REPORT OF INTERGOVERNMENTAL COORDINATION GROUP INDIAN OCEAN TSUNAMI WARNING & MITIGATION SYSTEM (ICG/IOTWMS)

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Prof. Dwikorita Karnawati
Chair, ICG/IOTWMS

32nd IOC Assembly 23 June 2023

ICG/IOTWMS Work Programme

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In line with UN "Early Warnings for All" (EWS4ALL) initiative from COP-27, ICG/IOTWMS working groups and task teams continue to work across all four pillars:

Pillar 1
Disaster risk knowledge
Systematically collect data and undertake risk assessments

- Are the hazards and the vulnerabilities well known by the communities?
- What are the patterns and trends in these factors?
- Are risk maps and data widely available?

Pillar 2
Detection, observations, monitoring, analysis and forecasting of hazards
Develop hazard monitoring and early warning services

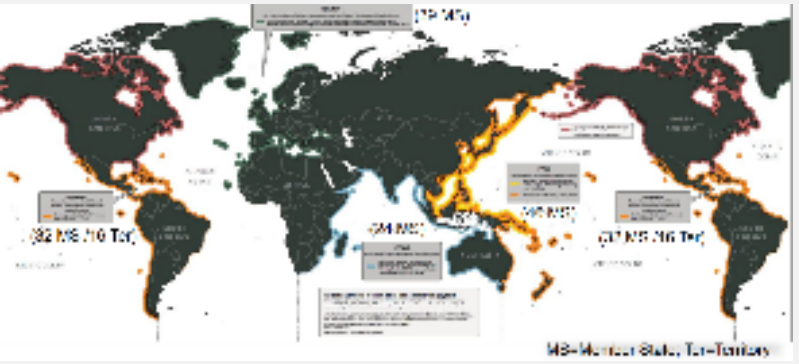
- Are the right parameters being monitored?
- Is there a sound scientific basis for making forecasts?
- Can accurate and timely warnings be generated?

Pillar 4
Preparedness and response capabilities
Build national and community response capabilities

- Are response plans up to date and tested?
- Are local capacities and knowledge made use of?
- Are people preapred and ready to react to warnings?

Pillar 3
Warning dissemination and communication
Communicate risk information and early warnings

- Do warnings reach all of those at risk?
- Are the risks and warnings understood?
- Is the warning information clear and usable?



ICG/IOTWMS GOVERNANCE

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UNESCO-IOC
Assembly/Executive Council

WMO, IHO, IMO, UNISDR, UNDP…

Task Team Disaster Management & Preparedness

UN Ocean Decade Tsunami Programme Science Committee

Working Group for Tsunami & Other sea level related Warning & mitigation Systems (TOWS-WG)
[4x ICG Chairs, WMO, UNISDR, UNDP, IMO, IHO]

Task Team Tsunami Watch Operations

ICG Caribbean & Adjacent Seas (CARIBE-EWS)

Intergovernmental Coordination Group
Indian Ocean Tsunami Warning & Mitigation System (IOTWMS)
Chair: Prof. Dwikorita Karnawati (Indonesia)
Vice Chair: Dr. Yuelong Miao (Australia)
Vice Chair: Mr. Pattabhi Rama Rao (India)

Steering Group: Officers, WG Chairs/VCs, TT Chairs

ICG Pacific Tsunami Warning & Mitigation System (PTWS)

ICG NE Atlantic & Mediterranean Seas (NEAMS-TWS

WG1 Tsunami Risk, Community Awareness and Preparedness - DMOs,
Chair: Dr. Harkunti Rahayu (Indonesia)

WG2 Tsunami Detection, Warning & Dissemination
Dr. Karyono (Indonesia)

WG3 Tsunami Ready Implementation
Chair: Ms. Suci Anugrah (Indonesia)
Task Team – IOWAVE23
Chair: Mrs. Weniza (Indonesia)

RWG North-West Indian Ocean
Chair: Dr. Mohammad Mokhtari (Iran)
Task Team – Scientific Tsunami Hazard Assessment of the Makran Subduction Zone
Chair: to be elected

IOC Tsunami Resilience Section
Head: Bernardo Aliaga (Paris)

