**Agenda Item 4.2**

**Working Group 2:** **Tsunami Detection, Analysis and Forecasting**

This document presents the activities, recommendations, conclusions and a proposed work plan of Working Group2: Tsunami Detection, Analysis and Forecasting. The ICG is requested to consider, comment and eventually endorse the recommendations issued by Working Group 2.

1. Introduction – Terms of Reference Purpose:

Working Group 2 aims to review and recommend to the ICG priorities and actions required to ensure and enhance existing capabilities, as well as explore new technologies to improve tsunami detection and forecasting capability.

Its tasks include:

* Source detection, identification and characterisation
  + Ensure the effectiveness of the observational system by promoting the open exchange of seismic and other relevant data in real time.
  + Advise Member States on the monitoring and detection capabilities of tsunamigenic sources needed for operating national tsunami warning centres.
  + Assure the compliance with the agreed standards for the detection systems.
* Wave detection
  + Ensure the effectiveness of the observational system by promoting the open exchange of sea level data in real time.
  + Advise Member States on the tsunami monitoring and detection capabilities needed for operating national tsunami warning centres.
  + Assure the compliance with the agreed standards for the tsunami detection systems.
* Forecasting
  + Define the operational requirements for the monitoring and forecasting systems.
  + Provide guidance on tsunami forecasting tools to Tsunami Service Providers (TSPs), National Tsunami Warning Centres (NTWCs) and provide actionable information to emergency managers.
  + Explore, experiment and test novel approaches for tsunami forecasting.

1. Working Group 2 Activities:

Actions and Updates:

* + 1. WG2 is planning an in person sea level training with the support of NOAA, IHO, NOC, and the secretariat. The sea level training originally planned for July 2025 is being moved to Fall 2025 due to current uncertainty with sponsor and trainer availability. A new host is currently being identified.
    2. WG2 Chair met with Smart Cable members to initiate a closer partnership and explore test geometries. Arangements for a Smart Cable webinar are in progress and planned for after the ICG Carbe-EWS XV.
    3. A code has been developed to calculate the state of health of the Caribe EWS seismic station based upon earthquake detection time. The code is based on open-source python codes (ObsPy and PyGMT) and based upon the receipt of the PTWC text monthly report. The code can be adapted for other text reports or test geometries of future installations.

WG2 Action Status:

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| Action Description | Status |
| List of volcanoes and volcano observatories and the VONUT to be shared with the Ad Hoc Team on TGV of TOWS-WG-TT-TWO | Completed |
| Initiate contacts with the identified volcano observatories and/or institutes responsible for monitoring volcanoes threatening the CARIBE-EWS, to implement the MoU with the VONUT | In Progress: CL to inform Member States on the report on Monitoring and warning for tsunamis generated by volcanoes (IOC/2024/TS/183) and call for global/regional webinars to promote synergies between Volcano Observatories/VAACs |
| Conduct a study to demonstrate improvement in tsunami early warning times with two to four variations on SMART Cable designs | In Progress: Code Developed for Seismic Detection; Geometries in process |
| Engage industry to understand which telecommunications cables are scheduled for replacement or new installations | In Progress: |
| Organize a SMART Cable webinar targeting the Caribbean Region | In Progress: WG2 Chair in contact with the representatives of the SMART Subsea Cables JTF |
| Formation of a sub-group under Working Group 2 to specifically address the implementation of such technology in the CARIBE-EWS. | In Progress: WG2 Chair in contact with the representatives of the SMART Subsea Cables JTF; formal task team reccommended. |
| Organize a training course to be taught in English on the general principles of installation and maintenance of sea level stations and the use of tide gauge data | In Progress: Letters were sent to PRSN and CARICOOS and and agreements were received on their co-hosting for this course in Puerto Rico (San Juan or Mayagüez) during (tentatively) 7-11 July 2025. A revised assessment indicated the need to shift this training to 2025/11 to be conducted in a different Member State. |
| Organize sea level training courses in English and Spanish languages in alternating years with the support of NOAA and the Secretariat, and in close collaboration with the International Hydrographic Organization (IHO) and the International Maritime Organization (IMO). | In Progress: English sea level training planned for 2025/11. Planning for a Spanish training will commence after completetion of the English language training. |

Actions and Updates:

* + 1. A working group is planning an in person sea level training. The sea level training originally planned for July 2025 is being moved to Fall 2025 due to current uncertainty with sponsor and trainer availability. A new host is currently being identified
    2. WG2 Chair met with Smart Cable members to initiate a closer partnership and explore test geometries. Arangements for a Smart Cable webinar are in progress and planned for after the ICG Carbe-EWS Meeting
    3. A code has been developed to calculate the state of health of the Caribe EWS seismic station based upon earthquake detection time. The code is based on open-source python codes (ObsPy and PyGMT) and based upon the receipt of the PTWC text monthly report. The code can be adapted for other text reports or test geometries of future installations.

**Draft Recommendations for ICG/CARIBE EWS XV**

* **Notes** and **appreciates** the member States role of network operators in the region for the installation, maintenance, and data transmission from seismic, sea level and GNSS stations in the region
* **Appreciates** the NOAA ITIC-CAR, PTWC and Earthscope for improving the automated processing and continued reporting on the status of seismic and sea level stations;
* **Notes** that a high percentage of the stations in the CARIBE-EWS sea level network are currently non-operational and therefore can delay the proper assessment of tsunami events and the issuance of timely and accurate tsunami alerts;
* **Urges** Member States and operators of sea level stations contributing to CARIBE EWS to maintain their sea-level stations in an operational status and regularly review and update the status of its stations, in the IOC Sea Level Monitoring Facility, and inform ITIC-CAR and Secretariat on plans for repair;
* **Notes** the development of a tool to assess impact of seismic outages in the region;
* **Recommends** the development of a similar tool to assess the impact of sea level station outages.
* **Appreciates** the work of the UN Ocean Decade on smart cables and efforts to quantify the impact of smart cables on regional detection of tsunamigenic events;
* **Recommends** the formation of a task team to specifically address the implementation of such technology in the Caribe-EWS and formalize relationships between the Caribe-EWS and the ITU/WMO/UNESCO-IOC Joint Task Force (JTF) on SMART Cables.
* **Further Encourages** Member States to incorporate SMART capability into new subsea telecom cable projects.
* **Recognizing** and **Appreciating** the success of the Spanish language sea level training in Costa Rica and;
* **Appreciating** the efforts of the NOAA, IHO, NOC, and the secretariat to secure support for an English sea level training and;
* **Appreciating** the efforts of English sea level training organizing committee and regional partners in initial planning of such a training
* **Recommends** that WG2 continue to organize an English language sea level station workshop with the support of NOAA, IHO, IMO, and the secretariat.
* **Recommends** that WG2 organize a Spanish language sea level station workshop with the support of NOAA, IHO, IMO, and the secretariat in 2026.