



**unesco**

Intergovernmental  
Oceanographic  
Commission

## **Working Group2: Tsunami Detection, Warning and Dissemination**

**Dr. Karyono (Indonesia, Chair of WG2)  
Mr Padmanabham Jijavarapu (India, Chair of WG2)  
Dr. Robert Greenwood ( Australia, Vice-Chair of WG2)**

*Meeting of ICG/IOTWMS Steering Group)\  
5-6 February 2004, Hyderabad, India*

# Terms of Reference

## Terms-of-Reference

Liaise with other working group(s) and task team(s) within the ICG/IOTWMS and with working groups from the other ocean basins through the TOWS-WG to:

1. Coordinate and strengthen the operational implementation of tsunami detection, warning and dissemination, including for tsunamis generated by non-seismic and complex sources.
2. Support the Tsunami Service Providers (TSPs) delivery of interoperable regional tsunami threat information products to Member States.
3. Support Member States in the development of their national tsunami warning capabilities.
4. Monitor the performance of key observational, warning and communication system components.
5. Support implementation of IOWave Exercises.
6. Identify areas of priority for action following assessments, communications tests, exercises, and real tsunami events.
7. Provide advice on further development of IOC-UNESCO TRRP.
8. Provide advice to the Indian Ocean Tsunami Information Centre (IOTIC) on educational materials about the warning systems and services.
9. In collaboration with IOC-UNESCO IOTIC and IOC-UNESCO Secretariat for ICG/IOTWMS, help strengthen the capacity and capability of Member States.

# Membership



**Chair:** [Dr Karyono](#) (Indonesia)

**Vice-Chair:** [Dr Robert Greenwood](#) (Australia)

**Vice-Chair:** [Mr Jijavarapu Padmanabham](#) (India)

## Members:

[Ms Adriene Moseley](#) (Australia)

[Mr Nagaraja Kumar Masuluri](#) (India)

[Mr Iman Fatchurachman](#) (Indonesia)

[Mr Urip Setiyono](#) (Indonesia)

[Mr Jean Bernardo Andrianaivoarisoa](#) (Madagascar)

[Mr Rina Andrianasolo](#) (Madagascar)

[Dr Chai Mui Fatt](#) (Malaysia)

[Mr Afiq Zhofri bin Abdul Razak](#) (Malaysia)

[Mr Jaifar Al-Busaidi](#) (Oman)

[Mr Malik Al-Ghafri](#) (Oman)

[Mr Tariq Ibrahim](#) (Pakistan)

[Mr Ameer Hyder](#) (Pakistan)

# WG2- Activities

1. Help coordinate and facilitate the development and operational implementation of tsunami detection, warning and dissemination systems and procedures within Multi-Hazard Early Warning System (MHEWS) frameworks and systems.
2. Monitor, assess and routinely report to the Steering Group and ICG on the performance of Tsunami Service Providers (TSPs), observational seismic and sea level monitoring networks, communication systems and procedures.
3. Consult with Working Group 1 “Tsunami Risk, Community Awareness and Preparedness” on the requirements and suitability of threat information and warning products.
4. Work closely with Working Group 1 "Tsunami Risk, Community Awareness and Preparedness", Working Group 3 “Tsunami Ready Implementation”, IOC-UNESCO IOTIC and IOC-UNESCO Secretariat for ICG/IOTWMS, to help develop the capacity of Member States across the Indian Ocean to implement the IOC-UNESCO Tsunami Ready Recognition Programme (TRRP) or similar initiatives.