IOTWMS Secretariat
hosted by Australia (BoM)
Head: Rick Bailey

IOTIC (Jakarta)
hosted by Indonesia (BMKG)
Head: Ardito Kodijat

IOC Secretariat, Tsunami Unit

Support provided for 25 IOTWMS Member States

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1. ICG/IOTWMS Secretariat
Support for further two years (2023-2024)(USD$310K per year) from Government of Australia, through Australian Bureau of Meteorology

2. Indian Ocean Tsunami Information Centre (IOTIC)
Support for further five years (2022-2027) (USD$130K per year + office, staff and activities) from Government of Indonesia, through BMKG

3. UNESCAP funded Project "Strengthening tsunami warning in the North-West Indian Ocean through regional cooperation"
Phase 2b completed Mar 2023,
Phase 2c start Jul 2023 (USD$240K)

4. BMKG OTGA Specialized Training Center
Support for competency training from for Tsunami Ready (2021), Tsunami Community Preparedness (2022), and Ocean Forecast Systems (2021 and 2022)

5. Tsunami Service Providers
Support by Australia, India, Indonesia in providing tsunami threat information to all Member States to help develop sovereign national tsunami warnings

6. NWIO Probability Tsunami Hazard Assessment (PTHA) archive and access
Support by India (computing facilities and staff)

ICG/IOTWMS Major Activities in 2022

1. **13th Session ICG/IOTWMS**
   Bali, Indonesia, 28 Nov - 1 Dec 2022
   17 Member States
   (75 participants, 17 countries)
2. **Indian Ocean Tsunami Ready Workshop**
   Bali, Indonesia, 22 – 26 Nov 2022
   (84 participants, 12 countries)
3. **Nine (9) new communities receive Tsunami Ready Recognition**
4. **UNESCAP funded NW Indian Ocean Project Phases 2a and 2b** held 15 regional and national workshops, including NWIO Science Exchange Workshop, Abu Dhabi, UAE, 16 – 22 Nov 2022
   (52 participants, 7 countries)

