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Exercise Indian Ocean Wave 2023 (IOWave23) and Scenarios

Weniza-BMKG-Indonesia

Acknowledge :

Mr. Rick, Ms. Nora, Dr. Ajay and TT IOWave23

ICG Indian Ocean Tsunami Warning & Mitigation System SOP Workshops July 2023:

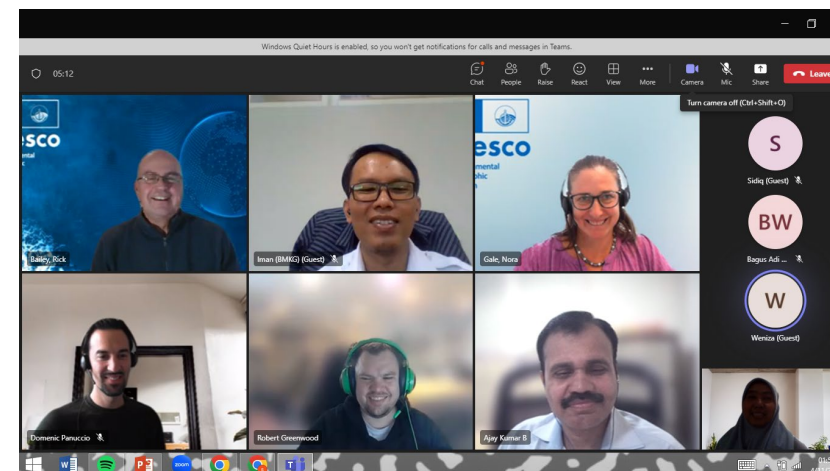
*Standard Operating Procedures (SOPs) for
National Tsunami Warning Centres (NTWCs) and
Disaster Management Organisations (DMOs)*

IOWave23 Task Team

- **Ms. Weniza**, BMKG, Indonesia – Chair
- **Dr. Ajay Kumar**, INCOIS, India – Vice Chair
- **Ms. Kate Parkey**, Australia – Member
- **Mr. Domenic Panuccio**, Australia – Member
- Mr. Khalid Al-Wahaibi, Oman
- **Mr. Ameer Hyder**, Pakistan - Member
- **Mr. Tariq Ibrahim**, Pakistan - Member
- Dr. Ali **Khoshkholgh**, Iran - Member
- Mr. Sidiq Hargo, Indonesia - Member
- Ms. Gloria Simangunsong, Indonesia – Member
- Mr. Bagus Adi Wibowo, Indonesia – Member
- Mr. Ardito, IOTIC - Member

TT Meeting – 4 April 2023

Meeting with TSP– 12, 18, 25 April, 30 June 2023



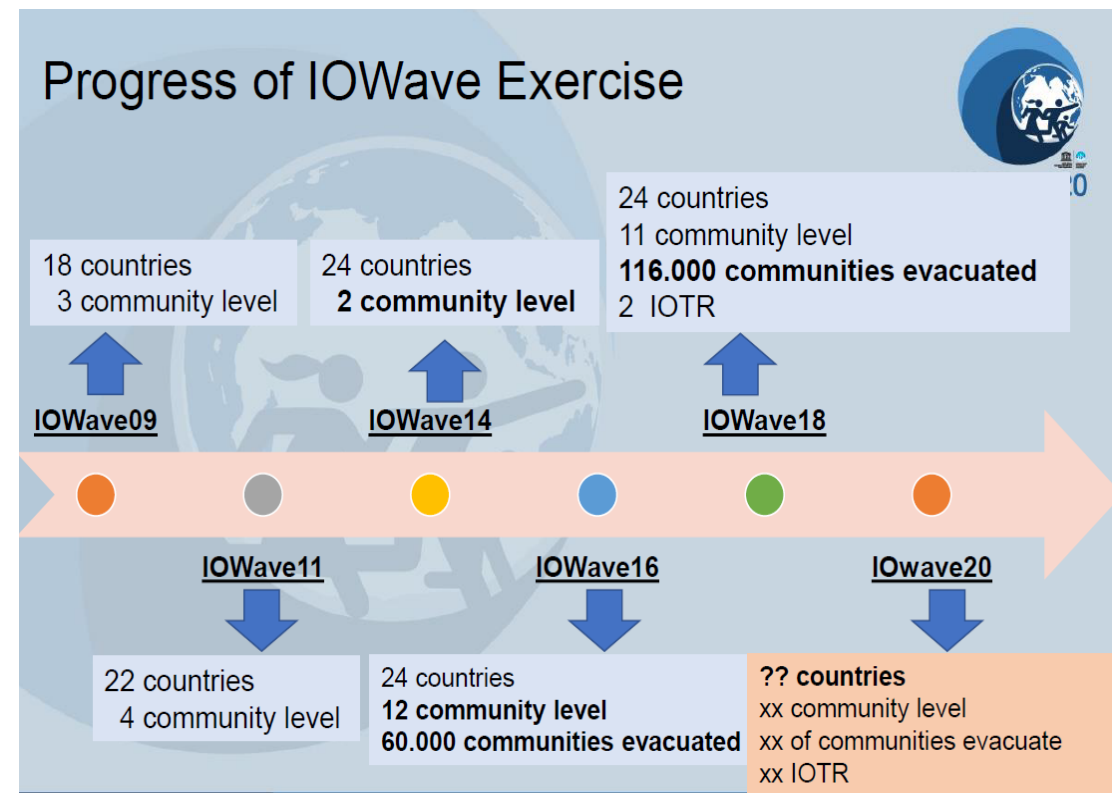


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Previous IOWave Exercises

IOWave	Date	Scenario
IOWave09	14 Sep 2009	Mag 9.2, Northern Sumatra 3.3N, 95.96E
IOWave11	12 Oct 2011	Mag 9.2, Northern Sumatra 3.30N, 95.96E
IOWave14 Day 1	9 Sep 2014	Mag 9.1, South of Java 10.40S, 112.80E
IOWave14 Day 2	10 Sep 2014	Mag 9.0, Off Coast of Pakistan 24.80N, 62.20E
IOWave16 Day 1	7 Sep 2016	Mag 9.2, Southern Sumatra 1.93S, 99.22E
IOWave16 Day 2	8 Sep 2016	Mag 9.0, Off Coast of Pakistan 24.80N, 62.20E
IOWave18 Day 1	04 Sep 2018	Mag 9.0, Off Coast of Iran 24.8N, 58.2E
IOWave18 Day 2	05 Sep 2018	Mag 9.3, Northern Sumatra 3.30N, 96.0E
IOWave20 Day 1	06 Oct 2020	Mag 9.1, South of Java 10.40S, 112.80E
IOWave20 Day 2	13 Oct 2020	Mag 9.2, Andaman Islands 12.63N, 93.50E
IOWave20 Day 3	20 Oct 2020	Mag 9.0, Off Coast of Pakistan 24.80N, 62.20E



IOWave23 Exercise Purpose



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Purpose:

- To evaluate and improve **the effectiveness of the IOTWMS**, through its operational TSPs, NTWCs, NDMOs and LDMOs, in responding to a potentially destructive tsunami.
- To test their **operational lines of communications**, to **review their tsunami warning and emergency response SOPs**, and to **promote emergency and community preparedness**.