## WG2- Activities (cont..)

5. Work closely with Working Group 1 "Tsunami Risk, Community Awareness and Preparedness", Working Group 3 "Tsunami Ready Implementation", IOC-UNESCO IOTIC and IOC-UNESCO Secretariat for ICG/IOTWMS, to develop effective national tsunami warning chains, warning products, services, Standing Operating Procedures, and warning chains.
6. Monitor existing international and national arrangements and provision of real-time data required for tsunami monitoring and warning with regards to seismic, GNSS, sea level and other kinds of measurements and data exchange.
7. Undertake studies to determine warning requirements for seismic and sea level data.
8. Facilitate the ongoing development and benchmarking of tsunami modelling, forecast and verification systems.
9. Contribute to the conduct of regular exercises and communication tests of the IOTWMS.
10. In collaboration with Working Group 1 "Tsunami Risk, Community Awareness and Preparedness", Working Group 3 "Tsunami Ready Implementation", IOC-UNESCO IOTIC and IOC-UNESCO Secretariat for ICG/IOTWMS, help to develop, coordinate, and implement training and capacity building programmes for NTWCs, DMOs and Broadcast Media in the Tsunami Warning Services.
11. Develop and maintain relevant documentation, such as the IOTWMS Service Definition and IOTWMS NTWC Users Guide.

# Working Group -2 : work plan 2023-25 & Progress

- 1. Publish, advertise, and implement the updated IOTWMS TSP Service Definition Document (Version 5) and request the TSPs to conform to it. (Secretariat, TSPs);** - Adopted the Version 5 during ICG/IOTWMS –XIII ; TSPs are implementing the updated SDD.

The updated Draft Version 5 of the SDD was presented to the ICG/IOTWMS during its 13th session. The ICG/IOTWMS then endorsed Version 5, recommending that Tsunami Service Providers (TSPs) implement this latest version. The following are the major changes in the SDD-V5

- Added an explicit statement that TSPs can issue a Level 2 bulletin if there is a threat to the Indian Ocean from earthquake outside the Indian Ocean source zone, even if the magnitude is less than M8.0. This addressed a request to WG2 from the ICG/IOTWMS XII.
  - Marked any earthquake magnitude change as "Updated", not "Revised" to minimise chance of mistaking 'revised' as 'arbitrary'. This addressed a request to WG2 from the ICG/IOTWMS XII.
  - Added a requirement to produce a new TSP product to NAVAREA Coordinators for their issuing navigational warnings to ships. Product templates and examples are also added.
  - Updated the KPI reporting threshold from M6.5 to M6.8 in USGS final solution. This is to improve reporting consistency without compromising reporting standards.
  - Defined explicitly those traffic light reporting thresholds of 'on target/near target/missing target' to improve clarity of the performance reporting.
  - Expanded the TSP services (not mandatory but on best effort and voluntary basis) to handle non-seismic and complex tsunami sources to meet increasing demands.
- 2. Update the NTWC User Guide in accordance with the updates to the TSP Service Definition Document (Secretariat, TSPs);**  
- A draft NTWC User Guide is under preparation with updates on seismic and non-seismic templates and procedures.(Led by Robert). – JP, Nora
  - 3. Maintain the NTWC User Guide and TSP Service Definition Document (Secretariat, TSPs);** - on going
  - 4. Implement further the TOWS-WG request on TSP messages for the maritime community and Secretariat to obtain contacts for NAVAREA operators (TSPs, Secretariat);** - TSP Australia ready to produce such TSP maritime bulletins, other two TSPs planned to implement;  
-Currently, we lack subscribers and must establish a procedure for contacting NAVAREA coordinators and maintaining their details, which we propose adding to the NTWC/TWFP Contact Database. (Secretariat)