13th Session of ICG/IOTWMS

Indian Ocean Tsunami Ready Workshop

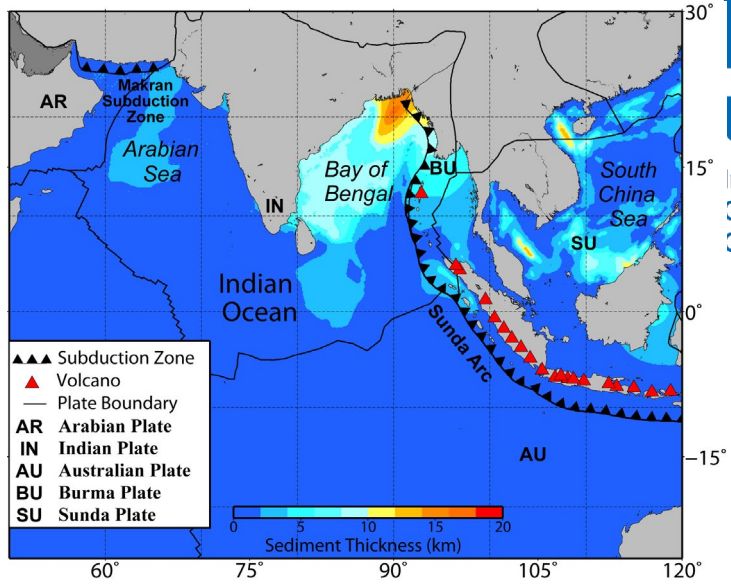
Tsunami Ready Recognition

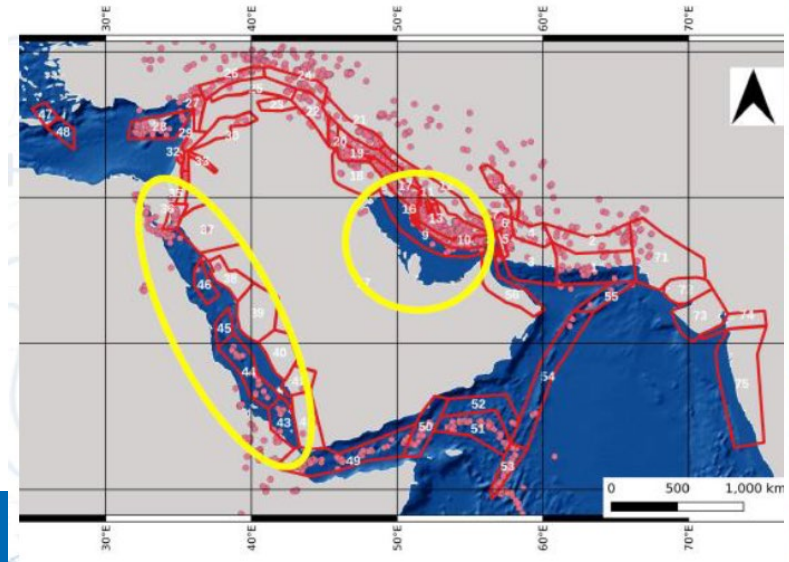
NWIO Science Exchange Workshop

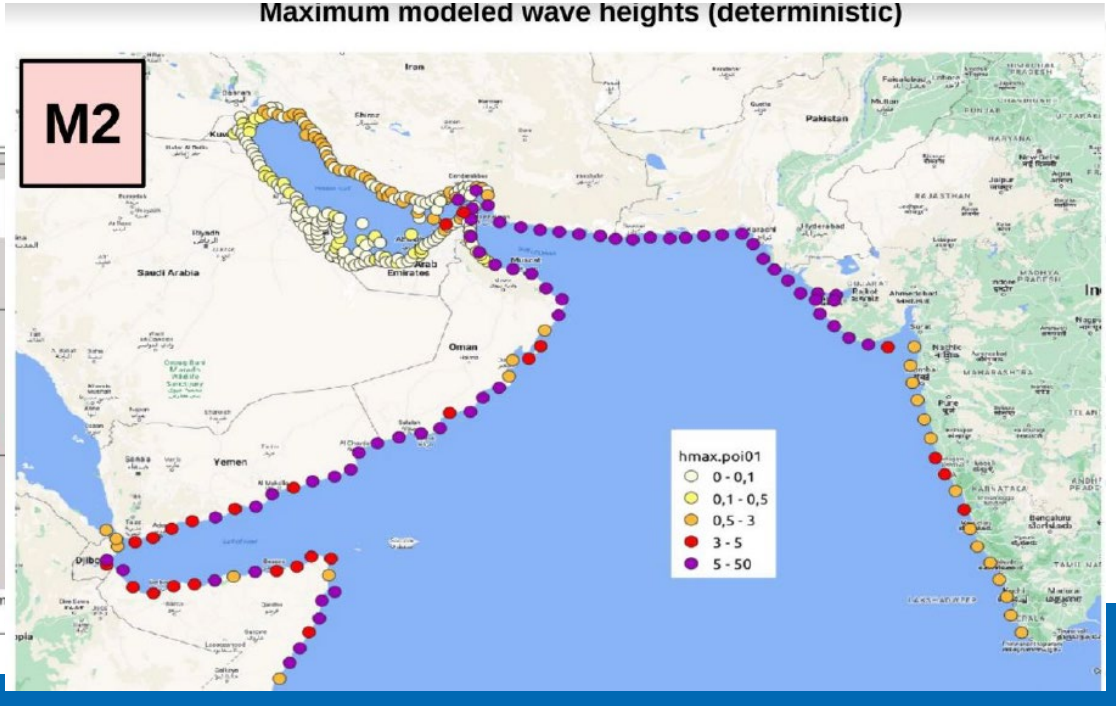
PILLAR I: TSUNAMI RISK ASSESSMENT

Tsunami Hazard Assessment

- Underpins better understanding of the risk and guide preparedness by authorities and communities
- Probabilistic Tsunami Hazard Assessment (PTHA) V1.0 developed for NW Indian Ocean by UNESCAP funded project
- Future versions to include other sources, such as splay faulting, submarine landslides, etc