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IOWave23 Objective

Objective 1, 2, 3 survey question are to be completed with input from NTWC :

1. Validate **the 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.
2. Validate **the access by NTWCs to the tsunami bulletins and other products on the TSP websites**, and the use of that information for the production of national warnings.
3. Validate **the reporting by NTWCs to the TSPs of their National Tsunami Warning Status**.

Objective 4, 5 survey question are to be completed with input from DMO and/or NTWC depending on how tsunami response role are structure in country:

4. Validate **the SOPs within countries for generating and disseminating tsunami warnings to their relevant emergency response agencies, media and the public**.
5. Validate **the SOPs within countries for the issuing of public safety messages, ordering evacuations and where possible issuing all-clear messages**.

Objective 6 survey question are to completed with input from DMO and/or NTWC :

6. Validate **the level of community awareness, preparedness and response** (including focused on Tsunami Ready Community)

Objective 7 survey question are to completed with input from NTWC :

7. Test the preparedness tsunami generated by a non-seismic (i.e., volcanic) source

Exercise Involvement



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The following organisations should be involved in the Exercise:

- Tsunami Service Providers (TSPs)
- National Tsunami Warning Centres (NTWCs)
- National Disaster Management Organisations (NDMOs)
- Local Disaster Management Organisations (LDMOs)
- Media Organisations
- Local Communities

Participation Level

- Member States are invited **to participate in at least one scenario** or all **scenarios** (if country fall under threat);
- Member States are encouraged **to conduct community evacuations**;
- All Member States, particularly those piloting the Programme, are encouraged **to use the UNESCO-IOC Tsunami Ready guidelines** and **indicators to guide their community preparation for IOWave23 exercise.**

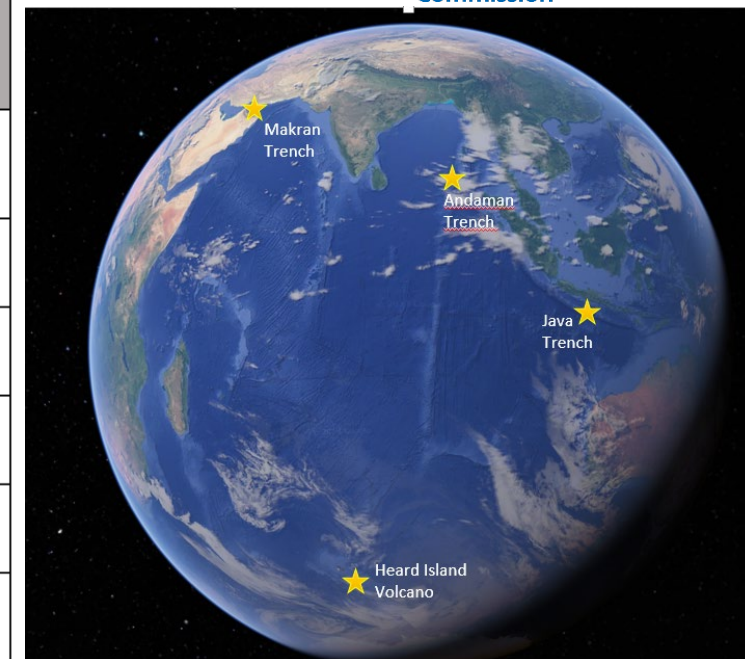
IOWave23 Scenario

25 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



Nicobar Islands, India – M9.0 – Andaman Trench



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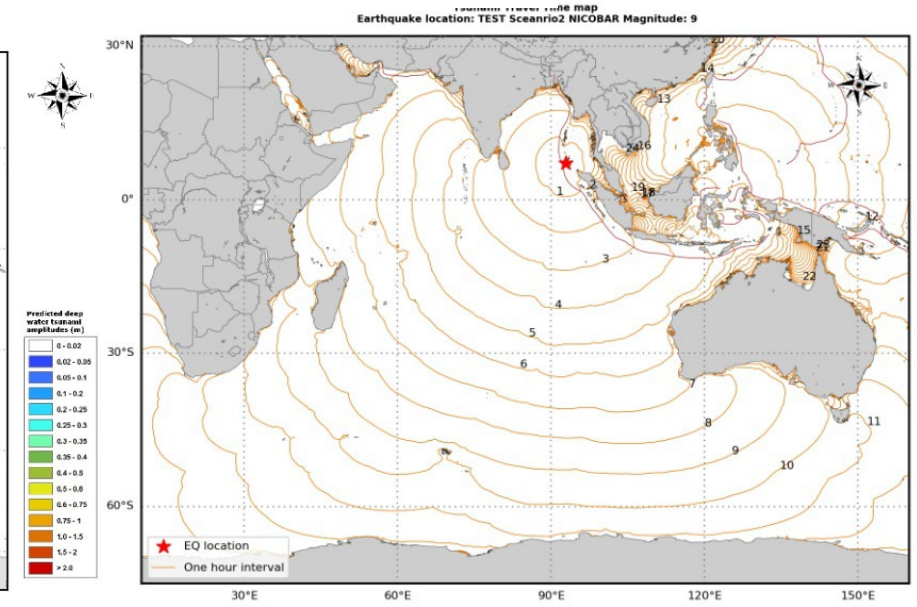
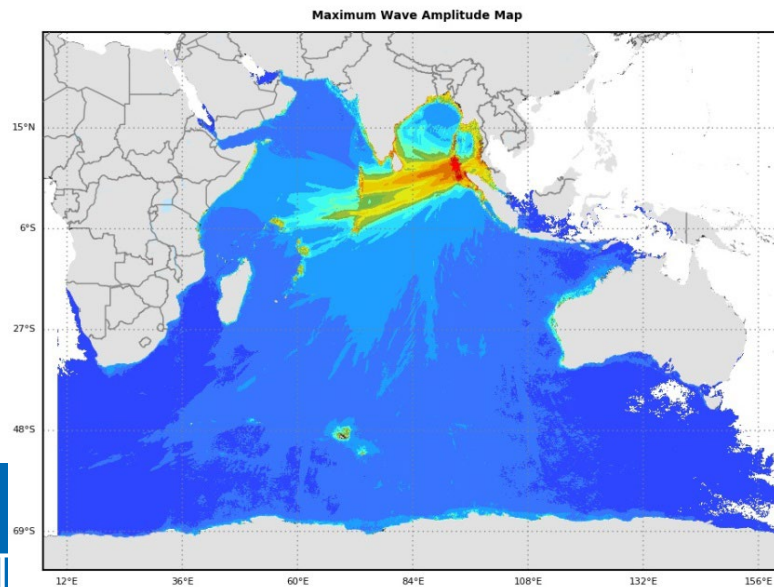
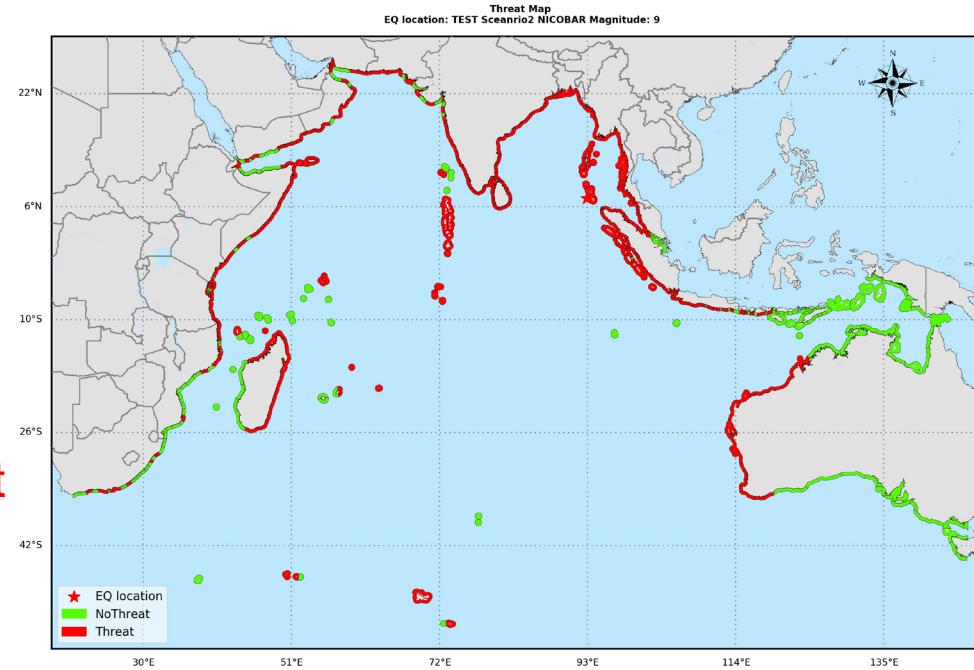
Mag 9.0 Epicentre: 7.2 N 92.9 E