# Working Group -2 : work plan 2023-25 & Progress

5. **Provide training subject to resources including: (Led by Dr. Karyono , Secretariat, TSPs) – TBD**
  - a) Awareness on tsunamis generated by non-seismic and complex sources
  - b) An additional one-day session on Tsunami Warning Centre and Seismic Network Operations as part of all future Standard Operating Procedure (SOP) training (Dr Karyono with support from TSPs, Secretariat);
  - c) Support to increase the capacity for analyzing real time seismic and sea level data for tsunami threat (TSPs, Secretariat);
  - d) On job trainings for the Indian Ocean Member States (Secretariat and IOTIC to assist the TSPs);
  - e) Capacity support for NTWCs in tsunami modeling to support generation of threat forecast (Secretariat, IOTIC, TSPs);  
Provide training subject to resources including:
6. **Identify sea level observations that are not available on the IOC sea level station monitoring facility and update the IOC on the data feeds (NTWCs, TSPs); -TBD**
7. **The Secretariat to work with the IOC Sea Level Facility to identify reliable tide gauge stations with fast transmission rates (Secretariat); - !!**
8. **Assist the Secretariat in maintaining the database of seismic and sea-level reporting stations for the IOTWMS (Secretariat, WG-2 members); - On Going** [The Secretariat proposes to reach out to each Member State yearly to check the TNC, NTWC, and contact details for receipt of TSP bulletins are up-to-date. Included in this we could also check the real-time seismic and sea-level stations operated in each Member State (if agreed in this meeting). The current seismic and sea level station database is many years old and needs updating to reflect the current configurations.] Through Capacity Assessment survey!!
9. **Determine the work required for the optimal seismic and sea level network coverage and identify instrumentation gaps for more accurate and timely tsunami warnings in the Indian Ocean region noting the work of the PTWS (Secretariat, Karyono, Robert, JP ) - Yet to initiate. The current TOWS-WG upcoming guidelines will be used to meet the requirements**

# Working Group -2 : work plan 2023-25 & Progress



10. **Contribute to the conduct of ocean-wide exercise (IOWave23) and 6 monthly IOTWMS Communication Tests and prepare reports of each test in conjunction with the Secretariat (TSPs, NTWCs; Secretariat);**
  - ✓ Supported the IOWave23 throughout the pre/during/post stages.
  - ✓ Conducted 2 comms tests (Dec 2022, Jun 2023) with issues captured in each comms test report and followed up (where practically possible).
11. **Encourage the NTWCs of Member States to increase the frequency of table top or similar tsunami warning exercises to review and test SOPs and reduce the potential for complacency among countries that have not experienced a recent tsunami event (NTWCs); - On going**
12. **TSP Australia to share the outcomes of the Australian warning system currently in development with respect to multi-hazard early warning approach or system for mutual benefits (to be led by Robert Greenwood) and take this up for wider consideration across all ICGs (TT TWO representatives from Indian Ocean);**
13. **Assist WG-3 with the SOP training workshops on IOC-UNESCO Tsunami Ready Recognition Programme (TSPs); WG2 has supported the Wg3 to conduct the below workshops & trainings.**
  - ✓ 01Jun -ICG/IOTWMS : Eastern Indian Ocean Member State Preparation Meeting for SOP Workshop
  - ✓ 01 Jun -ICG/IOTWMS : Western Indian Ocean Member State Preparation Meeting for SOP Workshop
  - ✓ 03-06 Jul -ICG/IOTWMS : Western IO Member States Training Workshop on SOPs for NTWCs and DMOs (Hybrid)
  - ✓ 10-13 Jul -ICG/IOTWMS : Eastern IO Member States Training Workshop on SOPs for NTWCs and DMOs(Hybrid)
  - ✓ 07-08 Aug - ICG/IOTWMS : North-West Indian Ocean SOP Hybrid Training Workshop

# Working Group -2 : work plan 2023-25 & Progress

14. **Establish a work mechanism between NTWCs and TSPs to solve communication issues (i.e. non-receipt of messages) and re-examine the need for fax (TSPs, Secretariat);**
15. **Consider having the TSPs send an SMS/email notification whenever there are tsunami product updates**  
-The requirement was already met. 3 TSPs are sending the SMS/Email notifications for any new bulletins issued. Closed
16. **Encourage NTWCs to conduct a risk assessment of upstream tsunami warning including dissemination of tsunami warnings, reliable resources, etc. (for example, SWOT analysis: strengths, weaknesses, opportunities, threats) (TSP Australia, Secretariat);**
17. **In regard to tsunamis generated by non-seismic and complex sources (e.g. volcanoes, landslides, splay-faulting, meteotsunami, onshore earthquakes, mud volcanos):**
  - a) **Extend the TSP services to include tsunamis generated by non-seismic and complex sources (TSPs);** -  
The SDD V5 revisions specify the bulletin formats for both seismic and non-seismic tsunami sources. During the SOP workshop, it was highlighted that TSP Australia employs a uniform approach for all sources, though it's noteworthy that only volcanic tsunamis have been empirically tested in a real-world scenario. TSPs are encouraged to innovate in threat assessment techniques, provided that their outputs comply with the standards set forth in SDD V5.
  - b) Investigate methods of detection and threat assessment of non-seismic and complex source tsunami events in coordination with TOWS-WG TTTWO,
  - c) Prepare an atlas of known sources, and
  - d) Conduct an online workshop on non-seismic and complex source tsunami events (JP, Mohammad, Ameer, Robert, Secretariat);



