned the scope of the group which is vast and covers all the tsunami research to understand the tsunami risk and hazards including developing and promoting the best practices for tsunami risk assessment, material programme standards, and lots of specific activities working with scientific experts to support MSs and tsunami risk assessment, tsunami reduction to improve the practices and assessment is increasing their local sources and non-seismic data tsunami sources.
3. Dr Titov highlighted the workshop that that took place to identify tsunami sources and risks for Peru and Chile. Its report is currently being prepared. He further mentioned the list of activities that the working group undertook in parallel to the US efforts for the national tsunami hazard mitigation of similar scope to develop seismic sources scenarios for the risk assessment, which is part of the national programme, but also contributing to the Pacific risk assessment. He presented an overview of the past hazard assessment studies
4. Various new features have been added to the TsuCat. The new version of ComMIT (v1.8.3) uses global tsunami propagation database for input for local inundation models. Tweb, as a web-based tsunami modelling tool is also linked to the ComMIT. GNSS data has been integrated into DIFT to improved inundation estimates.
5. Mr Bill Fry (New Zealand) commented that the US National Tsunami Hazard model had contributions from experts in New Zealand and Australia for the development of the source model. He wondered whether it was appropriate for the link between that source model and WG 1 hazard assessments. He asked whether it is useful for working with Group 1 to reach out to communities that are separate from their IOC community to try and find a way to facilitate information transfer for that source model for use by that community. Dr Titov responded that the scope of the working group is wide, including all kinds of activities used in the risk reduction side.
6. Mr David Hiriasia (Solomon Islands) posed his question on risk assessment, pointing out the lack of risk assessments in the SW Pacific, and inquired whether this is the result of funding issues or lack of expertise. Dr Titov commented that the funding is definitely an issue. However, the slide presented is dated to 2009 showing where these activities have started. He added that it is focused on the Indian Ocean after the 2004 Indian Tsunami, the reason why the IOC started this activity of Tsunami mapping. He stressed that the recent version is more complete and impacts which probably covers the most of coastline of the Pacific.
7. Dr Miao (Australia) asked the Secretariat regarding the process for the approval of the WG recommendations, and whether they have to make any recommendation of workplans of ICG to approve when each working group or task team reports. In addition, he raised questions about 1) a mechanism the working group should work on and 2) whether it was separately discussed in policy matters.
8. The Secretariat clarified that the Working Group recommendations should be provided to the consideration of the ICG under the respective agenda item to be approved, after being presented during the respective presentation under the respective agenda item. Dr Miao (Australia) commented it means that the working group or a task team needs to be diligent and be explicit on what it recommends to ICG for a way forward because the current presentation is merely a status report. Mr Korovulavula reminded that two chairs who were in this working group have left during the intersessional period and Dr Titov just presented what he could muster to report for the meeting today.

3.7.2 WORKING GROUP 2: TSUNAMI DETECTION, WARNING AND DISSEMINATION

1. Dr Bill Fry (Chair WG2, Principal Scientist, GNS Science, New Zealand) presented the [Report of WG2](https://oceanexpert.org/downloadFile/54566), available also as a [Presentation](https://oceanexpert.org/document/33198).
2. He began his presentation recalling the decision made 2 years ago on conducting an expert meeting for the New Hebrides region to ensure that this decision doesn’t get lost because of leadership transition in WG1.
3. The structure of WG2 is large and there are 4 TTs currently under WG2 (TT-Tsunami Service Providers, TT-Seismic Data Sharing in SW Pacific, TT-Minimum Competency Levels for National Tsunami Warning Center Operations, TT-Integrated PTWS Sensor Networks for Tsunami Detection and Characterisation.
4. The first TT on the minimum competency framework for the NTWCs will be covered under agenda item 4.3. He believed the framework tends to be adaptable and able to incorporate lessons-learned during future events and processes. WG2 proposed to disband this task team, if the framework is accepted by the ICG/PTWS during the current session.
5. TT-PTWS Sensor Networks will be covered under the agenda item 4.4. According to the TOR, for this TT has 3 points.

* Developing a methodology for gap and sensitivity analysis that combines multiple sensing technologies for tsunami detection and characterisation. This task team was born out of the recognition of the rapid advancing field of potential cable observation like SMART cables, and GNSS technology.
* Integrating emerging techniques and sensor technologies aiming to better use of all the different sensing, data sharing they have with the existing network to meet warning service requirements, dealing with how to take the dispreading data is to package it together in the way they can use all the data
* Where possible, include a cost-benefit analysis of the potential technologies being considered, which provides the criteria with the framework they developed.

1. Dr Fry explained the spatial and temporal sensitivity of data in relation to the tsunami observations, confirmations, cancellations and their relation to the distance from the source or time. Dr Fry highlighted the relative of using the data streams and need to understand where each of data stream fit into the whole warning chain. One of the recommendations that came out from the TT is that noting the rapid advances community initiative in the geodesy and geophysics they are going to recommend the establishment of WG2 and TTs to support the alignment of their PTWS work in the global effort in geodesy. WG2 see geodesy as a big challenge but also with a potential to present great benefits.
2. TSP TT chaired by Dr McCreery will present few different recommendations under the respective agenda item, which will address the proposal for the source zone expansion, maritime products and the progress in the updates of TSP for the user guides. He proposed the continuation of the TT for the TSPs.
3. Telefaxing messages is an old technology that is not commonly used, failing all the time for 44 out of 65 designated telefax numbers. He added that the problem is once fax fails it attempts five times by the telefax provider, resulting in a loss of for giving up US5$ for each series of failures, reaching a total sum of US$14.300.
4. The recommendation is that the ICG/PTWS requests the IOC to send a letter to all MSs informing them of the plan to terminate telefaxing as a method of receiving PTWS TSPs text products. The IOC requests MSs to respond if the termination of TSP fax services will result in an unacceptable risk of not receiving TSP text products. They recommended the ICG/PTWS to provide suggestions for alternative dissemination of these products. The ICG/PTWS sets a target date to cease all telefaxing by the TSPs except to potential numbers at the discretion of each TSP. The PTWS TSPs and the MSs explore and implement alternative dissemination methods to ensure that everyone gets proper data.
5. The TT on Seismic Data Sharing in the Southwest Pacific (Co-chairs Rennie Vaiomounga and Mathew Moihoi) is working closely with ORSNET community. WG2 requests to ICG/PTWS to view the outcomes for the 7th ORSNET Meeting presented in Appendix 4 of the online report. There was a back-to-back meeting of every task team and the ORSNET program and their recommendation was suggested to them by TTs as a recommendation to the IOC.
6. The complementarity of TT Seismic Data Sharing and ORSNET are noted and noting also the regional focus of this task team, WG2 recommends ICG-PTWS consider moving the TT Seismic Data Sharing from WG2 to the Pacific Island Countries and Territories Working Group.
7. WG2 recommends the ICG/PTWS adopt the recommendations contained in the TOWS TT on Tsunamis Generated by Volcanoes. In addition, it was also noted that the recommendations of establishment of new monitoring infrastructure may be beyond the capabilities of MSs in some situations. He added therefore, WG2 recommends the establishment of TT to explore options for developing alternative warning strategies for TGV. They believed that these are separated tasks from developing and source agnostic early warning. He stressed this is the way to use the current available data in quick way to provide advice to MSs for deploying new seismic network. WG2 recommends the establishment of a permanent HTHH monitoring and warning system based on the products and method in place since March 2022 and presented in the CL 2882 and CL2902. He added that documents are using an interim procedure, and they would like to make them a permanent procedure.
8. Dr Fry pointed out the recommendation on the establishment of TTs to investigate news of TEW strategy based on direct tsunami observations of the ocean height specifically targeting a volcano which potentially has different tolls. Recognizing the increase in scope and complexity of WG2 through the requested establishment of an additional 2 TT, bringing the total number 5, and rapid advances in Early Warning Methods, WG2 recommends the addition of 2 vice-chair roles to support the chair in the next intersessional period. WG2 requests the ICG/PTWS solicit confirmation of current members of WG2 and nominations for additional representatives from Member States.
9. The Chair mentioned that phasing out of telefax of TSPs will have large impact on the transmission method to the Member States and he opened the floor for comments and questions to the WG2.
10. Dr Miao (Australia) commented that the recommendations are reasonable due to the complexity of the tasks for this working group. He commented that phasing out of telefax as TSPs must be considered by the ICG, noting that it is an ancient technology, and it is not well received now in these days. However, they should take note that it may still be working in some areas. So, the proposition is for the phasing out but not the immediate cease of telefax.
11. Mr Ushida (Japan) explained that they repeatedly failed to deliver their telefax numbers so Japan supported the recommendation regarding the phasing out of telefax, emphasizing the need for PTWS to explore alternative methods to ensure that all Member States has reliable dissemination’s methods.

3.7.3. WORKING GROUP 3: DISASTER RISK MANAGEMENT AND PREPAREDNESS

1. Ms Ashleigh Fromont (Chair WG, Acting Team Leader, Hazard Risk Management, Risk & Recovery Unit, National Emergency Management Agency-NEMA, New Zealand) and Dr Kong (Vice Chair WG3, Director of the UNESCO/IOC International Tsunami Information Centre) presented the [Report of WG3](https://oceanexpert.org/downloadFile/54540), available as a [Presentation](https://oceanexpert.org/downloadFile/54540).
2. MsFromont noted the report of WG3 which has information with their recommendations is available on the website.
3. Ms Fromont mentioned the ToR which was reaffirmed in the previous meeting of the ICG. Many works have been delivered through the work of the International Tsunami Information Centre (ITIC) and the IOC Tsunami Ready Guideline (MG-74) has been published.
4. Concerning the actions and notes from the TT-DMP tasks include a guideline for mainstreaming Tsunami Disaster Risk Reduction for coastal urban development planning, critical infrastructure from impacts, and update the Tsunami Hotel Guide. UNESCO/IOC Tsunami Ready Recognition Programme (TRRP) and a Tsunami Ready Coalition established. In order to raise the profile of TRRP in collaboration with critical stakeholders across the UN system and also advised TOWS and its TTs for another main component for tsunami ready. In addition, Dr Kong, the Director of ITIC, was appointed Chairperson of the Tsunami Ready Coalition and will serve for two-year period in 2024.
5. In terms of promoting preparedness, she reported that the World Tsunami Awareness Day (WTAD) focus for 2022 was the target (g) of the Sendai Framework which was regarding the availability of and access to multi-hazard early warning systems. In 2021 the previous WTAD was organized by ITIC ‘shout-outs’ (Be Aware, Be Prepared, Be Tsunami Ready) in the Western Pacific, Pacific Islands, and Eastern pacific). For the 2023 campaign, the theme focused on fighting inequality for a resilient future. In addition, concerning the exercises, the PTWS designed and carried out a 10th Exercise Pacific Wave.
6. In terms of Awareness Products, the ITIC continued to update its global and regional awareness products and to create new ones. Updates were done until 2022 and the WG have identified that undertaking further identification of existing awareness product would be beneficial. She raised an example for a tabled list of videos in the UNDRR IOC video repository.
7. ITIC conducted a number of person-trainings, but after COVID-19, it was not allowed to do in-person meetings from March 2022 to October 2022. These trainings are including the tsunami ready implementation as well as tsunami ready evacuation, SOPs and training session. Tsunami Ready Implementation training for Kiribati, Samoa, Solomon Islands, and Vanuatu is planned. ITIC is supporting the IOC Ocean Teacher Global academy (OTGA) as a designated Specialized Training Center for Tsunamis. They work together for Tsunami Ready Training for topics such as Tsunami Awareness, Tsunami Ready, Tsunami Early Warning Systems, TEMPP, Tsunami TWC and TER SOPs, and NTWC Competencies.
8. The progress of the Tsunami Ready Recognition Programme will be reviewed under agenda Item 4.2.17 Pacific Communities in 6 countries (Honduras, El Salvador, Costa Rica, Guatemala, Panama and Samoa) will have official recognition. TRR for communities is further planned or underway in at least in 9 countries. 5 further member states have expresses interest to ITIC in implementing Tsunami Ready, and most countries have already achieved some indicators.
9. TSUCAT (introduced in 2017) has a new version, v4.3, made available in Quarter 1 of 2023. The major addition is the addition of options to include community tsunami exercise injects that are based on the PTWC messages. In 2022, the U.S. compiled tsunami maritime guidance and practices for hazard planning and preparedness for Maritime Communities.
10. She mentioned about numbers of the implementation of formal recognition programme with official notification to the IOC. Through WG3, MSs can continue to share the outcomes and progression towards the 100% ‘Tsunami Ready’ goal with WG3, including communities that are already considered compliant through national standards.
11. She stated that they continue their mandates. The ITIC continue to facilitate implementation and data collection regarding Tsunami Ready compliance in the PTWS. Regarding the Marine Ports Guidance, in 2022, the U.S. compiled tsunami maritime guidance and practices for hazard planning and preparedness for Maritime Communities. The ITIC compilation of global best practices in tsunami resistant building design and vertical evacuation guidance remains available with the link on the website.
12. In terms of the tsunami risk reduction theory, the WG notes that a MidTerm Review of the implementation of the Sendai Framework for disaster Risk Ruction has taken place. The high-level recommendation released in Jan 2023. Three of recommendations pertain to early warning systems. To work closely with communities creates systems that integrated with local knowledge on disaster risk. In governance engagement, it links between early warning systems to social protection to address vulnerability to natural hazard impacts.
13. She stated that in 2022, New Zealand published risk assessment guideline for use by regional officers for promoting identification and mitigation of opportunity. This approaching guide encourages to identify treatment of multiple hazards. In similarly. UNDRR published the “Technical guidance on comprehensive risk assessment and planning in the context of climate change” which is the framework on increasingly complex and cascading risk due to climate change factors. It can be used to methodology and guidance to mitigate tsunami risks and climate change adaptation.
14. There were no comments following this presentation.

*[UPDATES FROM THE SECRETARIAT ON THE ELECTION-RECOMMENDATION COMMITTEES AND ON INTRASESSIONAL WORKING GROUPS]*

1. At this stage The Secretariat gave an update about the nominations and informed the delegations on the receipt of 1 nomination for the Chair and 3 nominations for the Vice Chair positions.
2. Election Committee Members are:

* Mr Roger Ball (New Zealand)
* Mr Ching-chi LAM (China)
* Mr David Hiba (Solomon Islands)

1. Recommendations Committee Members are:

* Ms Lara Bland (New Zealand)
* Mr François Schindelé (France)
* MS Adrienne Mosely (Australia)

1. The Secretariat proposed that the Election Committee and Recommendations Committee meet themselves today and appoint a Chair.
2. The Secretariat said that the second issue on the Intra-sessional WGs is that they they must investigate the PACWAVE 2024, UN Decade of Ocean Science for Sustainable Development, Tsunami Ready Programme, Tsunami Ready Programme Implementation, and Tsunami Generated by Volcano and Warning Systems. He stated that there was an agreement to split this into 2 separate sessions on Thursday: one to be conducted before the coffee break and another to be conducted after the coffee break. He added that initially they were planned to be as parallel session. He received the suggestion because of the fact that some Member States are only represented by one delegate the sessions will be proceeded by one after the other. The order will be as follows:

i. Before the coffee break, 45 mins for the PACWAVE 2024 to intersessional WGs PACWAVE

ii. 45 mins for the OCEAN Decade for Tsunami Programme

iii. After the coffee break, 1 hours for Tsunami Ready Programme

iv. 1 hours for the Tsunami Generated by Volcanoes (TGV)

1. The Secretariat asked to Member States’ if they agree on the proposal. The Chairperson indicated that there is no objection and declared that they will proceed according to the proposal. This was confirmed by the Secretariat stating that the next day morning they will start with the PACWAVE 2024 and continue with Ocean Decade Tsunami Ready Programme. The Tsunami Ready Implementation will be after the morning coffee break followed by TGV.

3.7.4. REGIONAL WG SOUTH CHINA SEA

1. Mr Dakui Wang (China), Chair PTWS WG-SCS presented the [Report of WG-SCS-X session](https://oceanexpert.org/downloadFile/49671), which was available also as a Presentation.
2. Mr Dakui summarized the activities of the WG during the intersessional period. The 10th Meeting was held in the 28th and 30th of September 2021 with China, Indonesia, Malaysia, Philippines, Singapore, Thailand and Viet Nam including NWPTAC. The group elected Mr Dakui Wang (China) and Ms Suci Anugrah (Indonesia) as the Chair and Vice-Chair, respectively. The group agreed to conduct the IOC training workshop on tsunami forecasting and risk assessment for tsunami warning operators in the SCS region hosted by China. The group agreed on dissolve a TT on the Establishment of a South China Sea Tsunami Advisory Centre of the Regional Working Group on the Tsunami Warning and Mitigation in the SCS and decided to establish a TT on capacity development and services. In addition, they agreed to commence full operation of the “Backup South China Sea Tsunami Advisory Center (BSCSTAC)" in Hong Kong upon satisfactory performance in the trial operation period with a specific date to be decided by SCSTAC and announced by the IOC Secretariat to the WG-SCS MSs through a Circular Letter.
3. The group welcomed the SCS proposal to continue with the International Staff Programme to host 2 or 3 experts from the MSs of the WG-SCS in 2022 subject to the condition of the COVID pandemic. In addition, they accept with appreciation the offer of China to keep the possibility of hosting an in-person meeting of the Group in 2022 in Guangzhou, China.
4. In terms of actions and recommendations of the group, the training for seismic and the tsunami warning operator for proceeding standards SOP for seismic data and the tsunami warning in the region was held on 9th and 10th December 2021 (online). Over 150 participants from Brunei, China, Indonesia, Malaysia, and Vietnam attended the training. Additionally, the first NMEFC-BMKG Workshop on Non-seismic and complex tsunamis was organized on 14 July 2022, in which more than 200 participants were present from Brunei Darussalam, China, Indonesia, Philippines, and Singapore, as well as Japan, Tonga and Unites States. The 2022, International Symposium on Applied Technologies for Earthquake and Tsunami Monitoring, Early Warning Systems, and Disaster Mitigation in the South China Region took place on 20th December 2022, and was attended by over 100 participants from Brunei Darussalam, China, Indonesia, Malaysia, Philippines, Singapore and Thailand.
5. BSCSTAC in Hong Kong commenced the full operation in March, and a communication test was conducted on 29 March 2023. The short-term of international staff programme is ongoing and announced by the IOC CL-2949. The first international staff training was held in 2018 with 2 colleagues from the MSs (Indonesia, and the Philippines), and the second term of the programme was held in 2019 with 3 colleagues from Malaysia, Philippines, and Viet Nam. Now, short time started with 10th October and December 10th with 4 colleagues (2 from Indonesia, 1 from Malaysia, and 1 Philippines).
6. The 11th meeting will be held in two weeks in Guangzhou, China. Since there were no meetings during the intersessional period, the decision, recommendations, and actions of the 10th meeting still stand. Therefore, the group recommends that the ICG/PTWS decides to continue the Regional Working Group on Tsunami Warning and Mitigation System in the SCS region, recognizing the Chair and Vice-Chair elections in its last meeting. The Terms of Reference for this group will remain unchanged.

3.7.5. REGIONAL WG CENTRAL AMERICA

1. Dr Wilfried Strauch (Nicaragua), Vice-Chair WG-CA presented the [Report of the PTWS-CA-VI session](https://oceanexpert.org/downloadFile/54430) on behalf of the Chair Ms Griselda Marroquín, which was available also as a [Presentation](https://oceanexpert.org/downloadFile/54450).
2. He briefed on the tsunamis observed in Central America in 2022-2023. HTHH was observed in some places in Costa Rica, El Salvador, and Honduras. The other event was in Mexico on September 19th and only observation was in Costa Rica through eye-witness. He stressed that the 10th-anniversary commemoration of the Mendez Island tsunami in El Salvador (27 August 2012), impacting both El Salvador and Nicaragua but with no victims, was held in El Salvador.
3. PacWave 2022 evacuation drills were done in Costa Rica and El Salvador. In addition, Caribe Wave 2023 evacuation drills were done in Panama, national drills are organized regularly (Costa Rica, El Salvador and Guatemala 1 per year, Nicaragua 4 per year as a multi-hazard exercise).
4. 19 communities are recognized as Tsunami Ready so far, 2 with recognitions expired in 2017 and 8 requiring renewal during 2023. Some questions and doubts exist regarding the renewal process, for example the need to demonstrate the completion of at least 2 drills and 12 outreach activities during the 4 years.
5. Costa Rica, El Salvador, Guatemala and Nicaragua have now applications for earthquake early warning. Warning messages are delivered to the public in Nicaragua and Costa Rica. The system has the potential to be effectively used for tsunami warning. .
6. The sixth meeting of the WG-CA was held in Heredia Costa Rica, including 10 delegates from 5 countries. The WG recognised the efforts and progress made by Nicaragua to strengthen the capabilities of the CATAC, as a candidate TSP, by increasing and training its staff, improving its processes, and improving its processes, and improving its capacity to process earthquakes and tsunamis in general. The group also recognised that CATAC has gained experience with the processing of earthquakes that have occurred in the region. The Group recommended that CATAC carry out new communication tests as soon as possible and decided to support the request that CATAC will present at the ICG/CARIBE-EWS-XVI meeting to enter interim and fully functionality in the short term for the Caribbean coast of Central America. In addition, the group recommended that countries ensure the generation and strengthening of national personnel and institutional capacities in early warning systems. Also, the group instructed the Technical Secretariat of the ICG/PTWS to forward this recommendation to the ICG/PTWS and ICG/CARIBE-EWS and transfer it to CEPREDENAC which is an agency in CA for natural disaster prevention in all the region for their attention.

3.7.6. REGIONAL WG-PICT

1. Mr Rennie Vaiomunga on behalf of Ms Esline Garaebiti (Vanuatu), Chair of WG-PICT presented the [Report of the PTWS-PICT-IX session](https://oceanexpert.org/downloadFile/54568).
2. First in-person meeting supported by SPC PREP PROJECT and UNESCO/IOC held in Nuku’alofa, Tonga on 17th-21st October 2022, which provided an opportunity to organize the 7th ORSNET Meeting and 8th Task Team Seismic Data Sharing in the SouthWest Pacific.
3. First Pacific Islands Countries and Territories Regional Exercise 2022 was conducted as part of Exercise Pacific Wave 2022. NTWC and NDMOs of 18 Countries participated in a 2h live exercise using WhatsApp, e-mail and HF Radio to test the HTHH Interim Procedures. The support from ITIC on hosting the website was appreciated.
4. First Regional Training on UNESCO/IOC Tsunami Ready Recognition Programme took place in Nadi, Fiji on 30th January-1st February 2023, and was attended by 13 PICTs. The target is at least one community to be recognized as Tsunami Ready in 2023.
5. On-Going Review and Update of Tsunami SOP and National Tsunami Response Plan are in place for Vanuatu, Tonga, Cook Islands, Solomons Islands, Fiji. On 3rd February, 2023, the 9th WG-PICT meeting was attended by representatives of Australia, Cook Islands, Fiji, French Polynesia, Kiribati, Nauru, New Caledonia, New Zealand, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu as well as the Intergovernmental Oceanographic Commission of UNESCO (UNESCO/IOC), IOC International Tsunami Information Centre (ITIC), United Nations Office for Disaster Risk Reduction (UNDRR), Plan International and the Pacific Community (SPC).
6. WG-PICT recommended the establishment of a Task Team on Information Sharing Platform, use of a World Meteorological Organization (WMO) dissemination method through the Global Telecommunication System (GTS) and Common Alert Protocol (CAP) in order to share national tsunami warnings between countries to be piloted by Solomon Islands and Tonga, and request to PTWC to report on 6h timeframe in its first bulletin regarding the tsunami forecast and ETA.

3.7.7. SOUTH EAST PACIFIC WORKING GROUP

1. Mr Matias Sifon (Chile), Chair, and/or Mr Michael Linthon (Ecuador, Vice Chair WG-SEP presented the [Report of the PTWS-WG SEP](https://oceanexpert.org/downloadFile/54429) which was available also as a [Presentation](https://oceanexpert.org/downloadFile/54428).
2. Mr Sifon highlighted emergencies between December 2021 to August 2023 mainly due to the tsunami generated by the HTHH in 2022. He stated the actions after emergency, there was SitRep Meeting which is a situation report after a week, lessons Learned meeting after a month, and he would like to highlight the 2023-regional exercise with HTHH scenario to test National Protocols with PTWC products. He stated that through this, they conducted regional exercise on August with the objective of not only to evaluate the operational response of the NTWC of the region to address a tsunami generated by the eruption of the HTHH volcano, but also to evaluate the understanding of the NTWC staff of the PTWC interim procedures and the capabilities of each center to effectively follow the tsunami propagation across the Pacific through the sea level stations available at the sea level data facility website sponsored by the IOC.
3. Mr Sifon stated that Colombia acted as PTWC by sending all the participants the tsunami bulletins based on the PTWC interim procedures and PTWS user’s guide. Following these, Chile issued the raw sea level data and processed tsunami amplitudes graphs for 66 tide gauges available through the IOC sea-level station monitoring facility website. For these 66 stations, the information was issued every 5 minutes, for every 10 minutes of real time, the simulated elapsed time was 1 hour, acting effectively as an 18 hour long emergency. He underscored that these events allow all the participants to practice their national procedures and identify areas of improvements in their internal procedures. In addition, he added that they’re working for the final report by collecting at the first self-validation surveys and compiling the lesson-learned and best practices.
4. Mr Sifon added the other activities that they had at the annual meeting in Santiago on November 22nd. Lastly, they hosted a UNESCO/IOC, PTWC, and SHOA shared access to sea-level data workshop which was very useful. He stated that at the beginning it started with online but at the end it was physically done in Santiago. The main result was the regional countries were able to share more sea level station’s data to the IOC Sea-level station monitoring facility. He gave a comparison of the map between before the event and after. He added that this workshop and the result was the addition of more than 25 stations to the IOC sea level station monitoring facility.
5. Mr Sifon mentioned a tsunami modelling training with international experts which is carried in 2022 and they held 6 regular virtual meetings in the period. in addition, there was a UNESCO/IOC expert meeting on tsunami sources and hazards in southern Peru and northern Chile which hosted many representatives of the scientific community people and also from NTWC, NDMO. He evaluated this meeting helped them to realize what the real threat is in terms of earthquake with tsunamigenic potential. In addition, he added they developed a document to support SMART Cables which is titled ‘SMART Cables Potential for the National Tsunami Warning Centres’. He stressed that this document is on the website providing an overvie of the current status in the SEP Member States, how they could implement SMART Cables, and how the implementation of SMART Cables can help them to improve their monitoring capabilities. He hoped that this document will be a useful base to try to produce a working plan on this matter.
6. Mr Sifon expressed that they held 4 regionals operational exercises. He highlighted that the last one was related to the HTHH volcano eruption. WG-SEP Member States participated in the PacWave 2022. Concerning activities regarding the WTAD 2022, there were community-driven activities, evacuation drills, social media reports, etc. He stated that the Galapagos Island is on its progress to go through the Tsunami Ready Recognition Programme. He planned activities in 2023 including 2 regular virtual meetings, one annual virtual meeting, so there are the turnover of the Chair and Vice-chair according to the Terms of Reference. Mr The recommendations of the WG-SEP to the ICG were:

* Continued the efforts with SMART cables and an attempt to strengthen the monitoring capabilities in the region.
* Continued the regional working group with the same TOR with turnover of Chair of Vice-Chair

1. Mr Arturo Oxley (Chile) hoped to add on to his colleague’s presentation which is that they conducted the workshop sponsored by the Director General of UNESCO which was originally planned to be conducted online. However, the change in the mode of workshop resulted in the increased more than 25 sea level gauges and incorporated into the network of the IOC. In addition, he mentioned that this is an example of the importance of coordinating for ensuring that assets and resources are made available to PTWS.
2. The Chairperson reminded that PTWS has 3 Task Teams under its Steering Committee, namely on Future Goals and Performance Monitoring, UN Ocean Decade, and PacWave. He highlighted that the TT on UN Ocean Decade and PacWave have specific agenda items and invited Mr Miao (Australia) to present the work status of the Task Team on Future Goals and Performance Monitoring.