Nicobar Islands, India

Origin Time: 0130Z

Australia	0807Z	1.1m
Bangladesh	0503Z	2.0m
Comoros	1212Z	0.7m
Djibouti	1142Z	0.7
France	1214Z	1.7m
India	0132Z	12.5m
Indonesia	0150Z	10.1m
Iran	1347Z	0.7m
Kenya	0954Z	1.4m
Madagascar	0927Z	1.1m
Malaysia	0451Z	1.5m
Maldives	0441Z	6.6m
Mauritius	0743Z	1.6m
Mozambique	1049Z	1.3m
Myanmar	0304Z	2.3m
Oman	1002Z	1.1m
Pakistan	1720Z	0.7m
Seychelles	0555Z	1.3m
Somalia	0841Z	2.5m
South Africa	1935Z	0.7m
Sri Lanka	0317Z	6.0m
Tanzania	1029Z	1.1m
Thailand	0258Z	3.4m
UAE	0056Z+1	0.7m
Yemen	0856Z	1.8m

25 countries under threat



Scenario – 1

Nicobar-India, M9.0 Mwp, 04 October 2023 0400 UTC.

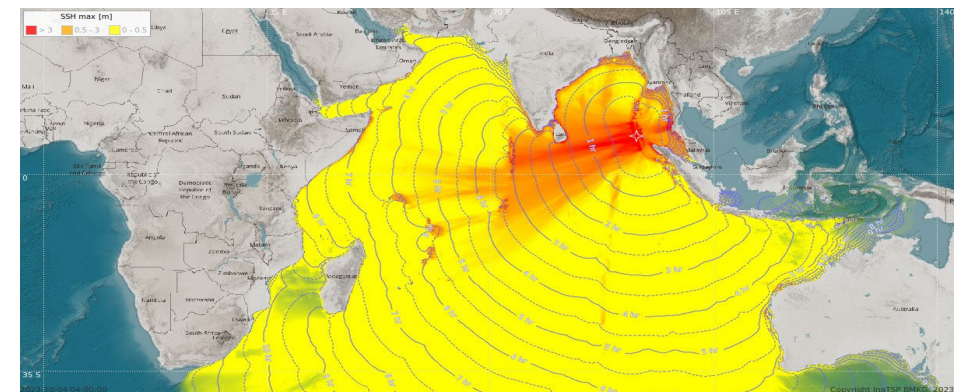
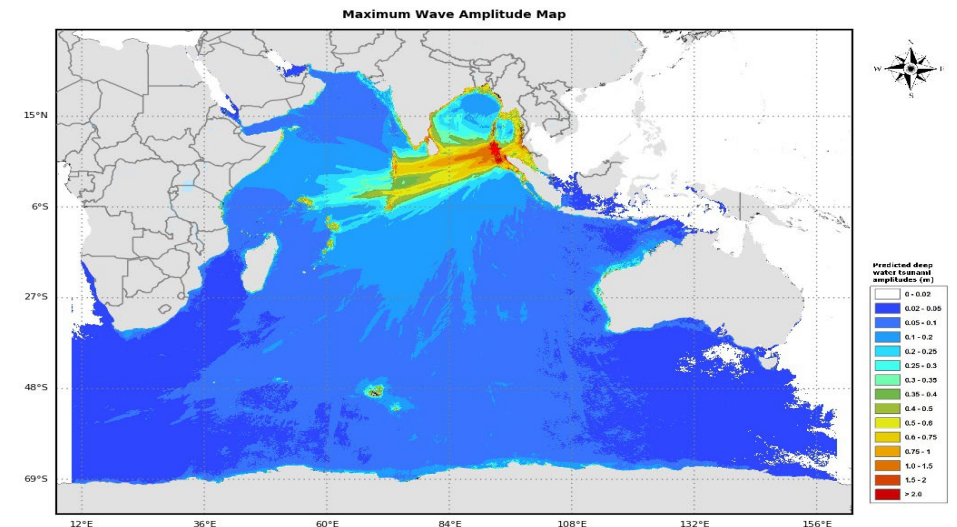


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Date	Time (UTC)	Bulletin #	Detail
04-Oct-23	0400		Earthquake occurs
04-Oct-23	0408	1	Earthquake Bulletin (M8.6)
04-Oct-23	0415	2	Potential Threat (M9.0)
04-Oct-23	0430	3	Confirmed Threat (M9.0)
04-Oct-23	0500	4	Confirmed Threat (M9.0)
04-Oct-23	0600	5	Confirmed Threat (M9.0)
04-Oct-23	0700	6	Confirmed Threat (M9.0)
04-Oct-23	0800	7	Confirmed Threat (M9.0)
04-Oct-23	0900	8	Confirmed Threat (M9.0)
04-Oct-23	1000	9	Confirmed Threat (M9.0)
04-Oct-23	1100	10	Confirmed Threat (M9.0)
04-Oct-23	1200	11	Confirmed Threat (M9.0)
04-Oct-23	1300	12	Confirmed Threat (M9.0)
04-Oct-23	1400	13	Confirmed Threat (M9.0)
04-Oct-23	1500	14	Confirmed Threat (M9.0)
04-Oct-23	1600	15	Final Bulletin

