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TOWS-WG and TT-TWO Feb 2025: Recommendations & Actions

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Members and Observers of TOWS Task Team on Tsunami watch Operation

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Members:

- **Yuji Nishimae, Chair of TOWS-WG-TTTWO (PTWS/JMA)**
- Alessio Piatanesi (NEAMTWS/INGV)
- Charles McCreery (CARIBE-EWS/NOAA-PTWC
- Dakui Wang (PTWS/NMEFC)
- Elizabeth Vanacore (CARIBE-EWS/PRSN)
- Helene Hebert (NEAMTWS/CEA)
- Jijjavarapu Padmanabham (IOTWMS/INCOIS)
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Observers:

- Bruce Howe (SMART Cable JTF/U. of Hawaii)
- Ceci Rodriguez Cruz (SMART Cable JTF/U. of Hawaii)
- Takeshi Sato (JMA/Japan)
- Fujiang Yu (NMEFC/China)
- Carlos Zuniga (SHOA/Chile)

IOC Technical Secretary

- Öcal Necmioglu

Agenda of the TTTWO Meeting

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21 February 2025

1. Welcome and Introductions
2. Session Organisation (Logistics and agenda)
3. Discussion on the outcomes of the joint Meeting with TT-DMP
4. Review of TTTWO Action Items
5. Tsunami Watch Operations status and plans in all ICGs
6. Updates to Area of Coverage and ESZ Maps of the ICGs
7. Tsunami Service Provision Considerations for Events Outside ICG Earthquake Source Zones
8. Updates on Products for Maritime Community
9. Optimal Seismic and Sea level Monitoring Networks
10. Discussion on SOPs for Tsunamis Generated by non-seismic sources
11. Common Format for the TSPs' Tsunami Products
12. Updates on the Global Service Definition Document

22 February 2025

13. Support for Ocean Decade Tsunami Programme Research & Development Implementation Plan
14. TT-TWO Work Plan
15. AOB
16. Recommendations and Report to the TOWS-WG (1115-1230)

Recommendations

1. GLOBAL SERVICE DEFINITION DOCUMENT
2. ALL CLEAR MESSAGES
3. THREAT LEVELS
4. PRODUCTS FOR MARITIME COMMUNITY
5. FORECASTING METHODS
6. OFFSHORE TSUNAMI DETECTION AND OBSERVATIONS
7. RADIO MESSAGES
8. OPTIMUM SEA-LEVEL NETWORK
9. SOPs FOR TSUNAMI GENERATED BY VOLCANOES
10. METEOTSUNAMIS
11. TSUNAMIS GENERATED BY LANDSLIDE
12. CESSATION OF FAX DISSEMINATION
13. TSUNAMI SERVICE PROVISION CONSIDERATIONS FOR EVENTS OUTSIDE ICG ESZ

1. GLOBAL SERVICE DEFINITION DOCUMENT

Recommendation to the ICGs

Notes the revisions on the Global Service Definition Document (GSDD);

Notes that in some ICGs segments of Area of Services are subject to the services of only one Tsunami Service Provider;

Further notes that the Global Area of Service map needs to be updated with the changes reflecting the Interim Service Provided by the Central America Tsunami Advisory Center / Nicaraguan Institute for Territorial Studies (CATAC/INETER) for both ICG/PTWS and ICG/CARIBE-EWS and CATAC service area (coasts of Costa Rica, El Salvador, Honduras, Guatemala, Nicaragua, Panama) should also be reflected;

Recommends establishing arrangements among TSPs within each ICG to ensure that service provision is ensured at all times for the full Area of Service of the ICG;

Recommends the approval of the revised GSDD with the updates as noted above;

2. ALL CLEAR MESSAGES

Recommendation to the ICGs

Noted the possible complexities and challenges which may arise from the All Clear messages issued by the NDMO/CPA of Member States and widely disseminated through social media, for others that may not have done so yet;

Notes that TSP's responsibility is limited to inform that the threat has passes, whereas issuance of the "All Clear" message is the responsibility of the sovereign nation and its responsible institutions;

