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Exercise IOWave25 – Overview & Preliminary Results

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Acknowledgements:

Dr. Srinivasa Kumar Tummala and Ms. Nora Gale (Secretariat of ICG/IOTWMS UNESCO-IOC)

Previous Indian Ocean-Wide Tsunami Exercises (IOWave)

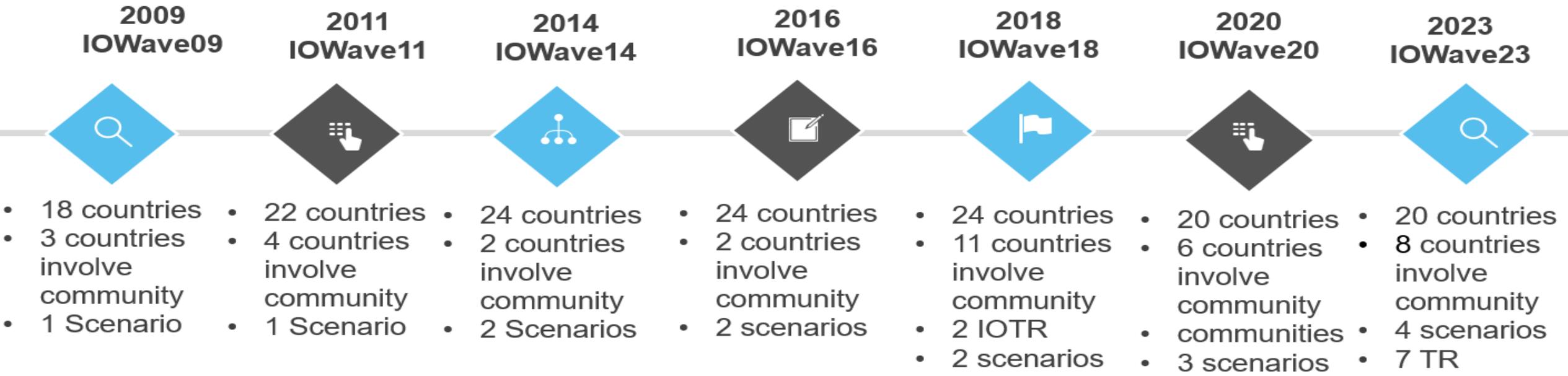


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Conducted by ICG/IOTWMS to test tsunami notification and response systems:

1. **IOWave09** (Oct 2009)
2. **IOWave11** (Oct 2011)
3. **IOWave14** (Sep 2014)
4. **IOWave16** (Sep 2016): Over 60,000 people participated in evacuation drills
5. **IOWave18** (Sep 2018): Participation exceeded 119,000
6. **IOWave20** (Oct 2020): Testing communication protocols during the pandemic
7. **IOWave23** (Oct 2023): ~45,000 people participated, including all genders, children, elderly, and persons with disabilities



IOWave25 Exercise



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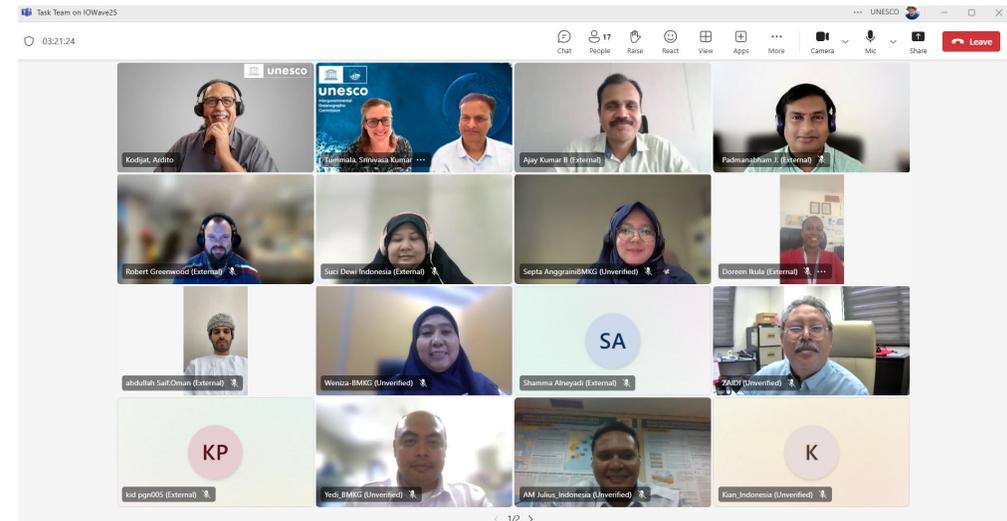
Purpose:

- To evaluate and improve **the effectiveness of the IOTWMS**, through its operational Tsunami Service Providers (TSPs), National Tsunami Warning Centres (NTWCs), National Disaster Management Organisations (NDMOs) and Local Disaster Management Organisations (LDMOs), and other relevant authorities in responding to a potentially destructive tsunami.
- To test **operational lines of communications, review tsunami warning and emergency response Standard Operating Procedures (SOPs) and promote emergency and community preparedness** in India Ocean countries.

Task Team Members

- **Dr Ajay Kumar B**, INCOIS, India - Chair
- **Ms Septa Anggraini**, Indonesia – Vice Chair
- Ms Kate Parkey (tbc), Australia - Member
- Dr Nuraini Rahma Hanifa, Indonesia - Member
- Mr Zaidi Zainal Abidin, Malaysia - Member
- Mr Abdullah Al Busafi, Oman - Member
- Ms Doreen Ikula, Seychelles - Member
- Mr Chathura Liyanaarachchige, Sri Lanka - Member
- Mr Badr Alameri, UAE - Member
- Mrs Shamma Alneyadi, UAE - Member
- Mr Hadif Alshehhi, UAE - Member
- Mr Ali Almehrzi, UAE - Member
- Mr Abdullah Alymmahi, UAE - Member
- Mr Hilal Alkaabi, UAE - Member
- Dr Robert Greenwood (tbc) Australia, TSP Australia Representative
- Mr Yedi Dermadi (tbc), Indonesia, TSP Indonesia Representative
- Dr Weniza, Indonesia - WG1 Chair
- Mr Padmanabham Jijavarapu, India - WG2 Chair / TSP India Representative
- Ms Suci Dewi Anugrah, Indonesia - WG3 Chair
- Mr Ardito Kodijat - IOTIC

- Task Team established during **ICG/IOTWMS-XIV** (Nov 2024, Banten, Indonesia)
- Scheduled during **September – November 2025**



There are nine (9) objectives of Exercise IOWave25. Each objective is designed to validate a part of the end-to-end tsunami warning and mitigation system.

Objectives 1 and 2 survey questions relate to the at-risk coastal communities.

- **Objective 1:** Validate procedures are in place to ensure tsunami warnings get to all in the community, including those with disabilities, all genders, elderly, and youth.
- **Objective 2:** Validate the level of community awareness, preparedness, and response.

Objective 3 and 4 survey questions relate to standard operating procedures at all levels in the national tsunami warning chain.

- **Objective 3:** Validate the Standard Operating Procedures associated with tsunami warning chains within countries for generating and disseminating tsunami warnings to their relevant emergency response agencies, other authorities, media, and the public.
- **Objective 4:** Validate the Standard Operating Procedures associated with tsunami warning chains within countries for the issuing of public safety messages, ordering evacuations and where possible issuing all-clear messages.

Objectives 5 to 9 survey questions relate to the National Tsunami Warning Center and NAVAREA stakeholders.

- **Objective 5:** Validate dissemination by TSPs of Tsunami Bulletin Notification Messages to NTWCs via Tsunami Warning Focal Points (TWFPs) of Indian Ocean countries and the reception by NTWCs of the TSP messages. Validate the access by NTWCs to the tsunami bulletins and other products on the TSP websites, and the use of that information to produce national warnings.
- **Objective 6:** Validate dissemination by TSPs of Tsunami Bulletin Notification messages for NAVAREA stakeholders to ensure navigational safety and security.
- **Objective 7:** Validate access by NTWCs to the tsunami bulletins and other products on the TSP websites, and the use of that information to produce national warnings. Validate the reporting by NTWCs to the TSPs of their National Tsunami Warning Status.
- **Objective 8:** Validate the reporting by NTWCs to the TSPs of their National Tsunami Warning Status.
- **Objective 9:** Validate receipt and understanding by NTWCs of new TSP service for tsunamis generated by non-seismic and complex sources.