# Working Group -2 : work plan 2023-25 & Progress

- 18. Share information on possible new tsunami-detection technologies such as pressure sensors attached to undersea communications cables (WG-2 members & NTWCs); -**
- 19. Assist NTWCs with their implementing Common Alerting Protocol (CAP), mobile applications and social media including WRS-TSP Indonesia for effective dissemination of national tsunami warning information (Australia, India, Indonesia, NTWC representative – to be confirmed);**
- 20. Request Member States to review TSP bulletin dissemination details annually and advise of updates (Secretariat).**
- 21. To support and contribute on the Capacity Assessment of Tsunami Preparedness in the Indian Ocean Report which is under way.**

## Other WG2 Updates

- Held WG2 intersessional meetings 2022, online WG2 meetings in 2023.
- Global tsunami coordination
  - Supported the yearly global tsunami coordination meetings of TOWS-WG and its Task Team Tsunami Watch Operations
  - Supported the Ad Hoc Team on Tsunamis Generated by Volcanoes through surveys.
  - Contributed to the harmonised global performance framework and questionnaires

## 2. Challenges/Gaps in Tsunami Detection Warning and Dissemination



- Challenge to sustain the seismic and sea level networks/observing systems
- Major challenge to enable free and full data sharing of real-time observations .
- Challenge to sustain research and development efforts that
  - update or expand the pre-computed scenario database to real-time tsunami modelling capabilities, that
  - develop auto-alerting capability and improve use of real-time observations including new/emerging technologies such as GNSS and SMART cables, and that
  - provide scientific basis for impact-based forecasts and warnings.
- Insufficient inter-agency coordination and cooperation, which reduced wider reach of warnings, and the timely and appropriate emergency response.
- Integrated Multi-hazard approach remains largely a concept unless coordinated at each Members states.
- Major challenge to provide timely and accurate tsunami detection and warning to near-field tsunami, and non-seismic and complex tsunami.

### 3. Plans and timelines – 2024



- Initiating the trail run of TSP messages [At least one TSP] for the maritime community in co-ordination with Secretariat & NAVAREA operators – for the Upcoming Communication Tests . – [June/Dec 2024](#).
- Contributing to WG-1 for the Capacity Assessment of Tsunami Preparedness in the Indian Ocean Report. – [Dec 2024](#).
- Creating a Standard Operating Procedure (SOP) document for dealing with non-seismic sources of tsunamis, specifically focusing on Tsunami-Generating Volcanic Events (TGVVs), involves outlining clear, step-by-step procedures that can be followed by TSPs. – [Dec 2024](#)
- Prepare an atlas of known sources with possible tsunami travel times for ready reference to NTWCs.- TBD
- Contribute to the conduct of regular exercises and communication tests of the IOTWMS. – [\[As and When\]](#)
- WG2 to realign the action plans to meet the broader objectives of UN Ocean Decade Tsunami Program in addition to the ICG/IOTWMS WG2 roles and responsibilities/ Plans. – [TBD](#)
- Determine the work required for the optimal seismic and sea level network coverage and identify instrumentation gaps for more accurate and timely tsunami warnings in the Indian Ocean region noting the work of the PTWS - [Initiate the work based on the report from upcoming TOWS-WG](#).



**unesco**

Intergovernmental  
Oceanographic  
Commission

Thank You