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## Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS)

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*UNESCO-IOC IOTWMS IOTIC TEMPP TRRP TRIP Training Workshop*

*ITCOOcean UNESCO C2C INCOIS, Hyderabad, India*

*15 – 23 April 2025*

# IOTWMS developed

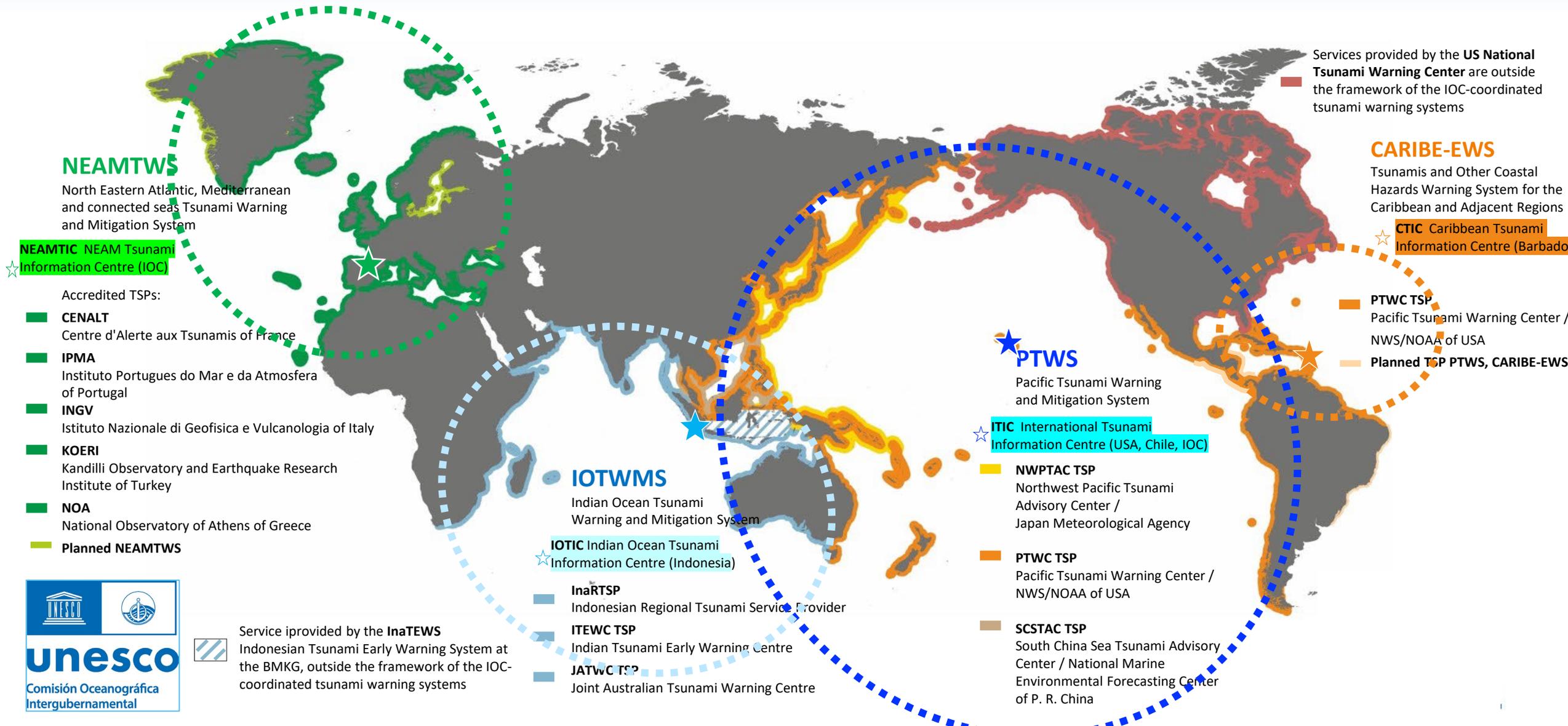
- **The Intergovernmental Oceanographic Commission (IOC) of UNESCO** in 2005 was given the mandate by the United Nations to establish the Indian Ocean Tsunami Warning & Mitigation System (IOTWMS)
- 25 countries around the Indian Ocean are Member States of the **UNESCO-IOC IOTWMS**
- Member States have worked together through regional cooperation to develop and operate the IOTWMS
- The fight against the common tsunami threat unites the countries together