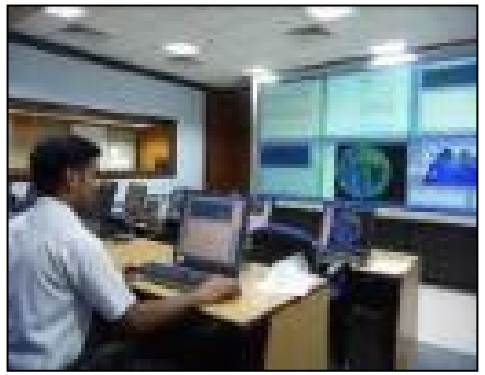


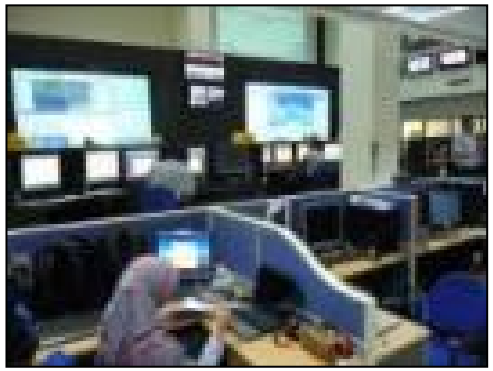


PILLAR II: TSUNAMI DETECTION AND WARNING

Tsunami Service Providers

- Operated by **Australia, India, and Indonesia**
- Developing within **multi-hazard** environments
- **ISO compliant:** ISO 9001 (Australian and India) and ISO 22328-3 (Indonesia)
- **Performance monitoring** against 7 KPIs
- Threat information provided for **non-seismic source tsunami** by Australia from 2023
- **Maritime products for NAVAREAs** to be trialed in 2023 and implemented from 2024
- **Monitoring and warning tools and systems being enhanced by all TSPs**





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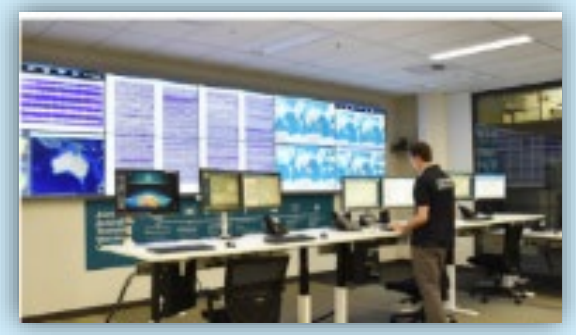
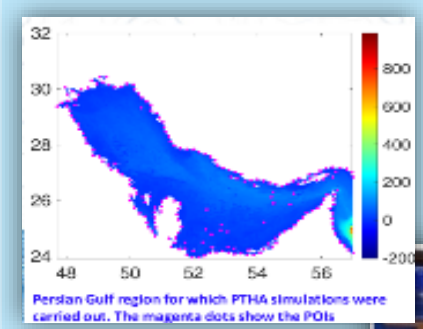
TSP FUTURE PLAN



- **Integrated, tested and operationalised seismic array processing as input to rapid earthquake detection and characterization**.
- To commence work towards ISO 9001 accreditation for GA-JATWC systems
- Bureau-JATWC to replace the current tsunami Decision Support Tool with TOAST

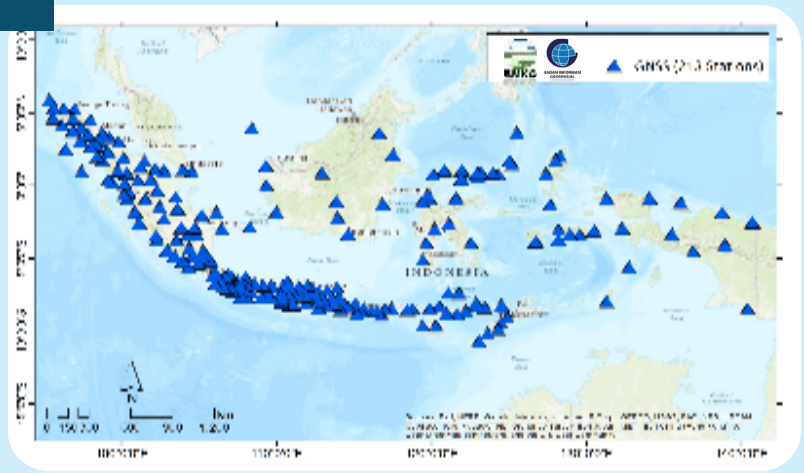
TSP AUSTRALIA



Persian Gulf region for which PTHA simulations were carried out. The magenta dots show the POIs

