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## 3.2 Update on Exercise Indian Ocean Wave 2023 (IOWave23)

Weniza-BMKG-Indonesia  
Dr. Ajay-INCOIS-India

Acknowledge :

Mr. Rick, Ms. Nora, and TT IOWave23

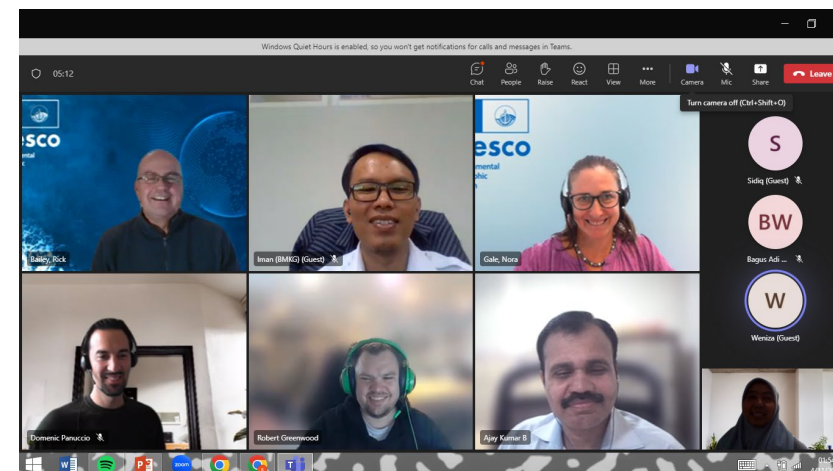
Working Group 3 Meeting  
24 August 2023

## 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, 15 June 2023***

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



# 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**.

# IOWave23 Objectives are to validate:

## Objectives 1 and 2 survey question are to be completed with input from DMO and/or NTWC :

1. Procedures in place to ensure tsunami warnings get to all in the community, including those with disabilities, all genders, elderly, and youth.
2. Level of community awareness, preparedness, and response.

## Objective 3 and 4 survey question are to be completed with input from DMO and/or NTWC depending on how tsunami response role are structure in country:

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

## Objectives 5 to 8 survey question are to be completed with input from NTWC :

5. 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 for the production of national warnings.
6. 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.
7. Reporting by NTWCs to the TSPs of their National Tsunami Warning Status.
8. Receipt and understanding by NTWCs of new TSP service for tsunamis generated by non-seismic and complex sources.

# Exercise Involvement

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The following organisations could be involved in the Exercise:

- Tsunami Service Providers (TSPs)
- National Tsunami Warning Centres (NTWCs)
- National Disaster Management Organisations (NDMOs)
- Local and Provincial Disaster Management Organisations (LDMOs)
- Other authorities, e.g. port and airport authorities, marine rescue, beach life-saving organisations
- Media Organisations
- Local Communities

## Participation Level

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- 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.**