# GLOBAL TSUNAMI WARNING AND MITIGATION SYSTEM

Intergovernmental Oceanographic Commission of UNESCO

<https://tsunami.ioc.unesco.org/>



# Governance in ICG/IOTWMS



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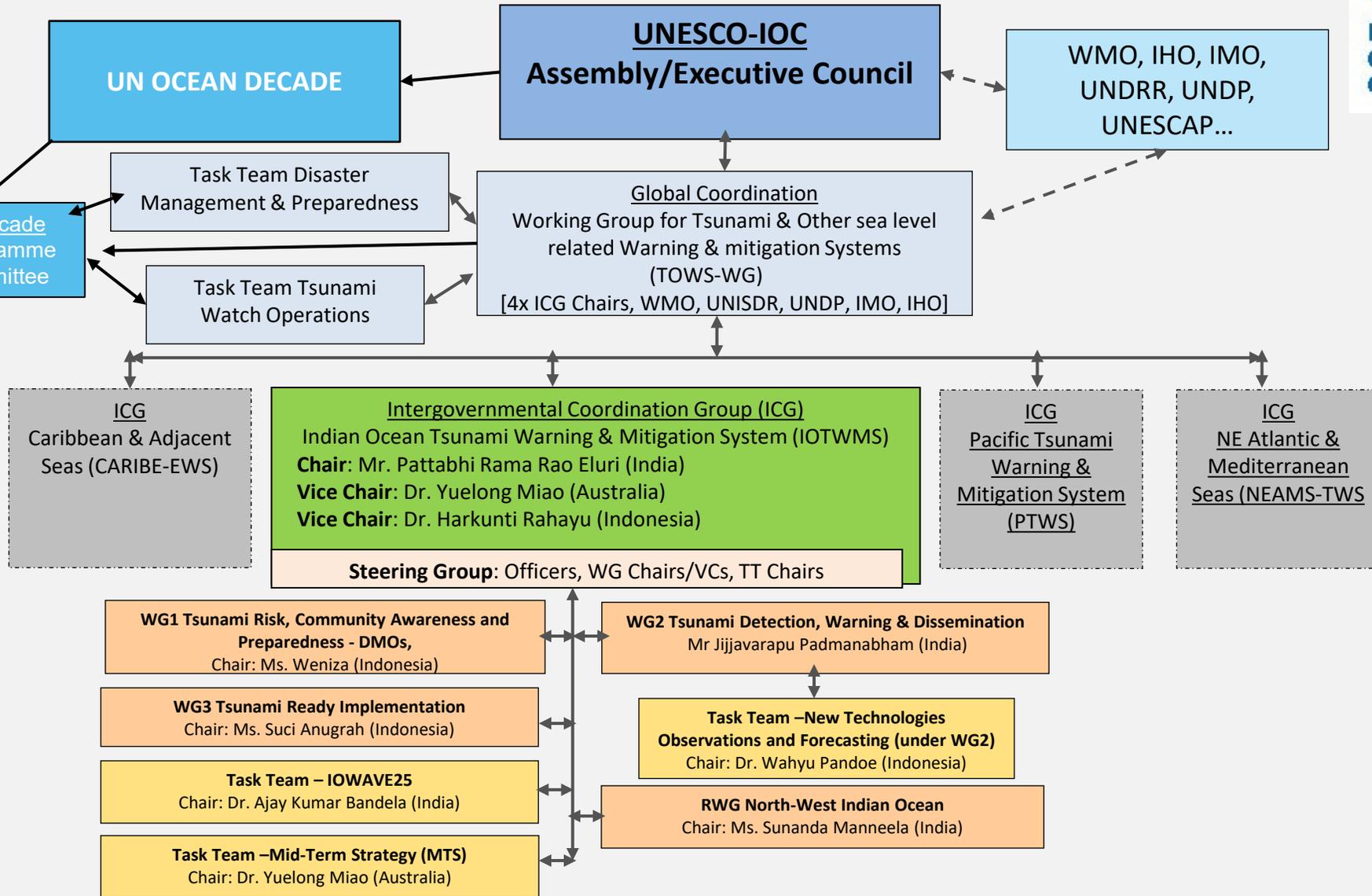