- **Adopting the multi-hazard approach**
- Developing SOP for Non Seismic Tsunami Sources
- Utilizing GNSS & SMA for rupture characterization
- Archiving the Makran source PTHA results to provide access to member states
- Mounting efforts on Integrated inversions for tsunami source characterization

TSP INDIA



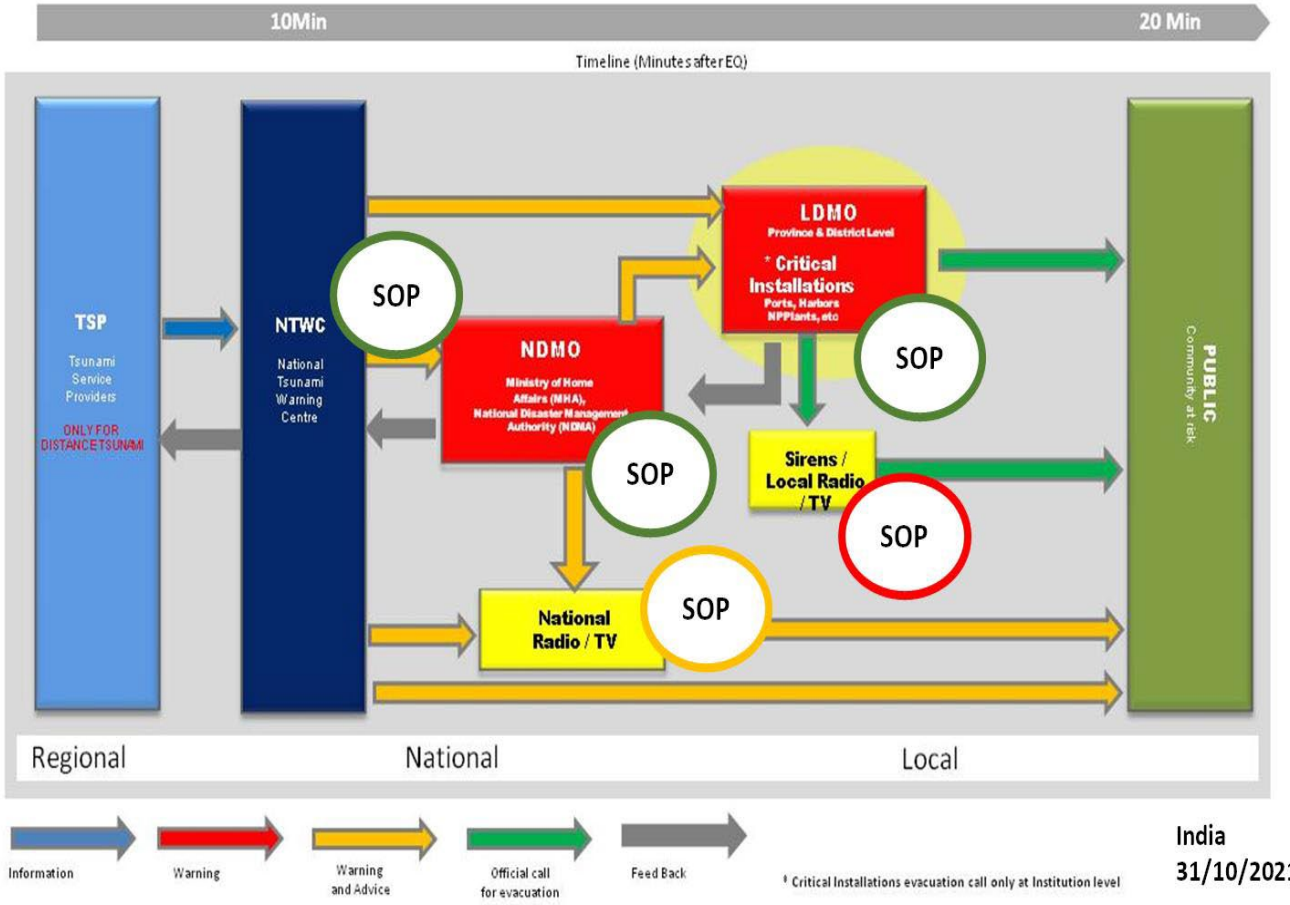
- **Development of processing system for Earthquake Early Warning**
- **Developing the Multi-hazard Early Warning System**
- Utilization of GNSS for earthquake parameter calculation
- Research on non seismic tsunami
- Provide sea level observation portal for the Indian Ocean area
- Support the On Job Training for the IO member states