3.7.8. REPORT ON THE TASK TEAM ON FUTURE GOALS AND PERFORMANCE MONITORING

1. Dr Miao (Co-Director of the joint Australian Tsunami Warning Centre, JATWC-Australia) as a member of the Task Team or Sarah Jayne McCurrach (Head of Risk Reduction & Resilience, Toka Tū Ake Earthquake Commission-New Zealand) presented the report of the Task Team, available as a [Presentation](https://oceanexpert.org/document/35444).
2. Dr Miao briefly explained a report of the Task Team on Future Goals and Performance monitoring which involves various experts not only from the Pacific but also globally. He stated that the start of this work dates back to 2015 when the ICG/PTWS formed a Task Team.
3. The Task Team was mandated to work with all IOC-ICG’s to develop a consistent Global Framework for Goals and Performance Monitoring of Tsunami Warning & Mitigation Systems and to establish a performance baseline with the means to accurately identify shared activities, opportunities and resources required to help meet the identified goals. One critical point was the need to ensure a Global Framework for Goals and Performance Monitoring is aligned with the Sendai Framework for Disaster Risk Reduction, United Nations Decade of Ocean Sciences for Sustainable Development – A Safe Ocean, IOC Tsunami Programme, Tsunami Ready Programme and ICG/PTWS Strategy 2022-2030. The Task Team was requested to present a model to all IOC-ICG’s for the ongoing monitoring and evaluation of the framework, to ensure the process and delivery is sustainable. This must include a process for all ICGs to detail gaps, opportunities, and improvements in regard to their evaluation against a Global Framework for Goals and Performance Monitoring. Additionally, the Task Team was also requested to develop an online survey aligned with a Global Framework for Goals and Performance Monitoring, easily accessible to all Member States, comprehensive and fair, with the ability to develop ‘real-time’ evaluations.
4. The pandemic has provided an example of how probabilities of occurrence for disaster events have needed to be rapidly described and communicated to communities, who are in turn, making risk-based decisions on information provided by governments and officials. This is something the PTWS can reflect on when assessing our work programmes going forward, notably regarding the communication of tsunami hazard and risk.
5. The first assessment round completed by Member States, resulted in several suggestions for improvements in the framework model and the associated online survey. Given the TOWS KPI Task Team is developing a ‘Global IOC KPI Framework’ (linked closely to Inter-ICG Task Team on Disaster Management and Preparedness), to improve the consistency of all ocean basin performance, it was agreed all feedback would be taken into the development of the new local framework, rather than amending the PTWS KPI Framework. This is the source of the anticipation that the Global IOC KPI Framework will replace the PTWS KPI Framework.
6. Dr Miao stressed the need for the TOWS-WG for endorsement for the completion of the work. He invited the TOWS-WG representatives of the PTWS to ensure that the latest version of the framework is presented and considered by the next meeting of the TOWS-WG in February 2024 and reminded the delegations on the need to work closely with IOC Tsunami Resilience Section to develop the corresponding web portal.

**3.8 REPORT OF PACIFIC WAVE EXERCISE 2022**

1. Mr Anthony Jamelot (France), on behalf of Mr Emilio Talavera (Nicaragua) and or Ms. Margarita Martinez (Chile), Co-Chairs of the TT on PACWAVE, presented a report on the PACWAVE 22 exercise, available as a [Presentation](https://oceanexpert.org/document/33204).
2. Mr Jamelot summarized the activities from 2021 to 2023. He explained they conducted two informational webinars in English and Spanish, and around ten coordination and follow-up meetings. Separate evaluation forms for the TSP live communication test and the national & regional exercises were developed.
3. The Task Team supported the conduct of PacWave22 and elaborated the final report of PacWave 22 which is available on the website and included all the results of each regional exercise and the national exercises.
4. The 4 main objectives of PacWave22 were i) to test the communication from PTWS TSP with a live communication, ii) to test the national communication and cooperation as readiness within each of the participating countries, iii) to test the national communication and cooperation between MSs if there was a regional exercise, iv) to support the development of Tsunami Procedure and products for the CATAC and the new TSP pending endorsement.
5. Concerning the results of the TSP communication test on the 13th of October 2022, 28 countries and territories answered the questionnaire form. For the regional national exercise participants, they have a total of 19 countries and 3 territories. In terms of the main results, 93 % of the tsunami warning focal point received a TSP exercise to the message during the live communication, but 7 % didn’t receive. All messages were received in a timely manner without big delay at the time of receiving the new message.
6. Regarding the second objective, depending on the national exercise or regional exercise, there were mainly other national agencies involved, and only 16 % of public communication was involved in the exercise. In terms of the warning to the public, the main way to communicate with the public was to use WeChat, Weibo, WhatsApp, and Telegram which was a dedicated website at 50%. Mr Jamelot mentioned at the same level, they had radio, emails, and sirens. In terms of the objective to be about the national readiness within the country, they have 100 answers about NTWC and NDMO that have an activation and a response process, including a well-known specific response role in the event of a tsunami and engaging in tsunami response planning. Concerning the test of the national readiness within the country, they can see the tsunami emergency response plan along the timeline. He added they have 89 % of participants provide a local response plan which is 100% for regional and 95 % for distant tsunami scenarios. He stated the main results of tsunami preparedness are that they have 95% of tsunami public education and awareness materials have been developed and disseminated in their country. In addition, Mr. Jamelot highlighted that they have 37 % of the existing tsunami related programmes, educational programmes at all levels. Most of the country (74%) indicated that tsunami vulnerable communities don’t have elements of tsunami preparedness such as evacuation map, sign, assembly points for evacuation.
7. In terms of the global assessment, all countries responded to the questionnaires which indicated that stakeholder agencies have a better understanding of the goals of stability and roles in case of tsunami emergency. 94% of countries gaps in capability and capacity have been identified. 63 % of countries indicated the community have a better understanding and 41% of countries indicated that news, media participated and covered the exercise.
8. In terms of the 3rd objective, Mr Jamelot stated the only 11% indicated that the NDMO communicated with other countries during the event about cooperation and regional cooperation, leaving room for improvements. He invited Mr Sifon to speak about the regional exercise of the Southeast Pacific Region.
9. Mr Sifon stated the Regional Working Group on Southeast Pacific regularly carried out the operational exercises at a regional level. He explained the simulation was divided into two phases using historical scenarios on the border between 2 Member States and generated a situation in which the even was nearfield for two countries and far field for the other by allowing the countries to involve their NDMOS and their seismological agencies during the near field events in the case of 4 countries. He added this corresponds to organizations other than NTWC in the 4 cases, and therefore they have their own simulation schedules.
10. In terms of the objective, it is to implement and evaluate the regional communication protocol between the NTWCs in Southeast Pacific and to test the communication channels which they test regularly but it is still ongoing exercise. He also added in different context, to activate and test each NTWC internal procedures in near field and far field events, including the distribution of civil information to measure the preparedness and response capabilities of the center’s personnel in its country and to identify opportunity for improvement in terms of operational procedures in this matter.
11. Mr Sifon mentioned the concept of the 2 scenarios and 2 phases during the exercise. He explained the idea for this is to get some scenarios where all the countries could get some near field and far field events. In addition, he explained they add complexities to the event by adding another earthquake in a different position which means some NTWC had to deal with 2 simultaneously earthquakes and to test procedures, communications and dissemination capabilities in a complex situation having to deal with 2 different events at the same time. He highlighted that the personnel on duty had to be meticulous and orderly in receiving the information and to be able to get the information through the process of the two different events and to handle two different events simultaneously. In addition, he added the importance of continuing to carry out this type of regional exercises is that it allows to test both the regional protocol and the internal procedures of each center by liking them with the other entities that are part of the tsunami warning systems in each country. Lastly, he stated this is related to the improvement of actions and the mechanisms to maintain the articulation between the tsunami warning centers and NDMOs in the region.
12. Mr Jamelot closed the presentation by highlighting the PICT regional exercises on the 9th of November 2022. He mentioned the 2nd Objective which was to test the HTHH PTWC interim products, a regional communication and cooperation between PICT Member States. He stated this was to try alternative information and informal information sharing between national facilities in tsunami alert and decision making.
13. Regarding the feedback for the 2nd Objective about the HTHH PTWC interim products, the forecast is useful for issuing warnings, upgrade, downgrade, and cancellation of tsunami alert. He stated that one of the recommendation and remark from the group was to explore the variability to have more forecast points in the text message. Therefore, the final request to PTWC is a possibility to conduct a broader assessment for their first bulletin to include regios within 6h travel time instead of 3h, to include those countries and territories located far from the source in the case of HTHH event.
14. The exercise highlighted the need to keep building regional cooperation and direct links between NTWC and NDMO of each Member State. He stated that communication still needs to be improved for non-traditional methods like WhatsApp as an official communication channel to exercise for some tsunami warning operations. He stressed some ToR to be validated by the ICG for the new TT on Information-Sharing Platforms. Lastly, he thanked to the colleagues, IOC Secretariat and ITIC for their active participation.
15. Following the presentation; the floor was open for comments and questions from the delegates.
16. The Secretariat pointed out that the Arika Earthquake in 1868 resulted in casualties both from the earthquake and tsunami and inquired whether such a scenario in the context of multi-hazard preparedness can be considered, including the possible use of earthquake early warning systems for the purposes of tsunami warning.
17. Mr Oxley (Chile) commented that this was why they had the symposium in the previous year as there was a concern about the fact that there is high probability of a seismic event that could affect both Peru and Chile. As reported during the national report, SHOA shares its bulletins with Peru, Colombia and Ecuador in real time or as close as possible to real time. He stated that they receive feedback quickly and that is why they have a huge amount of sharing of data of sea level gauges and buoys with Peru following the HTHH and why it is important during the monitoring phase, to know what is happening in the in other coastal regions of South America for better assessment. He ended his comments by recognizing the fact that there is room for improvements.
18. Mr Fry (New Zealand) raised two comments. The first comment is that the challenge between working together by using the example of the shaking type of analysis and forecasting that many of the Member States do have and more global or regional tsunami forecasts that are separate entities. He stated that he believes these two are working on different scales, however, it is happening at many States. His second point was on the direction of the early warning forecasters which are headed towards what he believes the next decade impact-based forecasting that many States are making efforts towards this. He further commented that he believes where the real challenge is that they started to understand what the conditional loss is when they have the first shaking and tsunami subsequently. He believed that currently these two communities are becoming far apart, however, it is important to try and bring them closer. Mr Fry stated that the type of stuff from CATAC earlier had looked at the seismic source. He thought that it is a great mechanism for understanding how it would create the impact forecasts from tsunamis and compounding hazards.
19. The Chairperson indicated that the recommendation for the PacWave 2024 Exercise will be discussed in detail during the intra-sessional Working Group and reported under Agenda Item 4.6 Pacific Wave Exercise 2024 in the afternoon. In addition, he further highlighted the need for of a revised TOR and Exercise Objectives.

**3.9 STATUS OF PROGRESS IN OTHER ICGS**

3.9.1. ICG/CARIBE-EWS

1. Ms. Regina Browne, the Vice Chair for the ICG/CARIBE EWS presented the report of ICG/CARIBE EWS, on behalf of the ICG/CARIBE-EWS Chair Mr Gerard Metayer (Haiti), available as a [Presentation](https://oceanexpert.org/downloadFile/54629).
2. The 16th Session of the ICG/CARIBE EWS took place in Costa Rica from the 25th to the 28th of April 2023. 19 out of 48 Member States were represented and new Officers were elected. Next Session is scheduled during 6-10 May 2024, awaiting Host Country decision.
3. Updates on SOPs, UNESCO/IOC Tsunami Ready Guidelines, Ocean Decade Tsunami Programme, CaribeWave exercise implementation plans were among the topics addressed at the ICG/CARIBE-EWS XVI. The ICG decided to realign its Working Group structure, as follows: WG 1) Risk Knowledge, WG 2) Tsunami detection analysis and forecasting, WG 3) Warning dissemination and communication, and WG 4) Preparedness, Response, Capabilities, and Resilience. The ICG also noted the need to develop strategies to monitor volcanoes that could generate tsunamis, the need for more tide gauges. The support from JICA to CATAC has been noted and the next session will consider admittance of CATAC’s full operational status as a TSP.
4. The ICG recommended a deeper cooperation between Caribbean Tsunami Information Center (CTIC) and ITIC-CAR, WG 4, UNDRR to support Members States preparedness and resilience and noted the need to expand support for the TRRP. In this context, the ICG also requested Members States to provide greater support through financial and human resources.
5. CARIBE WAVE 23 took place on 23 March 2023 with two scenarios, namely Honduras Gulf and Mount Pelee eruption, with a total number of 720.000 registrations. CaribeWave24 is scheduled for March 21st of 2024 with two scenarios: Puerto Rico Trench and the 1882 North Panama Deformed belt. For Caribe Wave 2025, 1692 Jamaica and the 1755 Lisbon earthquakes are being considered as source scenarios.
6. In terms of Tsunami Ready, she stressed that 17 countries and territories have implemented Tsunami Ready. There are 15 UNESCO-IOC Tsunami Ready recognized communities/countries and territories, 9 UNESCO-IOC Tsunami Ready Communities in progress, and 49 US Tsunami Ready communicates in Puerto Rico and USVI.
7. Mr Angove (USA) pointed out that the revised working group structure reflects the main objectives of the Ocean Decade Tsunami Programme and noted the need that such structure may need to be considered by each ICG.
8. Mr Metayer (Haiti), the Chair of the ICG/CARIBE-EWS asked if USVI has accepted hosting the next meeting of the CARIBE EWS. Ms Browne commented that this is not known at moment, but it would be something that they can discuss offline.

3.9.2 ICG/IOTWMS

Dr Yuelong Miao (Vice-Chair of ICG/IOTWMS) on behalf of Prof. Dwikorita Karnawati (Chair of ICG/IOTWMS) reported on ICG/IOTWMS activities available as a [Presentation](https://oceanexpert.org/downloadFile/54594).

1. Dr. Miao presented the governance structure of the ICG/IOTWMS. The Technical Secretariat is supported by the Government of Australia, whereas support to IOTIC is provided by the Government of Indonesia. 25 Member States of the ICG/IOTWMS are active in the implementation of the work programme
2. The work programme of ICG/IOTWMS is aligned with EW4All objectives, namely Pillar 1: Disaster risk knowledge, Pillar 2: Detection, Observations, Monitoring, Analysis and forecasting of Hazards, Pillar 3: Warning Dissemination and Communication, and Pillar 4: Preparedness and response capabilities. 3 TSPs of Australia, India, Indonesia provide tsunami threat information to all Member States to help develop sovereign national tsunami warnings.
3. 13th Session ICG/IOTWMS took place in Bali, Indonesia, 28 Nov - 1 Dec 2022 with the participation of 75 experts from 17 Member States. Indian Ocean Tsunami Ready Workshop was also organized in Bali, Indonesia, 22 – 26 Nov 2022 with 84 participants from 12 countries). Nine new communities received Tsunami Ready Recognition.
4. Phase 2b of the UNESCAP funded Project “Strengthening tsunami warning in the North-West Indian Ocean through regional cooperation” project is completed in March 2023 and Phase 2c has started in July 2023.
5. TSP Australia (JATWC) integrated, tested, and operationalized seismic array processing as input to rapid earthquake detection and characterization. In addition, Australia also commences the working towards the ISO 9001 accreditation for JATWC systems and to replace the current tsunami decision support tool with TOAST. TSP India adopted multi-hazard approach, developed SOP for Non-Seismic Tsunami Sources, utilized the GNSS & SMA for rupture characterization, and archived the Makran source PTHA results to provide access to Member States. Lastly, TSP Indonesia developed processing system for earthquake early warning, the Multi-hazard Early Warning System, utilized the GNSS for earthquake parameter calculation, conducted research on non-seismic tsunami and is ISO 22328-3 compliant.
6. National tsunami warning chains involve National Tsunami Warning Centres (NTWCs), Disaster Management Organisations (DMOs at national, provincial, and local level), and the Broadcast Media with Standard Operating Procedures (SOPs) underpinning each link. SOP Training Workshops were organized in July 2023. Routine 6-monthly communication tests in are conducted in June and December every year (email, GTS, SMS, Fax). National tsunami warning chains and SOPs are tested and evaluated in IOWave23 Exercise.
7. 11 communities have been recognized as UNESCO-IOC Tsunami Ready, 2 in India and 9 in Indonesia. Other Indian Ocean Member States interested to implement Tsunami Ready among other: Australia, Iran, Maldives, Oman, Pakistan, Seychelles, Sri Lanka, Thailand, and Timor Leste. Tsunami Ready Implementation for critical infrastructure i.e Airport Tsunami Ready in Indonesia, Port, and industrial zones.
8. BMKG issued the tsunami warning for the Mentawai Earthquake M7,3, 25th April 2023. The communities responded well based on capacities built through 12 Tsunami Ready indicators, conducting self–evacuation protocols, demonstrating high level of awareness of tsunami evacuation plans, routes, and evacuation sites. Vulnerable people were evacuated by their family and assisted by Local Disaster Ready Groups. Although there was no significant tsunami (detected only 11 cm), community accepted action they took was necessary, clearly demonstrating that a good understanding of official warnings issued by National Tsunami Warning Centre reduces the possibility of panic and enables acting.
9. ISO 22328-3 "Community Based Early Warning System for Tsunami Building A Reliable Early Warning System" has been published. The ISO 223 can be considered as the public-private based instrument to accelerate the achievement of Tsunami Ready Society (beyond the community), such as businesses, critical infrastructures, etc. It was developed based on 12 indicators of UNESCO-IOC Tsunami Ready and various lessons learned, with the objective to engage and involve the private sector as well as the government in strengthening and sustaining the Tsunami Ready Society.
10. Lastly, Dr. Miao informed the delegations on the 2nd UNESCO-IOC Global Tsunami Symposium which “Reflections of the two Decades Post Indian Ocean Tsunami 2004 and Way Forward”, which will be organized in Banda Aceh, 10-14th November 2024
11. Mr Angove (USA) raised the question why there was no specific references to UN Ocean Decade and whether this is merely a reflection of the fact that the work programme is aligned with the EW4All. Dr Miao responded that the Ocean Decade drives a lot of policy and strategy and the governance of the IOTWMS. He stated one of the key governance changes is as to have the additional WG 3 to focus on the Tsunami Ready Programme Implementation. He further added that the IOTWMS is working through the various Working Groups and trying to implement the Research, Development and Implementation Plan for the Ocean Decade Tsunami Programme.

**3.10 REPORTS FROM UN AND non-UN ORGANIZATIONS**

3.10.1 SPC

1. Ms Litea Biukoto, Senior Advisor Risk Reduction, Disaster Risk Programme, Secretariat of the Pacific Community (SPC), reported on the SPC initiatives on Disaster Risk Reduction and cooperation with PTWS, available as [Presentation](https://oceanexpert.org/document/33258).
2. Ms Biukoto began by expressing her gratitude for this time to share the work that has been done with a number of organisations who are present in the session but also being mindful that some of this work is also anchored as well through bi-lateral arrangements with partners who are also in the session, noting the work UNESCO-IOC is already covering, the National Emergency Management Agency (New Zealand), GeoScience Australia, GNS (New Zealand) and other organisations as well. In addition, her presentation focused on the policy and the work that they do how it is linked back to some of the leaders that they have had. She stated that what they are trying to do now is how to work coherently together in the region.
3. In terms of the how they involved with Tsunami warning and Mitigation in the Pacific, Ms Biukoto started her presentation with an overview of some activities conducted within the last 4 years in relation to the 4 pillars of the EW4All and UN Ocean Decade.
4. Strategic partnerships and collaboration are needed to start to include the gender and social inclusion as an important baseline from the start of the design process. A good example is the acquisition of high-resolution bathymetry and topography, that is open and accessible to all. There is a need to have a better handle of what baselines exist and the need for the better earth and marine observations. Efforts are in place to improve ocean observations in the middle of the Pacific Ocean, and an effort towards consolidation is necessary for this aim. Additionally, the importance of impact-based forecasting and exposure assessment is acknowledged.
5. In terms of the Oceania regional seismic network, SPC is looking into how support can be provided. SPC is investing some funds to be able to get technical advice on board who could work one-on-one with the countries.
6. In terms of this work, the real value in peer exchanges is noted. A good example is the case of Galapagos, and it would be desirable to implement similar mechanism in PICTs. The resource limitations require to be smart, and the collaboration with UNESCO-IOC and ITIC is crucial for resource optimization.
7. SPC notes the importance of competency-based training in all areas of the disaster risk management, which requires a change of the mindset to focus on the impact of the target audience. An example is Certificate IV in Disaster Risk Management (Team Leader) DRM001 Unit Standards Booklet which includes capacity development, peer to peer exchanges, mentoring and internships.
8. Coherency among the early warning and preparedness initiatives and programmes being rolled out in the Pacific is needed to strengthen country-level risk assessment capacity including the conduct of post disaster assessment.
9. Dr Kong (ITIC) noted the fruitful cooperation and collaboration with SPC throughout the years.

3.10.2 ITU/WMO/UNESCO IOC JOINT TASK Force on SMART Cables Report

1. Dr Bruce Howe, Office of the Joint Task Force on. SMART Cables reported on ITU/WMO/UNESCO IOC Joint Task Force on SMART Cables, available as a [Presentation](https://oceanexpert.org/downloadFile/54593) and Document.
2. Dr Howe briefly explained that the Joint Task Force consists of roughly 200 volunteers, and it was formed in 2011 by the 3 UN agencies which are the International Telecommunications Union (ITU), World Meteorological Organization (WMO), and the UNESCO/IOC. In addition, he underlined the importance of the ITU as the whole SMART concept rests on the shared and multi-use infrastructure, and the submarine cable network. He added that SMART Cable is endorsed by the UN Ocean Decade.
3. Dr Howe highlighted the importance of the Ocean in terms of the climate change and sea-level rising because of the thermal expansion of seawater, land ice melting, and filling the basins. The SMART Cable concept offers enhanced capabilities to improve tsunami early warning and observations related to the impact of the climate change.
4. SMART Cables will complement the sparse data arrays, buoy arrays, and there is a possibility to allow these to be positioned in more targeted areas. These cables can help improve cable integrity and the reliability of societal connectivity both detecting external aggression like fishing as well as earthquakes and landslides. For example, the case of the HTHH, the need for smart and second backup cables or even 3 backup or more backup cables became evident for communication because the existing cable broke after the event.
5. One of the goals of the UN Ocean Decade is to integrate SMART cable technology into early warning systems. In the Pacific, there are a number of initiatives for SMART Cables. The Vanuatu-New Caledonia cable is supported by France and an inter-governmental MoU has been signed in July 2022. New Zealand is proposing connecting North Island and Chatham Islands. NSF is proposing connecting Antarctica and NZ for internet connectivity and SMART. A feasibility study has just been completed with positive result. There is a proposed cable from Southern Chile to Antarctic bases, crossing the oceanographically extremely important Drake Passage. Far North Fiber will link Europe and Asia through the Arctic region. Project Koete will be connecting Perth (Australia) to Malaysia as well as serving Australian offshore and communities to Darwin. Indonesia is developing in country capability, starting with short single ended cables working up to a telecom and sensor SMART cable spanning in Makassar Strait.
6. The global submarine cable network extends to a total of 1.4 million kilometers of cable which provides an opportunity to add SMART repeaters to obtain a planetary scale sensor power and internet network that can observe climate oceans, sea-level, earthquakes and tsunamis. Portugal’s SMART Atlantic CAM which is an ideal example of the SMART system and the blue economy.
7. The expectations of the JTF from the ICG/PTWS is that Regional Working Groups to work with each country to connect with relevant ministries to establish national focal points, report on current and potential SMART opportunities (e.g., replacing retiring cables, 2nd and 3rd international cables, etc), assist in planning and implementation, investigate and clarify data sharing policies unique to SMART and to region and countries and to perform regional observing system simulations to optimize and quantify benefits.
8. Overall, IOC is expected coordinate SMART activities across all ICGs, improve coordination between GOOS, balancing the requirements for the different purposes for a global optimization in designing a multi-purpose observing system, work with GOOS to formalize SMART Cables as an emerging network, assist the JTF in accessing Climate and DRR sections of funders, e.g., multilateral development banks and work together as part of the UN EW4All.
9. Dr Miao (Australia) commented that it was an inspiring presentation and wanted to receive further clarifications on the expectations from the ICG. Dr Howe answered that they are recommending coordination at different levels both within IOC, also with different parts of the Tsunami programmes, different ICGs as well as the GOOS and Ocean Decade. Regarding the project that included France and Vanuatu, Mr Schindelé (France) raised the issue of sharing of data, and the role of IOC in this context. Dr Howe commented that this is indeed an issue but also a perfect example of working out such issues. From France side, he understood that the data would be free and open, however, it is required to work out the details of whether it is planning to go into ORSNET or broader. For these systems including Portugal, they will be setting important precedents and data which is one of them. He further commented that the Joint Task Force was unable to solve these matters which can be dealt with directly among the countries concerned.