UNESCO Disaster Risk Reduction Section

UNESCO-IOC Tsunami Resilient Section

ICG/IOTWMS Secretariat  
Srinivas Tummala Kumar  
Nora Gale

Indian Ocean Tsunami  
Information Centre  
(IOTIC) Ardito Kodijat



UNESCO-IOC Member States

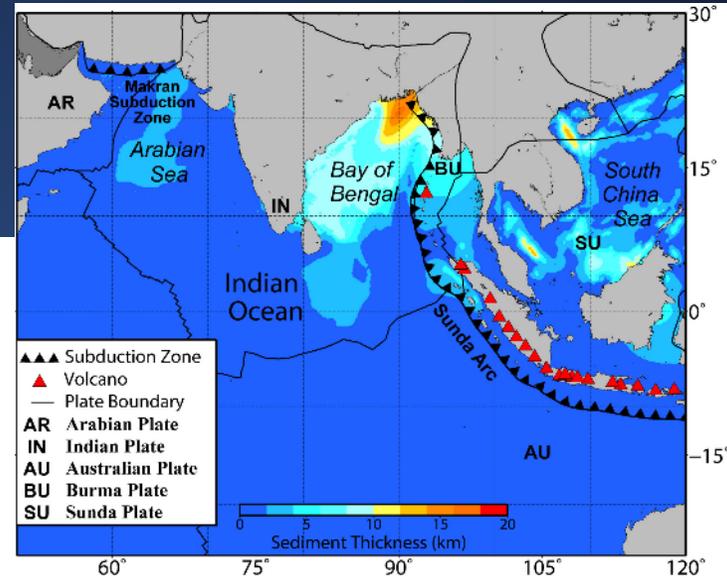
# ICG/IOTWMS Secretariat Terms of Reference

1. Support meetings of the Intergovernmental Coordination Group for the Indian Ocean Tsunami warning & Mitigation System (ICG/IOTWMS).
2. Facilitate the liaison among the various national contact points and national tsunami warning centres.
3. Maintain a current list of operational national contact points and facilities and make it available on request to all Member States.
4. Organize the liaison between ICG/IOTWMS and the ICG/ITSU, with the PTWC and with other tsunami warning centres to facilitate best practices in tsunami warning.
5. Initiate and support training activities and enhance and enrich tsunami warning in the Indian Ocean

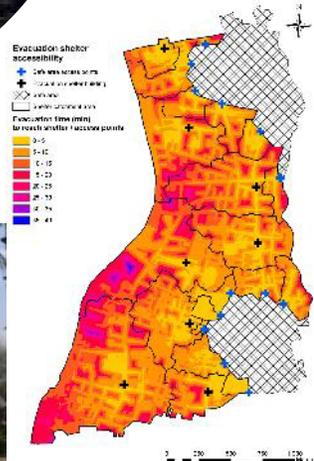


**Figure:** Participants at the ICG/IOTWMS Steering Group meeting hosted by the Indian National Centre for Ocean Information Services in Hyderabad, India during 5-6 February 2024.

# Pillar #1: Risk assessment



- The first step is to scientifically assess the tsunami hazard and potential risk
- This helps inform governments and communities about what they must prepare for
- Tsunamis are one of the deadliest natural disasters





# Pillar #3: Community Awareness and Preparedness



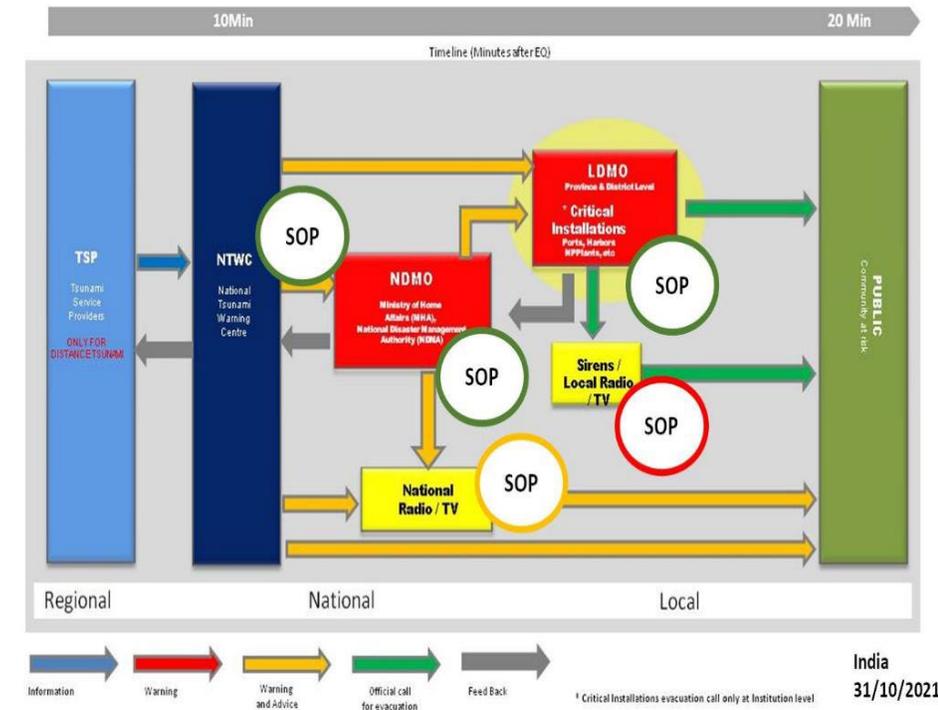
- A tsunami warning won't be effective if the at-risk communities aren't aware of the threat and don't know what to do when a warning is disseminated
- At-risk communities must be educated and made aware of the tsunami threat
- At-risk communities must be educated on what actions they must take to respond effectively to natural warning signs (feel the earthquake, water recedes, roaring sound) or warnings disseminated by the authorities
- Indian Ocean Tsunami Information Centre (IOTIC)