TSP INDONESIA

PILLAR III: TSUNAMI WARNING DISSEMINATION

National Tsunami Warning Chains and SOPs

- 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 to be run in July 2023**
- **Routine 6-monthly communication tests** in June and December every year (email, GTS, SMS, Fax)
- Test and Evaluate national tsunami warning chains and SOPs in **Exercise IOWave23 in October 2023**



PILLAR IV: COMMUNITY AWARENESS & PREPAREDNESS

Tsunami Ready Recognition in the Indian Ocean

- **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 zone**

Lesson Learnt from Recognized Tsunami Ready Communities (Purus and Lolong Belanti) in Responding to the Recent 25th April 2023 Mentawai Earthquake

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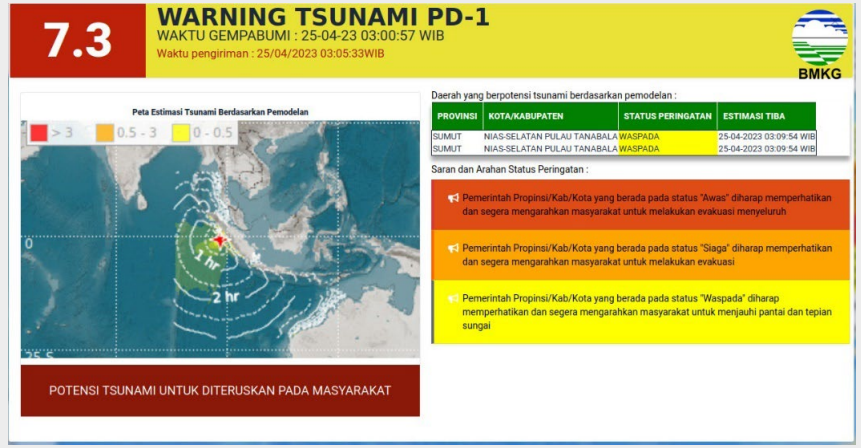

BMKG issued the tsunami warning for the Mentawai Earthquake M7,3, 25th April 2023

- Responded well based on capacities built through 12 Tsunami Ready indicators
- Conducted self–evacuation protocols
- Very well-aware of tsunami evacuation plans, routes, and evacuation sites
- Vulnerable people evacuated by their family and assisted by Local Disaster Ready Group
- Understanding of official warnings issued by National Tsunami Warning Centre and able to take action accordingly
- Understanding about the hazard in their area reduced panic.
- Although there was no significant tsunami (detected only 11 cm), community accepted action they took was necessary

ISO 22328-3 : COMMUNITY BASED EARLY WARNING SYSTEM FOR TSUNAMI BUILDING A RELIABLE EARLY WARNING SYSTEM

- The ISO 223 is consider 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 lesson learned, with the objective to engage and involve the private sector as well as the government in strengthening and sustaining the Tsunami Ready Society.
- The Private sector can take the benefit of applying ISO for better market exposure
- This ISO 22328-3 includes guidelines for conducting (1) Risk Assessment; (2) Dissemination and Communication of Knowledge; (3) Monitoring and Warning Services; (4) Improving response Capability; and (5) Commitment of the authority and the community at risk to the sustainability of the tsunami early warning system.