3.10.3 NOAA/NCEI-WDS integrated Tsunami Data

1. Dr Nicolas Arcos (online) reported on NOAA/NCEI-WDS integrated Tsunami Data: Support Research, Forecasts, Warnings, Response, Hazard and Risk Assessments, available as a [Presentation](https://oceanexpert.org/downloadFile/54612).
2. Dr Arcos briefly explained he will focus the global historical tsunami database which provides a comprehensive list of historical tsunami source events and tsunami heights throughout the world. The database is continuously updated based on new information and they are focused on making that data more accessible and discoverable and improving their public interface. Over 2500 events with more than 31000 observations are included in the database. Socioeconomic impact data is also available and cited appropriately so that users can trace back to the source of data to make their own interpretations or see if they need more information or clarity on a specific event or run-up. In addition, the comments filed is often utilized to highlight discrepancies between differences and sources they use.
3. The database includes over 8,000 documents from a variety of source types that describe damage and effects from tsunami, earthquake, and volcano events. National reports from the ICGs and PTWS are critically important to have official information for small and or non-damaging events that may not be widely reported.
4. Over 1,500 data that were added during the last two years. More than half of those were from the 15th of Jan of 2022 HTHH post-tsunami survey and tide gauges observations they received. In terms of the types of observation, 45 % were post-tsunami survey measurements and 38% were from tide gauges. In addition, the others come from deep ocean gauges and eyewitness observations.
5. Dr Nicolas Arcos would like to thank for the ITIC about the collaboration with them. In terms of Analog Data Records, they have over 34,000 historic paper records between 1854 and 1994. They have 2,600 available images. In addition, they are planning on making many more available online in next year by using their Marigrams. He added that a lot of data collected from U.S and international stations. He welcomed to contact them for collecting paper records or digitized records.
6. Lastly, He summarized to encourage all MSs to submit their tsunami data for archiving. In addition, he requested to let them know if they do use their database and identify incorrect information.

Dr Alexander Rabinovich pointed out the relative lower level of cooperation of between the Institute of Computation Mathematics and Mathematical Geophysics (Russian Federation) and NOAA/NCEI-WDS and expressed his hopes for improvements. Dr Arcos commented that NOAA/NCEI-WDS Integrated Tsunami Data for the last few years have been focusing on moving IT platforms due to stability and security reasons. Dr Rabinovich further commented on what was reported by Mr McCreery on the issues with some of the tsunami height and amplitudes reported NOAA/NCEI-WDS and inquired what actions are to to be taken to remedy such issues. The question was to people who are working with historical data how they would deal with that. Dr Arcos responded on the challenges in dealing with reports of wave height and amplitudes without a clear definition on the type of the measurement. In addition, he added there is no elaboration on how to define different terminologies to people when products are produced. He highlighted that to have a section that explains how those height or amplitudes are defined is important because if not, their database is going to be limited to use for some users. He acknowledged the need to be consistent for the usefulness of the products.

3.10.4 PMC Weather Ready Pacific Programme

1. Mr Fa’anunu (Tonga, also WMO Vice-Chair for Region V) reported on the Pacific Meteorological Council’s Weather Ready Pacific Programme, available as a [Presentation](https://oceanexpert.org/document/33259).
2. Mr Fa’anunu explained the Weather Ready Pacific Programme (WRP) is a new initiative that was established by the Pacific Meteorological Council. He briefly stresses the background of the process of making decisions for establishing the initiative of the WRP.
3. Pacific Islands are highly vulnerable to extreme weather, hydrological and ocean events. Economic losses from cyclones and flooding in the South Pacific region in 2020 were around $1 billion with at least 71 lives lost. Annual average losses are around $500M. Climate change will exacerbate extreme events. Meteorological and Hydrological services in the region face some critical gaps in governance, observation networks, forecasting, delivering impact-based messages to communities, capacity and training. Many programs ongoing in the Pacific, especially in relation to climate (e.g. COSSPac, PREP, GCF, RESPAC), but a regional, long-term approach to building NMHS capacity in extreme events is needed. Too many projects are implemented in silos resulted in fragmented implantation and overburdening NMHSs.
4. PMC-5 in 2019 noted the importance of ensuring information to support preparedness and response to extreme weather events, water and ocean risks; further noted the need for long-term strategic investment in capability that supports critical gaps in preparedness and response at short time scales; agreed to commission through SPREP, in cooperation with members, WMO and other CROP agency partners to undertake a study to scope a decadal Pacific regional extreme weather, water and ocean response program initiative; and agreed to use the outcomes of the scoping study to inform deliberations at the next PMC Ministerial Meeting.
5. Investment priority areas include the governance & leadership, infrastructure, forecast & warning production, communication & delivery, and capacity development. On 6 August 2021, Pacific Leaders forum endorsed the Weather Ready Pacific Decadal Programme of Investment, which seeks to reduce the human and economic cost of severe weather, water and ocean events across Pacific Island communities, by strengthening national meteorological and hydrological organizations and their partnerships with national disaster management organizations. WRP was presented at numerous forums including the UNFCCC COP26 & 27, UN Ocean Conference, Asia Pacific Ministerial Conference on DRR, etc. The initial investment of WRP is made by Australia for AUD 30 million and support from New Zealand.
6. Mr Fa’anunu mentioned the WG called the Pacific Island Panel on Marine and Ocean Services and the recommendations that were approved at the PMC meeting which includes to increase sustainable finance assistance through the Weather Ready Pacific Decadal Programme of Investment and other financing programme facility toward the PTWS among PICTs including the Oceania Regional Seismic Network (OSRNET) and UNESCO/IOC TRRP under the Ocean Decade Tsunami Programme (OTDP). He added that the recommendations to the ICG is to recognize the WRP as vehicle for tsunami work in the Pacific Island countries and territories, to recognize the tsunami activities of the pacific Meteorological Council is delivered through the Pacific Islands Marine and Ocean Service Panel (PIMOS) of PMC), and to invite the PICT-WG of ICG/PTWS to collaborate with PIMOS to synchronize efforts including resource mobilization.
7. Following his presentation the following comments were made:
8. Dr Miao (Australia) queried whether the Pacific Weather Program includes tsunamis as an extension of the scope, or whether it was always considered part of the scope.
9. Mr Fa’anunu commented that the tsunami is part of it which has always been a part of the scope hence the reason he had presented in the first slide which stressed that capital investment is needed. He stated that it’s the beginning of the overall process, but there will be a meeting in Samoa next week to investigate the governance system and take at the implementation plan. One of the matters that they will look at is the revision of the investment plan, especially the name needs to be re-looked at in order to strengthen the intention that all tsunami and other hazards are included, for example, renaming the initiative to Hazard-Ready.

**4. POLICY MATTERS**

**4.1 PTWS STATUS REPORT**

1. The Chairperson presented his report on the Monitoring of the Progress of Implementation of the Recommendation of the PTWS-XXIX session, it was also made available as a [Document](https://oceanexpert.org/downloadFile/54453).
2. Mr Nishimae recalled the recommendation about the PTWS Expansion source zone and the IOC Executive Council disagreement on this. In terms of the CATAC, ICG CARIBE-EWS considers admission of CATAC as a TSP of ICG/CARIBE-EWS. Given that, PTWS should consider reporting to the next IOC Executive Council for the endorsement by the IOC for the official operation of the CATAC as one of the TSP of the PTWS.
3. Concerning the UN Decade of Ocean Science for Sustainable Development, the implementation plan will be published soon, and they decided to establish an ICG/PTWS TT on the Ocean Decade under the PTWS SC. He believed that it was necessary to change the ToR of the TT.
4. He stated the structure of PTWS WG and TT from 2021 to 2023. There are 7 WGs, 3 technical groups, and 4 regional WGs in the PTWS. In addition, under the SC, there are 3 TT which are future goals & performance monitoring, TT UN Decade, and TT PacWeb Exercise. Mr Nishimae ended his presentation by stating that some members are overlapping in some WGs. For example, he is the chair, Co-chair, and a member of another task team and working group. He further commented that he feels that some members will have more workloads. Given that, in order to share the workload, he proposes more members in the WGs.
5. Mr Fa’anunu (Tonga) reminded the delegates that there are 4 pillars when discussing early warnings. and asked for clarification how the issue for data sharing is captured for the whole Pacific region. The Chair responded that currently this aspect is not covered within the existing governance mechanism. Mr Fa’anunu highlighted the need to have a governance structure that reflects the decisions of the ICG.
6. Dr Fry (New Zealand) commented that rather than continuing the Task Force on Seismic Data Sharing purely for the Southwest Pacific, to somehow launch an effort that the renaming of the TT or the reformulation of the Terms of Reference. At least in the intra-sessional period document they can get data and where they can’t get data and make a suggestion to the next ICG where the blocks are to get those data. He further commented that he doesn’t know whether they have a systematic list of where they are having trouble accessing data. He felt that the first part was getting together as a community and figuring out where the endpoints are.
7. Mr Fa’anunu stressed that he believes that all the recommendations from the meeting should go into some terms of reference of some working group. He asked for clarification on who does the mapping/alignment of this structure should also ensure that all recommendations are incorporated into ToRs.
8. Dr Wang (China) stressed that information on data sharing is mainly discussed within the regional working groups. They used the data sharing for the SCS Region as an example, citing that the data is one of the main original agenda items in the meetings.
9. The Chair that the next step would be the changing of the ToR for the Regional WG of the Southwest Pacific or for Task Force WG 2 Seismic Data Sharing. He pointed out that collaboration should be seen from the Regional WG of the Southwest Pacific and Task Force WG 2 to sort out this issue.

**4.2 TSUNAMI READY RECOGNITION PROGRAMME**

1. Dr Kong (Director of the International Tsunami Information Centre-ITIC) and Ms Ashleigh Fromont (Acting Team Lead Hazard Risk Management. Risk and Recovery. National Emergency Management Agency-NEMA, New Zealand) presented their report which was also made available as a Document on [Tsunami Ready Governance in the PTWS](https://oceanexpert.org/downloadFile/54539), an information [Document on Recognition in Countries with existing Tsunami DRR Programmes](https://oceanexpert.org/downloadFile/54577) and a [Presentation](https://oceanexpert.org/document/33254)
2. Dr Kong briefly explained the short timeline of Tsunami Ready Programme that was approved in 2022, but it started as an effort in the US in 2001 by the US National Weather Service. In 2011, US TsunamiReady was piloted in the Caribbean. In 2015, IOC Assembly approves Tsunami Ready Pilot Project to be implemented in other regions. Tsunami Evacuation Maps, Plans and Procedures (TEMPP) training supporting Tsunami Ready started in Pacific and Indian Ocean during 2015-2017. In 2022, UNESCO/IOC established the Tsunami Ready Recognition Programme with the goal of ‘100% of communities at risk of tsunami prepared for and resilience to tsunamis by 2023’.
3. At the meeting of the ICG/PTWS Steering Committee 2023, it was agreed that WG3 would explore potential governance structures for PTWS to effectively support Tsunami Ready. At ICG/PTWS-XXIX, WG3 was requested to ‘explore […] ways to recognise communities that choose not to implement the UNESCO / IOC Tsunami Ready Programme, as compliant with the TR indicators.
4. In terms of the PTWS governance structure, the TT on Tsunami Ready to advocate for ongoing this risks duplication of effort and or membership with WG3 which has an overall mandate of disaster risk management and preparedness can be considered in the same context as the TT UN Ocean Decade, which is working to support the Decade Goals by 2030.
5. Tsunami Ready coalition was established in 2022 and started in 2024, and together with the WG3 are looking at ways by meeting the UN Decade Goal without having to implement the UNESCO/IOC Programme in each country. Concerning the recommendation on the TT of Tsunami Ready, they suggested to establish a TT as opposed to a WG and the assist for a finite context for the ToRs similar to the Ocean Decade Task Team. In addition, they would like to address the sustainability by integrating any other responsibilities into WG 3.
6. MsFromont explained about the Tsunami Ready equivalency. She stated how they recognize the nation that have existing Tsunami DRR programmes that make communities effectively prepared for and resilient to tsunamis but may choose not to implement the TRRP in its formal state for various reasons. She added that it is been identified that including these communities and this country progress is important in order to be able to accurately capture and report progress as a system towards that goal of the UN Ocean Decade which they have prepared the information document available online.
7. Ms Fromont stated the WG3 has identified that the principles of a tsunami ready equivalency approach should include that countries who choose not to implement the tsunami-ready programme have a strong motivation to ensure their communities at risk of tsunami are prepared for and resilient to. She added that the WG3 would like to ensure that reporting on progress is consistent with the Tsunami-Ready Framework which is important to enable consistency across the whole of the system in reporting.
8. Ms Fromont added the effort to track and report toward global targets is concentrated at the national level to make sure that the balance of resources is appropriate. The approach they’re proposing in this information document is basically seeking to enable reporting on tsunami preparedness in a manner compatible with the 12 indicators of the Tsunami Ready Programme but using existing national frameworks and requirements.
9. Ms Fromont mentioned some steps for this process including defining the most appropriate level of the community, undertaking a review of the existing resources, utilizing existing community reporting, and empowering community participation. She added the National Tsunami Ready Board should be established regardless of implementation of the programme to enable both consistency and reporting across the ICG/PTWS but also enable local communities to progress the formal recognition should that be appropriate for the country territory community.
10. Ms Fromont summarized what WG 3 is proposing is to develop the approach into formal guidance for approval by the ICG/PTWS and they hoped it would be in collaboration with the regional WGs and other WGs’s Task Team as appropriate. She proposed further discussion on this topic and the informational document provided in the intersessional working group for Tsunami Ready.
11. As an example to the equivalency approach, New Zealand is not able to roll-out formal TR recognition as a national programme. However, there is interest at a national level to encourage the measurement of Tsunami Ready Recognition Programme, in support of the Ocean Decade Goal of 100% of all at risk communities “Tsunami Ready”. This would be preferentially undertaken at the Civil Defense Emergency Management Group Level (CDEM-committees of local authorities within regional boundaries).
12. Some indicators can be met “as standard” across the entire country as they are either national capability OR legislatively required to be reported in Regional Group Plans. Some work is required at the national level to describe how these are cross-referenced to the Tsunami Ready indicators. Groups could then apply with supplemental information on remaining indicators, where these are optional national activities. New Zealand’s Tsunami Reference Group (or sub-set) can be designated as a NTRB.
13. Dr Kong would like to meet intra-sessionally given that the fact they have already have the capability as a group. She would like to invite them to look more closely at the documents and bring them up during their intersessional WG.

4.3 MINIMUM COMPENTENCIES FOR NTWCs

1. Mr Fa’anunu of Tonga and Dr Kong of ITIC, Co-Chairs of the WG2 Task Team on Minimum Competency Level for NTWC Operators presented their report.
2. Dr Kong gave a brief history of the NTWC Competency Framework development, which initially came out from the WG-SWP-IV in 2016. The action request came out from the PTWS-XXIX by mid-2018. However, there was no funding, so it was not realized as proposed. In 2019 at PTWS-XXVIII a draft framework was finalized. In 2021, draft PTWS NTWC Minimum Competency Framework was shared with Global TOWS WG Inter-ICG TT on Tsunami Watch Operations and Disaster Management and Preparedness. WG 2 now recommends approval of PTWS NTWC Minimum Competency Framework and ITIC proposes to pilot Competency Training in 2024.
3. The Task Team was requested to establish and document the minimum competency levels for NTWC operations staff and develop a framework for the competencies and training requirements of the roles of a NTWC. Associated tasks included the establishment of the minimum competency levels required for NTWC operations staff, establishment of a framework for the required competencies required by the roles of a NTWC, establishing what training is required to ensure NTWC staff meeting minimum competency levels, and investigating and documenting what schemes are currently in existence and what guidelines and principles can be adapted for this purpose.
4. The competencies of the framework are core/advanced science knowledge, core/advance operational competency, and core agency competencies. The feedback provided so far included the need better understanding of volcano monitoring within NTWC, attachment of operational staff at PTWC in Hawaii or other NTWC, familiarization of the MET Staff with seismic operations, and the need to understand DRR aspects in issuance of warnings. Resulting recommendations can be summarized as the use of Training the Trainer (TTT) model as a more sustainable for countries to maintain their staff through own capacity development to address staff turnover and that the competency framework for PICTs should not belimited to seismic sources, but also address volcanic sources within an integrated approach.
5. In terms of the existing schema, Dr Kong mentioned that the TT asked for the profile of staff, length of NTWC training, and training information to several countries and they received information from the USA (PTWC, USNTWC), Australia (BOM, GA), Chile (SHOA), New Zealand (GNS, NEMA), and India (INCOIS, NTWC). TOWS WG-XVI in 2023/02 appreciated the intersessional progress on the work of ICG/PTWS to develop a National Tsunami Warning Centre (NTWC) Competency Framework (2019), and the ITIC’s leadership to pilot training courses based on the Framework and instructed ITIC to pilot the Draft PTWS National Tsunami Warning Centre (NTWC) Competency Framework (2019) for endorsement by ICG/PTWS with the goal to develop a global framework for all ICGs to use.
6. In terms of the ITIC plan for the NTWC Competency Training, requirements for the content and training modalities have been studied and ITIC has been exploring funding for piloting the framework in PTWS in 2024 and beyond.
7. Dr Kong ended the presentation by presenting the recommendations that they have identified in the report to be approved by the ICG.
8. The Chair commented that it is indeed important to raise the capability of the NTWC. Mr Fa’anunu (Tonga) elaborated that what was being asked here was the approval of the framework so that they could move on. However, they can carry on with the pilot with the Task Team under the capacity development, but there needs to be a follow-up with the change in mechanism perhaps in the Terms of Reference to ensure that it still follows the competency work.
9. The ICG noted recommendations arising from the TT Minimum Competencies, and noting the submission of a Minimum Competency Framework to the IOC for consideration, and in anticipation that conditions around assessment of efficacy have been met, and further noted the instruction of the Working Group on Tsunamis and Other Hazards related to Sea-Level Warning and Mitigation Systems (TOWS-WG) at its 16th meeting in 2023 to the regional ICG, notably the PTWS, and the ITIC to pilot the PTWS National Tsunami Warning Centre (NTWC) Competency Framework for endorsement by ICG/PTWS with the goal to develop a global framework for all ICGs to use. There are no objections from MSs to the approval of the NTWC competency framework.

4.4 INTEGRATION OF PTWS SENSORS NETWORKS FOR TSUNAMI DETECTION AND CHARACTERISATION

1. Dr Bill Fry, the Chair of the Task Team on Integrated PTWS Sensor Networks for Tsunami Detection and Characterization, presented his report on this agenda item, available as chapter 5 of the [Report of WG2](https://oceanexpert.org/downloadFile/54566) and Presentation.
2. Dr Fry presented what they hope is a useful simplification of a somewhat complicated problem. This came from getting more data stream coming into the operational centre and how to determine which is the useful information and how to utilize that information. He also wanted to acknowledge his co-chair, Tim Melbourne.
3. Dr Fry explained the TT ToR and highlighted the following aspects:

* Developing a methodology for gap and sensitivity analysis that combines multiple sensing technologies for tsunami detection and characterization
* Integrating emerging techniques and sensor technologies, for example the better use of tide gauges, GNSS technology and processing and sensors on telecom cables
* -Cost-benefit analysis of the potential technologies. and he would like to highlight the DART and SMART Cables.

1. In terms of the gap and sensitivity analysis for multisensory network, he presented a graph on gap and sensitivity analysis for multisensory network 10 and 20 minute for Wphase solution and GNSS inversion for earthquake source (finite fault), taking also into the consideration the population within 45m arrival time and living within 10km inland from the coast in <50m elevation. For stations within 100km of coast, it is assumed that an M7.5 earthquake will generate natural warning for the closest coastlines, which enables also the use of strong motion approaches. Regarding the GNSS inversion for earthquake source, it would suffice to have 5 GNSS stations within 200km of fault (edges of the unit source) for successful utilization of the data. He added that GNSS precise point positioning can improve characterisation of large local/regional earthquakes, providing rapid estimates of magnitude and fault geometry/slip distribution, and concluded that using a risk-based approach, optimum multi-sensor networks can be designed/considered allowing 20 min pre-impact warning.
2. In conclusion, WG2 recommended i) the ICG/PTWS continue to work closely with the JTF for SMART Cables and the IUGG GeTEWS project to utilise monitoring data from these efforts when they are available, ii) the TT on Integrated networks develop a framework based on the Research, Development and Implementation Plan for the Ocean Decade Tsunami Programme by which member states can contribute instruments/data/telemetry, etc in order to

achieve ODTP tsunami detection, measurement and forecasting goals within PTWS, and iii) that ICG/PTWS continue the Task Team on Integrated PTWS Sensor Networks.

1. The Chair thanked Mr Fry for his presentation and commented on France’s question from the morning regarding the data sharing. He reminded the delegations on the revisions of the IOC Data Exchange Policy in 2023 and underlines that this policy does not address exchange of seismic or GNSS data. With regards to the telecommunication of the data, he stated that he does not deny that the exchange of the data plays a very important role in the quick detection of tsunamis but noted that the transmission of said data is costly and the question remains on how these costs should be covered.
2. Dr François (France) commented that the Chair is correct that under the IOC mandate relates to the sea level data, whereas there is no clear agreement/understanding on the exchange of other types of data, such as data from SMART Cables Dr François stated that the telecommunication cable from Vanuatu to New Caledonia is managed outside of the SMART project, with data sharing cost will be covered by the telecommunication sector. He stressed that it is quite possible to properly have two hubs in New Caledonia and Port Villa which can be shared through the internet, but the exact type of telecommunications remains to be unclear.
3. Dr Rabinovich stated the cost of data transfer with high resolution, such as in the case of Japan, will indeed be high, and therefore underlined the importance of common data storages allowing data download on the need basis. Mr Angove (USA) reminded the delegations that the Ocean Decade depends on Member States contributions and such telecommunication costs could also be subject to such contributions. Dr Titov supported the remarks of Mr Angove and highlighted the importance of joint analysis of seismic and sea-level data.
4. In response to the remarks related to the cost of data transmission data from the SMART Cable, Dr Howe clarified that the volume of the data is relatively small, and the transmission of the scientific data and telecommunication data is ensured through different channels as completely separate.
5. Mr Ushida (Japan) underlines the need for the PTWS to respect MS policies on data exchange while acknowledging the importance of data exchange within the ODTP framework and when considering the IOC Data Exchange Policy aspects.

**4.5 EXPANSION OF PTWS EARTH SOURCE ZONE**

1. Dr Chip McCreery, Director PTWC presented his report, available as Chapter 1.1.1 of the [Report of WG2](https://oceanexpert.org/downloadFile/54566) and as a [Presentation](https://oceanexpert.org/downloadFile/54595).
2. Dr McCreery opened the presentation by explaining the issue. He stated a large and complex earthquake with multiple ruptures, the largest an Mw 8.1, occurred in the South Sandwich Islands region on August 12, 2021. A tsunami was generated by the earthquake and was recorded on gauges throughout the Pacific including as far away as Alaska and the Aleutian Islands. He mentioned that is a very active seismic zone with 29 magnitude 6.5 or greater earthquakes there since the year 2000. In addition, that seismic zone is very close to Chilean coasts which is a part of the PTWs service area and tsunami travel times to the Chilean bases in Antarctica are less than 2 hours and to Chile itself are less than 4 hours. He added that that seismic zone is not part of the PTWS Earthquake Source Zone therefore PTWS TSP products are not authorized for earthquakes in this zone unless a hazardous tsunami is forecast for or observed along PTWS coasts or there is reasonable cause for concern.
3. Dr McCreery mentioned the background of the recommendation which was submitted to the TOWS-WG 15th session, but it was removed from the IOC Decisions and expansion of the PTWS ESZ was not realized. However, a decision was made at the PTWS SC in March 2023 to re-consider this recommendation.
4. PTWC is the only TSP currently covering the southeast Pacific and it would be the only TSP covering the proposed expansion area. Additional PTWC Tsunami Information Statements would be issued to PTWS MSs once or twice per year for large earthquakes that occur in this zone. A tsunami threat message would be issued by PTWC when appropriate for threatened PTWS coasts based on the initial earthquake magnitude or later based on RIFT forecast model results. He stated that the PTWC response to earthquakes in this region be part of a routine procedure instead of being an ad hoc judgment call by the duty analyst. This will make the procedure more reliable and help protect PTWS coasts that may be threatened by a future vent from this area.
5. Dr McCreery stated that WG2 recommends requesting the IOC to change the PTWS Earthquake Source Zone map in the TS 130 (2016 version).
6. Mr Nishimae, as the Chair of the ICG/PTWS, commented that his understanding from the PTWS SC Meeting in March 2023 was that such decisions are not needed to be confirmed and approved by the IOC Governing Bodies. Mr Oxley (Chile) commented that Chile would like to take note that the expansion of the Earthquake Source Zone (ESZ) is crucial for their country and all the PTWS MSs. However, the specific boundary of this area is not related to the Atlantic Ocean, in the good understanding that is only the geological feature related to the tectonic plates of the “Scotia Arc”, the specific area where earthquakes lead to generating a Tsunami threat to the countries within the Pacific RIM. Therefore, Chile recommended that the expansion of the Earthquake Source Zone should be referred only to as the “Scotia Arc” and not the Southern Atlantic Ocean, because the area of monitoring interest also covers other oceans (Pacific, Atlantic and Southern Ocean). Therefore, this system is more accurate in establishing a clear boundary related to where earthquakes occur. In addition, the reference to “Scotia Arc” would also be in compliance with the geologic limits (boundaries) of the Pacific Plate. Dr Miao (Australia) expressed their support to the recommendation for the purposes of a better service.