IOWave25 Scenarios



Scenario	1. Sunda Trench	2. Makran Trench	3. Fani Maore Volcano	4. Sumatra Trench
Date	25 September 2025 (Thursday)	15 October 2025 (Wednesday)	25 October 2025 (Saturday)	05 November 2025 (Wednesday)
Time	01:00 UTC	06:00 UTC	15:00 UTC (eruption at 14:00 UTC)	03:00 UTC
Source	Earthquake	Earthquake	Volcano	Earthquake
Magnitude	~M9.0	~M9.0	n/a	~M9.2
Depth	10 km	10 km	n/a	10 km
Latitude	6.94S	24.80N	12.92S	3.30N
Longitude	104.70E	62.20E	45.72E	95.96E
Location	Sunda Strait, Indonesia	Off Coast of Pakistan	Mozambique Channel	Northern Sumatra, Indonesia

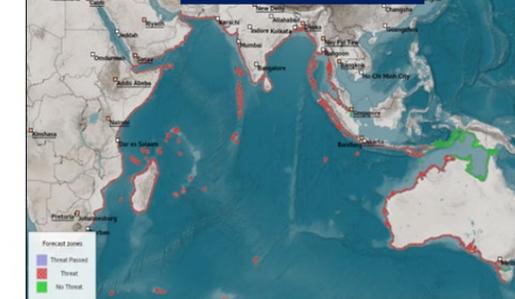
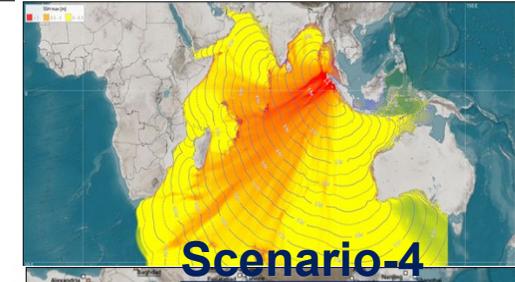
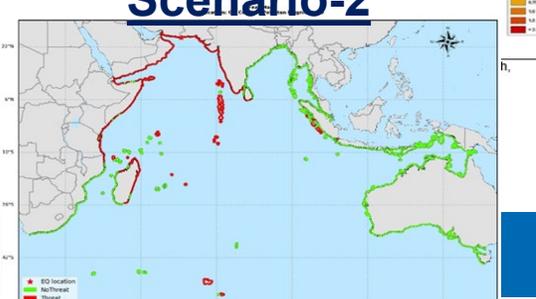
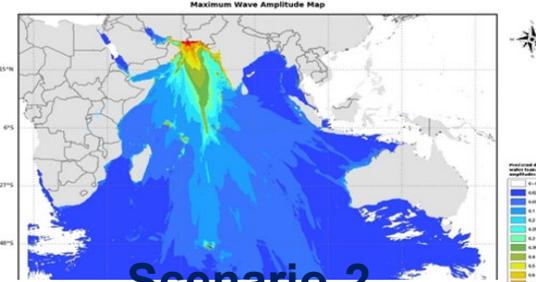


Figure 2. Threat Map example for Scenario 1, Sunda Trench, for a magnitude 9.0 earthquake.

Figure 5. Threat Map example for Scenario 2, Makran Trench, for a magnitude 9.0 earthquake.

Figure 8. Threat Map example for Scenario 3, Fani Maore Volcano.

Figure 10. Threat Map example for Scenario 4, Sumatra Trench, for a magnitude ~9.2 earthquake.

IOWave25 Manual & Supplements



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EXERCISE INDIAN OCEAN WAVE 25
An Indian Ocean-wide Tsunami
Warning and Communications Exercise
25 September – 05 November 2025

Volume 1 Exercise Manual

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Volume 1 Exercise Manual

Supplement 1
TSP Bulletins for Scenario 1: Sunda Trench
To be issued by the TSPs to NTWCs/TWFPs on 25 September 2025

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EXERCISE INDIAN OCEAN WAVE 25
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Volume 1 Exercise Manual

Supplement 2
TSP Bulletins for Scenario 2: Makran Trench
To be issued by the TSPs to NTWCs/TWFPs on 15 October 2025

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Volume 1 Exercise Manual

Supplement 3
TSP Bulletins for Scenario 3: Fani Maore Volcano
To be issued by the TSPs to NTWCs/TWFPs on 25 October 2025

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EXERCISE INDIAN OCEAN WAVE 25
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Volume 1 Exercise Manual

Supplement 4
TSP Bulletins for Scenario 4: Sumatra Trench
To be issued by the TSPs to NTWCs/TWFPs on 05 November 2025