# Intersessional Meetings of Working Groups and Task Teams

- Working Group on Tsunamis and Other Hazards related to Sea Level Warning and Mitigation Systems (TOWS WG) and its Task Teams
  - ✓ 6<sup>th</sup> Meeting of TOWS WG, Paris, France (hybrid), 27 February – 3 March 2023
  - ✓ 7<sup>th</sup> Meeting of TOWS WG, Sendai, Japan (hybrid), 19-23 February 2024
  - ✓ 8<sup>th</sup> Meeting of TOWS WG, Paris, France (hybrid), 21-25 February 2025
- ICG/IOTWMS Steering Group
  - ✓ Hyderabad, 5-6 February 2024 (hybrid) & Various planning meetings
- Working Group 1 on Tsunami Risk, Community Awareness and Preparedness
  - ✓ 17-18 March 2023 (online) & 19 August 2024 (online)
- Working Group 2 on Tsunami Detection, Warning and Dissemination
  - ✓ 5-6 April 2023 (online) & 7 August 2024 (online)
- Working Group 3 on Tsunami Ready Implementation
  - ✓ 24 August 2023 (online); 7 February 2024 (Hyderabad – hybrid); 29 August 2024 (online)
- Regional Working Group for the North-West Indian Ocean
  - ✓ 30 May 2023 (online) & 22 July 2024 (online)
- Task Team on Exercise Indian Ocean Wave 2023 (IOWave23)
  - ✓ Various planning meetings of full Task Team as well as TSP representatives

# Training Workshops on Standard Operating Procedures (SOPs)

- The Training Workshops helped countries to refine their tsunami SOPs in the lead-up to Exercise IOWave23 and contribute to reaching the UN Ocean Decade goal of 100% at-risk coastal communities prepared for and resilient to the tsunami threat by 2030.
- Three (3) workshops were held in the western, eastern, and north-west Indian Ocean regions:
  - ICG/IOTWMS Western Indian Ocean Member States Training Workshop on Standard Operating Procedures (SOPs) for National Tsunami Warning Centres (NTWCs) and Disaster Management Organisations, 3-6 July 2023 (online)
  - ICG/IOTWMS Eastern Indian Ocean Member States Training Workshop on Standard Operating Procedures (SOPs) for National Tsunami Warning Centres (NTWCs) and Disaster Management Organisations, 10-13 July 2023 (online)
  - North-West Indian Ocean Standard Operating Procedures (SOPs) Training Workshop, 7-8 August 2023 (online)
- The SOP training workshops included an online regional workshops and in-person national workshops.
- Participants reviewed and refined their SOPs in the lead-up to Exercise IOWave23.
- Participants were briefed on Exercise IOWave23 and sensitized to the new IOTWMS Tsunami Service Provider Australia products for non-seismic tsunami sources.



# Exercise Indian Ocean Wave 2023

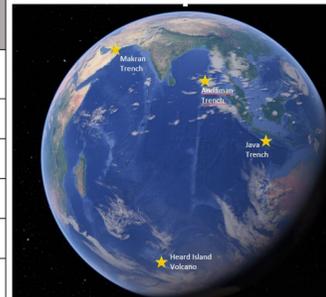
- 4, 11, 18 and 25 October 2023
- Four scenarios with simulated tsunami waves travelling across the Indian Ocean Basin
  - Andaman trench
  - Makran trench
  - Heard Island volcano
  - Java trench
- Webinar on Lessons Learnt during Exercise Indian Ocean Wave 2023, online, 12-13 December 2023
  - 20 countries participated
  - Community evacuations held in 8 Member States with ~45,000 people evacuating
  - Tsunami Ready indicators testes in 7 Member States
  - New non-seismic products produced by TSP Australia were utilised



## IOWave23 Scenario

25 countries under threat    20 countries under threat    20 countries under threat    19 countries under threat