**4.6 PROVISION OF TSUNAMI INFORMATION SERVICES FOR THE MARITIME COMMUNITY**

1. Dr McCeery, Director PTWC presented his report, available as Chapter 1.1.2. of the [Report of WG2](https://oceanexpert.org/downloadFile/54566) and as a [Presentation.](https://oceanexpert.org/downloadFile/54596)
2. Dr McCreery presented the agenda item that is mainly on provision of tsunami products or threat information to the ships at sea through the NAVAREA Coordinators of the IHO WWNWS. NAVAREA Coordinators currently convey such information to the ships at sea by manually extracting information from TSP and NTWC messages. He added that in recent years, representatives of the WWNWS have requested that TSPs create special Maritime Products with key information about tsunami threats that occur and send them to appropriate NAVAREA Coordinators for dissemination to ships at sea. Dr McCreery highlighted this issue has been discussed over several years at the meetings of the TOWS-WG and its TT on Tsunami Watch Operations. In addition, he added Australia’s TSP for the IOTWMS has developed these Maritime products after several discussions, none of the PTWS TSPs have developed Maritime Products.
3. Dr McCreery showed the photos of 21 WWNWS NAVAREAs in the world noting that there are only 7 in the Pacific (Australia, Chile, Japan, New Zealand, Peru, Russian Federation, USA. TOWS-WG 16th session in 2023 recommended the IOC Assembly at its 32nd session in 2023 to instruct the regional ICGs to test the tsunami maritime safety products in 2023/24 with a view to operationally implementing in 2024/25.
4. Dr McCreery stated the PTWS SC recommended the establishment of a TT on the provision of tsunami information of the TSPs to the maritime community for navigational warning with the following membership including all TSPs such as PTWC, NWPTAC, SCSTAC), Chile, Peru and Australia. He added that the SC instructed the Secretariat it send an email to formally launch the TT and support holding of a TT meeting before September 2023. He stressed that this special TT has not yet been formed, and interaction with the WWNWS in September has not yet taken place.
5. The following concerns were expressed in the PTWS SC Meeting in March 2023. Various situations that could create confusion if multiple TSPs as well as NTWCs were sending their information to the NAVAREA Coordinators. There is no directory of NAVAREA Coordinators, and that this information is essential for addressing the issue.
6. In terms of the recommendation from the TT of TSPs, PTWC should be the only PTWS TSP to create and provide the special tsunami maritime safety products to all NAVAREA coordinators in the Pacific. With regard to provision of the special tsunami maritime safety products to all NAVAREA coordinators in the Pacific, PTWC will transmit them to the NTWCs as well as the ordinary tsunami bulletin and the NTWCs will forward it to the NAVAREA coordinators in their countries. In addition, the other TSPs as well as NTWCs can provide their own more specific tsunami information to the NAVAREA coordinator appropriate for their respective service areas. Lastly, NTWCs are responsible for management of the focal point as well as coordination on forwarding methods to the NAVAREA coordinator covering the country of the NTWC.
7. The Chair thanked Mr McCreery for his presentation by stating this issue is not related to all MSs but 7 MSs who assume the responsibility of NAVAREA coordination.
8. Dr Miao (Australia) stressed that even though they were involved in the design of the product and implemented in the TSPs, the product has never been issued yet. He reported that the product does only inform on the potential threat but does not specify and specific coastline. He emphasized that the TSPs are in the best position to issue these products, and NTWCs role should be limited to give advice to port authorities within their national capabilities. He recommended that the communication with the WWNWS should be through the TOWS-WG rather than the ICG informing on which TSPs have such capability and inviting NAVAREA Coordinators to subscribe to the services of these TSPs, avoiding the need to go through the NTWC.
9. Dr McCreery stated that it certainly would be simpler and probably more effective to transmit the message directly to the coordinators rather than going through the NTWC. He stressed the need for more input from the WWWSN on this aspect. Mr Oxley informed that in the case of SHOA, both responsibilities are covered by the same organization, simplifying the matter.
10. Dr Rabinovich (Russian Federation) would like to support the opinion of the Australian delegation. He believed that this question is extremely important that they would try to be more specific in their tsunami warnings. He highlighted that they should remember that the price of every warning is very high. He argued that today, thanks to the denser observational networks and better forecasting, we can be more specific in the products disseminated.
11. Mr Fa’anunu (Tonga) informed on their experiences with the maritime radio. He stated whenever there is a tsunami warning, they broadcast it as one of the NAVAREAs areas while NZ is the area coordinator. He believed that the message comes from the NAVAREAs area as well because there are some states, especially in the Pacific that do not have national maritime broadcasting.
12. Mr Ball (New Zealand) essentially agreed with the Australian delegation. In New Zealand, NAVAREA responsibilities are coordinated by Maritime New Zealand, but the legislation assigns specific responsibilities to the NEMA regarding tsunamis. He highlighted the need to ensuring operational clarity which leads on to life safety questions.
13. Dr Miao supported to remarks provided by Tonga. He believed the concern is on the NTWC about how they maximize the dissemination of the national warning that they issued for their own country. He stated the HF radio to be more used for each country to also broadcast tsunami warning or any cause of hazard warnings. However, in the case of HTHH there was no warning because of the scope that only issue for marine weather warnings. He believed it should maximize using of the other channels to help maritime communities not only for ships but also other TSPs. He added that HF radio can be powerful and useful.
14. Mr Dennis Sinnott (Canada) informed on IHO standards S-100 and S-124 which deals specifically with NAVAREAs warning for vessels. He stated it might be worthwhile to investigate to see what type of messages they do send out and the cooperation that can go along with there.
15. Mr McCreery (PTWC) raised a concern about the confusion if he did not present clearly in the presentation. He stated the WWNWS sent representative twice to the TOWS-WG giving a structure and format for the proposed message, which in principle should reflect the expectations of the NAVAREA Coordinators. In this respect, he underlined the need to focus on delivering what has been requested by them.
16. The Chair commented that he notes the difficulty in reaching a consensus on this matter and invited the ICG to postpone any decisions to the next ICG through further elaborations within the SC Meetings. No comments were provided by the MSs.

4.7 REVISED USER’S MANUALS AND SERVICES OVERVIEW DOCUMENT

1. Dr McCreery introduced the agenda item. At the moment, there are 3 TSPs and a 4th one is underway. way. Each TSP has independently developed a Users’ Guide. The four TSP Users’ Guides have similar content, but each is organized differently. In addition, there is also a PTWS Users’ Guide from 2011 that contains an overview of PTWS TSP Services in whole.
2. In terms of the recommendation from the WG2 TT of TSPs, the TT of TSPs reviewed the four TSP Users’ Guides and agreed upon a common Table of Contents and the information to be provided under each heading in the Table of Contents. The TT also agreed recommending terminating the 2011 PTWS Users’ Guide, noting the effort required to maintain yet another document, and that its content will be sufficiently replaced by the PTWS TSP Users’ Guides in combination with the TOWS-WG Global Services Definition Document. Dr McCreery mentioned the detail is in the WG2 report for the revision of the Table of Contents and summarized which contents are in each heading in the Table of Contents (Overview, Operations, Products, Dissemination, and ANNEXES).
3. Dr Miao (Australia) supported the ongoing efforts. He shared experiences from the IOTWMS where there are separate user guides for each TSPs and a high-level one which captures all TSP common themes in a standard way. Additionally, there is a service definition document that lists the products to be made available and associated KPIs, being a bit more detailed than the GSDD, and inquired whether such mechanism could also be foreseen by the PTWS.

**4.8 PACIFIC WAVE EXERCISE 2024**

1. Dr Anthony Jamelot presented the report on behalf of Ms. Margarita Marinez, SENAPRED, Chile, and Emilio Talavera, INETER, Nicaragua (Co-chairs of TT on PacWave22) available as an [presentation](https://oceanexpert.org/document/33255).
2. Dr Jamelot reminded the delegations on the improvements for the 2024 exercise based on the feedback received from the PacWave2022 Exercise, such as the need to have more NDMO involvement, improve and promote people evacuation, timely advocation of the exercise, starting the planning earlier and aiming for earlier notification, and seeking funding opportunities. Dr Jamelot presented the calendar of PacWave24 with a proposal of September-November 2024 which includes the DRR Day (13 October) and WTAD (5 November). Details of the planned exercise will be discussed tomorrow during the intrasessional working groups discussions.

**4.9 CENTRAL AMERICA TSUNAMI ADVISORY CENTRE (CATAC)**

1. Dr Wilfried Strauch (Advisor on Earth Sciences, Instituto Nicaragüense de Estudios TerriToRiales, Nicaragua) presented his report and provided additional information about [CATAC’s draft user’s guide](https://oceanexpert.org/downloadFile/54584).
2. Dr Strauch gave an overview of the progress in CATAC. Due to the experience with the disastrous 1992 tsunami on the Nicaraguan Pacific coast, population and institutions of the country are much interested in the mitigation measures for tsunamis. CATAC manages 400 seismic stations, has state of art seismological and tsunami analysis tools (SeisComp and TOAST), operates an earthquake early warning system and is capable of providing initial seismological assessment in less than 2 min.
3. CATAC Advisory information is issued when CATAC detects an earthquake of magnitude 6.5 or greater in its monitoring area. In 2014, the government of Nicaragua proposed to establish Tsunami Warning Centre in Nicaragua at INETER and this proposal received support from all relevant institutions in the region. CATAC is thankful to Japan for their support to develop CATAC. In 2021, CATAC received the green light from the ICG/PTWS and the full operation of CATAC was accepted the interim mode.
4. Dr Strauch stressed they have a high density of seismic station in central America. He mentioned they get all the data from some countries and a there is a project supported by Switzerland for the earthquake early warning system installed in Nicaragua, El Salvador, Guatemala and Costa Rica, which contributed to the densification of the seismic network.
5. Efforts focused to identify areas in central America where local tsunamis can affect the coast. In addition to the use of accelerometer data efforts are in place to integrate GPS/GNSS in their system and to develop a cooperation with El Salvador regarding a back-up system. In terms of the request there is still request whether they could send messages in English to PTWC and NWPTAC, which in principle is possible for automatic standard messages but not practical for special observations or unusual situations as the English language capabilities of the duty officers are limited. INETER’s Met and IT Departments are not able to provide messages through the GTS. A SeisComP users group dedicated for Tsunami operations is highly recommended.
6. Dr Strauch argued that they are of the opinion that CATAC fulfils all the requirements to operate as a full TSP. The work for the finalization of the User’s Guide is in progress, as the draft was made available to the ICG/PTWS-XXX, to be also translated to Spanish. Accordingly, he proposed the ICG to admit the start of CATAC’s full operation and to endorse the final admission of CATAC by the IOC in the next year.
7. The Chairperson commented that CATAC has the same status both in PTWS and CARIBE-EWS, noting that the currents session is the last session before the IOC EC-57 in 2024.
8. Dr Kong (ITIC) noted the draft status of the User’s Guide and inquired when the final versions in English and Spanish will be made available, if there will be a review process and if the final version will become an IOC publication. Dr Strauch responded that the final versions in both languages will be ready by 1 January 2024. The Technical Secretary commented that he would seek confirmation and clarification and get back to the delegates regarding the IOC publication.

**4.10 OCEAN DECADE TSUNAMI PROGRAMME (ODTP)**

1. The Chair and Mr Angove (USA) presented this agenda item, available as a [Presentation](https://oceanexpert.org/downloadFile/54572). Background information for this agenda item is the [IOC Technical Series 180](https://oceanexpert.org/downloadFile/54567) and the Executive Summary of the Ocean Decade Tsunami Programme Research, Development, and Implementation Plan (ODTP RDIP), [available in six languages](https://oceanexpert.org/event/3920#agenda) on the meeting website.
2. The Chairperson stated the UNODTP Research and Development Implementation Plan was endorsed at the IOC 32nd Assembly. He raised two objectives of UNODTP. The first objective is to develop the warning system’s capacity to issue actionable and timely tsunami warnings for tsunamis from all identified sources to 100 % of coast at risk. The second objective is that 100 % of communities at risk to be prepared and resilient to tsunamis by 2030 through efforts like the IOC-UNESCO TRRP.
3. Mr Angove briefly explained the UNODTP Scientific Committee and the key elements of the Research, Development & Implementation Plan
   * Tsunami risk knowledge
   * Detection, analysis and forecasting of tsunamis and associated hazardous consequences
   * Warning, dissemination, and communication
   * Preparedness and response
   * Capacity Development (SIDS, LDCs)
   * Governance and Pathways to Implementation.
4. In terms of the detection, analysis and forecasting of tsunamis and associated hazardous consequences, the ODTP will aim to provide tsunami confirmation within 10 minutes or less or origin for the most at-risk coastlines. Warning, dissemination and communications as the third goal, 100% of the national authorities will be able to effectively warn the communities and population at risk, most importantly. For this, key elements that need to be addressed are effective decision making to warn, effective construction of warnings, and effective dissemination and communication of warnings. In addition, for this idea, the multi-hazard warning comes into this framework.
5. Concerning the preparedness and response capabilities, he highlighted the need to have 100% tsunami ready communities with multiple effective and sustainable communication methods in place. He mentioned the special consideration to be capacity requirements of SIDS and LDCs on the capacity building by highlighting the equality for the tsunami resilience. Regarding governance, he pointed out that there are two levels of governance envisioned by the Ocean Decade which are the UN and IOC level.
6. For the pathways to implementation, he underscored that MSs should endeavour to dovetail their national tsunami warning system plans/programmes with the ODTP objectives. In addition, MSs, academic institutions and industries will seek, possibly through ICG consultation to identify candidate proposals aimed at addressing the solutions. The intent of the plan is to offer contribution pathways that cover the full spectrum or financial commitment by targeting the objectives most important to advancing MSs capabilities.
7. The Chair introduced the discussion items for the intrasessional working group, which are i) change of Terms of Reference, taking into account the need for alignment with the ToR of the Task Team on Future Goals and Performance Monitoring, ii) selection of new co-chairs of the Task Team, and iii) the involvement of the ICG/PTWS in the 2ns Global Tsunami Symposium.
8. Dr Miao (Australia) inquired France’s view about how this symposium achieve better following the first successful first symposium in 2018. France mentioned the differences between 2018 and now. He believed this symposium should definitely be part of the activity of the ICG and the contribution to the Ocean Decade with another scale. He emphasized the need to aim for a broad participation and address global goals with all the activities to the tsunami warning system at a global level, including the scientific, civil protection and preparedness components.
9. Dr Rabinovich stressed the importance of the meteorological tsunamis and observations through micro-barometers as recording of atmospheric pressure can be good predictor of some volcanic events, even strong landslides and requested the ICG to consider including this aspect in its recommendations.
10. The ICG recognized that in the context of the Decade, ‘Ocean Science’ encompasses social sciences and human dimensions; the infrastructure that supports ocean science (observations, data systems); the application of those sciences for societal benefit, including knowledge transfer and applications in regions that are lacking science capacity; and the science-policy/user interface. While the intersessional efforts of the SC TT Ocean Decade were greatly appreciated, the ICG further noted both the need for coordination between the ICG/PTWS and its working groups in order to fulfil the UN ODTP goals for the PTWS and strong leadership and strategic oversight required to implement the UN ODTP. Based on these arguments, the Chair reminded that it is the Steering Committee which has the responsibility for strategic direction and coordination across all PTWS activities, including Ocean Decade and that the Steering Committee has the authority to invite additional members for advice on specific topics, and proposed to dissolve the SC TT Ocean Decade, and strengthen the mandate and ability of the Steering Committee to deliver on the Decade goals by modifying its Terms of Reference.

**4.11 TSUNAMI GENERATED BY VOLCANOES**

4.11.1 PTWS PROCEDURES AND PRODUCTS FOR THE NEXT HTHH EVENT

1. Dr McCreery presented this agenda item, available as a [Presentation](https://oceanexpert.org/document/33252). Background documents for this item are the [PTWS Interim Procedures Implementation Plan](https://oceanexpert.org/downloadFile/49836) and the HTHH Volcanic Tsunami Hazard Response: ICG/PTWS PTWC Interim Procedures and PTWS Products User’s Guide, V1.3, included under [IOC Circular Letter 2902](https://oceanexpert.org/downloadFile/54329). The ICG is expected to officially endorse PTWS Interim Procedures Implementation Plan and Users Guide at this session.
2. Dr McCreery briefly explained about the background of the plan after the HTHH eruption. He informed that the PTWC issued 12 products after the HTHH, but had problems with dissemination and editing as the products were designed for the earthquake triggered tsunamis.
3. Mr Francois Schindelé reported on the evolution of the HTHH ad hoc team on Volcano tsunami hazard response, which was established in February 2022, and presented the Terms of Reference of the ad hoc team. PTWS Interim Procedures Implementation Plan was disseminated in March 2022 through CL-2882 and PTWC Interim Procedures and PTWS products User’s Guide were distributed in August 2022 through CL-2902.
4. Dr McCreery explained the implementation plan which was established as ad hoc team. In terms of the interim standard operating procedures (SOP), he stated that the PTWC response to the 15 January tsunami presented some extraordinary challenges. He stated that because of the Interim SOP they will use observed tsunami amplitudes as the basis of a forecast. These include amplitudes from the tide gauge at Nuku’alofa and the deep ocean NZG DART gauge.
5. Dr McCreery explained the message contents that contain the estimated time tsunami waves were generated by the volcano along with the HTHH coordinates, the names of the countries or territories with a possible tsunami threat, the aforementioned tsunami amplitude forecast and estimated arrival times at gauge locations in the threat region, estimated tsunami arrival times at the tsunami forecast points in the threat region, and observed tsunami amplitudes on coastal and DART gauges. In terms of the message dissemination, messages will be disseminated to all the normal designated PTWS recipients via the standard methods used by PTWC for earthquake-generated tsunamis. However, there won’t be graphical products. An SMS will be sent with the first message to alert key government officials in Tonga. Messages will appear on the tsunami.gov website but will indicate an earthquake with a magnitude of 1. Messages will be issued at least once an hour until the threat has passed.
6. The Chair stated that the procedures and the products for the next HTHH event had been released without the endorsement of the ICG/PTWS, as the time of any future events is naturally not known. Mr McCreery (PTWC) commented that in his view the procedure should be kept in place but, some points may need to be generalized for any future volcanically generated tsunamis, which requires additional work.
7. Mr Fa’anunu acknowledged and thanked to the hard work. He commented that the 15min target as foreseen in the current procedure is not useful for Tonga and highlighted the need to promote further research on jhow to improve the timeline for efficient early warning also applicable for the near/local field. The use of infrasound technology needs to be explored further. SMS messages sent out should also be delivered to the NTWCs of Fiji, Samoa and Nieu.
8. Dr Kong recalled that there are some technologies available for automatic detection connected to some sirens, but they are not cheap. She wondered whether Prof Ripepe (Italy) would like to comment about the development and ability to put systems similar to the one installed in Stromboli could be installed anywhere else where it would be applicable and useful.
9. Prof Ripepe responded that the concept of cost relative and the cost of such a system of elastic beacon is actually one tenth of the cost of the DART.
10. The Technical Secretary raised a question regarding the pre-installation phase which also requires a detailed geological and geotechnical investigation. He wondered whether they don’t need any other preliminary investigations in terms of the geological part. Prof Ripepe responded that the strength of the elastic beacon system is the capability to respond to the oceanographic currents and the only requirement I terms of geomorphology is a flat ocean-bottom surface.
11. Mr Ball (New Zealand) requested a correction regarding correct referencing for the NZ DART buoys, which were shown as US DART buoys on the presentation delivered. Mr Angove (US) requested to make a clarification on which slide Mr Ball is referring to. Dr Fry (New Zealand) commented that they understood it is difficult to change the message product but in the body of the report he was wondering if the station code can be replaced with the NZ station code.
12. Dr Fry (New Zealand) further commented to the discussion about sensing techniques for non-HTHH explosions. He believed to identify the active volcanoes and develop maximum credible threat maps is the best interim solution because if they have a plan for the case of eruption, they can implement the threat maps that have been previously created, as the technology for effective real-time monitoring may not be available in near future.
13. Dr Miao (Australia) commented that the interim procedure for HTHH doesn’t solve other volcanic eruption problems. He raised the question about what the intersessional Working Group is going to discuss about what can be done to address the requirements for other volcanic eruptions of similar nature around the globe. He emphasized the need to collaborate with other UN agencies and stakeholders, such as Volcanic Ash advisory Centers (VAAC) to make a real multi-hazard effort and avoid working in isolation.
14. Mr Ushida (Japan) appreciated the work of the PTWS carried out for the interim SOP for the next HTHH event and supported the formalization of the procedure.
15. Dr Schindelé raised a question regarding the endorsement of the ICG, as he believed this question should be raised now to be included during the review of the recommendations. He wondered if the ICG endorses the document on the PTWC interim.
16. The Chair responded that he couldn’t identify any disagreement in this plenary, and but the formal endorsement will take place under the respective agenda item. The secretariat clarified that the document in question was the attachment of the respective Circular Letter and after the ICG approval it will become an IOC Technical Series publication. The Chair added that the ad hoc team will be dissolved as the end of this ICG session.

4.11.2. MONITORING AND WARNING SYSTEM AGAINST A TSUNAMI GENERATED BY VOLCANOES IN THE PACIFIC

1. The Chairperson, Mr Nishimae, draw attention and express appreciation for the work of *the TOWS-WG Ad hoc Task Team on Tsunamis Generated by Volcanoes under the Task team on Tsunami Watch Operations (TT TWO)* which delivered its [Report](https://oceanexpert.org/downloadFile/53940) at the TOWS-XVI session. The report is the culmination of that work and provides an overview of how volcanos can generate tsunamis, modelling techniques specific to volcanic tsunamis, requirements and examples of monitoring and warning systems, and finally recommendations for the future.
2. Mr Schindelé (France) acknowledged the contributions of the ad hoc Task Team members for this work. He stated there are 8 different sources for tsunami generated by volcanoes. In terms of the list of historical events, they provided some indications about the parameters of the sources in relation to the impact the tsunami run-up data, references, publications, and scientific studies.
3. He showed the global map and the western part of the Pacific with the largest number of the volcanoes with tsunamigenic potential. Out of 89 potentially tsunamigenic volcanoes established upon precise criteria, 57 are in the Pacific Ocean. In addition, he added that non-seismic and complex sources include underwater explosions, pyroclastic flows, large scale collapse, subaerial and underwater landslides, and tsunamis triggered by atmospheric perturbations. He indicated modelling of tsunamis in general is divided into 3 phases which are generation, propagation, and inundation. In terms of the SOPs, only Australia has documented SOPs for non-seismic sources that depend upon VAAC notifications.
4. Mr Schindelé informed the ICG that a questionnaire was sent to 25 volcano observatories and 17 responses were received. Tsunami Generated by Volcanoes (TGV) warnings currently follow a ‘Detect, then Warn’ procedure only. Requires detection and confirmation and may be too late to be useful unless there are many sensors between the volcano and coastal communities. For significant tsunami, eruption or flank collapse needs be ‘massive,’ but not yet been quantitatively defined. Hazard Assessment (eruption history, numerical modelling of historical events or worst- case scenarios) - not been conducted for all potential volcanoes. Most of the volcano observatories don’t have 24/7 operations. Only very recently the Stromboli Volcano Observatory is in close collaboration with the Italian NTWC (INGV) regarding tsunami monitoring and warning. He highlighted that Stromboli and Tonga are only volcanoes around the globe that are being monitored for tsunami warning.
5. Volcano Observatories (VO) monitor seismicity, surface deformation (tilt, movement), and geochemistry as eruption indicators. CARIBE-EWS tested the Volcano Observatory Notice for Tsunami Threat (VONUT) during the CARIBEWAVE 2023 (scenario Mt Pelée).
6. There are two types of triggers for tsunami warning: i) VAAC notice of activity (VO-VAAC information exchange), which does not include tsunami hazard potential, nor confirm tsunami wave generated and therefore can be considered as a pre-alert (tsunami watch). ii) Wave detection at coastal or in-water sensors to confirm wave generation and resulting in tsunami warning if a defined threshold is exceeded. Most VO do not host sea level stations, and thus are not monitoring sea level for tsunamis.
7. As a first step, organization(s) should be designated for monitoring and warning of Tsunamis Generated by Volcanoes (TGV). The second and third steps are to install monitoring instrumentation and develop Standard Operating Procedures (SOPs) to handle volcanic tsunamis. TGV monitoring and warning system should be implemented by, or in cooperation with the National Tsunami Warning Centre (NTWC) and regional Tsunami Service Provider and national and regional Volcano Service Providers, where such exist. All volcanoes mentioned in the TGV report should be monitored and have processes in place to warn for tsunamis. Should other, potentially tsunamigenic volcanoes begin erupting, these should also be monitored and included within the tsunami warning process. Detect/warn geophysical (seismology, GNSS, tiltmeter, barometric and sea level data streams need to be available to the designated tsunami monitoring/warning agency (and possibly also to the volcano monitoring agency)
8. As well as monitoring systems for volcano activity and potential far-field propagation of sea level signal, a sea level gauges network with real-time continuous data transmission should be deployed close to each identified volcano to verify risk and then ongoing monitoring and warning. One second sampling with 1cm accuracy (< 1 mm sampling) is recommended sampling is recommended for recording and automatic detection. Data transmission through radio or microwave links, fiber optic, or dedicated telephone lines, or other modes should be implemented to ensure the data is transmitted and received and widely shared with international community in timely manner. Methods to also specifically alert persons in remote areas (such as scientific teams in the field, or recreational hikers) should be considered. TGV SOPs for tsunami warning should be linked with existing Volcano Alert Activity scales.
9. A TGV hazard and risk assessment should be undertaken to determine vulnerable areas. For TGV, multi-stakeholder meetings should be convened that included science agencies, volcano and tsunami warning operations centres and disaster management agencies. For each identified potential source, worst-case and credible scenario planning discussions should start as soon as possible. During a period of heightened TGV hazard, consider closing access to vulnerable areas. When eruption is imminent and then tsunami hazard is high, consider evacuating populations from vulnerable locations. Specific TGV signage and evacuation routes should be implemented in all areas that may be impacted by tsunamis generated by volcanoes. TGV public awareness campaigns should be conducted regularly – the type and frequency of awareness activities may be different for the local population compared to transient populations such as tourists.

Dr Schindelé proposed the ICG is to implement a specific TGV group for the PTWC to confirm the list of potential threat volcanoes identified by the TGV in the Pacific (referred in Annex 4 Technical Series 183), and identify what is currently implemented as tsunami hazard assessment, monitoring and warnings systems for these volcanoes, with the final aim for developing guidelines on SOPs to monitor, detect and warn for any the induced tsunami waves. MSs agreed with Dr Schindelé’s proposal. The Group decided to establish the Task Team on Tsunami Generated by Volcanoes under the WG2.