Maximum Wave Amplitude Map



Off Coast of Iran– M9.0 – Makran Trench



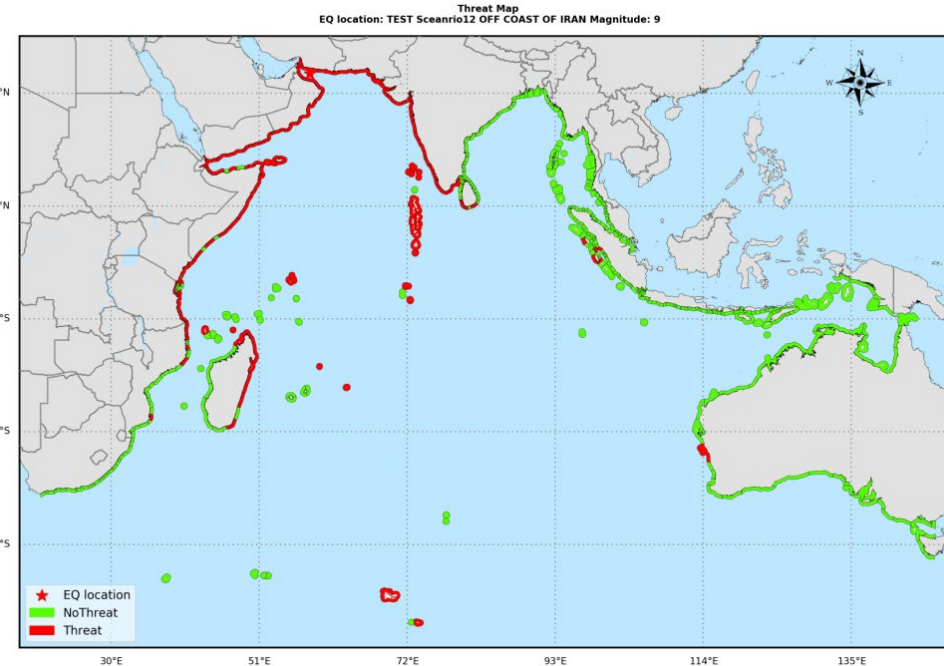
Mag 9.0 Epicentre: 24.8N 58.2E

Off Coast of Iran

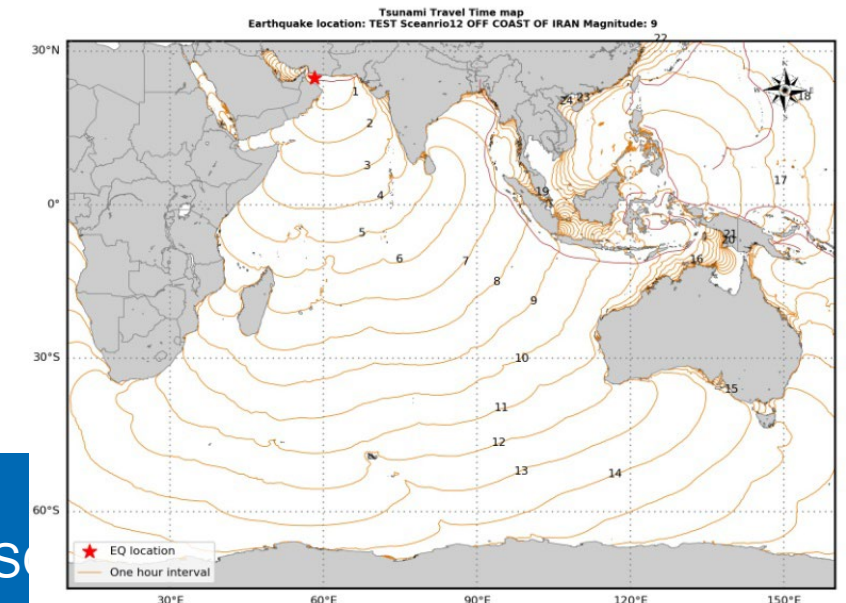
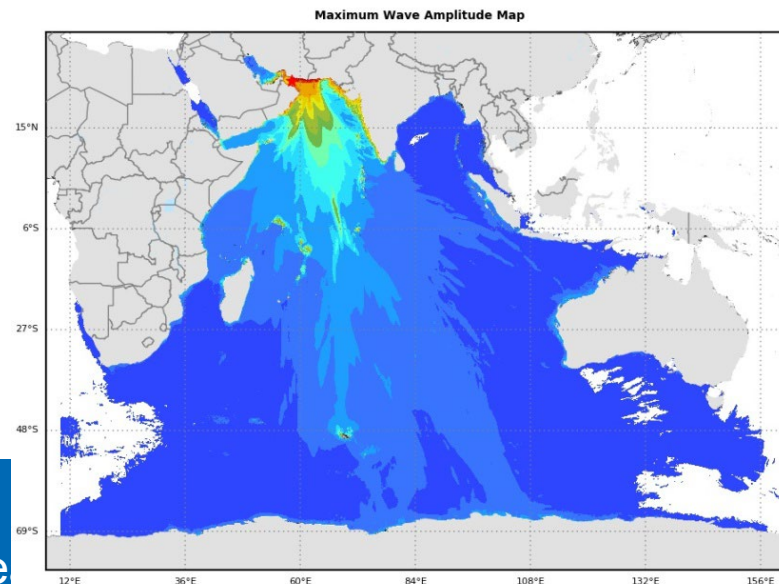
Origin Time: 0630Z

Australia	2223Z	0.5m
Comoros	1415Z	0.7m
Djibouti	1154Z	1.7m
France	1926Z	1.0m
India	0844Z	2.3m
Indonesia	1947Z	0.7m
Iran	0634Z	7.1m
Kenya	1333Z	1.7m
Madagascar	1322Z	0.9m
Maldives	0958Z	2.1m
Mauritius	1443Z	0.8m
Mozambique	1802Z	1.0m
Oman	0647Z	8.5m
Pakistan	0633Z	7.2m
Seychelles	1119Z	1.0m
Somalia	0956Z	2.3m
Sri Lanka	1159Z	0.8m
Tanzania	1315Z	1.0m
UAE	0718Z	3.7m
Yemen	0904Z	2.2m

20 countries under threat



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Scenario – 2

Off Coast of Iran, M9.0 Mwp, 11 October 2023 0600 UTC.