Scenario	1. Andaman Trench	2. Makran Trench	3. Heard Island Volcano	4. Java Trench
Date	4 October 2023 (Wednesday)	11 October 2023 (Wednesday)	18 October 2023 (Wednesday)	25 October 2023 (Wednesday)
Time	04:00 UTC	06:00 UTC	06:00 UTC	02:00 UTC
Magnitude	~M9	~M9	n/a	~M9
Depth	10 km	10 km	n/a	10 km
Latitude	7.20N	24.80N	53.10S	10.40S
Longitude	92.90E	58.20E	73.52E	112.80E
Location	Off west coast of Nicobar Islands, India	North-West Indian Ocean	Kerguelen Islands Region, Southern Ocean	South of Java, Indonesia



- The outcomes from IOWave23 will be published in an UNESCO-IOC Exercise Report.
- Propose for the next Exercise:
  - Plan and conduct the exercise in 2025
  - Consider performing exercises outside of working hours, in particular during the night or weekend
  - Encourage the Member States to ensure the participation of the community, especially those recognized as UNESCO-IOC Tsunami Ready Community

# Strengthening tsunami warning in the North-West Indian Ocean through regional cooperation



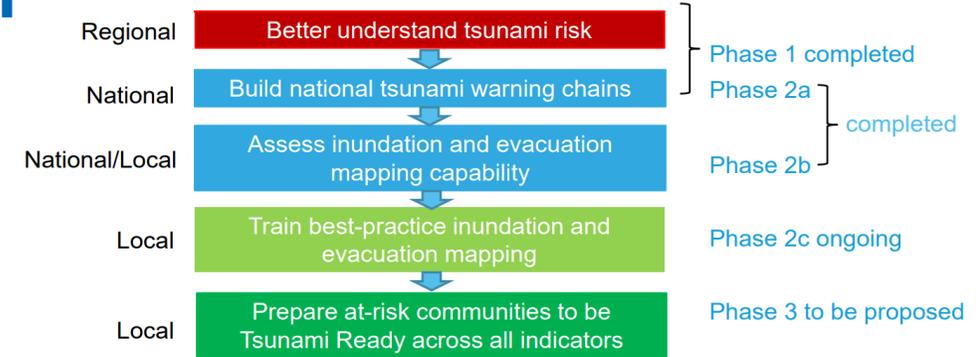
## Phase 1, 2a & 2b Achievements:

- ❑ **PTHA for NW Indian Ocean Completed:** Supported by experts (GFZ, INGV, NGI, INCOIS); PTHA results will be hosted by INCOIS for NWIO countries.
- ❑ **Workshops/Trainings Conducted:**
  - “Makran Subduction Zone Science Strengthening Tsunami Warning and Preparedness”: 14–16 Nov 2023, Abu Dhabi, UAE.
  - UNESCO-IOC Indian Ocean Tsunami Ready Hybrid Workshop: 22–26 Nov 2022, Bali, Indonesia.
  - Training in tsunami inundation mapping, “Enhancing Capacities in Tsunami Modelling”, Muscat, Oman (19–23 Apr 2024).
- ❑ **Tsunami Ready Recognition Programme (TRRP):** Guide countries to prepare at-risk communities.

## Phase 2c ongoing/planned activities:

- ❑ The project on “Strengthening tsunami warning in the North- West Indian Ocean through regional cooperation – Phase 2c”, was launched on 15 November 2023
- ❑ **Phase 2c funded by the ESCAP Tsunami Trust Fund over a 12-month period**
- ❑ A capacity-building workshop on Tsunami Evacuation Maps, Plans, and Procedures is planned for early 2025 supported by IOTIC, UNESCAP, UNESCO-IOC, INCOIS and BMKG. **India will host this training at the INCOIS in April 2025**
- ❑ Translate Manual and Guides – **Ongoing**
- ❑ Engaged National Consultants to support the facilitation coordination at the local level to Pilot the Tsunami Evacuation Plan in selected sites in the country. – **On Going**