1. Dr Fry stressed the importance for MS to have a database of threat maps based on maximum credible events. Dr Rabinovich added that some hazardous volcanoes in the area of the Kuril Islands can be specified only by specialist and hence the list of volcanoes identified may need to be revisited, which be the task of the newly proposed Task Team, as confirmed by Dr Schindelé. Dr Angove highlighted the risks for TSPs to assume first order responsibility for issuing threat information for such events and Mr Nishimae inquired what kind of volcanic phenomena will have to be observed for the purposes of detecting and issuing threat information for volcanic origin tsunamis. Dr Schindelé clarified that such systems will have to address both volcanic origin earthquakes and inflation type phenomena.
2. Prof Ripepe added that while the general approach is to monitor for the purpose of identifying potential eruption, but it would be important as a recommendation for volcano observatory to start monitoring the sea level change, as for tsunami warning purposes, there is no need to forecast the volcanic eruption. He highlighted the complexities of volcano observations and highlighted the need to endorse presence of tsunami experts in volcanic observatories, where applicable and needed. The Technical Secretary informed the ICG next conference on the Cities on volcanoes on 11-17 Feb in Guatemala which can provide a god opportunity to engage better with this community and promote their problems by seeking possible solutions.

**5. PROGRAMME AND BUDGET FOR 2024-2025**

1. Mr Necmioğlu reported that the original [Draft Programme and Budget for 2024-2025](https://oceanexpert.org/downloadFile/53441), which was presented to the IOC 32nd Assembly has been profoundly modified following the following three key decisions:
2. The 216th session of the UNESCO Executive Board (10-24 May 2023)

Item 44’ Urgent requirement for increased and more stable resources to the Intergovernmental Oceanographic Commission (IOC): UNESCO’s Executive Board decided to recommend that the UNESCO General Conference at its 42nd session agree to an increase in the IOC’s share of the UNESCO regular budget of [1%], not to be decreased by transfers of funds to other parts of the budget and ‘that a baseline to be identified and agreed for the IOC’s share of the UNESCO’s regular budget under document 42 C/5 and future C/5 documents and that no reduction to this baseline be made in the future unless agreed by the General Conference’;

1. IOC 32nd Assembly (21-30 June 2023)

The IOC Resolution A-32/4: Governance, Programming and Budgeting Matters of the Commission:

Requests about the IOC Executive Secretariat that additional regular budget for 2024-2025 be allocated to IOC Functions in two respects, with the advice that each of these should receive at least one third of additional resources:

(i) Recognizing the importance and existing balance of all IOC Functions, the uplifted regular budget for 2024-2025 should be allocated, for example pro-rata to stabilize all IOC existing functions, where the indicative pro-rata basis for distribution is based on the IOC Executive Secretariat’s proposal for the regular budget distribution in the Draft 42 C/5 presented to the UNESCO Executive Board at its 216th session, including non-staff and staff costs as included in Annex 1 to this Resolution.

(ii) Also recognizing the need for targeted additional regular budget investment focused on critically vulnerable areas, the increased regular budget for 2024-2025 should be allocated to:

a) IODE

b) GOOS

c) Capacity Development

d) Regional Subsidiary bodies;

For additional details see [Adopted Decisions and Resolutions (A-32)](https://oceanexpert.org/downloadFile/54133)

1. Fifth extraordinary session of the General Conference (29-30 June 2023)

The 5th extraordinary session of the UNESCO General Conference discussed about Financial matters related to the return of the United States to the Organization as a MS, as per the letter of the United States of America presented to the MSs by the Director-General of UNESCO on 12 June 2023, and decided that, should the United States of America join the Organization as a MS by 31 July 2023, this MS may take part in the voting at the General Conference at its 42nd session, be eligible as a Member of the Executive Board in the elections that will take place at that 42nd session and, if applicable, may take in the voting at sessions of the Executive Board until the 43rd session of the General Conference.

For additional details see [Records of the General Conference, 5th extraordinary session](https://unesdoc.unesco.org/ark:/48223/pf0000386259/PDF/386259eng.pdf.multi).

Because of the above decisions a revised Draft 42C/5 has been prepared by UNESCO with appropriated input from the IOC Secretariat that translate the relevant decisions above in the following key elements that concern to the Tsunami Resilience Section including PTWS elements.

* Establishment of a P3 IOC post in the Suva UNESCO Office
* Establishment of a P3 IOC post in the Cartagena IOC Office
* Increase of the regular budget for Function C which host the main 3 budget lines of the Tsunami Resilience Section (Governance, Tsunami Ready and Community Preparedness, Hazard Assessment). The increase is around 3 times the current biennial budget.

1. Mr Necmioğlu concluded his presentation by stating that these changes are subject to the decisions of MSs at the coming 42nd session of the General Conference, 7 -22 November 2023:
2. Dr Miao (Australia) acknowledged the great addition to the TRS programme and requested clarification about what the benefit to PTWC is and whether the proposed P3 post is overlapping with the position currently being held by Mr Korovulavula.Mr Necmioğlu responded that are getting stronger in the implementation of the IOC’s tsunami programme and through more financial and human resources, that will also contribute to the effective implementation of the PTWS strategy 2022-2023. In response to Dr Kong’s question regarding whether the proposed P3 post will be dedicated specifically to the IOC’s tsunami programme or if the assignment will cover all activities of UNESCO Suva office, Mr Korovulavula responded that the Secretariat does not have an answer at this stage.

***6.* NEXT SESSIONS**

6.1 CONFIRMATION OF DATE AND PLACE OF ICG/PTWS XXXI

1. The Chairperson presented on this agenda item. He recalled venues and host countries of previous ICG/PTWS meetings.
2. Dr Wang (China) announced the proposal of China to host the 31st session of the ICG-PTWS in Beijing, China in April 2025.Dr Miao (Australia) welcomed the proposal and inquired the possibility to organize a scientific workshop in the fringes of the ICG session. Dr Kong seconded the statement by Dr Miao and proposed organization of a Joint IOC-IUGG/JTC Scientific Workshop, as in the case of the current session. She further highlighted the need to ensure that the proposed date would allow the Secretariat to provide a report to the next session of the IOC assembly in June 2025, also ensuring that the proposed timeline is agreeable for the requirements of the PacWave24. Dr Wang (China) welcomed the proposal of a scientific workshop and stated China’s readiness to work towards this in close collaboration with the Secretariat and PTWS Steering Committee. Dr Jamelot (France/New Caledonia) informed the ICG that a near-final draft of the PacWave24 should be available to the next session of the ICG. The Chair announced that the next session of the ICG/PTWS will be held in China in 2025, and the precise dates will be determined at a later stage.
3. Mr Necmioglu expressed the Secretariat’s sincere gratitude to the Government of China for its willingness and availability to host the next ICG and informed the ICG that the Secretariat will do its best to make sure that the documents, presentations, and report to be made at least one week before the ICG.
   1. TARGET DATE FOR ICG/PTWS XXXII
4. The Chairperson invited MSs to consider hosting ICG/PTWS XXXII in 2027. Mr Schindelé (France) offered to organize this session New Caledonia offering to organize this in 2027 in the city of Nouméa with the date to be confirmed during the next session in China.

**7. ELECTION OF OFFICERS**

1. Mr Necmioglu reminded the ICG of the Rules and Procedures for the Election of Officers. The Chair of the Elections Committee, Mr Ball (New Zealand), presented the Report of the Elections Committee, chaired by Mr Ball (New Zealand) and supported by Ms Queenie C. C. Lam (China) and Mr David Hiriasia (Solomon Island). The election of officers of the ICG-PTWS was announced with the invitation in CL2947, providing the required forms for one Chair and two Vice-chair positions. The deadline for nominations was set in CL2947 and confirmed in annotated agenda as Wednesday, 13 September 2023 at 18:00 local time in Tonga. He informed the ICG that 1 nomination for the Chair and 3 nominations for the Vice-Chair positions were received by the Secretariat, as follows:

***Nomination for the Chair position:***

Mr Yuji Nishimae (Japan), seconded by USA and Republic of Korea

***Nominations for the Vice-Chair positions:***

Dr Dakui Wang (China), seconded by Malaysia and Indonesia.

Dr Wilfried Strauch (Nicaragua), seconded by El Salvador and Panama

Mr ‘Ofa Fa'Anunu (Tonga), seconded by Solomon Islands and Cook Islands

1. The Election Committee advised the ICG as follows:

Mr Yuji Nishimae (Japan) is therefore elected as Chair,

For the role of Vice Chair, given that there are three candidates for two roles, the following options are suggested for consideration by the ICG/PTWS-XXX:

i) voluntary withdrawal of one of the nominees

ii) consideration of a governing structure with 3 Vice-Chairs

iii) conduct elections.

1. The Chairperson invited MSs to provide their comments.
2. Mr Angove (USA) supported the expansion of three Vice-Chair positions within the PTWS governance structure due to the amount of workload. Solomon Islands, Australia, Chile, France, Ecuador, Canada and Cook Islands seconded US intervention on this issue.
3. As there were no objections, the Chair declared that there will be no elections for the Vice-Chair positions and all nominated candidates will assume the role of ICG/PTWS Vice-Chair for the next intersessional period
4. Upon request of the Chair, Mr Necmioglu presented the current organization structure of the ICG/PTWS and invited delegations to communicate list of members for the WGs and TTs.

**8. ANY OTHER BUSINESS**

1. Under this agenda item, Indonesia gave a presentation on the 2nd Global Tsunami Symposium which will be organized during 11-14 November 2024 in Banda Aceh, Indonesia, to be hosted by the Government of Indonesia – BMKG, and co-hosted by the UNESCO IOC - Tsunami Resilience Section and IUGG – Joint Tsunami Commission.

**9. ADOPTION OF DECISIONS AND RECOMMENDATIONS**

1. The Decisions and Recommendations of the ICG/PTWS were adopted after the ICG/PTWS-XXX session through the review of the Head of Delegations via e-mail was announced as adopted on 27 November 2024 through a notification addressed to the TNCs attended the ICG/PTWS-XXXI.

**10. CLOSURE**

1. The Chairperson, Mr Yuji Nishimae (Japan), thanked to the MSs and Observers for their active participation in the ICG/PTWS-XXX meeting. He also welcomed the Chairs/Vice-Chairs of the ICG/PTWS and WGs and TTs.
2. Mr Nishimae (Japan) announced further proposes in the recommendation agenda items that they have not yet approved the recommendations and decisions of the 30th session. He also instructed that the documents be emailed to the members, and he intend to hold the SC to deliberate on the recommendations and relay approval.
3. Dr Schindelé (France) thanked the Chair that it has been 30 years with his work starting in 1995 in chairing many groups, Task Teams and to all of his colleagues who have supported the groups as TTs and co-chairs; and to all colleagues around the Pacific and Indian Pacific (2005). He wished that the group in the next 30 years to improve the system in collaboration with scientists, NDMOs and Tsunami Warning Centres as it is crucial to continue in improving the system.
4. Mr Nishimae announced that this will also be the last session for Mr David Coetzee (New Zealand). He thanked Mr Coetzee for his work and collaboration throughout the years. Mr Coetzee thanked the Chair and wished he could have been here, and he noted that the delegations worked through everything. He would like to thank everyone for making it possible for him in the years he has been involved in this space to make sure that no one is left behind and he will continue to take that with him. He wishes everyone a safe travel.
5. He thanked colleagues for their collaboration and hard work for 5 days and appreciate the hospitality of Tonga colleagues and staff member of the Tonga Met Service. Also, he thanked to the Secretariat, Mr Necmioğlu, for his assistance. The previous face to face meeting was held in 2019 in Nicaragua followed by online meetings. He thought that there could be deeper discussion and better understanding and the same recognition of issues brought up. He felt that this session was very fruitful.
6. The session was closed at 00:33 (UTC) on 15 September 2023.

ANNEX I

**AGENDA**

**1. WELCOME AND OPENING OF SESSION**

**2. ORGANIZATION OF THE SESSION**

2.1. ADOPTION OF AGENDA

2.2. DESIGNATION OF THE RAPPORTEUR

2.3. CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION

**3. REPORT ON INTERSESSIONAL ACTIVITIES**

3.1. CHAIRPERSON REPORT

3.2. SECRETARIAT REPORT

3.3. TOWS-WG REPORT

3.4. TSUNAMI SERVICES PROVIDERS REPORT

3.4.1.1. PTWC

3.4.1.2. NWPTAC

3.4.1.3. SCSTAC

3.5. ITIC’S REPORT

3.6. NATIONAL PROGRESS REPORTS

3.7. WORKING GROUPS AND TASK TEAM REPORTS

3.8. REPORT OF PACIFIC WAVE EXERCISE 2022

3.9. STATUS OF PROGRESS IN OTHER ICGS

3.10. REPORTS FROM UN AND NON-UN ORGANISATIONS

**4. POLICY MATTERS**

4.1. PTWS STATUS REPORT

4.2. TSUNAMI READY RECOGNITION PROGRAMME

4.3. MINIMUM COMPETENCIES FOR NATIONAL TSUNAMI WARNING CENTERS

4.4. INTEGRATION OF PTWS SENSORS NETWORKS FOR TSUNAMI DETECTION AND CHARACTERISATION

4.5. EXPANSION OF THE PTWS EARTHQUAKE SOURCE ZONE

4.6. PROVISION FOR TSUNAMI INFORMATION SERVICES FOR THE MARITIME COMMUNITY

4.7. REVISED USER’S MANUALS AND SERVICES OVERVIEW DOCUMENT

4.8. PACIFIC WAVE EXERCISE 2024

4.9. CENTRAL AMERICA TSUNAMI ADVISORY CENTER (CATAC)

4.10. OCEAN DECADE TSUNAMI PROGRAMME (ODTP)4.11. TSUNAMI GENERATED BY VOLCANOES

**5. PROGRAMME AND BUDGET FOR 2024–2025**

**6. NEXT SESSION**

6.1. CONFIRMATION OF DATE AND PLACE OF ICG/PTWS-XXXI

6.2. TARGET DATE FOR ICG/PTWS-XXXII

**7. ELECTIONS OF OFFICERS**

**8. ANY OTHER BUSINESS**

**9. ADOPTION OF DECISIONS AND RECOMMENDATIONS**

**10. CLOSURE**

ANNEX II

**ADOPTED RECOMMENDATIONS**

Recommendation ICG/PTWS-XXX.1

**ICG/PTWS Governance**

The Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS),

**Recalling** IOC Resolution IV–6 that established the International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU) and IOC Resolution XXXIX-8 that renamed ITSU to be the Pacific Tsunami Warning and Mitigation System (PTWS) and to provide continuity through the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS),

**Reaffirming** that the PTWS is a coordinated network of national systems and capacities, and is part of a global network of early-warning systems for all ocean-related hazards,

**Noting:**

* [Sendai Framework for Disaster Risk Reduction 2015–2030](https://www.unisdr.org/we/inform/publications/43291) was adopted by UN Member States on 18 March 2015 at the World Conference for Disaster Risk Reduction (WCDRR),
* IOC Decision A-31/3.4.1 on Warning Mitigation Systems for Ocean Hazards approved the establishment of the Ocean Decade Tsunami Programme (UN ODTP) and a Scientific Committee (SC) to prepare the Draft 10-Year Research, Development, and Implementation Plan for this UN ODTP,
* IOC Decision A-32/3.4.1 on Warning Mitigation Systems for Ocean Hazards decided to endorse the 10-Year Research, Development and Implementation Plan of the UN ODTP as presented in document IOC/A-32/3.4.1.2.Doc(1), and also decided that warning systems for tsunamis generated by volcanoes should be considered and coordinated as part of the UNESCO/IOC Global tsunami and other Ocean-related Hazards Warning and Mitigation System (GOHWMS), and also when possible be part of a MHEWS;

**Having** **reviewed** the progress made in the implementation of the PTWS since the 29th Session of the ICG/PTWS,

**Having considered** the reports of:

* Working Group 1 on Understanding Tsunami Risk
* Working Group 2 on Tsunami Detection, Warning and Dissemination
* Working Group 3 on Disaster Risk Management and Preparedness
* Working Group 2 Task Team on Minimum Competency levels for National Tsunami Warning Centre (NTWC) operations staff
* Working Group 2 Task Team on the integrated PTWS sensor networks for tsunami detection and characterisation
* Working Group 2 Task Team of Tsunami Service Providers (TSPs)
* Working Group 2 Task Team on Seismic Data Sharing in the South West Pacific
* Task Team on PacWave Exercises, on PacWave22
* Task Team on Future Goals and Performance Monitoring
* Regional Working Group on Tsunami Warning and Mitigation System in the Central American Pacific Coast
* Regional Working Group on Tsunami Warning and Mitigation System in the South East Pacific Region
* Pacific Island Countries and Territories Regional Working Group on Tsunami Warning and Mitigation System
* Regional Working Group on Tsunami Warning and Mitigation System in the South China Sea Region
* Report of the Meeting of the PTWS Steering Committee, 6-9 March 2023
* 16th Meeting of the Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG-XVI), 2-3 March 2023
* North West Pacific Tsunami Advisory Center (NWPTAC)
* Pacific Tsunami Warning Center (PTWC)
* South China Sea Tsunami Advisory Center (SCSTAC)
* Central American Tsunami Advisory Center (CATAC)
* International Tsunami Information Center (ITIC)
* Reports of the ICG/IOTWMS, ICG/CARIBE-EWS,
* Chair’s Report
* Secretariat Report

**Having further considered** the reports on:

* Report of the Task Team on Future Goals and Performance Monitoring
* UN Decade of Ocean Science for Sustainable Development (2021-2030)

Research, Development and Implementation Plan for the UN ODTP ([IOC Technical Series No 180](https://unesdoc.unesco.org/ark:/48223/pf0000386603.locale=en))

* SPC initiatives on Disaster Risk Reduction and cooperation with PTWS
* ITU/WMO/UNESCO IOC Joint Task Force on SMART Cables
* NOAA/NCEI-WDS Integrated Tsunami Data
* Pacific Meteorological Council's Weather Ready Pacific Program

**Acknowledging** that the PTWS is effective in saving lives and reducing the impacts to communities in both near-field and distant-tsunami events through the three pillars of risk assessment and reduction, detection, warning and dissemination, and awareness and response,

**Requests** Member States to share any new forms of sea level data for tsunami warning purposes in accordance with the IOC Oceanographic Data Sharing Policy,

**Decides** to:

Continue *WG1 Understanding Tsunami Risk* with Terms-of-Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. Elected Co-Chairs are Chris Moore (USA, first term) and (VACANT);

Continue *WG2 Tsunami Detection, Warning and Dissemination* with Terms of Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXIX.1. Elected Chair is Mr Bill Fry (New Zealand, first term) and Vice-Chair(s) Lara Bland (New Zealand, first term) and Vasily Titov (USA, first term);

Continue *WG2 Task Team on the Integrated PTWS Sensor Networks for Tsunami Detection and Characterisation* with revised Terms-of-Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. Elected Co-Chairs are Ms Adrienne Moseley (Australia, first term) and Mr Tim Melbourne (USA, second term);

Continue *Task Team on Seismic Data Sharing in the Southwest Pacific* under the *Pacific Island Countries and Territories Working Group on Tsunami Warning and Mitigation System* (per ICG/PTWS-XXX.3)*,* with Terms-of-Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. Elected Chair is Mr Rennie Vaiomunga (Tonga, first term), and Vice-Chair is Mr Mathew Moihoi (Papua New Guinea, first term);

Continue *WG3 Disaster Risk Management and Preparedness* with Terms-of-Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. Elected Chair Ms Ashleigh Fromont (New Zealand, second term) and Vice-Chair Ms Laura Kong (USA, second term);

Continue Sub-Regional Working Groups and Task Teams with same Terms of Reference except where noted:

*Regional Working Group on Tsunami Warning and Mitigation System in the South China Sea Region* with Terms-of-Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. The Chair and vice-chair to be elected at its eleventh meeting.

*Task Team on Capacity Development and Services* under the Regional Working Group on Tsunami Warning and Mitigation Systems in the South China Sea Region with Terms of Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. The Chair and vice-chair to be elected at its eleventh meeting.

*Regional Working Group on Tsunami Warning and Mitigation System on the Central American Pacific Coast* with Terms-of-Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. Chair Ms Griselda Marroquin (El Salvador) and Vice-Chair Dr Wilfried Strauch (Nicaragua). The Terms of Reference for this group remains unchanged.

*Regional Working Group on Tsunami Warning and Mitigation System in the Southeast Pacific Region* with Terms-of-Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. Elected Chair is Mr Matias Sifon (Chile, first term) and Vice-Chair Mr Michael Linthon (Ecuador). The Terms of Reference for this group remains unchanged,

*Pacific Island Countries and Territories Working Group on Tsunami Warning and Mitigation System* with updated Terms-of-Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXIX.1. Elected Chair is Mrs Esline Garaebiti (Vanuatu, second term) and Vice Chair is Mr Mathew Moihoi (Papua New Guinea, second term), The Terms of Reference for this group remains unchanged.

*Pacific Island Countries and Territories Working Group Task Team on Capacity Development* with Terms-of-Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. Elected Chair is Mr Ofa Fa’anunu (Tonga, third term). The Terms of Reference for this group remains unchanged.

Continue the PTWS Steering Committee with revised Terms-of-Reference in order to strengthen its mandate and ability to deliver on the UN Ocean Decade goals. Revised Terms-of-Reference are attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1;

Continue *Task Team on PacWave Exercises* with revised Terms of Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. Elected Co-Chairs are Mr Laitia Fifita (Tonga, first term) and Ms Margarita Martinez (Chile, second term);

Continues *Task Team of the Tsunami Service Providers (TSPs)* under Working Group 2 with Terms of Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1, Elected Chair is Mr Charles “Chip” McCreery (United States, second term);

Dissolve the *Task Team on UN Ocean Decade*

Dissolve *Task Team on Future Goals and Performance Monitoring*;

Dissolve *WG2 Task Team on the Minimum Competency Levels for National Tsunami Warning Centre (NTWC) Operations Staff;*

Establish a *WG2 Task Team on Tsunami Generated by Volcanoes (TGV)* with Terms-of-Reference attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. Elected Co-Chairs are Mr Geoff Kilgour (New Zealand, first term) and TBD, and;

Establish a *WG2 Task Team on Forecasting from Ocean Observations* (TT-FOO) with Terms-of-Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. Elected Co-Chair is Mr Bill Fry (New Zealand, first term), and Mr Vasily Titov (USA, first term);

Establish a *WG3 Task Team on Tsunami Ready* with revised Terms-of-Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. Elected Co-Chairs are Laura Kong (USA, first term), and Ashleigh Fromont (New Zealand, second term);

Establish a *Pacific Island Countries and Territories Working Group Task Team* *on Information Sharing Platforms* with Terms-of-Reference as attached in Appendix 1 to Recommendation ICG/PTWS-XXX.1. Interim Co-Chairs are Anthony Jamelot (France-French Polynesia, first term) and Jonathan Tafiariki (Solomon Islands, first term).

**Decides** to carry out an eleventh Exercise Pacific Wave in 2024 (PacWave 24) in the months of September through to November 2024 to support International Disaster Risk Reduction Day (13 October) and World Tsunami Awareness Day (5 November), as reflected in the Terms of Reference;

**Expresses its gratitude** to the Government of the Kingdom of Tonga for kindly hosting the 30th session of the ICG/PTWS in Nuku’alofa, Tonga;

**Accepts** **with appreciation** the kind offer of China to host the 31st Session of the ICG/PTWS in April 2025 in Beijing. Specific dates will be determined at a later stage;

**Notes with appreciation** the kind offer of France to host the 32nd Session of the ICG/PTWS in 2027 in Nouméa, New Caledonia;

**Recognising** the scope and scale of the tasks ahead, decides to increase the number of ICG/PTWS Vice-Chair positions to three.

**Congratulates** Chair Mr Yuji Nishimae (Japan) and Vice Chairs Mr Dakui Wang (China), Mr Wilfried Strauch (Nicaragua), and Mr ‘Ofa Fa’anunu (Tonga) on their election to leadership of the PTWS.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Financial Implications: None

Recommendation ICG/PTWS-XXX.2

**Understanding Tsunami Risk**

The Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS),

**Noting** and welcoming New Zealand deployed next generation DART buoys (DART 4G) in July 2021, with a higher sampling rate than the previous generation DARTs, and an electronic filter capable of filtering seismic noise from the hydrodynamic signal,

**Further noting** that during the 5 March 2021, Kermadec Subduction Zone earthquakes the DART buoys were successful in capturing tsunami wave observations and scientists were able to use these observations to underpin wave forecasts, leading to more rapid cancellation and the ability to provide a series of de-escalation forecasts to the national agency responsible for issuing tsunami warnings,

**Also noting** that Pacific Marine Environmental Laboratory (PMEL) of NOAA have recently updated the Tsunami Coastal Assessment Tool (TsuCAT). TsuCAT helps assess the possible impact of tsunamis from multiple sources,

**Takes note** of the outcomes of the Expert Meeting on Tsunami Sources, Hazards, Risk and Uncertainties associated with the Colombia-Ecuador Subduction Zone, held in Guayaquil, Ecuador, 27–29 January 2020,

And **also** **notes** the outcomes of the Expert Meeting on Tsunami Sources, Hazards, Risk and Uncertainties Associated with the Chile-Peru Subduction Zone held in Arica, Chile, 21-25 August 2023.

**Agrees** to support a scientific meeting of experts on the New Hebrides Trench; a meeting of Scientific Experts on the New Hebrides Trench would allow better assessment of uncertainties in tsunami hazard associated with this Subduction Zone and Back Arc. Situated between Vanuatu and New Caledonia, the Subduction Zone and Back Arc is extremely active, capable of producing >M7 earthquakes, that can be tsunamigenic.

**Requests** WG1 to:

* **Continue to support** Tsunami Hazard Assessment (THA) studies in the Pacific as part of comprehensive risk assessment, consistent with the first objective of the UN Ocean Decade Tsunami Programme (UN ODTP), to achieve 100% coverage for coasts at risk of tsunamis.
* **Support** and encourage regional workshops of seismic experts in tsunami sources. Such regional workshops are best way to include local experts into THA studies.
* **Support** further development of the tsunami hazard and risk assessment tools for use in THA (TsuCAT, ComMIT, Tweb and others).
* **Encourage** development of new and improved methods and promote use of best practices for THA.
* **Encourage** creation of a clearing house for access to the results of the THA studies.
* **Encourage** use of THA results for use in various IOC programs such as ITIC training, Tsunami Ready Program, IOC/ICG/PTWS WG 2 and WG 3 activities and UN ODTP.
* **Note** the small number of official country nominations to ICG/PTWS-WG 1 and promote further nominations through the Steering Committee.