Recommended Member States NTWCs to work with national and local emergency management authorities to define the criteria for and institutions in charge of issuing the All Clear message, as recommended also in the GSDD;

3. THREAT LEVELS

Notes with appreciation the ICG/NEAMTWS XIX agreement to adopt the threat levels according to the revised draft version of the Global Service Definition Document (GSDD);

Further notes that preparation of a template for the implementation of these threat levels by the NEAMTWS TSPs;

4. PRODUCTS FOR MARITIME COMMUNITY

Recommendation to ICGs

Notes the continuous engagement of the TT-TWO in developing specialized TSP bulletins for the maritime community in consultation with the International Hydrographic Organisation (IHO) Sub-Committee on the World-Wide Navigational Warning Service (WWNWS-SC);

Notes that JATWC(Australia), ITEWC(India) as TSPs of the IOTWMS, respectively, have developed the required capabilities, while CEA as TSP of NEAMTWS aims at testing a maritime product during next NEAMWave in the Atlantic scenario;

Recommends that dissemination of the specialized TSP bulletins for the maritime community is to be tested in CARIBE-EWS, IOTWMS and NEAMTWS by at least one TSP either through the planned communication tests or tsunami exercises;

Further recommends that full operational implementation of such services by at least one TSP in each ICG takes place in 2025;

JATWC & ITEWC (TSP-Australia & India) have been included, as both TSPs have developed the required capabilities.

5. FORECASTING METHODS

Recommendation to ICGs

Notes the continuous need for more accurate and precise tsunami forecasts, especially in the complex tectonic context;

Notes the progress made within the ICG/NEAMTWS investigation and possible adoption of the tsunami probabilistic forecasting method by TSPs in NEAMTWS, which may represent an improvement over the method in use with the goal of reducing uncertainty and false alarms, particularly the forecasting methods that consider tsunami numerical modelling and uncertainty quantification;

Strongly recommends continuation of the investigation and the possibility to adopt tsunami forecasting methods, including probabilistic methodologies, toward impact-based forecasting, that could also post-disaster response, recovery and needs assessment processes;

6. OFFSHORE TSUNAMI DETECTION AND OBSERVATIONS

Recommendation to Member States

Notes the critical importance of offshore seismic and sea-level detection and observation instrumentation, such as DART/GPS buoys or cabled systems (e.g. SMART Cables);

Further notes the progress made in the ongoing project of the CAM SMART cable off Portugal, TAM TAM SMART cable between New Caledonia and Vanuatu, **undersea cable installations being deployed by Indonesia and India;**

Recommends Member States to invest more in such offshore measurement systems, where possible with multi-hazard observational capabilities, serving the needs of earthquake seismology, meteorology and oceanography, where possible;

7. RADIO MESSAGES

Recommendation to the Secretariat

Notes the considerations and review of the TT-TWO on the basic tsunami warning product/template for use in radio developed by the ICG/CARIBE EWS;

Recommends that the final version of this product/template to be disseminated to the Member States as a guidance;

*At _(XX:XX)_ local time a magnitude _X.X_ earthquake occurred at _Lat, Lon_ with a depth of _X_ km, _**X**_ **km** _**Direction**_ **of** _**(Place)**_**.** The _(NTWC)_ has issued a tsunami _(level)_ for _(Place)_.*

8. OPTIMUM SEA-LEVEL NETWORK

Request to TT-TWO

Recalls that the first objective of the ODTP also requires provision of tsunami confirmation within 10 minutes or less of origin for the most at-risk coastlines;

Recognizes the need to conduct a study on in which areas this requirement is met and not met;

Recognizes huge costs to install and to maintain sea level stations, especially in remote areas.