## Programmatic Approach



## Tsunami Ready Implementation in Pilot Sites

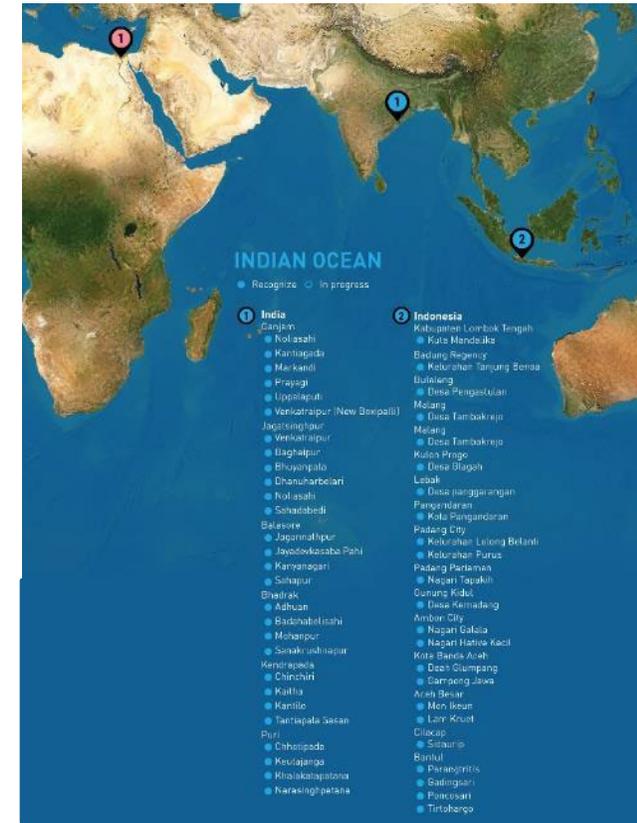
Phase 3: Proposed for (2025-2027)



# UNESCO-IOC Tsunami Ready Recognition Programme



- 48 Indian Ocean communities have received the UNESCO-IOC Tsunami Ready Recognition.
- In **India**, 24 villages received the UNESCO-IOC Tsunami Ready Recognition, and 2 villages received the renewal in 2024.
- In **Indonesia**, 13 new UNESCO-IOC Tsunami Ready villages were recognized in 2023-2024 in addition to the 9 communities already recognized.
- National Tsunami Ready Training was conducted by IOTIC in Maldives, Seychelles, and Timor Leste in 2023-2024.
- In 2025, IOTIC plans to conduct one National Tsunami Ready Training.
- National Tsunami Ready Focal Point have been established for 19 Indian Ocean Member States (through IOC Circular Letter No 2978).



National Tsunami Ready Training in Timor Leste, July 2023



National Tsunami Ready Training in Seychelles, November 2023



National Tsunami Ready Training in Maldives, August 2024

# 2024 Capacity Assessment of Tsunami Preparedness in the Indian Ocean

## Overview

- The 2024 UNESCO-IOC Capacity Assessment of Tsunami Preparedness in the Indian Ocean provides an update of the current status of tsunami preparedness capacity in the region, identifies specific gaps and prioritises capacity development requirements at both the regional and national levels.
- Areas of assessment (i) Risk assessment and reduction, (ii) Detection, warning and dissemination, (iii) Public awareness, preparedness and response, and (iv) Tsunami Ready Recognition Programme.
- Survey responses from twenty-two (22) Member States were received.
- The University of Huddersfield has analysed the data and compared with the results of the 2018 Assessment to produce a draft report.
- The Capacity Assessment Team met in Bangkok during 4-6 September to formulate the recommendations with support from the ESCAP Tsunami Trust Fund and Asian Development Bank.
- The report is being finalised as an UNESCO-IOC technical series publication
- ICG/PTWS will implement the Capacity Assessment of Tsunami Preparedness in the Pacific Ocean in 2025.

## Key Findings

- Much progress has been made to develop the Indian Ocean Tsunami Warning and Mitigation System
- Tsunami policies, plans and guidelines have increased or remained at a similar level between the 2018 & 2024 surveys.
- The upstream tsunami warning system components of detection, warning and dissemination have plateaued since 2018.
- During the same timeframe, efforts have been increasing in community preparedness.
- The observed increase in community tsunami activities between 2018 and 2024 may be attributed to the adoption and growth of the UNESCO-IOC Tsunami Ready Recognition Programme.



**Figure:** Participants at the ICG/IOTWMS Capacity Assessment of Tsunami Preparedness Validation Workshop held in Bangkok during 4-6 September 2024.

# UNESCO-IOC 2nd Global Tsunami Symposium

## Banda Aceh, Indonesia (10-14 Nov 2024)

**Banda Aceh Statement:**

**Global Tsunami Warning and Mitigation: Building Sustainability for The next decade through Transformation and Innovation.**

**UNESCO and its partners call on States and civil society to drastically step up their investments and efforts to achieve 100% of Tsunami Ready Communities across the world by 2030.**

### Participants:

- 682 participants
  - 170 online participants
  - 1200 viewers of Youtube
  - From about 32 countries
- Engaged many parties including: Scientists, Policy Makers, Academia, Professionals, Practitioners, Private Sector, Schools, Communities, Youth, NGOs, UN Organizations

### Outcomes:

- Showing the achievement of the technical development of tsunami warning and mitigation system
- Showing the achievement of the community's engagement in the Tsunami Preparedness capacity and response
- Identifying priorities and gaps



# 14<sup>th</sup> Session of the ICG/IOTWMS

## Banten, Indonesia, 17-19 November 2024



- The 14<sup>th</sup> Session of the ICG/IOTWMS was hosted by the Republic of Indonesia under the chairpersonship of Prof. Dwikorita Karnawati.
- The session was held in hybrid modality and attended by 77 delegates from 19 Indian Ocean Member States.
- The ICG reviewed the progress made during the intersessional period and recommendations from its Steering Group, Working Groups and Task Team.