------------------------------------------

Financial implications: None

Recommendation ICG/PTWS-XXX.3

**Tsunami Detection, Warning and Dissemination**

The Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS),

**Noting** the intersessional ICG/PTWS adoption of interim Hunga Tonga Hunga Ha’apai (HTHH) warning processes and noting the IOC publication of CL 2882 and CL 2902,

**Decides to** establish permanent HTHH monitoring and warning procedures based on the products and methods in use by PTWC since March 2022 and presented in the CL 2882 and CL 2902.

**Considering** that the seismic zone in the Scotia Arc region is very active and have produced 33 earthquakes of magnitude 6.5 or greater since the year 2000, 13 of which were magnitude 7.0 or greater,

**Recognizing** that the Scotia Arc is not part of the PTWS Earthquake Source Zone,

**Observing** that the August 12, 2021, magnitude 8.1 earthquake in the South Sandwich Islands of the Scotia Arc produced a tsunami recorded widely, including throughout the Pacific and as far away as Alaska with amplitudes up to 0.19m,

**Noting** that parts of the PTWS coastal service area were as close as 4 hours tsunami travel time from that earthquake,

**Recalling** discussion of ICG/PTWS-XXIX.3 at the 15th session of TOWS-WG in February 2022, and the decision of the Steering Committee in March 2023, that the PTWS Earthquake Source Zone be expanded to include the Scotia Arc seismic region in order to routinely provide Member States of the PTWS with information about the frequent large earthquakes from this region, and any subsequent tsunami threat,

**Decides** to expand the PTWS Earthquake Source Zone to include an area from 63o to 52o south latitude and from 72o to 18o west longitude to include the Scotia Arc and its adjacent seismic zones.

**Requests** the IOC to change the PTWS Earthquake Source Zone map in TS 130, accordingly.

**Noting** advances in SMART Cable efforts in the Pacific and globally, and **noting** the advances in GNSS instrumentation and real-time processing, and noting the possibility of these advances to contribute to PTWS TEW goals,

**Recommends** WG2 continue to work closely with the JTF for SMART Cables and the IUGG GTEWS\_Oceania project to utilize monitoring data from these efforts when they become available.

**Noting** the establishment of an Integrated Network Assessment Framework presented in WG2 report to ICG/PTWS-XXX, and **noting** the UN ODTP goal of proliferation of monitoring systems; and **also** **noting** the possibility of improvements to the global tsunami warning system through the incorporation of Member State data, and

**Encouraging** open sharing of data while respecting the data policies of each Member State,

**Recommends** the TT on Integrated Networks develop a framework based on the 10-Year Research, Development and Implementation Plan for the UN ODTP to create a pathway by which Member States can contribute instruments, data, telemetry, etc., to support the UN ODTP tsunami detection, measurement and forecasting goals within the PTWS.

**Noting** challenges of telefaxing messages and the request from TT TSP presented in the WG2 report to ICG/PTWS-XXX,

**Requests** the Secretariat write to Member States to request feedback on the proposed changes to Telefax messaging, and also request Member States to indicate whether the proposed changes pose an unacceptable risk to their respective NTWCs and, if so, recommend those Member States work with their TSP to identify alternative methods for receiving TSP messages.

**Noting** the outcomes of the 7th ORSNET meeting, presented in Appendix 4 of the WG2 report, and the progress of WG2 Task Team on Seismic Data Sharing in the Southwest Pacific (TT-SDSSWP) during the intersessional period, and the complementarity of ORSNET and the Terms-of-Reference and regional focus of TT-SDSSWP,

**Decides** to move the TT-SDSSWP from WG2 to the Pacific Island Countries and Territories Working Group on Tsunami Warning and Mitigation System (WG-PICT).

**Noting** recommendations arising from the TT Minimum Competencies, and noting the submission of a Minimum Competency Framework to the IOC for consideration, and in anticipation that conditions around assessment of efficacy have been met,

**Decides** to dissolve this task team.

**Noting** the vast amount and variable nature of non-earthquake tsunami sources in the historical record, and noting the challenge of forecasting most non-earthquake tsunamis,

**Decides** to establish a WG2 TT on Tsunami Forecasting from Ocean Observations (TT-FOO), to investigate the use of TEW strategies based on direct ocean observations from available and emerging technologies.

**Recognising** the increase in scope and complexity of WG2 through the requested establishment of an additional two TT, bringing the total number to five, and rapid advances in TEW methods,

**Decides** to establish a WG2 TT to explore options for developing alternative warning strategies for tsunamis generated by volcanoes (TT-TGV).

**Noting** that the PTWC proposed some changes to its text product including putting the names of countries and territories with a potential threat in alphabetical order, organising the list of expected tsunami arrival times by country and territory, organising the list of observed tsunami amplitudes by country or territory, including an indicator for the type of observation made, and replacing the term “height” with “amplitude” which is more appropriate,

**Agrees** that PTWC implement these changes following notification to Member States by circular letter three months in advance in accordance with the change process put in place by ICG/PTWS-XXVI in 2015.

**Concerned** that one other proposed change, agreed to by ICG/PTWS-XXVI in 2015, to rename the forecast category labeled “less than 0.3 meters” and replace it with the label “no threat” indicates a level of danger rather than just the tsunami amplitude,

**Decides** to continue further discussion on these changes to the PTWC text products in the WG2.

**Recalling** Recommendation ICG/PTWS-XXVIII.2 on the TSPs Users’ Guide,

**Reviewed** the common Table of Contents (see Appendix 2 of ICG/PTWS-XXX.8) proposed by the WG2 Task Team of TSPs,

**Agreed** with the proposed common Table of Contents for the four PTWS TSP Users’ Guides.

Agreed that there is no longer the need for an overarching PTWS Users’ Guide to replace the Operational User’s Guide for the PTWS (TS 87) published in 2011, since its key content is covered by information in the four TSP User’s Guides as well as by the Tsunami Watch Operations - Global Services Definition Document (TS 130).

------------------------------------------

Financial implications: None

Recommendation ICG/PTWS-XXX.4

**Recalling** the TOWS-WG approved the proposal on TSP Messages for the Maritime Community and requested the ICGs to consider the proposal for implementation in their respective basins in the TOWS-WG XII session,

**Recalling** IOC Assembly instructs the regional Intergovernmental Coordination Groups (ICGs) TSPs in collaboration with NAVAREA operators of the International Hydrographic Organization (IHO) test the tsunami maritime safety products in 2023/24, with a view to operationally implementing them in 2024-2025 in IOC Decision A-32/3.4.1,

**Noting** necessity of coordination with the IHO with regard to provision of tsunami maritime safety products,

**Affirming** that the Pacific basin is covered by seven NAVAREAs and NAVAREA coordinators,

**Noting** the NTWCs of some member states have provided the information to the tsunami at near coasts,

**Considering** differences of tsunami threat to vessels or ships offshore and near the coasts,

**Noting** recommendations from the WG2,

**Recommends** the PTWC to finalize necessary preparations to provide special tsunami maritime safety products specifically for ships for all NAVAREA Coordinators in the Pacific and in the Southwest Atlantic (e.g. NAVAREAs VI, X, XI, XII, XIII, XIV, XV, and XVI) to transmit to the NTWCs to be forwarded to the NAVAREA Coordinators of their countries, or upon their request directly to the NAVAREA Coordinators in the absence of a NTWC,

**Requests** the PTWS Steering Committee to finalise its decision at its next meeting on the provision of these products for a period of testing to be followed by a full operational implementation by the PTWC in 2024-2025,

Recommendation ICG/PTWS-XXX.5

**Disaster Risk Management and Preparedness**

The Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS),

**Notes** the report of Working Group 3 (Disaster Management & Preparedness),

**Notes** the publication of IOC MG 74 Standard Guidelines for the Tsunami Ready Recognition Programme to support the implementation of Tsunami Ready,

**Appreciates** the long contributions of the ITIC to Member State capacity development and awareness-raising, and especially for its immediate support to Tonga after the HTHH volcanic eruption and tsunami in January 2022,

**Notes** the appointment of the Director of ITIC as the Chairperson of the Tsunami Ready Coalition in February 2023,

**Notes** the publication of the report of the Midterm Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015 -2030,

**Encourages** Member States to continue to share outcomes and progression towards 100% Tsunami Ready goal with WG3, including communities that are already considered compliant through national standards,

**Mandates** the ITIC to continue to facilitate implementation and data collection regarding Tsunami Ready compliance in PTWS,

**Notes** the challenges Member States may face in reaching the Ocean Decade tsunami resiliency goal as listed in the Terms-of-Reference given to WG3 at the ICG/PTWS-XXIX,

**Recalling** the ICG/PTWS-XXIX.1 recommendation for WG3 to explore ways to recognize communities that choose not to implement the UNESCO IOC Tsunami Ready Recognition Programme as compliant with the Tsunami Ready Indicators,

**Notes** with appreciation the work of WG3 through its Information Document “Recognition in Countries with existing Tsunami DRR Programmes”, proposing a Tsunami Ready Equivalency Approach that seeks to enable reporting of tsunami preparedness in a manner compatible with the UNESCO IOC Tsunami Ready Recognition Programme, using existing national administrative frameworks and reporting requirements, and without requiring formal UNESCO IOC recognition,

**Endorses** the proposed approach, and

**Establishes** a Task Team for Tsunami Ready under WG3 with Terms of Reference as listed in Appendix 1 of ICG/PTWS-XXX.1,

**Recommends** WG3 develop formal guidance for ICG/PTWS on the application of the proposed Tsunami Ready Equivalency Approach, led by WG3 TT on Tsunami Ready, in consultation with Regional Working Groups.

**Notes and appreciates** the contribution of the Task Team on Future Goals and Performance Monitoring in developing the Global Performance Monitoring Framework,

**Recommends** the latest version of the Framework be presented at the next TOWS-WG for endorsement of the global adoption by all ICGs, and

**Recommends** the TT DMP to work with the IOC Tsunami Unit to develop the web portal.

Recommendation ICG/PTWS-XXX.6

**Start of Operation of Central America Tsunami Advisory Center (CATAC)**

The Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS),

**Considering** the report of the fourth meeting of the Regional Working Group for Central America of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS), held in Managua, Nicaragua, on 11 February 2019, and the recommendations of the fifth meeting of the Regional Working Group for Central America of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS), 15 November 2021 (Online),

**Considering** recent tsunamis on the Pacific (September 1992 and August 2012) and Caribbean Central America coasts (1991, 2009 and 2018), and the potential loss of life and economic impact caused by such possible future events,

**Considering** the Coordination Centre for the Prevention of Natural Disasters in Central America (CEPREDENAC) as the institution specialized in integrated disaster risk management in Central America and that harmonizes the approach to these priorities with the strategies and agendas of other specialized bodies of the Central American Integration System (SICA),

**Considering** the efforts of Central American countries and regional organizations to establish new seismic stations, to maintain existing stations, and to make progress in the exchange of seismic data to advance tsunami and earthquake warning and research capabilities in Central America,

**Recalling and appreciating** the technical cooperation provided by the Japan International Cooperation Agency (JICA) to Nicaragua for the creation of the Central America Tsunami Advisory Centre (CATAC) and the strengthening of the regional system, including technical training,

**Decided** to support the efforts and progress made by Nicaragua in the creation of the Central America Tsunami Advisory Centre (CATAC), as a tsunami service provider (TSP) within the framework of the ICG/PTWS,

**Also recalling** that CATAC has been on trial mode as of August 2019,

**Notes** that CATAC elaborated a report to ICG/PTWS-XXX in PPT and Text formats about its development and the progress during the interim period 2022-2023,

**Notes** that CATAC elaborated a draft version of its Users Guide corresponding to the new standard proposed (25 Aug 2023) by ICG/PTWS Task Team of TSPs; taking into account the new processing methods, messaging formats and channels,

also **notes** that CATAC will discuss the final version (English) of the new User´s Guide in WG-CA, ICG/PTWS TT Task Team of TSPs, for decision, for the Pacific coast of CA. Thereafter the Spanish translation will be produced,

**Recalling** Recommendation ICG/PTWS-XXIX.5 which noted that the approval of both the ICG/CARIBE-EWS and IOC are necessary for the official full functional operations of CATAC,

**Decides** to admit the start of the official full functional operations of CATAC, starting after the IOC governing body meeting in 2024, with the specific starting date to be **decided** after the coordination with the ICG/CARIBE-EWS

------------------------------------------

Financial implications: None

Recommendation ICG/PTWS-XXX.7

**Minimum competency levels for National Tsunami Warning Centre (NTWC) operations staff**

The Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS),

**Recalling** the requests from Pacific Island Countries in 2016 and at the Twenty-seventh Session of the ICG/PTWS-XXVII in 2017 for the PTWS Working Group Two to establish minimum competency levels for NTWC operations,

**Recalling** the Draft NTWC Competency Framework shared at the Twenty-eighth Session of the ICG/PTWS-XVIII in 2019, and the establishment of the Task Team on the Minimum Competency Levels for National Tsunami Warning Centre (NTWC) Operational Staff established under PTWS Working Group Two during this Session,

**Recalling** **further** the establishment of the Task Team on Capacity Development established under PTWS Regional Working Group for the Pacific Island Countries and Territories on Tsunami and Mitigation at Twenty-eighth Session of the ICG/PTWS-XXVII in 2019, to continue the development of a competency framework for National Tsunami Warning Centres personnel and pilot it in Australia, Vanuatu, Fiji, Samoa and Tonga, and report progress and lessons learned to ICG/PTWS WG 1, 2 and 3,

**Appreciating** the initiative of Tonga, ITIC, PTWC, and IOCto pilot the Draft NTWC Competency Framework with the Tonga Meteorological and Geological Services and the Solomon Islands Meteorological Services in Nuku’alofa, Tonga in October 2019,

**Appreciating** feedback to the PTWS NTWC Competency Framework from Task Team on Capacity DevelopmentReport to the Ninth Session of PTWS PICT WG in February 2023,

**Noting** the TOWS WG-XV (2022) request to its Inter-ICG Task Teams on Disaster Management and Preparedness and Tsunami Watch Operations to consider development of guidelines for a global NTWC competency framework based on the available set of documents and Pacific input, noting that implementation can be at a regional level,

**Noting** the TOWS WG-XVI (2023) appreciation of the intersessional progress of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS) to develop a National Tsunami Warning Centre (NTWC) Competency Framework (2019), and the ITIC’s leadership to pilot training courses based on the Framework,

**Noting** the TOWS WG-XVI (2023) instruction to the regional ICG, notably the PTWS, and the ITIC to pilot the PTWS National Tsunami Warning Centre (NTWC) Competency Framework for endorsement by ICG/PTWS with the goal to develop a global framework for all ICGs to use,

**Noting** the United Nations *Early Warning 4 All* and *Weather Ready Pacific Programme* includes the need for timely and effective tsunami warnings in order to save lives, and the strategic importance of partnerships (e.g., IOC-WMO),

**Recommends** the approval of the PTWS National Tsunami Warning Centre competencies, framework, and training requirements, as described in IOC ICG/PTWS-XXX Working Document (Agenda 4.5) Report from the Task Team on the Minimum Competency Levels for National Tsunami Warning Centre (NTWC) Operational Staff.

**Welcomes** the ITIC proposal to pilot the PTWS Minimum NTWC Competency Framework through the development and conduct of a training course during the intersessional period, and report back on its outcome to the Thirty-first Session of the ICG/PTWS.

**Recommends** the ICG/PTWS WG 2 to report on the use of the Framework by Member States during the intersessional period to the Thirty-first Session of the ICG/PTWS.

Recommendation ICG/PTWS-XXX.8

**UN Decade of Ocean Science for Sustainable Development (2021-2030)**

The Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS),

**Recognizing** the [UN Decade of Ocean Science for Sustainable Development (2021-2030)](https://en.unesco.org/ocean-decade) as a once-in-a-lifetime opportunity to realize transformative ocean science solutions,

**Recognizing** the UN Decade of Ocean Science societal outcomes include a Safe Ocean, where life and livelihoods are protected from ocean-related hazards, such as tsunamis,

**Recalling** the IOC Symposium, “Advances in Tsunami Warning to Enhance Community Responses” (February 2018) that informed the TOWS WG on best practices and guidelines for the implementation and future development of the four regional tsunami warning and mitigations systems of the Global Tsunami Warning System,

**Recalling** Recommendation ICG/PTWS-XXVIII.6 for PTWS Member States to actively support the Ocean Decade through contributions of existing and new data, and promotion of the Decade programs as part of their national platforms and priorities,

**Noting** the recommendation of the 14th Session of the TOWS WG to establish a UN ODTP,

**Considering** the decision of the 32nd Assembly of the IOC (IOC Decision A-32/3.4.1) to endorse the 10-Year Research, Development, and Implementation Plan of the UN ODTP. as presented in document IOC/A-32/3.4.1.2.Doc(1)

**Welcoming** the endorsement of “Science Monitoring and Reliable Telecommunications (SMART) Subsea Cables: Observing the Global Ocean for Climate Monitoring and Disaster Risk Reduction, ID 94” as a UN Ocean Decade Project,

**Further welcoming** the UN Decade Project “Ocean Teacher Global Academy: Building Capacity and Accelerated Technology Transfer for the Ocean Decade”,

**Recognizing** that in the context of the Decade, **‘**Ocean Science’ encompasses social sciences and human dimensions; the infrastructure that supports ocean science (observations, data systems); the application of those sciences for societal benefit, including knowledge transfer and applications in regions that are lacking science capacity; and the science-policy/user interface. The integration of traditional knowledge in ocean research will also be promoted in the context of the Decade,

**Noting** the ICG/PTWS-XXIX decision to establish a Task Team on the Ocean Decade under the PTWS Steering Committee with Terms of Reference ICG/PTWS-XXIX.1,

**Noting** also the ICG/PTWS-XXIX **decision** to include a permanent agenda item on the Ocean Decade in the Policy section of its regular meetings,

**Appreciating** the intersessional efforts of the SC TT Ocean Decade,

**Noting** the need for coordination between the ICG/PTWS and its working groups in order to fulfil the UN ODTP goals for the PTWS,

**Noting** the strong leadership and strategic oversight required to implement the UN ODTP

**Recognising** that the Steering Committee has responsibility for strategic direction and coordination across all PTWS activities, including Ocean Decade,

Also **recognising** that the Steering Committee has the authority to invite additional members for advice on specific topics,

**Decides** to dissolve the SC TT Ocean Decade, and

**Recommends** strengthening the mandate and ability of the Steering Committee to deliver on the Decade goals by modifying its Terms of Reference as contained in Appendix 1 to the Recommendation ICG/PTWS-XXX.1.

------------------------------------------

Financial implications: None

**Appendix 1 to Recommendation ICG/PTWS-XXX.1**

Terms of Reference

**Working Group 1:   
Understanding Tsunami Risk**

Develop and promotebest practice tsunami risk assessment material, programmes, standards, and tools for understanding tsunami risk, to support emergency management and early warning, including but not limited to:

hazard assessment and coastal inundation models and products

risk assessment methodology and risk forecasting

scenario assessments including maximum credible and most likely events to understand likely exposure, vulnerability, and event frequency

forecast and threat models

evacuation and inundation modelling

use of new and improved data including digital elevation modelling (DEM), GNSS and paleotsunami information

Workwith scientific experts to support Member State tsunami risk assessment.

Improve best practice for assessing risk of local source and non-seismic tsunami sources.

Develop projects to address gaps or areas for improvement in tsunami risk assessment, this may include land-use planning, vertical evacuation or supporting early warning improvements.

The Group will be composed of members nominated by Member States, with two co-chairs, one from a science and one from a disaster risk management background, to be elected.

Terms of Reference

**Working Group 2:  
Tsunami Detection, Warning and Dissemination**

1. Liaise with other working group(s) and Task Team(s) within the ICG/PTWS and with working groups from the other ocean basins through the TOWS-WG to:
2. Develop, coordinate, and enhance operational implementation of interoperable tsunami threat information products and services.
3. Undertake studies to determine warning requirements for seismic and sea level data.
4. Monitor and report on the performance of key observational, warning and communication system components.
5. Contribute to the conduct of regular exercises and communication tests of the PTWS.
6. Identify areas of priority for action following assessments, communications tests, exercises, and real tsunami events.
7. Develop and maintain relevant documentation, such as the PTWS TSP User’s Guides.
8. Provide advice to the International Tsunami Information Centre (ITIC) on educational materials and for capacity building about the warning systems and services.
9. Help strengthen the capacity and capability of Member States.
10. Provide advice to the PTWS considering emergent data and novel processing and forecasting technologies to support NTWC and TSP, ensuring alignment to the UN ODTP goals.

The Working Group will be composed of members nominated by Member States, representatives for each ICG designated TSPs, ITIC, and invited observers, with a Chair and two Vice-Chairs to be elected by the ICG.

Terms of Reference

**WG2 Task Team:  
Tsunami Service Providers (TT-TSP)**

1. Share with each other their response to significant events including a timeline of actions, analyses made and the result of those analyses, decisions made and the basis for those decisions, the timeliness and accuracy of products issued, and any other notable successes or challenges.
2. Share with each other information about existing and any new methodologies for rapidly detecting and characterizing tsunami source events, for detecting and measuring tsunami waves, and for forecasting tsunami propagation and impacts.
3. Share with each other information on the effectiveness of products including format and content to make them understandable and actionable, dissemination methods and their testing, and any other support to customers prior to and during events.
4. Report to ICG on Task Team activities during the intersessional period as well as any resulting findings, changes, or recommendations regarding TSP operations.

The Task Team will be composed of representatives of PTWS Tsunami Service Providers (TSPs) and a representative from ITIC.

Terms of Reference

**WG2 Task Team:  
Integrated PTWS Sensor Networks for Tsunami Detection and Characterisation**

**(TT-ISN)**

This expert Task Team will establish and document a methodology to test the sensitivity of the PTWS sensing networks, integrating new and emerging techniques and technologies by:

Developing a methodology for gap and sensitivity analysis that combines multiple sensing technologies for tsunami detection and characterisation.

Integrating emerging techniques and sensor technologies (e.g. better use of tide gauges; GNSS technology and processing; sensors on SMART Cables) with the existing sensing network to meet tsunami warning service requirements in support of UN ODTP goals.

Where possible, include cost-benefit analysis of the potential technologies being considered.

Undertake to establish direct collaboration between ICG/PTWS Member States and other expert groups (such as International Association of Geodesy (IAG), International GNSS Service (IGS)) for the purpose of collaborating on data sharing and research efforts that are adaptable to the tsunami warning systems and operations of the IOC-Tsunami Programme, and aligned to the 10-year Research, Development and Implementation Plan of the UN ODTP.

Assess the utility and limitations of emergent technologies and techniques, e. g. GNSS, ADDOSS and SMART Cable, that have potential to deliver ocean height in real-time.

Align efforts with the *Task Team on Tsunami Forecasting from Ocean Observations* to ensure that Task Team recommendations account for existing and likely future observation systems.

Align efforts with the *Task Team for TSPs* and NTWC operational needs, to ensure that the Task Team recommendations consider the current and potential operational feasibility of emergent technologies augmentation for TSPs and NTWCs.

The Task Team will be open to TSPs, members nominated by Member States, and invited experts. Co-chairs to be elected by the ICG.

Terms of Reference

**WG2 Task Team:**

**Tsunami Forecasting from Ocean Observations (TT-FOO)**

1. Compare and document existing strategies for source-independent tsunami early warning and quantify and document their operational usefulness. Efforts will include consideration of both existing and emerging ocean observations technologies and techniques.
2. Connect with appropriate entities in the WMO and IOC Oceanographic communities to allow best-practice direct observation driven forecasting techniques to be assessed for their usefulness in Tsunami Forecasting from Ocean Observations.
3. Align efforts with the Task Team Integrated PTWS Sensor Networks to ensure that existing and likely future monitoring systems support TT recommendations.

The Task Team will be open to members nominated by Member States, invited experts. Co-chairs to be elected by the ICG.

Terms of Reference

**WG2 Task Team:**

**Tsunami Generated by Volcanoes (TGV)**

1. To confirm the list of volcanoes identified by the TGV as posing a potential threat to the Pacific (referred in Annex 4 Technical Series 183), to identify additional potential threat volcanoes, and continually review the list.
2. Among the volcanoes with potential tsunami threat, to identify those with implemented tsunami hazard assessment, monitoring, warning, and preparedness systems.
3. To establish direct collaboration between ICG/PTWS member states and IAVCEI to facilitate the contribution of PTWS tsunami expertise to the monitoring and warning capability of existing volcano monitoring centres or NTWCs, as appropriate.
4. To Identify potential volcanic partners in countries and international bodies, and recommend collaboration opportunities with them to improve tsunami early warning and to support the downstream decision makers affected by the volcanically-generated tsunami
5. To develop guidelines on SOPs to monitor, detect, warn, and prepare for any volcano-induced tsunami waves.
6. To develop guidelines on SOPs to monitor, detect, warn, and prepare for any volcano process that could induce tsunami waves.

The Task Team will be composed of members nominated by Member States, a representative from ITIC, and invited observers. Co-chairs to be elected by the ICG.

Terms of Reference

**Working Group 3:  
Disaster Risk Management and Preparedness**

1. In collaboration with TOWS Task Team on Disaster Management and Preparedness and organizations such as UNDRR, support the exchange of experiences and information on risk reduction and preparedness actions, and matters related to disaster management.
2. Promote preparedness in coastal communities through education and awareness products and campaigns.
3. Facilitate SOP training across regions to strengthen emergency response capabilities of Member States and their Disaster Management Offices.
4. Develop and promote best practice preparedness material, programs, and assessment tools.
5. Develop and Promote tsunami risk reduction theory and practice.
6. Support the ITIC of the ICG.

The Group will be composed of members nominated by Member States, regional organisations, a representative of ITIC with a Chair and a Vice-Chair to be elected by the ICG.

Terms of Reference

**WG3 Task Team:  
Tsunami Ready**

This expert Task Team will facilitate and coordinate efforts relating to the Tsunami Ready Recognition Programme and within the ICG/PTWS, in support of UN Ocean Decade Goals.