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The 6th Plenary Meeting of ISO/TC 292, Sydney, 11-16 March 2018

The 11th Plenary Meeting of ISO/TC 292, Virtual, 10 June 2022

Commemoration of World Tsunami Awareness Day

- In commemoration of WTAD, 5 Nov 2022, several countries around the Indian Ocean conducted events, such as a **TSUNAMI FUN DRILL** in Indonesia and evacuation drills in Mauritius, to support the theme **#gettohighground**
- Theme for 2023 is **"Fighting inequality for a resilient future"**

ICG/IOTWMS FUTURE WORK PLANS

1. Implement **Ocean Decade Tsunami Programme Research & Development Implementation Plan**
2. Implement outcomes from Multi-Hazard Early Warning Conference (MHEWC) in Indonesia, May 2022 and translate Words-into-Action in support of UN Sec General call for **all communities to have access to early warning systems by 2027.**
3. Hold next **Exercise IOWAVE23** on 4, 11, 18, 25 Oct 2023 with seismic and non-seismic scenarios
4. Focus on helping NTWCs review national tsunami chains and **develop SOPs for seismic, non-seismic, and complex source tsunamis** with training workshops in July 2023
5. Undertake the **UNESCAP funded NWIO Tsunami Project Phase 2c** with focus on inundation mapping and evacuation planning, including workshops in October 2023
6. Help develop awareness and preparedness with **Western Indian Ocean Workshop** in November 2023
7. Provide **Tsunami Ready training in Seychelles** in November 2023
8. Undertake **3rd Capacity Assessment** to guide future development
9. Hold Tsunami Symposium to commemorate the **20th anniversary** of the **Indian Ocean Tsunami 2004,** back-to-back in Indonesia with the **14th Session of ICG/IOTWMS**

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2nd UNESCO-IOC Global Tsunami Symposium "Reflection Of The Two Decades Post Indian Ocean Tsunami 2004 And Way Forward"

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Venue and Date: Banda Aceh, 10-14th November 2024

Host: Indonesia (BMKG)
Organiser: UNESCO-IOC
Partner: International Union Geodesy & Geophysics
Co-Chairs:

- Dr. Harkunti Rahayu
- Mr. Yuji Nishimae
- Ms. Suci Dewi Anugrah

Day 1 Opening and Session 1 (Panel Discussion and poster session)

- Welcoming Remarks by Government of Indonesia (Ministry of Maritime)
- Remarks UNESCO-IOC and UNDRR
- Moment of Silence
- Presidential Speech
- Keynote from ICG/IOTWMS

Day 2 Panel Discussions, Poster Sessions

- Enhancing warning accuracy and timeliness
- 100% at-risk communities prepared and resilient to tsunami threat

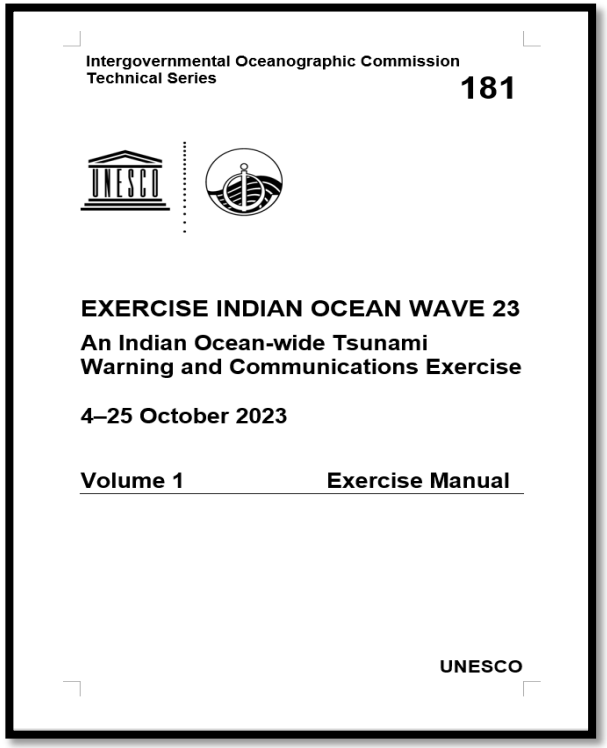
Day 3 Drill and Field Trip

- Tsunami Aceh Museum and Tsunami Ready community in Aceh
- Tsunami Ready Recognition ceremony