# Major Decisions from the 14th Session of ICG/IOTWMS

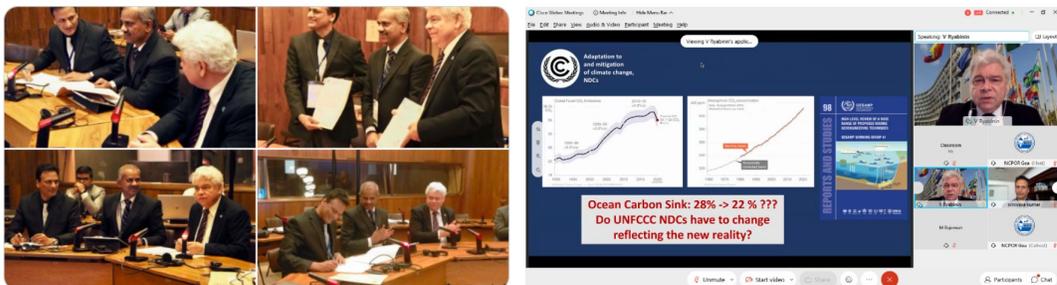
(17-19 Nov 2024, Banten, Indonesia)

- Include the instructions from 57<sup>th</sup> Session of the IOC Executive Council, and the recommendations from TOWS-WG XVI and XVII in the work plans of the ICG for the next inter-sessional period;
- ICG/IOTWMS Steering Group released the **Service Definition Document version 5.0 that covers templates for NAVAREA and Non-Seismic templates.**
- Extend the **TSP services to include tsunamis generated by non-seismic and complex sources**
- Instructs the Steering Group to **finalize the 2024 Capacity Assessment Report and Executive Summary** in 4 weeks, for further review by the Member States, incorporate feedback if any, and endorse the final report for publication as UNESCO-IOC Document
- Establish a new intersessional **Task Team on Indian Ocean Wave 25 Exercise (IOWave25)** reporting to the Steering Group
- Establish a new intersessional **Task Team on New/Emerging Technologies for Observations and Forecasting** under the WG2
- Establish a new intersessional **Task Team on Mid-Term Strategy (MTS)** to prepare a draft MTS
- Request the Steering Group to supervise the work of the Task Team and to **finalise the MTS 2025-2030** by early half of 2025
- Instructs the Steering Group, Working Groups and Task Teams to **consider the recommendations of the ODTP RDIP, IOWave23, 2024 Capacity Assessment and 2<sup>nd</sup> Global Tsunami Symposium** into their work plans.
- Decides to **continue the capacity development initiatives related to SOPs, TEMPP, TRRP and on-the-job training for warning center operators** by TSPs. TEMPP, hosted by INCOIS, is scheduled to take place in April 2025.
- Request the Steering Group to **explore if there is a need of expanding sub-regional working groups to address regional gaps and strengthen collaborations.**
- Develop the **summary statement of the 2nd UNESCO-IOC Global Tsunami Symposium** together with the Program Committee for publication as a UNESCO-IOC document.
- **Optimal sea level and seismic network design for the Area of Service (AoS) and work with Member States to fill identified gaps, including the strategic and coordinated submission of projects to the UN Ocean Decade and potential funding sources for support.**

# UN Ocean Decade Tsunami Programme

## Decade Collaborative Centre for the Indian Ocean Region

National Decade Coordination Committee (NDCC)

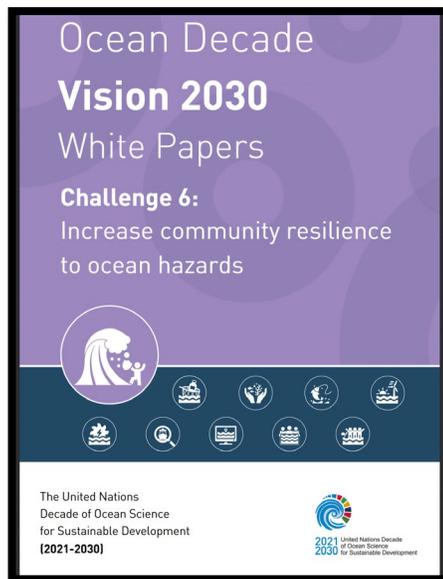


## Indian Ocean Regional Ocean Decade Conference (IOCon-24)



As part of Call for Decade Actions No. 07/2024, India proposed 3 projects namely

- INCOIS SUBMARINE CABLE MULTI-PARAMETER OBSERVATORY
- TSUNAMI READY ODISHA (TRO)
- PEOPLE CENTRED TSUNAMI EARLY WARNING FOR INDIA - PCTWIN