Develop formal PTWS guidelines following the 'Tsunami Ready Equivalency Approach’ for recognition of tsunami readiness of communities not implementing the IOC Tsunami Ready Recognition Programme,

Monitor Tsunami Ready campaigns and outcomes, and report results,

Ensure the advocacy for Tsunami Ready is aligned with other PTWS and IOC documents,

Advise on the Tsunami Ready workflow as it pertains to the PTWS and regions,

Support ITIC in its efforts to facilitate the implementation of Tsunami Ready in PTWS Member States,

Support ITIC’s efforts to develop standardized training supporting Tsunami Ready under the framework of OTGA, such as through feedback on content and helping to test trainings before officially deployed,

Help to identify sources of funding in support of the implementation of Tsunami Ready,

Report progress on encouraging the standard text in the UNESCO-IOC Tsunami Ready signage for vertical evacuation, such as “Go to the designated building for vertical evacuation”,

Report progress toward informing the public on the validity of the recognition, to be indicated on Tsunami Ready signage and on the certificate under the UNESCO-IOC Tsunami Ready logo.

The Group will be composed of members nominated by the Member States, representative of ITIC, with two co-chairs to be elected by the ICG.

Terms of Reference

**Regional Working Group on Tsunami Warning and Mitigation System on the Central American Pacific Coast**

1. To assist the Central American countries in the development, improvement and implementation of their National Tsunami Warning and Mitigation Systems, and the countries which are becoming new members of ICG/PTWS in their integration into the ICG/PTWS.
2. To request CEPREDENAC to support the development of CATAC in Nicaragua as interim Regional Tsunami Advisory Centre for all Central American countries.
3. To implement a regional communications and warning plan.
4. To facilitate Tsunami Hazard and Risk studies in the Central American Region.
5. To Serve as coordination point within the region for member states proposals related to UN ODTP objectives, including the SMART Cables initiative and advising the PTWS Steering Committee on details of such proposals for consideration.

The Group will be composed of members from Member States Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama, with a Chair and a Vice-Chair elected by the members of the Working Group and endorsed by the ICG.

Terms of Reference

**Regional Working Group on Tsunami Warning and Mitigation System in the Southeast Pacific Region**

1. To enhance regional capabilities in the Southeast Pacific Region for the Detection, Assessment, Warning and Dissemination of tsunami events, based on lessons learned and global trends, with the purpose of generating improvement opportunities for the National Tsunami Warning Centres (NTWCs) following the Sendai Framework priorities as a reference.
2. To facilitate cooperation in the establishment and upgrading of seismic and sea level stations and networks and communication systems in the region, and their interoperability in accordance with ICG/PTWS requirements, through the active participation of appropriate national delegates from Member States, in the Working Group 2: Tsunami Detection, Warning and Dissemination.
3. To improve the communication channels between the countries, according to the regional communications protocol established under Permanent Commission for the South Pacific (CPPS), through periodical tests using redundant systems.
4. To evaluate the merits of implementing the Tsunami Ready Equivalency Approach or the IOC Tsunami Ready Recognition Programme in the region.
5. To promote regional activities and join projects considering in-region capacity building and enhancing disaster preparedness for response as main efforts, according to the priorities number 1 and 4 of the Sendai Framework.
6. To facilitate capacity building and the sharing of sea level information among others, including the free and open exchange of data.
7. To improve the educational programs with regional criteria based on social, cultural, and economic reality, through the active participation of appropriate national delegates from Member States, in the Working Group 3: Disaster Risk Management and Preparedness.
8. To develop synergies with universities and academic centres to promote and to facilitate regional tsunami research in order to cope with regional needs.
9. To Serve as coordination point within the region for member states proposals related to UNODTP objectives, including the SMART Cables initiative, and advising the PTWS SC on details of such proposals for consideration

The Group will be composed of representatives nominated by the Member States of Chile, Colombia, Ecuador, and Peru, with a Chair and a Vice-Chair from each country rotating every two years, following an alphabetical order. In this context, the Vice-Chair will assume regional presidency for the coming period.

Terms of Reference

**Regional Working Group on Tsunami Warning and Mitigation System in the South China Sea Region (WG-SCS)**

1. To evaluate capabilities of countries in the South China Sea Region for providing end-to-end tsunami warning and mitigation services.
2. To ascertain requirements from countries in the South China Sea Region for the tsunami warning and mitigation services.
3. To promote and facilitate tsunami hazard and risk studies in the region.
4. To facilitate cooperation in the establishment and upgrading of seismic and sea level stations and networks and communication systems in the region.
5. To facilitate improvement of the education programmes on tsunami mitigation in the region.
6. To facilitate capacity building and the sharing of tsunami information in the region, including the free and open exchange of data.
7. To Serve as coordination point within the region for member states proposals related to UN ODTP objectives, including the SMART Cables initiative, and advising the PTWS SC on details of such proposals for consideration

The Group will be composed of members nominated by Member States Brunei, Cambodia, China, Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam and invited experts with a Chair and Vice-Chair to be elected by the members of the Working Group and endorsed by the ICG.

Terms of Reference

**WG-SCS Task Team:**

**Capacity Development and Services**

1. To coordinate training workshops and other technical exchanges on topics related to earthquake and tsunami for enhancing the tsunami warning capabilities of the WG-SCS Member States.
2. To facilitate implementation of the International Staff Programme for short-term secondment of staff from WG-SCS Member States to SCSTAC on an annual basis.
3. To explore ways for furthering the sharing and exchange of relevant data and information in the South China Sea region.
4. To ascertain the latest requirements of WG-SCS Member States for tsunami advisory service provided by SCSTAC.

Membership: Representatives of Member States of the ICG/PTWS WG-SCS (Brunei Darussalam, Cambodia, China, Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam) and invited experts; representatives of PTWC and NWPTAC (JMA); with Chair and Vice-Chair to be elected by the ICG.

Terms of Reference

**Pacific Island Countries and Territories Working Group   
on Tsunami Warning and Mitigation (WG-PICT)**

The Pacific Island Countries and Territories Working Group on Tsunami Warning and Mitigation will contribute to the implementation to Framework for Resilient Development in the Pacific and is encouraged to share the results of the working group with the Pacific Resilience Partnership.

The working group aims to:

1. continually review and evaluate capabilities of and make recommendations for improvements to countries in the Pacific Islands and Territories (PICT) Region for providing end to-end tsunami warning and mitigation services.
2. support the involvement and contribution of PICT countries in the activities of the ICG/PTWS.
3. promote and facilitate the tsunami hazard and risk studies in the PICT region.
4. facilitate cooperation in the establishment and upgrading of seismic and sea level stations and networks in the region, and the interoperability of these systems in accordance with ICG/PTWS requirements.
5. facilitate training and capacity building in the end-to-end tsunami warning and mitigation system in the region.
6. encourage the sharing of tsunami information, including but not limited to the free and open exchange of data.
7. facilitate tsunami awareness in school curricula, and development and dissemination of public educational materials.
8. work in cooperation with PTWS Working Group 1, 2 & 3, and relevant task teams especially on activities that strengthen country capacity in tsunami warning, risk mitigation & emergency response.

Members composed of representatives from Pacific Island Countries and Territories (PICTs), Council of Regional Organizations in the Pacific (CROP) Agencies, ITIC and WMO. Chair and Vice Chair elected by the members of the Working Group and endorsed by the ICG.

Terms of Reference

**WG-PICT Task Team:   
Seismic Data Sharing in the Southwest Pacific**

1. Advocate seismic data and related tsunami monitoring sharing in the region.
2. Advise Southwest Pacific countries on data sharing protocols, techniques, and technologies.
3. Work with Southwest Pacific Countries and partners to have a common data sharing policy.
4. Encourage Southwest Pacific Countries with existing or planned broadband seismograph stations to (i) join the International Federation of Digital Seismograph Networks (FDSN), (ii) use the standards developed by the FDSN for data exchange and (iii) take advantage of the data archiving and services provided by FDSN.

Members are representatives of Southwest Pacific Countries and territories (Australia, Fiji, France–French Polynesia, France-New Caledonia, New Zealand, Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu), PTWC, NWPTAC, Japan, and United States. Co-chairs to be elected by the ICG.

Terms of Reference

**WG-PICT Task Team:   
Capacity Development**

1. Continue the implementation of minimum competency framework for National Tsunami Warning Centres personnel and work with the ITIC to pilot it with Australia, Fiji, Samoa, Tonga and Vanuatu, and report progress and lessons learned to ICG/PTWS WG 1, 2 and 3.
2. Continue to monitor and coordinate the Tsunami Ready Programme and TEMPP in Fiji, Cook Islands, Samoa, Solomon Islands, Tonga and Vanuatu and review the Tsunami Ready Checklist for schools and communities in PICT.
3. Continue to develop the guideline for National Tsunami Warning Centres in responding to local tsunami and report to WG 1, 2 and 3.
4. Develop an online survey of warning and mitigation capabilities in the Pacific Island Countries and Territories (Member countries and IOC).

The Task Team Members: Australia, Fiji, France-New Caledonia (Co-Chair), New Zealand, Papua New Guinea, Samoa, Solomon Islands, Tonga (Co-Chair), Vanuatu, ITIC, IOC, PTWC, SPC, SPREP. Co-chairs to be elected by the ICG.

Terms of Reference

**WG-PICT Task Team:   
Information Sharing Platforms**

1. Propose a WG-PICT regional PacWave24 objective;
2. Based on Pacwave22 report, re-evaluate early / anticipatory information to be shared between NTWC and NDMO and which platform would be more adapted for each kind of information.
3. WhatsApp Guidelines:

* Maintain mobile contact in order to keep the PICT PacWave22 group alive;
* Obtain official mobile numbers of NTWC and NDMO
* Develop a guideline for messages sent on WhatsApp

1. HF-Radio Guidelines:

* Collect and collate feedback from monthly tests and recommend preliminary guidelines.
* Membership of the task team is open to any technical communication expert on this platform

1. Email Listerv Guidelines:

* Develop a guideline for messages shared by email (no acknowledgement, etc)
* Update and add new e-mail into the Pacwave22 listserv handled by ITIC

1. Identify and list new and relevant platform(s) for Information Sharing

* Other social media (e.g., Signal)
* Mobile App Broadcast system
* Dedicated (private) broadcasting information web-page.

The Group to be comprised of representatives from Pacific Island Countries and Territories (PICTs) and ITIC as members, Council of Regional Organizations in the Pacific (CROP) Agencies and WMO Regional Association V (RAV) as observers. Chair and Vice Chair to be elected by the members of the Working Group and endorsed by the ICG/PTWS.

Terms of Reference

**PTWS Steering Committee**

1. The Steering Committee shall act in an advisory capacity to the Chair of the ICG/PTWS during the inter-sessional period.
2. The Steering Committee shall coordinate and integrate the work of ICG/PTWS in the inter-sessional periods, as implemented through the various technical and regional working groups and task teams, including but not limited to:

* Maintain the PTWS Medium Term Strategic Plan.
* Monitor, maintain and update the PTWS Implementation Plan.
* Develop a Strategy for funding PTWS activities.
* Monitor the performance of the PTWS.
* Guide the work and direction of the PTWS to help deliver the goals of the UN Ocean Decade Tsunami Programme in support of its 10-year Scientific Research Implementation and Development Plan.
* Facilitate and report on PTWS contributions to the UN Ocean Decade Tsunami Programme and provide input to the Ocean Decade Tsunami Programme on behalf of the ICG/PTWS.

1. The Steering Group will be composed of the ICG/PTWS Officers (Chair and the Vice-Chairs), Chairs of the Technical and Regional Working Groups, Directors of the TSPs and ITIC, or their delegates, and other members’ representatives by invitation of the Chair.

Terms of Reference

**Task Team on PacWave Exercises**

Design and carry out the eleventh Exercise Pacific Wave 2024 with the following characteristics:

* An exercise shall be conducted with the aim to test PTWS Tsunami Service Provider (TSP) arrangements, and Country preparedness arrangements and operational procedures to respond and recover from a destructive tsunami.
* An exercise shall be conducted with the following objectives:

Test communications from the PTWS Tsunami Service Providers to Tsunami Warning Focal Points and National Tsunami Warning Centers of Member States.

Test national communication and cooperation, and readiness within the country.

Test regional communication and cooperation between Member States.

1. Prepare and Evaluate Exercise Pacific Wave 2024 (PacWave24), include that it will:

* Take place in the months of September through to November 2024 to support International Disaster Risk Reduction Day (13 October 2024, Sunday) and World Tsunami Awareness Day (5 November 2024, Tuesday),
* National exercises conducted within the intersessional period and before September, but not strictly as part of PacWave24, may be reported through the PacWave24 Post-Exercise evaluation survey.
* Be conducted as a series of regional exercises organized through the PTWS Regional Working Groups where applicable, with support from the PTWS TSPs and ITIC, involving all PTWS countries as part of the regular biennial Pacific Wave exercise conducted since 2006.
* Be conducted to include one live communications test from the PTWS TSPs to Member States on 5 November 2024, Tuesday at 00:00 UTC.
* Be conducted to include exercise activities over and above a table-top exercise.  Possible exercise variations include:
  1. Consider conducting in real time during the daytime working hours with full staffing or simulating minimal staff during night-time or weekend hours.
  2. Consider testing country capability to carry out their warning and response responsibilities for the situation where one or more PTWS TSPs is not able to provide guidance in a timely manner.
  3. Consider conducting the exercise down to the community level, including where possible an extensive public awareness campaign.
  4. Consider conducting as a regional exercise to share national event and alert level information in a timely manner with neighbouring countries in order to better inform tsunami threat decision-making.
  5. Consider the Sendai Framework for Disaster Risk Reduction Global Sendai Framework for Disaster Risk Reduction seven global targets and four priorities for action, World Tsunami Awareness Day and/or the UN Decade of Ocean Science for Sustainable Development in designing the exercise.
* Exercise Pacific Wave 2024 will be announced by Circular Letter from the IOC to Member States before 31 January 2024.
* The Exercise Pacific Wave 2024 manual will
  1. Include information on each regional exercise, such as through regional exercise manuals,
  2. Inform Member States on the availability of exercise products for their region, including instructions to Member States regarding the distribution dates,
  3. Include instructions to Member States regarding their participation and the evaluation instrument be prepared with content and structure similar to what was prepared for previous Pacific-wide exercises, but considering lessons learned on conducting exercises in a pandemic context, and any need to collect other additional information,
  4. Include a compilation and summary of good practices for planning, conducting, and evaluating virtual exercise,
  5. Be distributed by the IOC to Member States before 30 April 2024.
* Participating Member States are requested to complete and submit PacWave24 Exercise Evaluation Survey online by 15 December 2024 to complete (National/Exercise Survey + Live TSP Communications Test evaluation survey).
* Explore more automatic and efficient ways to compile the information, and accordingly implement subject to available resources.
* The Task Teak will define the survey questionnaire.
* The Task Team will compile the post-exercise evaluation survey and prepare the *Summary Report* with a list of recommendationsfor the PacWave24 exercise according to the following provisional calendar:
  1. Announcement of PacWave24 to all Member States before 31 January 2024, in the form of an IOC Circular Letter announcing the exercise period and TSPs live communication test date and time;
  2. PacWave24 National/Regional exercise period from 01 September to 31 November 2024;
  3. TSPs live communication test, 05 November 2024, 00:00 UTC;
  4. Deadline for PacWave24 online survey submission, 15 December 2024;
  5. PacWave24 Exercise Draft Summary Report will be shared with Member States 10 days prior to ICG/PTWS-XXXI;
  6. PacWave24 Summary Report will be published and posted at [www.pacwave.info](http://www.pacwave.info) on 30 June 2025.

1. The Task Team will provide guidance for the conduct of the next Exercise Pacific Wave, tentatively planned for 2026.
2. The Task Team will be composed of members nominated by Member States, regional working groups, SPC, ITIC, and TSPs.

* Members are Chile, China, Colombia, Fiji, France-French Polynesia, France-New Caledonia, Guatemala, Indonesia, Japan, Republic of Korea, New Zealand, Panama, Solomon Islands, Tonga, USA (ITIC and PTWC), and Vanuatu.

**Appendix 2 to Recommendation ICG/PTWS-XXX.8**

**Working Group 2**

**Tsunami Detection, Warning and Dissemination**

**Task Team on Tsunami Service Providers   
Proposed Common PTWS TSP Users’ Guide Table of Contents**

In bold below is the structure and the main headings and sub-headings that should be included in all TSP Users’ Guides. Other sub-headings, if necessary, would be at the discretion of individual TSPs based upon their unique capabilities, procedures, and products. Other common headings in all TSP User’s Guides may be included, if necessary, with a consensus among the TSPs.

***Change Log***

The User’s Guide is a living document that may require changes over time to reflect changes in TSP services, products, or other information. This section includes a table providing a brief description of any changes made, and the date of the change.

***Executive Summary***

This section may include some background information about the TSP, why the document exists, and a general summary of the document content.

**1. Overview**

**1.1. Background**

This section should contain background information about the country and organization that operates the TSP, why there is a need for the TSP, and how and when the TSP came into existence and how it is governed within the processes of IOC Tsunami Unit and the ICG/PTWS as well as within its own national organization.

**1.2. Area of Service**

This section should describe the coastal areas covered by the TSP and include a map indicating those coastal areas.

**1.3. Earthquake Source Zone**

This section should describe the seismic source area covered by the TSP and include a map of that area, ideally showing the seismicity and other potential tsunami sources such as active volcanoes. The section should note if sources other than earthquakes are also covered in some way. It should also note if any tsunami sources outside the normal Earthquake Source Zone will be covered if they produce tsunamis affecting the Area of Service.

**1.4. Tsunami Hazard**

This section should provide an overview of the known tsunami hazard for the Area of Service. It should include information about any significant historical tsunamis affecting the region as well as potential tsunamis that are not yet in the historical record.

**2. Operations**

**2.1. TSP Facility**

This section should contain information about the TSP operational facility including where it is located, what it contains in terms of an operations center, offices, IT and communications, how it is staffed overall and for 24x7 operations, and how it is backed up.

**2.2. Operational Tools and Procedures**

**2.2.1. Tsunami Source Detection and Characterization**

This section should primarily and generally describe the capabilities and procedures for rapidly detecting and characterizing large earthquakes and determining their tsunamigenic potential. The section should include a map of the seismic stations and any other sensors such as GNSS stations used for this task. It may also describe the same for other tsunami sources such as volcanoes or landslides if such capabilities and procedures exist.

**2.2.2. Tsunami Wave Observations**

This section should generally describe the capability for rapidly detecting and measuring tsunami waves that may produce hazardous impacts within the Area of Service, and also for monitoring tsunami waves impacting coasts within that area. It should include a map of those sensors that may be coastal sea level gauges, deep-ocean tsunameters, or other sensors.

**2.2.3. Tsunami Forecasting**

This section should generally describe tools such as those for tsunami travel time calculations and real-time or pre-run hydrodynamic models used for forecasting tsunami amplitudes and other impacts. It should include a brief description of their methodologies, constraining data, assumptions, strengths and weaknesses, and other characteristics.

**2.2.4. Decision Support**

This section should describe any tools employed by the analysts on duty at the TSP to to aid them in maintaining situational awareness as an event unfolds in order make soundly-based decisions regarding the tsunami forecasts, the types of products to be issued, and the content of those products.

**2.2.5. Product Creation and Dissemination**

This section should generally describe how the TSP products are created and disseminated. More detail about the products and dissemination methods is contained in later sections of the Guide.

**2.2.6. Timeline**

This section provides a general timeline and description of events that occur in carrying out TSP critical operations: from the source event (usually an earthquake), to the source detection and alarms, source characterization and evaluation of hazardous tsunamigenic potential, travel time determinations, issuance of initial products, tsunami wave confirmation and measurement, tsunami impact forecasting, issuance of subsequent products with forecasts and observations, and issuance of a final product.

**3. Products**

**3.1. Product Types and Criteria**

**3.1.1. Informational**

This section should note that the TSP will issue products for large earthquakes that have occurred but that present no tsunami threat to the Area of Service. It should indicate the criteria for those products such as magnitude and depth thresholds. It should also contain information about any other situations when an informational statement would be issued – for example in the case of a very distant source when the tsunami threat to the Area of Service is still under evaluation. It could be noted that informational products will be the most frequent products and provide a general idea of their frequency based on the historical seismicity and how often it meets informational product criteria.

**3.1.2. Threat**

This section should contain basic information about how the TSP handles tsunami threat situations. The section may be divided into sub-headings that describe the different stages of the crisis through time that include: rapid source detection with a potential tsunami threat, a confirmed tsunami, a validated tsunami forecast, observed tsunami impacts, and the end of the tsunami threat. Included should be the criteria for issuing initial tsunami threat products such as the earthquake magnitude, depth, and onshore-offshore thresholds, and how those criteria map into the coastal areas named with a potential threat. It should also describe the criteria for issuing subsequent threat products based upon tsunami wave observations and on numerical forecast information, and again describe how this information is applied to indicate the level of impact along various coasts. If there are categories of threat such as a threat to marine areas, coastal flooding threat, or major tsunami threat, then the criteria for those categories should be defined. This section should also contain the criteria for issuing a final threat product indicating that the threat is largely over.

**3.2. Product Content**

**3.2.1. Text Products**

The categories of information and how it is organized in text products is described in this section. Each category may warrant its own sub-heading in the Table of Contents. These might include: Product Heading, Product Title, Earthquake Parameters, Current State of the Tsunami Evaluation, Threatened Coastal Areas, Forecast Arrival Times, Forecast Amplitudes, Tsunami Observations, and Tsunami Safety Information. Each of those sub-sections should provide sufficient detail to enable recipients to properly understand the text product and to base actions on the text product if necessary.

**3.2.2. Graphical Products**

This section should describe any graphical products that would be issued. Usually this would only be for threat messages. Each type of graphical product should be under its own sub-heading. These could include a forecast tsunami travel-time map, a tsunami propagation map showing forecast maximum amplitudes across the ocean basin, a coastal forecast maximum amplitudes map, and a tsunami gauge observations map. Each of those sub-sections should provide sufficient detail about each graphical product to enable recipients to properly understand them and use them to inform their actions if necessary.

**4. Dissemination**

**4.1. Methodologies**

This section needs to describe the various ways that TSP information about a potential or actual tsunami threat reaches Member State TWFPs and NTWCs as well as how any public information is more widely disseminated.

**4.1.1. Products**

TSP text and graphical products are disseminated by various electronic communication methods and each of these should be described in its own sub-heading. Only communication links and methods that are under the control of the TSP or related government or international organizations such as the WMO are included. Dissemination by commercial third parties is useful, of course, but unless the third party is intentionally fed products by the TSP, such as might be the case with social media outlets like Facebook, then they are not necessary to be included. Key methods such as the GTS, AFTN, email, fax, SMS, website, CISN, etc. should be included and described under their own sub-headings.

**4.1.2. Customer Decision Support**

TSP staff may reach out to customers during events to ensure they are aware of a tsunami situation and ensure they have received any TSP products issued. They may also provide additional information to help with customer decision-making. Any such procedures should be described in this section and listed under separate sub-headings when appropriate. Procedures of this sort might include: call-down lists, conference calls, chat rooms, social media, and mass media interactions. It should be noted if such procedures are prescribed procedures or are ad-hoc and voluntary depending on staff availability.

**4.2. Communication Testing**

This section describes how TSPs routinely ensure that their products are reaching Member State TWFPs and NTWCs in a reliable and timely manner and that they are able to quickly recognize and respond to those products when their coasts are threatened by a tsunami. Testing is typically accomplished by a variety of means including routine and/or surprise communication tests, tsunami exercises, electronic product receipt verification, and by other means. Each method employed by the TSP should be named in its own sub-heading and described there. Part of ensuring that TSP products sent to TWFPs and NTWCs are recognized and viewed quickly also rests with The Member States. Their responsibility for responding to communication tests when necessary should be described and emphasized in this section. The IOC process for keeping their contact information up-to-date should also be described and emphasized.

**4.3. Contact Information**

This section should contain the contact information of the designated contact person(s) for the TSP including their name, physical address, email address, telephone number(s), and telefax number(s) if available. It should also include for reference similar contact information for the International Tsunami Information Center.

**ANNEXES**

**I. Example Products**

This annex should contain examples of TSP text and graphical products that cover the general range of what the TSP might issue – sample informational products, sample initial threat products, sample threat products with a forecast, sample threat products with observations, and sample final threat products. It could contain that sample threat suite for multiple source event scenarios if that would be useful. This section could contain sub-headings to make it easier for the user to locate particular sample products.

**II. Forecast Points**

This annex should contain a map or maps and table with the names and coordinates of geographical points used for forecast arrival times that may appear in text products. The annex should a table also contain a map or maps with the names and locations of points and/or coastal segments used for forecast maximum tsunami amplitudes given in products.

**III. Observation Sites**

This annex should provide maps and tables with the locations and key characteristics of the seismic, sea level, and any other observational stations that support their operation. This information will need to be only a snapshot of these stations at a given time since these data sources change frequently.