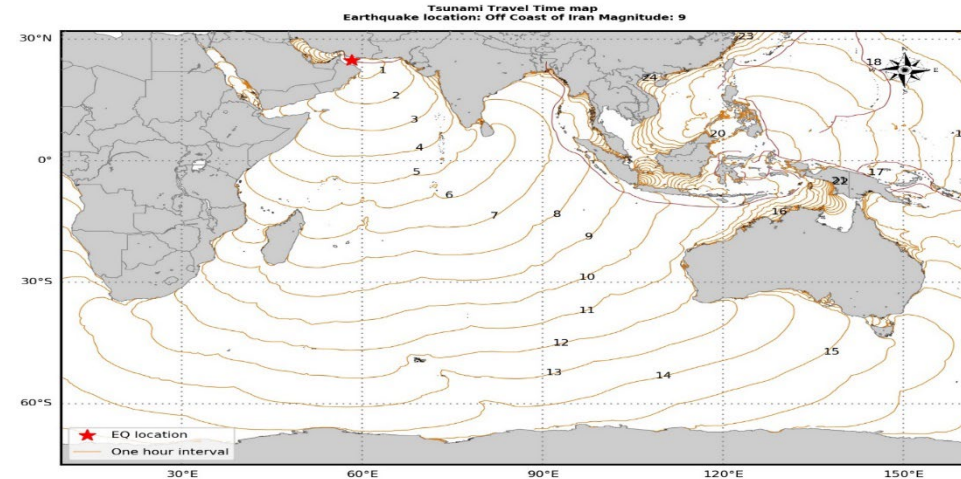
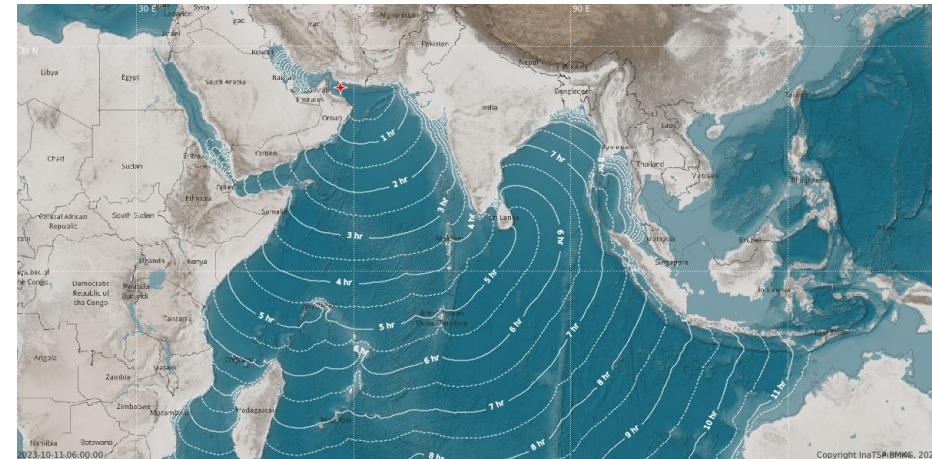


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Date	Time (UTC)	Bulletin #	Detail
11-Oct-23	0600		Earthquake occurs
11-Oct-23	0608	1	Earthquake Bulletin (M8.5)
11-Oct-23	0615	2	Potential Threat (M9.0)
11-Oct-23	0630	3	Confirmed Threat (M9.0)
11-Oct-23	0700	4	Confirmed Threat (M9.0)
11-Oct-23	0800	5	Confirmed Threat (M9.0)
11-Oct-23	0900	6	Confirmed Threat (M9.0)
11-Oct-23	1000	7	Confirmed Threat (M9.0)
11-Oct-23	1100	8	Confirmed Threat (M9.0)
11-Oct-23	1200	9	Confirmed Threat (M9.0)
11-Oct-23	1300	10	Confirmed Threat (M9.0)
11-Oct-23	1400	11	Confirmed Threat (M9.0)
11-Oct-23	1500	12	Confirmed Threat (M9.0)
11-Oct-23	1600	13	Confirmed Threat (M9.0)
11-Oct-23	1700	14	Confirmed Threat (M9.0)
11-Oct-23	1800	15	Final Bulletin

Tsunami Travel Time Map



Scenario – 3

Heard Island Volcano



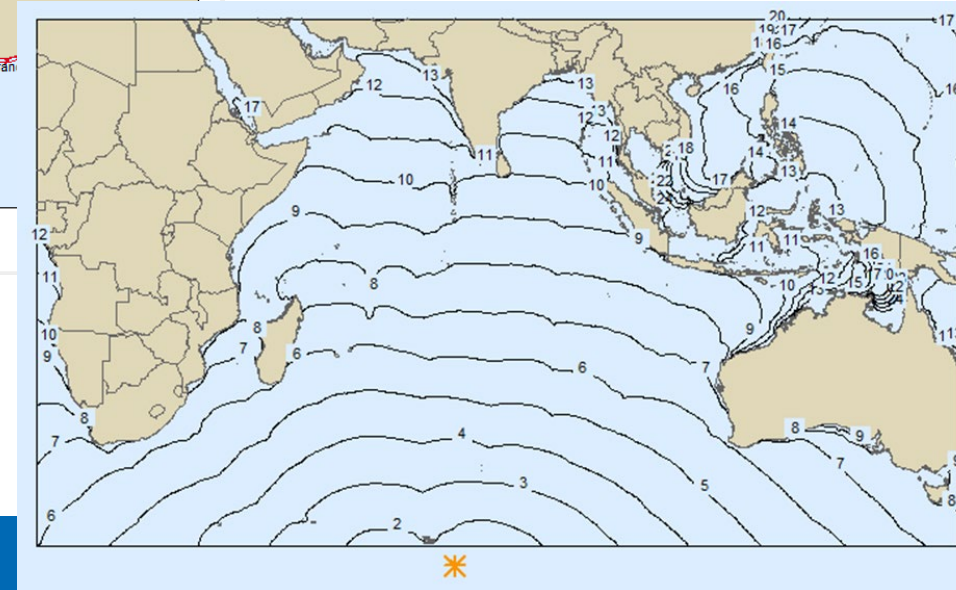
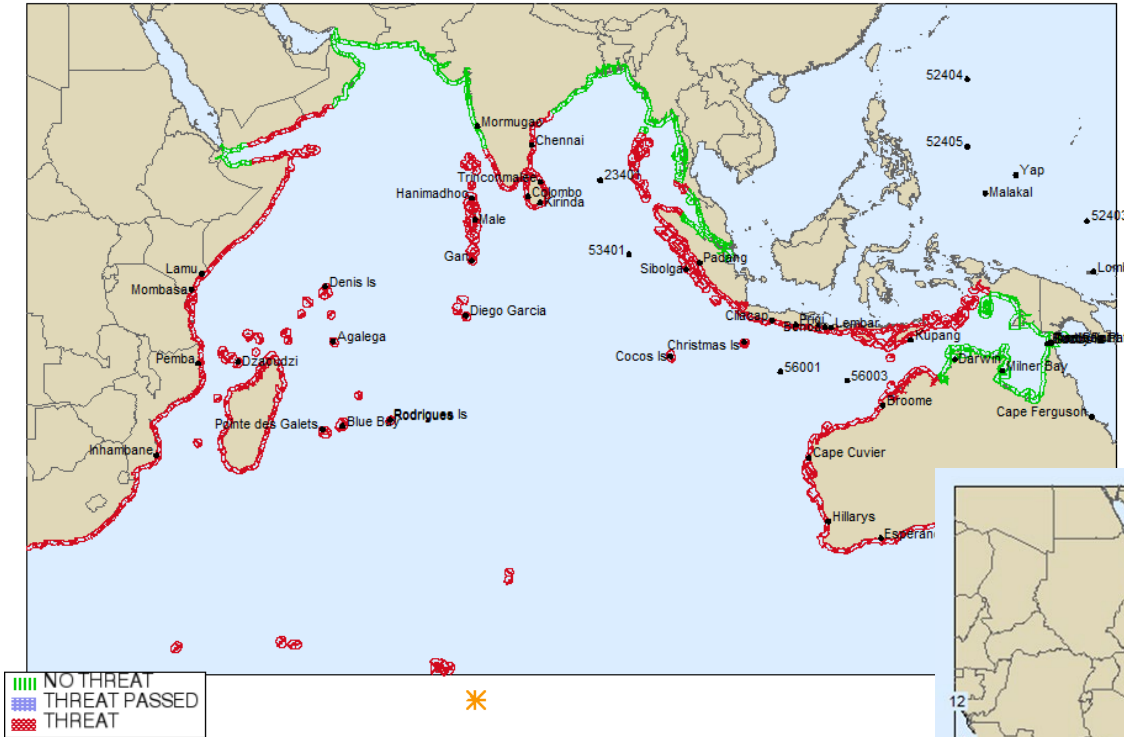
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Epicentre: 53.10S 73.52E
KERGUELEN ISLANDS REGION