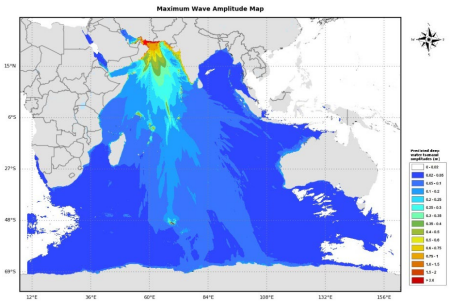
Day 4 Wrap Up and Closing

- UN Ocean Decade proposals
- Wrap up, summary and recommendations
- Closing ceremony, announcement of competition on *Tsunami Documentaries*

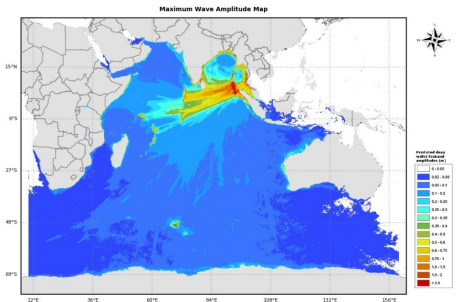
Exercise Indian Ocean Wave 2023 (IOWave23)



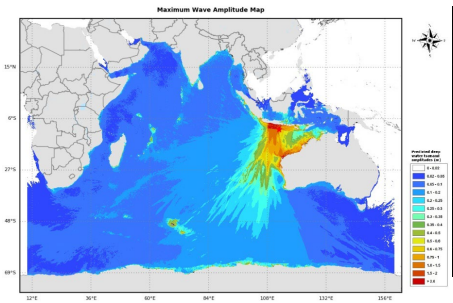
- **Four different scenarios** affecting different regions will be exercised on four different days **4, 11, 18, and 25 October**
  - **Three earthquake scenarios and one non-seismic scenario**
- Indian Ocean TSPs (Australia, India, and Indonesia) will issue tsunami bulletins in real-time
- Member States can decide how many scenarios they want to exercise and to what extent (eg if include evacuation drills)
- UNESCO-IOC Secretariat will conduct an online assessment that will be coordinated in country by the designated IOWave23 National Contacts.



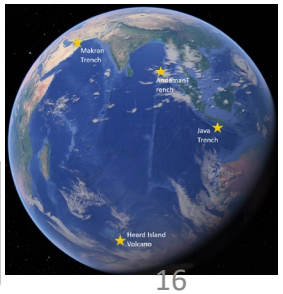
Makran Trench



Andaman Trench



Java Trench



Heard Island

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Summary

Since 2005 working across all four pillars as per 2022 UN EWS4ALL initiative:

1. To guide risk assessment a Probability Tsunami Hazard Assessment (PTHA) developed for NWIO and plans to update entire Indian Ocean to update risk assessment
2. To provide quality assured tsunami threat information by TSPs (Australia, India, Indonesia) to all Member States, with service performance routinely monitored and ISO compliant
3. To help ensure warnings get to all in the community, national tsunami warning chains to be reviewed, SOPs to be enhanced, warning dissemination links routinely tested, and Exercise IOWave23 to provide overall evaluation
4. To help ensure at-risk communities are prepared to respond to any tsunami warnings, plans to further roll-out UNESCO-IOC Tsunami Ready Recognition Programme or similar national initiatives, including the Tsunami Ready for Critical Infrastructures
5. to developThe ISO Community Based Early Warning System for Tsunami (ISO: 22328-3) was as the public-private based instrument to accelerate the achievement of Tsunami Ready Society

Future Plan:

1. 2nd UNESCO-IOC Global Tsunami Symposium will emphasize “Reflection Of The Two Decades Post Indian Ocean Tsunami 2004 And Way Forward, in Banda Aceh, 10-14th November 2024
2. Exercise Indian Ocean Wave 2023 (IOWave23) to examine the seismic and non seismic tsunami scenario
3. SOP Training Workshops to be run in July 2023

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