# 

# 

## ANNEX III

## LIST OF PARTICIPANTS

**ICG/PTWS-XXIX Twenty-ninth Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System**

**Chairs and Vice-Chairs**

Mr Yuji NISHIMAE  
Scientific Officer for International Tsunami Information  
Japan Meteorological Agency  
3-6-9 ToRanomon, Minato City

Tokyo 105-8431  
Japan  
Tel: +81 (3) 6758 3900  
Email: nishimae@met.kishou.go.jp

Mr. David COETZEE

(Retired) Manager, Regional Partnerships/ National Controller

National Emergency Management Agency (NEMA)

28A Hilton Drive

Amberley 7410

New Zealand

+64 274421236

dappie@xtra.co.nz

Dr Wilfried STRAUCH

Advisor on Earth Science

Instituto Nicaragüense de Estudios TerriToRiales

Frente Hospital Solidaridad.  
2110, Managua  
Nicaragua

Tel: +505 89 24 62 34  
Email: wilfried.strauch@yahoo.com

**Head of Delegation**

**Australia**

Mr Yuelong MIAO

Manager for Tsunami and SToRm Surge  
Environmental Prediction Services  
Bureau of Meteorology, Melbourne  
700 Collins Street, Docklands  
GPO Box 1289  
Melbourne VIC 3001  
Australia  
Tel: +61 3 9669 4110  
Email: [yuelong.miao@bom.gov.au](mailto:yuelong.miao@bom.gov.au)

**Canada**

Mr Dennis SINNOTT  
Supervisor Tides Currents and Water Levels  
Institute of Ocean Science (DFO – IOS), Fisheries and Oceans Canada  
9860 West Saanich Road  
P.O. Box 6000  
Sidney British Columbia V8L 4B2  
Canada  
Email: denny.sinnott@dfo-mpo.gc.ca

**Chile**

Mr OXLEY Arturo

Director of the Hydrographic and Oceanographic Service of the Chilean Navy

Servicio Hidrográfico y Oceanográfico de la Errazuriz 254, Playa Ancha 324

Valparaíso

Chile  
Email: oceanografia@shoa.cl

**China**

Mr Fujiang YU

Director-General  
National Marine Environmental Forecasting Center (NMEFC)/Ministry of Natural Resources (MNR)

No.8 Dahuisi Road, Haidian District  
Beijing, 100081  
China  
Tel: ++86 1062105732

Email: yufj@nmefc.cn

**Cook Islands**

Mr Arona NGARI

Director

Meteorological Service

P O Box 127, Avarua  
Rarotonga, Cook Islands, Avarua  
Cook Islands

Tel: +682 20603

Email: arona.ngari@cookislands.gov.ck

**Ecuador**

Mr LINTHON ALVAREZ Michael  
Director of Oceanography and Marine Meteorology, Oceanography Department

Instituto Oceanográfico y Antártico de la Armada del Ecuador  
Av 25 de julio, vía a puerto marítimo  
S/N  
090208, Guayaquil  
Ecuador  
Tel: +593985735569  
Email: arturolinthon@hotmail.com

**France**

Dr François Schindelé   
International expert

Commissariat à l’Energie Atomique et aux Energies Alternatives  
Bruyères-le-Châtel  
91297 Arpajon  
France  
Tel: +33 1 69 26 50 63  
Email: francois.Schindelé@cea.fr

Mr Shingo USHIDA

Seismology and Volcanology Department  
Japan Meteorological Agency  
3-6-9 ToRanomon, Minato City

Tokyo 105-8431  
Japan  
Tel: +81 (3) 6758 3900  
Email: ushida@met.kishou.go.jp

**Indonesia**

Mr Januar ARIFIN

Jl. Angkasa I No.2 Kemayoran Jakarta Pusat

P.O. Box 3540 Jkt.

DKI Jakarta

10720

Indonesia

Tel: +6285737000531

Email: januar.arifin@bmkg.go.id

**New Zealand**

Mr Roger Stephen BALL

Manager National Operations, National Operaitons  
National Emergency Management Agency (NEMA)  
PO Box 5010

Wellington 6140  
New Zealand   
Tel: 0272468857  
Email: roger.ball@nema.govt.nz

**Nicaragua**

Dr Wilfried STRAUCH

Advisor on Earth Science

Instituto Nicaragüense de Estudios TerriToRiales

Frente Hospital Solidaridad.  
2110, Managua  
Nicaragua

Tel: +505 89 24 62 34  
Email: wilfried.strauch@yahoo.com

**Republic of Korea**

Korea Meteorological Administration

61, 16-gil, Yeouidarbang-ro, Dongjak-gu  
Seoul  
South Korea

Tel: +82-2-2181-0062

Email: suncheon@korea.kr

**Solomon Islands**

Mr David Hiba HIRIASIA

Director of Solomon Islands Meteorological Service

Solomon Islands Meteorological Service

Ministry of Environment, Climate Change, Disaster Management and Meteorology. P.o. Box 21. P.O.Box 21

Honiara

Solomon Islands

Tel : 7682832  
Email: david.hiba@met.gov.sb

**Tokelau**

Ms Jewel TUITAMA   
Ministry for Climate, Ocean and Resilience  
P.O. Box 3298  
Apia, SAMOA  
Tokelau  
Email: jewel.tuitama@tokelau.org

**Tonga**

Mr Mafua-'i-Vai'utukakau MAKA

Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications

P.O. Box 1380

Nuku’alofa

Tonga  
Email: vaiutukakaumaka@gmail.com

**United States of America**

Mr Michael D ANGOVE  
Consultant, Subject Matter Expert  
National Weather Service/National Oceanic Atmospheric Administration

1325 East-West Highway  
Silver Spring, MD 20910  
United States

Tel: 17037171871  
Email: michael.angove@gmail.com

**Delegates**

**American Samoa**

Mrs Elinor LUTU-MCMOORE  
Meteorologist-In-Charge

National Oceanic Atmospheric Agency - National Weather Service - WSO Pago Pago  
P.O. Box 789

Pago Pago American Samoa 96799

American Samoa  
Tel: 6846999130  
Email: elinor.lutu-mcmoore@noaa.gov

**Australia**

Ms Adrienne MOSELEY

Director, National Earthquake Alerts Centre, Geoscience Australia  
[Geoscience Australia](https://oceanexpert.org/institution/10307)  
Cnr Jerrabomberra Ave and Hindmarsh Drive

Symonston

Canberra ACT 2609

Australia  
Tel: +61 (0)2 6249 9604  
Email: adrienne.moseley@ga.gov.au

**China**

Dr Dakui WANG

Associate Research Professor

National Marine Environmental Forecasting Center (NMEFC) / Ministry of Natural Resources (MNR)  
No.8 Dahuisi Road, Haidian District  
Beijing, 100081  
China  
Tel: +86-10-62105671  
Email: dakui.nmefc@gmail.com

Mr Jianyu SHI

Associate Research Professor

National Marine Environmental Forecasting Center (NMEFC) / Ministry of Natural Resources (MNR)  
No.8 Dahuisi Road, Haidian District  
Beijing, 100081  
China  
Tel: 15201607372  
Email: shijy@nmefc.cn

Mr Peitao WANG

Scientist, Tsunami Modeling

National Marine Environmental Forecasting Center (NMEFC)   
No.8 Dahuisi Road, Haidian District  
Beijing, 100081  
China  
Tel: +86-10-62105671  
Email: wpt@nmefc.cn

Mr Ching-chi LAM

Senior Scientific Officer

Hong Kong ObservaToRy  
134A Nathan Road   
Kowloon  
China  
Email: cclam@hko.gov.hk

**Cook Islands**

Mr John STRICKLAND  
Director of Emergency Management Cook Islands (EMCI)

Emergency Management Cook Islands  
Office of the Prime Minister.

Avarua

Cook Islands  
Tel: +68254005  
Email: john.strickland@cookislands.gov.ck

**Ecuador**

Ms Patricia ARREAGA VARGAS   
Oceanographer of Marine Science

Instituto Oceanográfico y Antártico de la Armada del Ecuador  
Av 25 de julio, vía a puerto marítimo

S/N, 090208

Guayaquil

Ecuador  
Tel: +593 4 2481 300  
Email: patricia.arreaga@gmail.com

**Fiji**

Mr Laisenia RAWACE

Seismology Unit

[Mineral Resources Department, Fiji](https://oceanexpert.org/institution/11674)

Private Mail Bag, GPO

Suva

Fiji  
Email: laisenia.rawace@mrd.gov.fj

**French Polynesia**

Mr Anthony JAMELOT  
Geophysicist

Centre Polynésien de Prévention Des Tsunamis (CPPT)

Laboratoire de Géophysique, Commissariat à l'Energie Atomique (CEA/DASE/LDG)

PO Box 640

98713 Papeete Tahiti

French Polynesia  
Tel: +689 87783646  
Email: jamelot@labogeo.pf

Mr Stéphane QUEMA

Laboratoire de Géophysique, Commissariat à l'Energie Atomique (CEA/DASE/LDG)

PO Box 640

98713 Papeete Tahiti

French Polynesia  
Email: quema@labogeo.pf

Mr Jérémy POUSSAC

Civil Protection

Crisis management officer

Haut-Commissariat de la République en Polynésie Française  
avenue Pouvana'a a Oopa

BP 115

98713 Papeete

French Polynesia  
Tel: +689 89 73 63 64  
Email: jeremy.poussac@polynesie-francaise.pref.gouv.fr

**Indonesia**

Mr Januar Arifin

JI. Angkasa I No. 2 Kemayoran

Jakarta Pusat

Indonesia

Tel: +62 (021) 4246703 10720

Email: jancorp@yahoo.com

Mrs Meita Yunita KATILI

Government Employee

Earthquake and Tsunami Center

BADAN METEOROLOGI, KLIMATOLOGI, DAN GEOFISIKA  
Jl. Angkasa 1, No. 2 kemayoran

Jakarta 11750

Indonesia  
Tel: 6281236016083  
Email: meita.yunita@gmail.com

Ms Mila APRIANI  
Deputy for Geophysics, BMKG

National Weather Service/National BADAN METEOROLOGI, KLIMATOLOGI, DAN GEOFISIKA  
P.O. Box 3540 Jkt.

Jl. Angkasa I No.2 Kemayoran Jakarta Pusat

DKI Jakarta

10720

Indonesia

Tel: + 628568548544  
Email: mila.apriani@gmail.com

**Japan**

Mr Yuji NISHIMAE  
Scientific Officer for International Tsunami Information  
Japan Meteorological Agency  
3-6-9 ToRanomon, Minato City

Tokyo 105-8431  
Japan  
Tel: +81 (3) 6758 3900  
Email: nishimae@met.kishou.go.jp

Mr Yoshitaka KON

Earthquake and Volcanic Engineering Affairs Division, Seismology and Volcanology Department  
Japan Meteorological Agency

Oceanic Atmospheric Administration

3-6-9 ToRanomon, Minato-ku  
Tokyo,  
105-8431  
Japan

Email: y\_kon@met.kishou.go.jp

**New Caledonia**

Ms Céline BARRÉ  
Head of studies, Direction de la sécurité civile et de la gestion des risques / Service des opérations et de la gestion de crise

Gouvernement de la Nouvelle Calédonie

BP M2

98849 Nouméa

New Caledonia

Tel: + 687962425  
Email: celine.barre@gouv.nc

**New Zealand**

Ms Lara BLAND  
Principal Advisor Hazard Risk Management, Risk and Resilience

[National Emergency Management Agency (NEMA)](https://oceanexpert.org/institution/22478)

PO Box 5010

Wellington

Wellington 6145

New Zealand

Tel: + 64272308383  
Email: lara.bland@nema.govt.nz

Dr Bill FRY

Scientist

Tectonophysics

SNS Science

P.O. Box 30-368

1 Fairway Drive

Avalon 5010

New Zealand  
Email: b.fry@gns.cri.nz

**Republic of Korea**

Ms Seulye SHIN

Earthquake and Volcano Monitoring Division

Korea Meteorological Administration

61 16-GIL, YEOUIDAEBANG-RO, DONGJAK-GU

Seoul

South Korea

Email: ssy3@korea.kr

Mr Haseong LEE

Earthquake and Volcano Reserach Division

Korea Meteorological Administration

45 Gisangchung-gil Dongjak-gu

Seoul

156-720

South Korea

Tel: +82 1091925275

Email: hslee321@korea.kr

**Solomon Islands**

Mr Cornell HIVAE  
Deputy Director - Digital Transformation & Strategic Projects, SIG ICT Services

Solomon Islands Government ICT Services

Lengakiki Road

Honiara

Solomon Islands

Tel: + 6777470755  
Email: chivae@sig.gov.sb

**Tonga**

Mr 'Ofa FA'ANUNU

Director of Meteorological Service

Meteorological & Coast Radio Services

Domestic Terminal

Fua'amotu Airport

Nuku'alofa

Tonga  
Email: ofaf@met.gov.to

Mr Taniela Feao Moe Lotu TAKEIFANGA

Meteorologist

Tonga Meteorological Services

Met Office-Fuaamotu

Domestic Terminal Fua’amotu Airport

Nuku’alofa

Tonga

Tel : +676 7206535  
Email: tanielat@met.gov.to

Mr Taniela Feao Moe Lotu TAKEIFANGA

Meteorologist

Tonga Meteorological Services

Met Office-Fuaamotu

Domestic Terminal Fua’amotu Airport

Nuku’alofa

Tonga

Tel : +676 7206535  
Email: tanielat@met.gov.to

Mrs Luisa TAUNGA

[Ministry of Works - National Emergency Management Office](https://oceanexpert.org/institution/12114)

PO Box 252 Vaololo

Vaololo, Nuku`alofa, the Ministry of Works

Nuku’alofa

Tonga  
Email: luisaetuate1784@gmail.com

**United States of America**

Dr Charles (Chip) MCCREERY

Director PTWC

National Weather Service

[Pacific Tsunami Warning Center](https://oceanexpert.org/institution/10052)

1845 Wasp Boulevard, Building 176

Honolulu, HI 96818

United States

Tel: +1 808 725 6300  
Email: charles.mccreery@noaa.gov

Dr Laura KONG

Director ITIC

UNESCO IOC NOAA International Tsunami Information Centre

1845 Wasp Blvd, Bldg 176  
Honolulu, Hawaii 96818 USA  
United States

Tel: 1-808-725-6051  
Email: laura.kong@noaa.gov

Dr Vasily TITOV

Lead Scientist

NOAA Center for Tsunami Research - Pacific Marine Environmental LaboraToRy

7600 Sand Point Way NE, Bldg 3

Seattle, Washington WA 98115

United States

Tel: +1 (206) 526 4536  
Email: vasily.titov@noaa.gov

Mr Stuart WEINSTEIN

Deputy Director

Pacific Tsunami Warning Center

1845 Wasp Boulevard, Building 176

Honolulu, HI 96818

United States

Tel: + 1 8086898207  
Email: stuart.weinstein@noaa.gov  
  
Ms STROKER Kelly

Associate Scientist - Coastal Sciences Team Lead / Center for Coasts, Oceans, and Geophysics

National Centers for Environmental Information, National Oceanic and Atmospheric Administration, U. S. Department of Commerce

325 South Broadway

E/GC4

Boulder, Colorado 80305

United States

Tel: 3034974603

Email: kelly.stroker@noaa.gov

Mr Nicolas ARCOS

Natural Hazards Scientific Data Specialist

Marine Geology and Geophysics Section

NOAA NESDIS National Centers for Environmental Information (NCEI), Boulder CO

325 Broadway

Boulder, Colorado 80305

United States

Tel: +1 303 497 3158

Email: nicolas.arcos@noaa.gov

Mr Christopher MOORE

Director, NOAA Center for Tsunami Research

NOAA Pacific Marine Environmental LaboraToRy

7600 Sand Point Way NE, Bldg. 3

Seattle, WA 98115

United States

Email: Christopher.moore@noaa.gov

Ms Susan WEST

International Program Analyst

National Weather Service

National Oceanic & Atmospheric Administration, National Weather Service

National Oceanic & Atmospheric Administration, National Weather Service1325 East West Highway

Silver Spring, Maryland 20910

United States

Email: susan.west@noaa.gov

Mr Marcus Landon YDLETT

Warning Coordination Meteorologist

National Weather Service

National Oceanic & Atmospheric Administration, Nation Weather Service

3232 Hueneme Road

Barrigada, GU 96913

United States

Tel: +1 (671) 777-5337

Email: marcus.aydlett@noaa.gov

Ms Jana PUSLEY

Geophysicist / Geohazards

U.S. Geological Survey, National Earthquake Information Center, Golden

1711 Illinois St.GoldenMailing Adress:Box 25046, DFC, MS 966

Denver, Colorado CO 80225-0046

United States

Tel: 7207372265

Email: jpursley@usgs.gov

Mr James GRIDLEY

NOAA / NWS / NTWC

910 South Felton Street

Palmer, Alaska 99645

United States

Email: james.gridley@noaa.gov

Mr Allison B. CRADDOCK

NASA Jet Propulsion LaboraToRy

4800 Oak Grove Drive

Pasadena, CA 91109

United States

Email: Allison.b.craddock@jpl.nasa.gov

Dr Paul Stanton EARLE

Geophysicist / USGS

USGS National Earthquake Information Center

1171 Illinois St

Golden, CO 80401

United States

Tel: +01 303 517 3880

Email: pearle@usgs.gov

Mr Levu Boaz ANTFALO

Meteorologist /National Weather Service

Vanuatu Meteorology & Geohazards Department

Private Mail Bag 9054

Lini Highway, Number 2

Port Vila

Vanuatu

Tel: (678) 22932

Email: lantfalo@meteo.gov.vu

**Observers**

Dr Timothy Melbourne

Geological Sciences

Central Washington University

400 E University Way

Ellensburg, WA 98926

United States

Tel: 5099632799

Email: tim@geology.cwu.edu

Dr Kwok Fai CHEUNG

Professor

Department of Ocean and Resources Engineering, University of Hawaii

School of Ocean and Earth Science and TechnologyUniversity of Hawai’i at Manoa2540 Dole Street, Holmes Hall 402

Honolulu, Hawaii HI 96822

United States

Email: cheung@hawaii.edu

Dr Bruce HOWE

Research Professor

Ocean and Resources Engineering

Department of Ocean and Resources Engineering, University of Hawaii

School of Ocean and Earth Science and TechnologyUniversity of Hawai’i at Manoa2540 Dole Street, Holmes Hall 402

Honolulu, Hawaii HI 96822

United States

Tel: +1 (808) 4690553

Email: bhowe@hawaii.edu

Dr Glen S. MATTIOLI

Vice President of Geodetic Instrumentation / Geodetic Instrumentation

EarthScope Consortium

EarthScope Consortium, INc.

1200 New York Avenue, NW Suite 400

Washington, District of Columbia 20005

United States

Tel: +1 3033 817 554

Email: mattioli@unavco.org

Dr Alexander RABINOVICH

Principal Research Scientist

P.P.Shirshov Institute of Oceanology of Russian Academy of Sciences

36, Nahimovski prospect

Moscow

117997

Russia

Tel: +7-499-124-8713

Email: A.B.Rabinovich@gmail.com

Mr Raja ACHARYA

Meteorologist B

India Meteorological Department, Ministry of Earth Sciences Government of India

Regional Meteorological Centre, Calcutta

India Meteorological Department, Regional Meteorological Centre

4 Duel Avenue, Alipore

Kolkata 700027

West Bengal

India

Email: raja.acharya2011@gmail.com

Ms Litea BIUKOTO

Senior Advisor Risk Reduction, Disaster Risk Programme

Secretariat of the Pacific Community - Regional Office

Ratu Mara Road, Private Mail Bag

Suva

Fiji

Tel: +679 3249249

Email: liteab@spc.int

Dr Matthew FOUCH

President and Co-Founder

Subsea Data Systems, Inc

8502 SW Kansas Ave

Stuart, FL - Florida 34997

United States

Tel: +12024307074

Email: matt.fouch@subseadatasystems.com

Dr Daniel MCNAMARA

Seismologist

U.S. Geological Survey, National Earthquake Information Center, Golden

Location:1711 Illinois St.GoldenMailing Adress:Box 25046, DFC, MS 966

Denver, Colorado CO 80225-0046

United States

Tel: 303-273-8550

Email: daniel.e.mcnamara@gmail.com

MR Rayhan HOSSAIN

Student, Department of Oceanography

University of Dhaka

Kaji Mutaher Hossain Bhaban

Dhaka - 1217

Bangladesh

Tel: +8801754495735

Email: rayhanhossain64@gmail.com

Ms Ceci Anais RODRIGUEZ CRUZ

Director

University of Hawaii at Manoa, School of Ocean & Earth Science & Technology

1000 Pope Road

Honolulu, HI 96822

United States

Tel: 8084751397

Email: cecirc@hawaii.edu

Ms Stephaine S CLARK

Regional Environmental Office, U.S. Embassy Suva

US Department of State

Room 5805 Washington DC 20520

United States

Tel: +6797729368

Email: clarkss@state.gov

**Staff**

Mr Bernardo ALAGA ROSSEL

Head Tsunami Resilience Section UNESCO-IOC

Intergovernmental Oceanographic Commission of UNESCO

7, place de Fontenoy

75732 Paris cedex 07

France

Tel: +33 1 45 68 03 17

Email: b.aliaga@unesco.org

Mr Jiuta KOROVULAVULA

National Professional Officer for Disaster Risk Reduction and Tsunami Warning

Tsunami Resilience Section

Intergovernmental Oceanographic Commission of UNESCO

7, place de Fontenoy

75732 Paris cedex 07

France

Email: j.korovulavula@unesco.org

Mr Öcal NECMIOĞLU

Programme Specialist (Tsunami)

Technical Secretary of ICG/PTWS and ICG/CARIBE EWS

Tsunami Resilience Section

Intergovernmental Oceanographic Commission of UNESCO

7, place de Fontenoy

75732 Paris cedex 07

France

Email: o.necmioglu@unesco.org

# 

ANNEX IV

**LIST OF ACRONYMS**

|  |  |
| --- | --- |
| **AGU** | American Geophysical Union |
| **AoS** | Areas of Service |
| **BMKG** | 1. Agency for Meteorological, Climatological and Geophysics (Indonesia) |
| **BSCSTAC** | 1. Backup South China Sea Tsunami Advisory Centre |
| **CA** | 1. Central America |
| **CARIBE-EWS** | 1. Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions |
| **CATAC** | 1. Central America Tsunami Advisory Centre |
| **CEPREDENAC** | Coordination Centre for the Prevention of Natural Disasters  in Central America |
| **CISN** | California Integrated Seismic |
| **COMCOT** | Cornell Multi-grid Coupled Tsunami Model |
| **CMT** | Centroid Moment Tensor |
| **ComMIT** | Community Inundation Model |
| **COPECO** | Comisión Permanente de Emergencias (Honduras) |
| **CTIC** | Caribbean Tsunami Information Centre |
| **DART** | Deep-ocean Assessment and Reporting of Tsunami |
| **DGOA** | General Directorate of the Environmental Observatory of the MARN (El Salvador) |
| **DIPECHO** | European Commission Humanitarian Aid Department's Disaster Preparedness Programme |
| **EMZ** | Earthquake Monitoring Zone |
| **EWARNICA** | Early Warning in Nicaragua and Central America |
| **EWS** | Early Warning System |
| **GNSS** | Global Navigation Satellite System |
| **GPU** | Graphic Processing Unit |
| **GOOS** | Global Ocean Observing System |
| **GTS** | Global Telecommunication System |
| **HKO** | Hong Kong Observatory |
| **ICG/CARIBE-EWS** | Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions |
| **ICG/IOTWMS** | Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System |
| **ICG/NEAMTWS** | Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas |
| **ICG/PTWS** | Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System |
| **ICG-UPA** | Panama Institute of Geosciences of the University of Panama |
| **INETER** | Instituto Nicaragüense de Estudios Territoriales |
| **INSIVUMEH** | Sismología, Vulcanología, Meteorología e Hidrología de Guatemala |
| **IOC** | Intergovernmental Oceanographic Commission (UNESCO) |
| **IOTIC** | Indian Ocean Tsunami Information Centre |
| **IRIS** | Incorporated Research Institutions for Seismology |
| **ITIC** | International Tsunami Information Center |
| **ITIC-CAR** | Caribbean Office of the International Tsunami Information Centre |
| **ITP** | International Training Programmes |
| **ITU** | International Telecommunication Union |
| **IUGG** | International Union of Geodesy and Geophysics |
| **JATWC** | Joint Australian Tsunami Warning Centre |
| **JICA** | Japan International Cooperation Agency |
| **JMA** | Japan Meteorological Agency |
| **JTF** | Joint Task Force |
| **KPIs** | Key Performance Indicators |
| **MAB** | Man and Biosphere Programme of UNESCO |
| **MARN** | El Salvador Ministry of Environment and Natural Resources |
| **MHEWS** | Multi-hazard Early Warning System |
| **NCEI** | National Centres for Environmental Information |
| **NMEFC** | National Marine Environmental Forecasting Centre |
| **NOAA** | National Oceanic and Atmospheric Administration |
| **NTWC** | National Tsunami Warning Centres |
| **NWPTAC** | Northwest Pacific Tsunami Advisory Centre |
| **OFTA** | USAID Office of Foreign Disaster Assistance |
| **ORSNET** | Oceania Regional Seismic NETwork |
| **OTGA** | Ocean Teacher Global Academy |
| **OVSICORI** | Observatorio Vulcanológico y Sismológico de Costa Rica |
| **PMEL** | NOAA Pacific Marine Environmental Laboratory |
| **PTWC** | Pacific Tsunami Warning Centre |
| **SCS** | South China Sea |
| **SCSTAC** | South China Sea Tsunami Advisory Centre |
| **SCVT** | Spherical Centroidal Voronoi Tessellations |
| **SDG** | Sustainable Development Goal |
| **SEP** | South East Pacific region |
| **SFDRR** | Sendai Framework for Disaster Risk Reduction |
| **SIFT** | Short-term Inundation Forecasting for Tsunamis system |
| **SINAMOT** | Sistema Nacional de Monitoreo de Tsunamis |
| **SMART** | Science Monitoring and Reliable Telecommunication |
| **SHOA** | Servicio Hidrográfico y Oceanográfico de la Armada de Chile |
| **SOP** | Standard Operating Procedures |
| **SPC** | Secretariat of the Pacific Community |
| **TEMPP** | Tsunami Evacuation Maps, Plans, and Procedures |
| **TIC** | Tsunami Information Centre |
| **TNC** | Tsunami National Contact |
| **TOWS-WG** | Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems |
| **TSP** | Tsunami Service Provider |
| **TSU** | Tsunami Unit of UNESCO/IOC |
| **TsuCAT** | Tsunami Coastal Assessment Tool |
| **TT** | Task Team |
| **TTT** | Tsunami Travel Time |
| **TT DMP** | TOWS-WG Task Team on Disaster Management and Preparedness |
| **TWC** | Tsunami Warning Centre |
| **TWFP** | Tsunami Warning Focal Point |
| **UCR** | Universidad de Costa Rica |
| **UN** | United Nations |
| **UNA** | Universidad Nacional Costa Rica |
| **UNAVCO** | NAVCO, Inc. (independent, non-profit, corporation) |
| **UNESCO** | United Nations Educational, Scientific and Cultural Organization |
| **USA** | United States of America |
| **USAID** | United States Agency for International Development |
| **WG** | Working Group |
| **WG-CA** | Working Group for Central America |
| **WG-PICT** | Pacific Island Countries and Territories Regional Working Group on Tsunami Warning and Mitigation System |
| **WG-SCS** | Working Group for the South China Sea region |
| **WG-SEP** | Working Group for the South East Pacific region |
| **WMO** | World Meteorological Organization |
| **WTAD** | World Tsunami Awareness Day |

1. The Executive Summary is available in French, Spanish and Russian. [↑](#footnote-ref-1)