Requests TT-TWO to conduct and present to TOWS-WG at its next session the result of this study with reference to the sea-level stations available in the IOC's Sea Level Station Monitoring Facility;

Encourages the TT-TWO to also include in this study an indicative assessment on possible locations of the future sea-level station monitoring installations to ensure that this requirement is met;

9. SOPs for Tsunami Generated by Volcanos

Recommendation to the ICGs

Notes that Hunga Tonga Hunga Ha'apai Volcano Permanent Monitoring and Warning Procedures of the Pacific Tsunami Warning Center (OTWC) ((IOC/2024/TS/188) was disseminated to Member States through IOC CL-2984;

Notes with appreciation that the IOC report on 'Monitoring and warning for tsunamis generated by volcanoes' (IOC/2024/TS/183) was also disseminated to the Member States through IOC CL-3029;

9. SOPs for Tsunami Generated by Volcanos (continued)

Recommendation to the ICGs

Also notes with appreciation that at the same time Member States were informed on the organisation of online webinars (tentatively on 6 and 23 April 2025) for each of the Intergovernmental Coordinating Groups (ICG) of regional Tsunami warning Systems involving relevant Volcano Observatories and Volcanic Ash Advisory Centres (VAACs) to:

a) brief on the report on 'Monitoring and warning for tsunamis generated by volcanoes' (IOC/2024/TS/183) and its recommendations,
b) highlight the hazard and vulnerable Member States,
c) initiate the required partnerships between National Tsunami Warning Centres (NTWC) and Volcano Observatories and VAACs,
d) initiate consideration of whether Tsunami Service Providers may also need to provide services where tsunami generated by volcanoes may impact several Member States.

9. SOPs for Tsunami Generated by Volcanos (continued)

Also notes the challenges to develop general guidelines on SOPs to warn for volcano generated tsunamis due the unique characteristics and mechanisms related to their tsunamigenic potentials;

Recommends each ICG to develop SOPs for volcanoes with a tsunamigenic potential within their Earthquake Source Zone (ESZ);

Recommendation to the Member States

Recommended Member States to consider deployment of sea level gauges close to each identified volcano with tsunamigenic potential, with real-time continuous data transmission and 1 sec sampling 1cm accuracy for automatic detection purposes;

10. Meteotsunami

Recommendation to the ICGs

Notes with appreciation that the IOC report on ‘Meteotsunamis: definition, detection and alerting services investigation’ (IOC/2025/TS/200) was disseminated to the Member States;

Notes that since meteotsunami are hazards driven by weather conditions, warning responsibility lies solely with the servicing NMHSs and TSPs or NTWCs play no role in real-time operational alerting;

Notes that tsunami-specific instrumentation including DART and ocean cable system can play a supporting role in terms of detection of meteotsunami;

Recommends each ICGs to create relationships between NMHS’ and TSPs/NTWCs in order to ensure these instruments are correctly monitored and utilized for detection of meteotsunami.

11. TSUNAMIS GENERATED BY LANDSLIDE

Recommendation to TT-TWO

Notes that tsunami risk can be considered on the rise as a result of landslides due to increased rainfall or glacial melting as a result of global warming/climate change;

Further notes that tsunamis generated by landslides (in a non-volcanic setting) remains as a challenge for the Global Tsunami Warning and Mitigation System (GTWMS);

Note: GTWMS (Global Tsunami Warning and Mitigation System); This is not agreed abbreviation yet but maybe this TOWS-WG meeting could provide an opportunity to agree on the use of this abbreviation.

Recommends the Task Team on Tsunami Watch Operations to include tsunamis generated by the submarine and subaerial landslides in its work programme and engage with the landslide hazard and early-warning scientific and operational community to address the requirements of the first objective of the ODTP to develop the warning systems' capability to issue actionable and timely tsunami warnings for tsunamis from all identified sources to 100 percent of coasts at risk;

12. CESSATION OF FAX DISSEMINATION

Recommendation to the TSP(s)

Noted that the IOC CL-3006 on the Cessation of fax transmissions of tsunami information products by Tsunami Service Providers by 31 March 2025 was issued on 27 September 2024,

Further noted that only one Member State requested the need to continue receipt of tsunami information products through fax,