Origin Time: 0000 Z

- Australia 0615Z**
- Comoros 0818Z
- France 0134Z
- India 1031Z**
- Indonesia 0844Z
- Kenya 0929Z
- Madagascar 0554Z
- Maldives 0903Z**
- Mauritius 0555Z
- Mozambique 0702Z
- Myanmar 1155Z
- Oman 1136Z
- Seychelles 0733Z
- Somalia 0928Z
- South Africa 0353Z
- Sri Lanka 0954Z
- Tanzania 0908Z
- Thailand 1145Z**
- Timor Leste 1012Z**
- Yemen 1046Z



South of Java, Indonesia– M9.1



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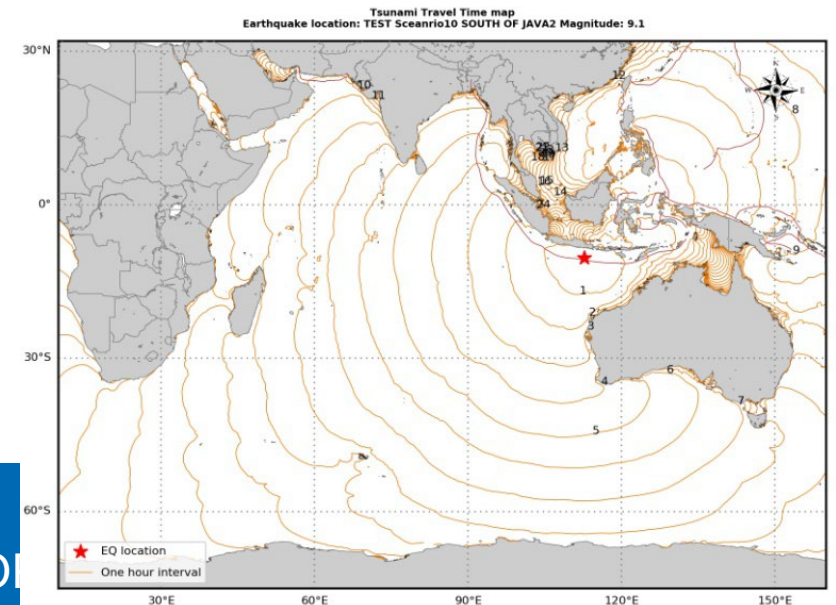
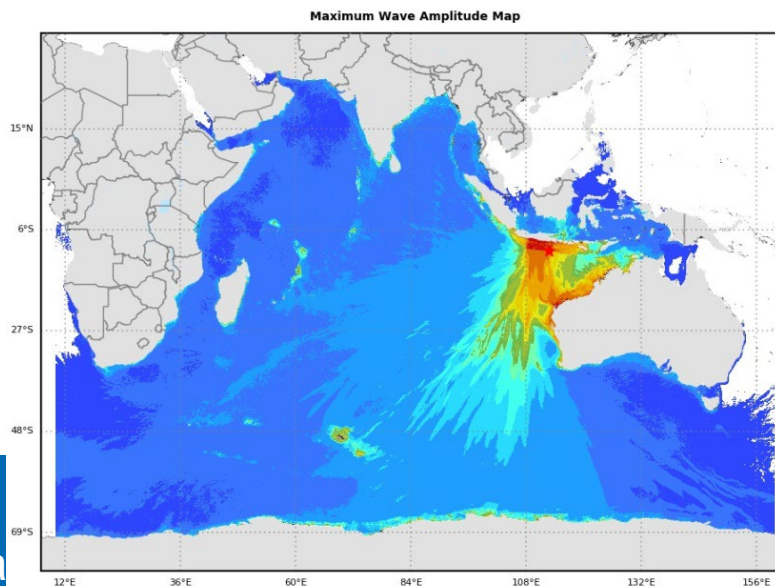
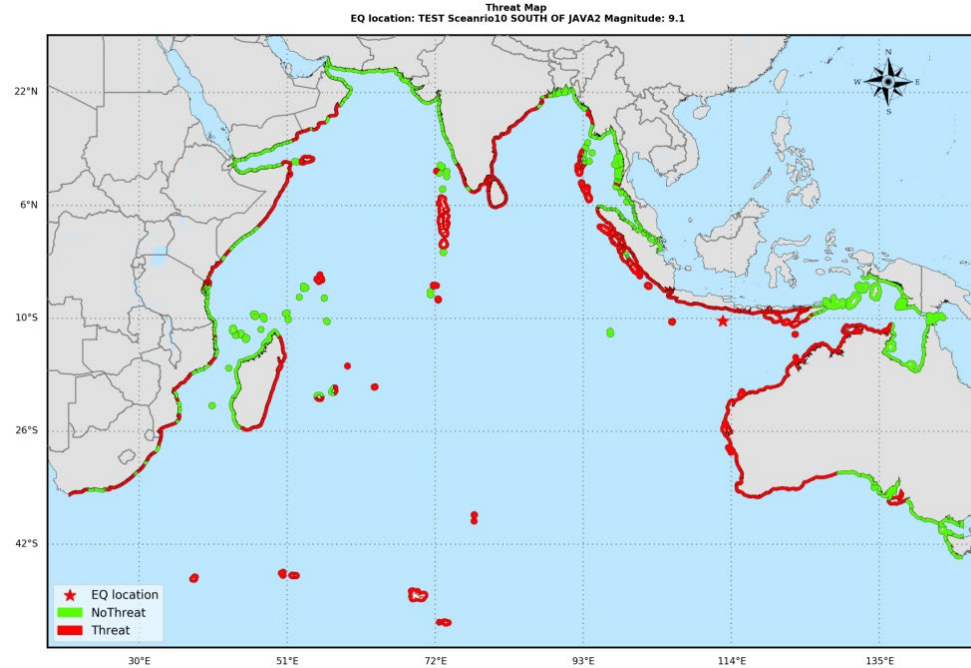
Mag 9.1 Epicentre: 10.4S 112.8E