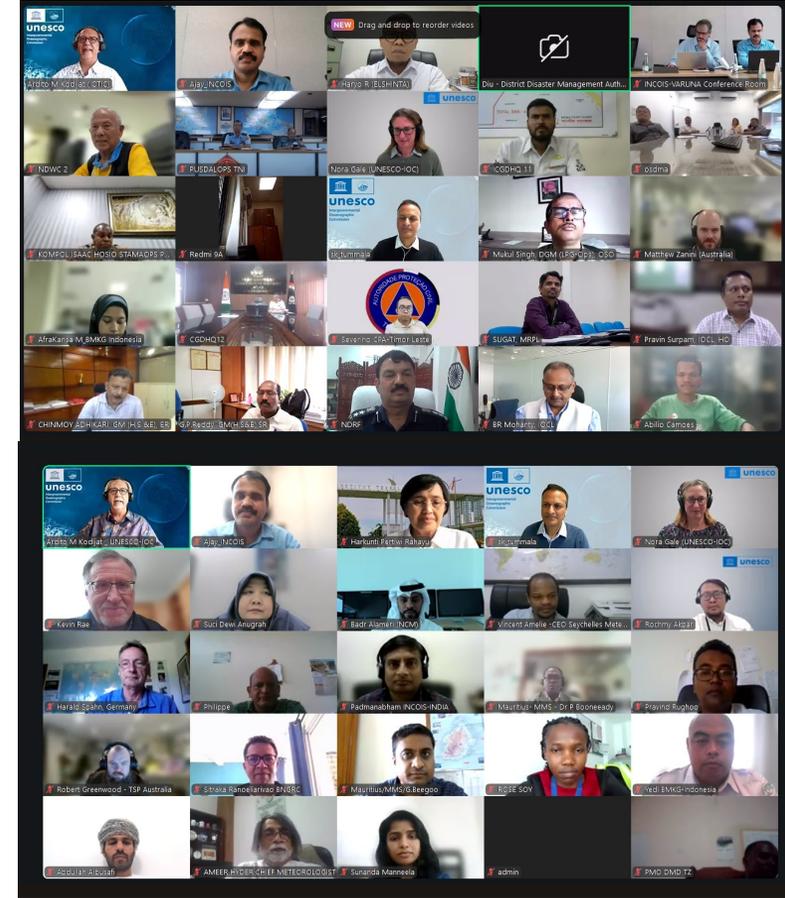
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- The IOWave25 **Exercise Manual** prepared. The **supplements** were provided.
- The manual has provided an overview including:
Purpose, Objective, Scope, Exercise Success Criteria, Type of Exercise, Scenario, Date, Checklist Activities Member, Exercise Evaluation (Exercise Survey, Exercise Observer), Checklist of Activities for Member States
- The supplements were containing all TSP bulletins and products.
- The Task Team anticipates **completion** and **circulation by Secretariat in August 2025**.
- All information and documents **made available on the exercise website:**
<https://oceanexpert.org/event/4786>

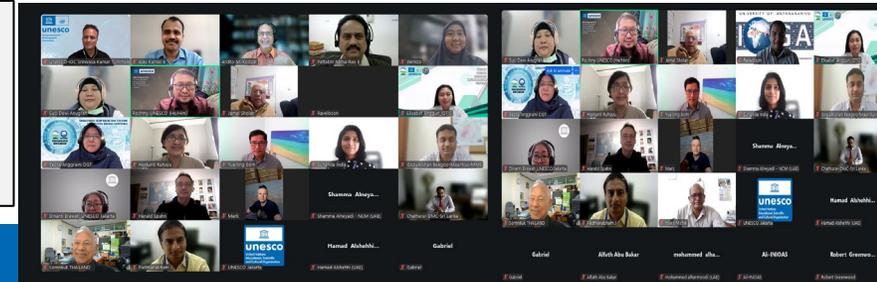
Pre and Post - IOWave25 Workshops



- IOTWMS secretariate & IOTIC incoordination with TT-IOWave25 conducted two pre-IOWave25 hybrid SOP workshops for Eastern and Western Indian Ocean member states
- For Eastern Indian Ocean Member States, conducted during 4-6 August 2025 for 11 member states i.e. Australia, Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Singapore, Sri Lanka, Thailand, and Timor Leste.
- For Western Indian Ocean Member States, conducted during 11-13 August 2025 for 14 member states i.e. Comoros, France Indian Ocean Territories, Iran, Kenya, Madagascar, Mauritius, Mozambique, Oman, Pakistan, Seychelles, South Africa, Tanzania, United Arab Emirates and Yemen.
- Overall, the pre-IOWave25 workshops were Great success, about 400 participated in the hybrid workshops.
- IOTWMS conducted a webinar for NAVAREA coordinators on 21 October 2025. NAVAREA coordinators from 5 regions (VII, VIII, IX, X, XI) were participated in webinar along with IHO/WWNWS-SC Representatives