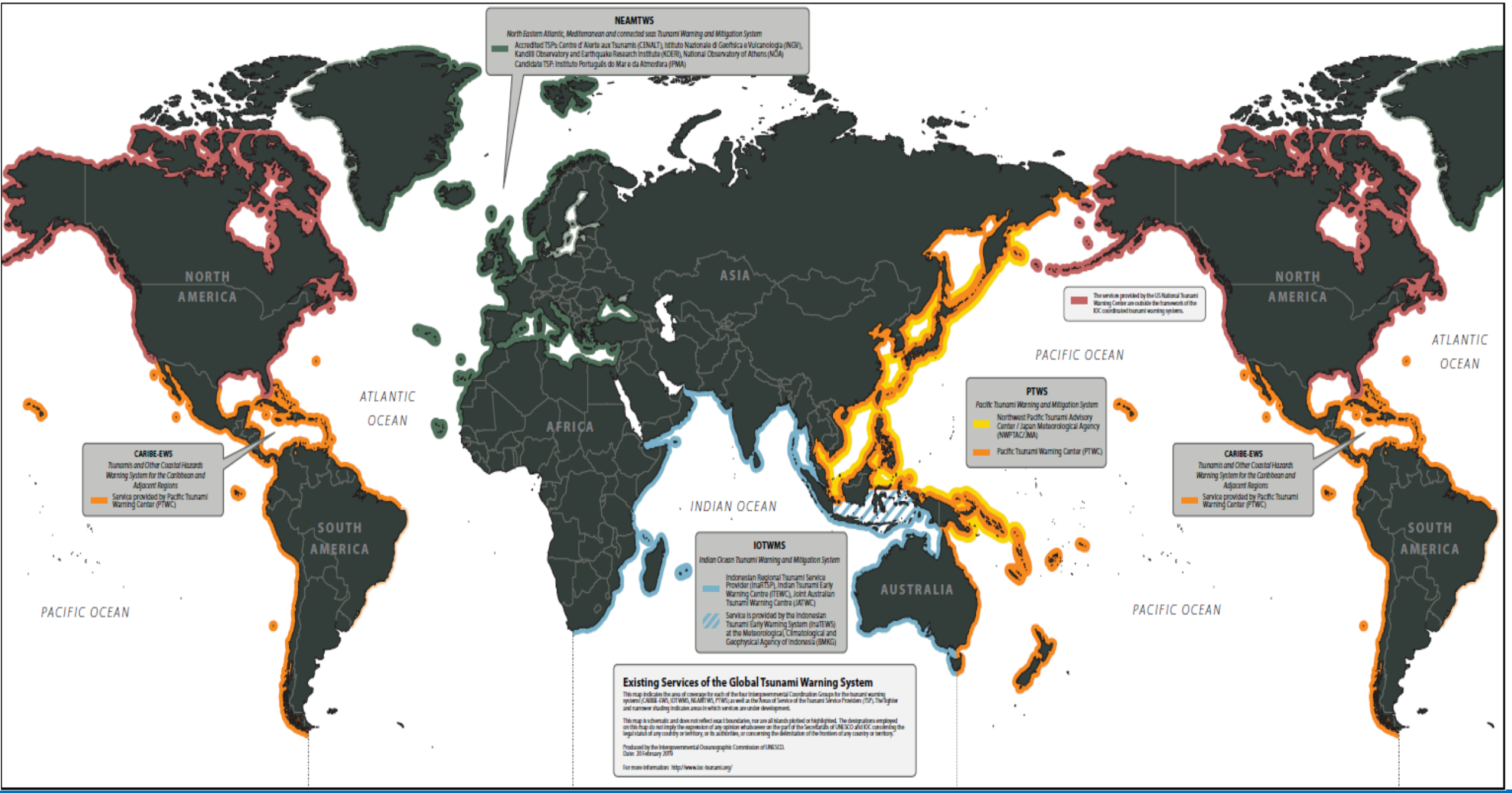
Noted that fax transmissions of tsunami information products will en by Tsunami Service Providers by 31 March 2025, except for those Member State who requested the continuation of this service, for which individual arrangements between the concerned Member State and respective TSP(s) will be established bilaterally;

14. TSUNAMI SERVICE PROVISION CONSIDERATIONS FOR EVENTS OUTSIDE ICG ESZ

Request to TT-TWO

Noted that there is a region in the boundary of IOTWMS and PTWS but outside of the framework of the IOC coordinated tsunami warning systems,

Requested the TT-TWO investigate the status of the TSP service provisions in this region.