South of Java, Indonesia

Origin Time: 0530Z

Australia	0559Z	8.4m
France	1259Z	2.2m
India	1333Z	1.4m
Indonesia	0532Z	11.9m
Kenya	0136Z+1	0.8m
Madagascar	1454Z	2.6m
Maldives	1126Z	1.2m
Mauritius	1454Z	0.8m
Mozambique	1959Z	0.9m
Myanmar	0146Z+1	0.5m
Oman	1813Z	0.9m
Seychelles	1724Z	0.8m
Somalia	1744Z	1.2m
South Africa	1929Z	1.1m
Sri Lanka	1246Z	1.3m
Tanzania	1958Z	0.8m
Thailand	0402Z+1	0.5m
Timor Leste	0706Z	1.0m
Yemen	1724Z	0.9m

19 countries under threat



Scenario – 4

South of Java, Indonesia, M9.1 Mwp, 25 October 2023 0200 UTC

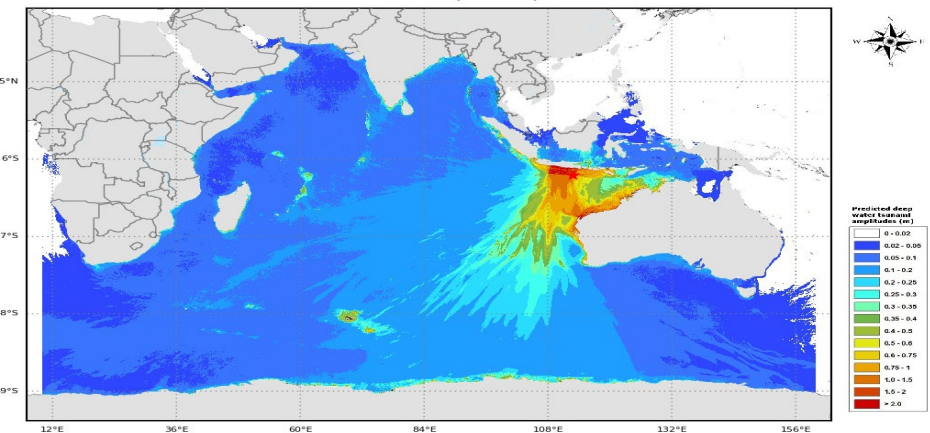
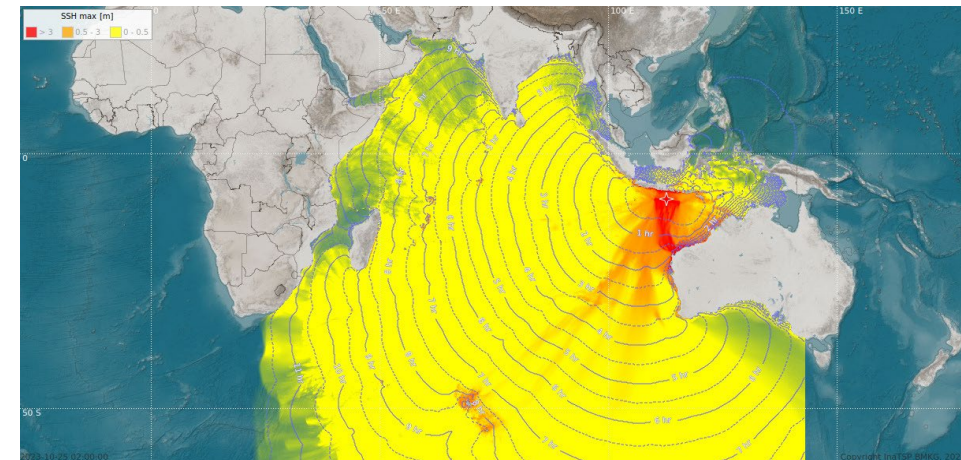


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Date	Time (UTC)	Bulletin #	Details
25-Oct-2023	0200		Earthquake occurs
25-Oct-2023	0208	1	Earthquake Bulletin (M8.6)
25-Oct-2023	0215	2	Potential Threat (M8.8)
25-Oct-2023	0230	3	Confirmed Threat (M9.1)
25-Oct-2023	0300	4	Confirmed Threat (M9.1)
25-Oct-2023	0400	5	Confirmed Threat (M9.1)
25-Oct-2023	0500	6	Confirmed Threat (M9.1)
25-Oct-2023	0600	7	Confirmed Threat (M9.1)
25-Oct-2023	0700	8	Confirmed Threat (M9.1)
25-Oct-2023	0800	9	Confirmed Threat (M9.1)
25-Oct-2023	0900	10	Confirmed Threat (M9.1)
25-Oct-2023	1000	11	Confirmed Threat (M9.1)
25-Oct-2023	1100	12	Confirmed Threat (M9.1)
25-Oct-2023	1200	13	Confirmed Threat (M9.1)
25-Oct-2023	1300	14	Confirmed Threat (M9.1)
25-Oct-2023	1400	15	Final Bulletin

Maximum Wave Amplitude Map



IOWave23 Check List & Timelines

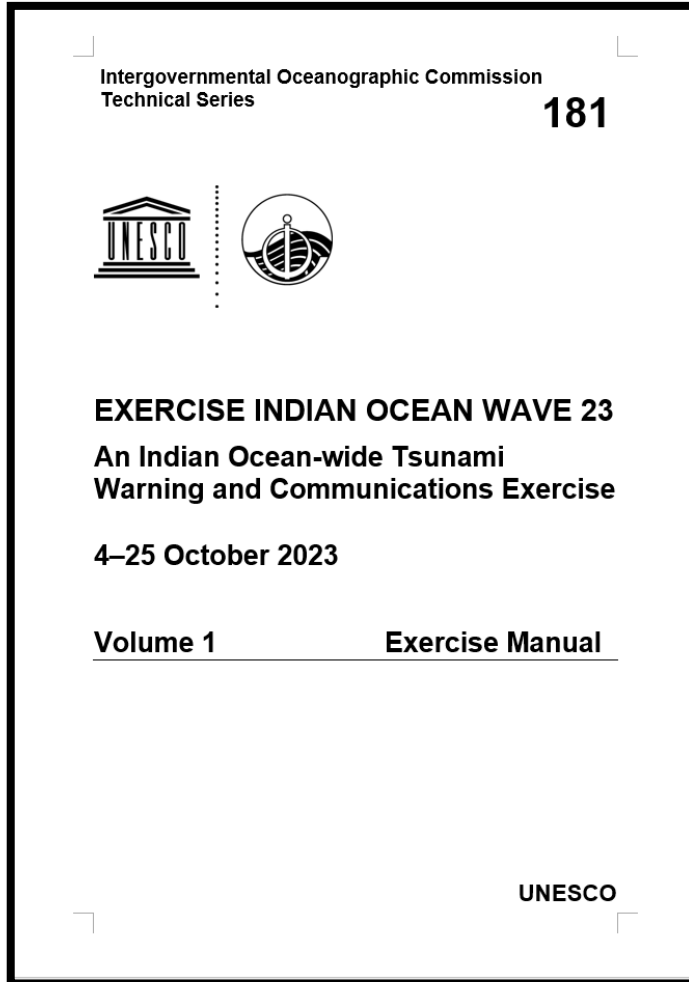
• Announcement by IOC Circular Letter 2945	May 2023
• Set up IOWave23 Exercise National Coordination Committee involving NTWC, LDMOs, NDMOs, and all other important stakeholders including private industry participants.	May 2023
• Decide on level of participation and identify communities for evacuation (where applicable).	May 2023
• Assign agency roles including exercise controller, key participants, and observers.	May 2023
• Nominate a National Contact for IOWave23.	May 2023
• Issue of IOWave23 Exercise Manual by the Secretariat.	May 2023
• Secure funding and support for community activities.	Ongoing
• Develop a National IOWave23 Exercise Manual to plan/guide activities, including those at community level.	May 2023
• Address indicators of UNESCO-IOC Tsunami Ready Recognition Programme or similar national initiative (where appropriate).	Ongoing
• Share IOWave23 Exercise in-country participation plans with the ICG/IOTWMS Secretariat.	June 2023
• UNESCO-IOC Standard Operating Procedure (SOP) Training Workshops (regionally online and nationally face-to-face).	July 2023
• Organise and hold pre-exercise national workshop(s) and meeting(s) with key stakeholders including media.	August – September 2023
• Ensure Standard Operating Procedures are in place and up to date.	August – September 2023
• Prepare a media press release.	One week before the Exercise
• Participate in IOWave23 Exercise.	4 / 11 / 18 / 25 Oct. 2023
• Hold post-exercise hot and cold debriefs.	After the Exercise
• Complete the IOWave23 online post-exercise evaluation.	November 2023
• Revise and improve SOPs in accordance with lessons learnt during the Exercise.	After the Exercise
• IOC-UNESCO Post-IOWave23 Exercise Lessons Learnt Workshop (online).	November 2023