## UN Ocean Decade Barcelona Conference Indian Ocean Event



Coastal cities and communities joining Tsunami Ready



Coastal Futures: Charting priorities for Coastal Resilience

Tsunami Night: 3 Films related to tsunami

2630 onsite & 3000+ online participants from 124 countries, 165 satellite events

# ICG/IOTWMS + PCTWIN

- IOTWMS WG-1 <-> PCTWIN WP-1 Knowledge Hub
  - IOTWMS WG-2 <-> PCTWIN WP-2 Early Warning
  - IOTWMS WG-3 <-> PCTWIN WP-3 Resilience
  - IOTWMS WG-NWIO <-> All WPs
- 
- Invite engagement of PCTWIN Experts in the Working Groups for exchange of knowledge (Participation in meetings, elicitation process, etc)
  - Facilitate adoption of PCTWIN knowledge and products (PTHA) for creating / updating guidelines and piloting them in IOTWMS member States
    - Risk Assessment (Guidelines, Products for pilot sites in Maldives, Sri Lanka, Mauritius, Seychelles, Timor Leste, etc, Early Warning Chain & SOPs)
    - Operational Warning (GNSS, Non-seismic sources, PTF, new techniques / procedures, communication of uncertainties)
    - Preparedness & Response (TRRP Implementation, Exposure Modelling, Evacuation Planning, Toolkit, Inclusivity KPIs)
  - IOWave Exercises as an opportunity to observe and test new knowledge & products



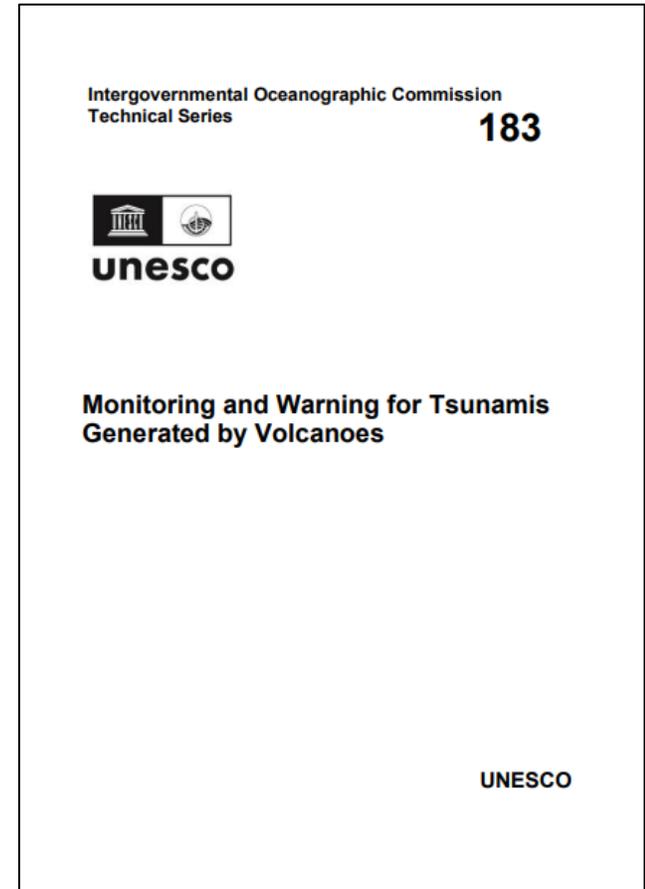
# Non-Seismic and Complex Source Tsunami – Webinars on 16 & 23 April 2025

- **TOWS-WG**

- UNESCO-IOC Technical Series #183: *Monitoring and Warning for Tsunamis Generated by Volcanos* was written by TOWS-WG Ad Hoc Team on Tsunamis Generated by Volcanos.
- *A Review of Tsunamis Generated by Volcanos (TGV) Source Mechanism, Modelling, Monitoring and Warning Systems* was published in *Pure and Applied Geophysics* by Francois Schindele et al., June 2024.

- **IOTWMS**

- IOTWMS Tsunami Service Providers (Australia, India, Indonesia) have developed new products and enhancements to operational procedures for responding to such events.
- The new products were tested during Exercise Indian Ocean Wave by a scenario from Herald Island Volcano in the Southern Ocean.





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