NEAMTWS
North Eastern Atlantic, Mediterranean and connected seas Tsunami Warning and Mitigation System
Accredited TSPs: Centro d' Allerta aux Tsunamis (CENALT), Istituto Nazionale di Geofisica e Vulcanologia (INGV), Kandilli Observatory and Earthquake Research Institute (KOERI), National Observatory of Athens (NOA)
Candidate TSP: Instituto Português do Mar e da Atmosfera (IPMA)
NORTH AMERICA
ASIA
AFRICA
ATLANTIC OCEAN
INDIAN OCEAN
PACIFIC OCEAN
SOUTH AMERICA
AUSTRALIA
CARIBE-EWS
Tsunamis and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions
Service provided by Pacific Tsunami Warning Center (PTWC)
IOTWMS
Indian Ocean Tsunami Warning and Mitigation System
Indonesian Regional Tsunami Service Provider (InaRTSP), Indian Tsunami Early Warning Centre (ITEWC), Joint Australian Tsunami Warning Centre (JATWC)
Service is provided by the Indonesian Tsunami Early Warning System (InaTEWS) at the Meteorological, Climatological and Geophysical Agency of Indonesia (BMKG)
PTWS
Pacific Tsunami Warning and Mitigation System
Northwest Pacific Tsunami Advisory Center / Japan Meteorological Agency (NWPTAC/JMA)
Pacific Tsunami Warning Center (PTWC)
The services provided by the US National Tsunami Warning Center are outside the framework of the IOC coordinated tsunami warning systems.
Existing Services of the Global Tsunami Warning System
This map indicates the area of coverage for each of the four Intergovernmental Coordination Groups for the tsunami warning systems (CARIBE-EWS, IOTWMS, NEAMTWS, PTWS) as well as the Areas of Service of the Tsunami Service Providers (TSP). The lighter and narrower shading indicates areas in which services are under development.
This map is schematic and does not reflect exact boundaries, nor are all islands plotted or highlighted. The designations employed on this map do not imply the expression of any opinion whatsoever on the part of the Secretariats of UNESCO and IOC concerning the legal status of any country or territory, or its authorities, or concerning the delimitation of the frontiers of any country or territory.
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For more information: http://www.ioc-tsunami.org/

TOWS-WG 2025 Key Recommendations

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Risk Knowledge, Detection, Warning and Dissemination

ICGs

- Develop SOPs for tsunamigenic volcanoes within Earthquake Source Zones (ESZ)
- Ensure TSP coordination for full and continuous service coverage
- Develop and adopt harmonized KPIs aligned with Global KPIs
- Pilot TSP maritime bulletins during exercises (CARIBE-EWS, IOTWMS, NEAMTWS)
- Ensure full operational rollout of maritime bulletins by at least one TSP in each ICG in 2025
- Foster collaboration with NMHSs to monitor critical tsunami instrumentation
- Promote adoption of probabilistic forecasting methods for impact-based tsunami warnings
- Prioritize regional Tsunami Ready workshops in 2025 and continue until 2030

Secretariat

- Develop reporting mechanism on Ocean Decade projects and against ODTP-RDIP KPIs aligning with Global KPI Framework
- Finalize and implement the Tsunami Ready Coalition Plan with partners and ambassadors
- Improve and standardize TNC/TWFP/NTWC contact data collection
- Disseminate the Tsunami Ready Toolkit and include it in IOC Guidelines (MG 74)
- Share finalized tsunami warning templates for amateur radio use
- Extend invitations to identified stakeholders for the Tsunami Ready Coalition

Member States

- Deploy additional tide gauges and tsunami detection systems in high-risk, under-monitored regions
- Maintain and restore sea level gauges promptly; share data in real time
- Install gauges / sea-level stations near tsunamigenic volcanoes with 1 sec sampling and 1 cm accuracy
- Invest in offshore multi-hazard instruments (Tsunameter/DART, GPS buoys, SMART Cables)

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THANK YOU