IOWave23 Manual & Supplements



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- The IOWave23 Exercise **Manual and supplements are under preparation.**
- The manual will provide an **overview and the supplements with contain all TSP bulletins and products** -- (Purposes, 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 Task Team anticipates **completion and circulation by Secretariat in July 2023**
- All information and documents will **be made available on the exercise website:**
<https://oceanexpert.org/event/3916>

IOC Circular Letter 2945:

Announcement of the Indian Ocean Tsunami Exercise (IOWave23) on 4, 11, 18, and 25 October 2023



 INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
COMMISSION OCÉANOGRAPHIQUE INTERGOUVERNEMENTALE
COMISIÓN OCEANOGRÁFICA INTERGUBERNAMENTAL
МЕЖПРАВИТЕЛЬСТВЕННАЯ ОКЕАНОГРАФИЧЕСКАЯ КОМИССИЯ
اللجنة الدولية لعلوم المحيطات
政府間海洋学委员会

UNESCO – 7 Place de Fontenay - 75352 Paris Cedex 07 SP, France
http://ioc.unesco.org - contact phone: +33 (0)1 45 68 03 18
E-mail: v.vyabin@unesco.org

IOC Circular Letter No 2945
(Available in English only)

IOC/VR/BA/RB/ah
4 May 2023

To : ICG/IOTWMS¹ Tsunami National Contacts

cc. : Official National Coordinating Bodies for liaison with the IOC
Permanent Delegates/Observer Missions to UNESCO and National Commissions
for UNESCO in ICG/IOTWMS Member States
UNESCO Offices in Doha, Islamabad, Jakarta, New Delhi, and Tehran
ICG/IOTWMS Chair and Vice-Chairs
ICG/IOTWMS Working Group Chairs and Vice-Chairs
ICG/IOTWMS Task Team IOWave23
ICG/IOTWMS Tsunami Warning Focal Points
ICG/IOTWMS National Tsunami Warning Centres

**Subject: Announcement of the Indian Ocean Tsunami Exercise (IOWave23)
on 4, 11, 18, and 25 October 2023**

The IOC Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS) at its 13th session (Bali, Indonesia, 28 November–1 December 2022, decided to organise an Indian Ocean Wave Exercise in 2023 (IOWave23) and established a Task Team to plan and conduct the exercise. At its most recent interessional meeting, held online on 4 April, and after consultation with key stakeholders, the Task Team IOWave23 decided to conduct IOWave23 with four different scenarios on 8, 11, 18, and 25 October 2023. The four scenarios will allow individual Member States to decide the type and number of exercise scenarios to participate in. This letter provides background information and details of the IOWave23 in which all ICG/IOTWMS Member States are encouraged to participate.

To date six IOWave exercises have been conducted (2009, 2011, 2014, 2016, 2018 and 2020). The exercises have been designed to test the receipt and dissemination of tsunami notifications along national tsunami warning chains, as well as test appropriate responses aligned with pre-established Standard Operating Procedures (SOPs). Throughout the IOWave Exercises, the engagement of coastal communities in tsunami education campaigns, preparedness measures, and evacuation

¹ ICG/IOTWMS Member States include Australia, Bangladesh, Comoros, Djibouti, France, India, Indonesia, Iran (Islamic Republic of), Kenya, Madagascar, Malaysia, Maldives, Mauritius, Mozambique, Myanmar, Oman, Pakistan, Seychelles, Singapore, Somalia, South Africa, Sri Lanka, Tanzania, Thailand, Timor Leste, United Arab Emirates and Yemen.

Chairperson Mr Anel Heman TROISI Technical Secretary Navy Hydrographic Service Av. Maires de Dca 2124 C1270ABV Buenos Aires ARGENTINA	Vice-Chairpersons Dr Marie-Alexandrine SICRE Directrice de Recherche Centre national de la recherche scientifique (CNRS) 3 rue Michel Ange 75016 Paris FRANCE	Mr Frederico Antonio SARAIVA NOGUEIRA Navy Captain (Ret) Directorate of Hydrography and Navigation Rua Barão de Jusséguis S/N 24048-900 Nilópolis BRAZIL	Dr Karim HLM Directeur de Recherche Institut National de Recherche Mathématique (INRM) 02, Boulevard Sid Abderrahmane An Dab 20180 Casablanca MOROCCO
Executive Secretary Dr Vladimir RYABININ Intergovernmental Oceanographic Commission – UNESCO 7 Place de Fontenay 75352 Paris Cedex 07 SP FRANCE	Dr Alexander FROLOV Assistant to the President National Research Center "Kurchatov Institute" Akademika Kurchatova pl., 1 123182 Moscow RUSSIAN FEDERATION	Dr Srinivasa Kumar TUMMALA Director Indian National Centre for Ocean Information Services (INCOIS) Pragathi Nagar (SO), Nizampet (SO) Hyderabad 500090 INDIA	

The Circular Letter requests all Tsunami National Contacts to nominate one **National Contact to IOWave23**.

To date nominations have been received from **Australia, Bangladesh, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Mauritius, Mozambique, Myanmar, Oman, Seychelles, Singapore, and United Arab Emirates, – (15 Countries)**

Please ensure the ICG/IOTWMS Secretariat (iotwms@unesco.org) receives your nomination at the earliest.

The IOWave23 National Contact to oversee completion of survey after exercise.



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THANK YOU