- Post IOwave-25, Lessons learnt webinar conducted on 16-17 December 2025
- 17 countries presented their IOWave25 exercise activities during the webinar.
- About 50 members participated in the learn webinar



IOWave25 Participation

As per feed back received through the online and presentation during IOWave lessons Learnt webinar:

- **18 Member States filled the feedback**
- 3 – Sunda Trench; 2 – Fani Maore; 10 – Makran; 10 – Sumatra; 4 – Multiple; 1 – All scenarios
- **7 MS participated up to community level** (for Makran and Sumatra Trench Scenarios)
 1. India – about 16 communities and 381 Schools with participation of 111,704 people
 2. Indonesia – 29 communities and 172 locations with 206,619 people participation
 3. Iran – 6 communities with about 80 people participation and evacuations
 4. Mauritius – 1 community with the participation of about 700 people
 5. Sri Lanka - 3 communities with about 3000 people participation and evacuations
 6. Timor Leste - 7 schools and local community members, and over 200 participants involved
 7. UAE - 1 community with about 108 people participation and evacuations

Overall, more than **580 communities, schools and locations** participated in the IOWave25 exercise, with approximately **320,000 people** taking part in the evacuation. Tested Tsunami Ready Communities as well.

NAVAREA Communication Test, 05 Nov 2025

Participation

- All five Indian Ocean NAVAREA Coordinators (VII–XI) took part in the communication test.

Summary of Responses

- All respondents confirmed that TSP products for NAVAREAs were easy to access and understand.
- 100% (5/5) reported that TSP information was useful for preparing NAVAREA messages (Australia, India, Japan Pakistan, South Africa).
- 40% (2/5) indicated interaction with their NTWC (India, Pakistan).

Feedback

- Message Formatting – Preferred formatting observed in India’s messages
- Coordinate Format - Geographic positions should follow the Joint IMO/IHO/WMO Manual format:
 - Latitude: DD-MM.mmN / DD-MM.mmS, Longitude: DDD-MM.mmE / DDD-MM.mmW
 - Example: 32-18.65S 165-02.81E

Images of Exercise Participation



Evacuation drill at Nusawiru Airport



Evacuation drill at PT. Solusi Bangun Andalas





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Lessons learnt and Future exercises could be improved by

- Need for greater inundation mapping to support creation of inundation/evacuation zones
- The warning dissemination system works well, but we need to improve awareness of tsunami preparedness and mitigation.
- Regular mock exercises are essential especially for near source regions, Exercise duration can be reduced to 3- 4 hours to involve more communities, and Exercise can be conducted non monsoon season.
- The WRS New Generation proved to be the most effective and reliable dissemination channel during the drill. Need to involve more stakeholders on the next exercise (such as network providers).
- Communication infrastructure in coastal provinces to be improved.
- Continuously using and evolving technology to improve the exercise to the maximum level of benefits, adaptive, and realistic, ensuring that people practice in more like real emergencies.
- A major technical flaw was identified as the warning bulletin was issued too late to be effective (Fani Maore Volcano)
- Media communication need to be impactful. Full evacuation especially during nighttime and if there is a festive period is the biggest challenge for evacuation.
- Extends exercises to include schools, coastal residents, fishermen, etc.
- Integrate schools, elderly care facilities, tourism operators, and persons-with-disabilities groups etc. into exercises and emergency planning.
- SMS system of TSPs need to improve for future exercises.
- Incorporating more stakeholders into the exercise: Missing stakeholders such as the health sector, fisheries and transport sector were identified.
- To expand the involvement of municipal-level stakeholders in future TTX and ensure awareness-raising activities are conducted more frequently throughout the year to maintain public readiness.
- Enhance public awareness, especially for tsunamis by promoting educations and preparedness measures to reduce potential impacts.

IOWave25 exercise was a major success, significantly strengthening awareness and preparedness among coastal communities