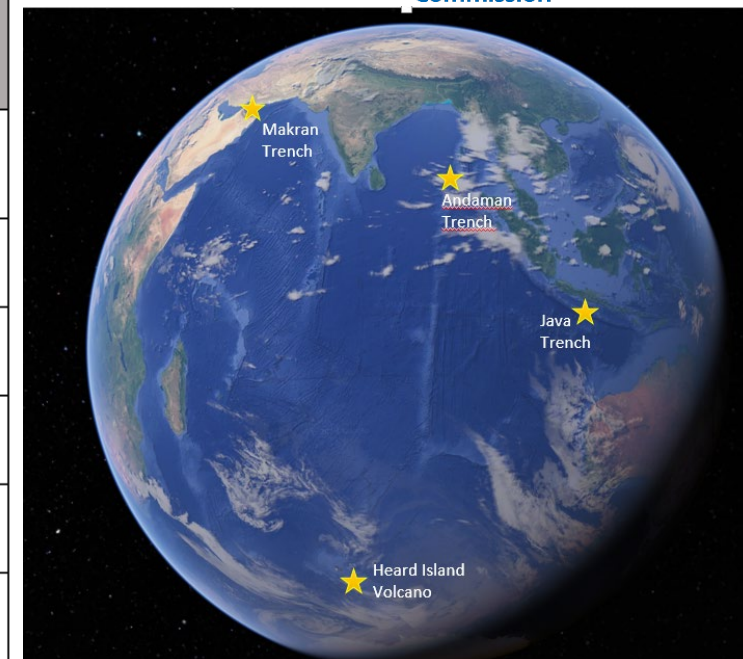
# IOWave23 Scenario

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



# Scenario 1: Nicobar Islands, Andaman Trench

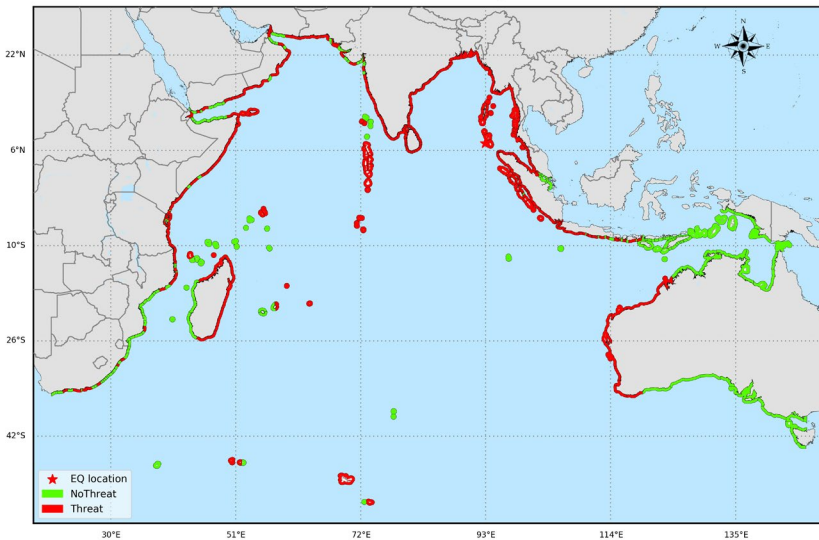


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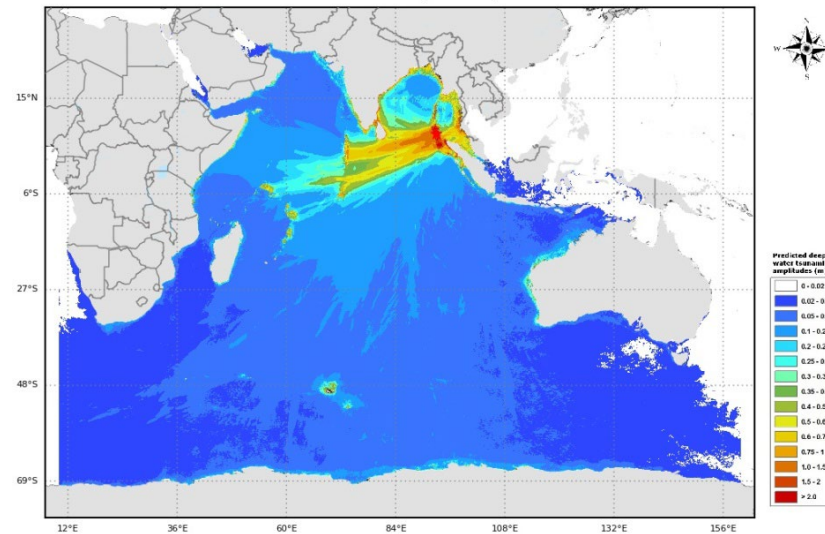
Date: 4 October 2023, Origin Time: 0400 UTC, Mag ~9, Epicentre: 7.20 N 92.90 E

Threat Map  
EQ location: TEST Sceario2 NICOBAR Magnitude: 9



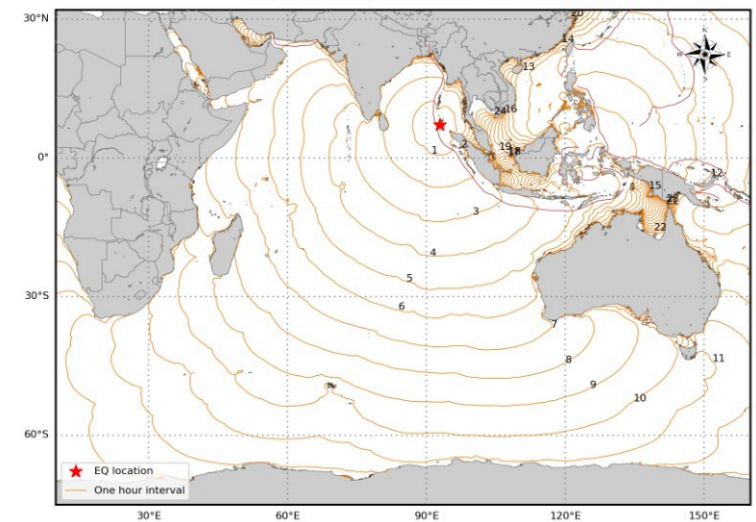
Threat Map

Maximum Wave Amplitude Map



Maximum Wave Amplitude Map

Tsunami Travel Time map  
Earthquake location: TEST Sceario2 NICOBAR Magnitude: 9



Travel Time Map



# Scenario 1: Nicobar Islands, Andaman Trench



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## Estimated Tsunami Arrival Times and Maximum Amplitudes

No	Country	T2 (UTC)	Max Beach (m)
1	Australia	06:18	2.0
2	Bangladesh	06:40	2.8
3	Comoros	12:12	1.2
4	Djibouti	13:56	0.7
5	France (Indian Ocean Territories)	10:48	1.7
6	India	04:00	14.4
7	Indonesia	04:20	19.2
8	Iran	12:05	0.7
9	Kenya	12:11	1.9
10	Madagascar	11:30	1.6
11	Malaysia	07:21	2.5
12	Maldives	07:04	9.7
13	Mauritius	09:44	1.6
14	Mozambique	12:45	1.3
15	Myanmar	04:56	4.6
16	Oman	10:35	1.3
17	Pakistan	11:40	0.7
18	Seychelles	10:08	1.9
19	Singapore	-	-
20	Somalia	11:02	3.1
21	South Africa	15:11	0.7
22	Sri Lanka	05:36	10.4
23	Tanzania	12:33	1.2
24	Thailand	05:28	8.6
25	Timor-Leste	-	-
26	United Arab Emirates	07:36	4.2
27	Yemen	10:44	3.0

# Scenario 2: Northwest Indian Ocean, Makran Trench

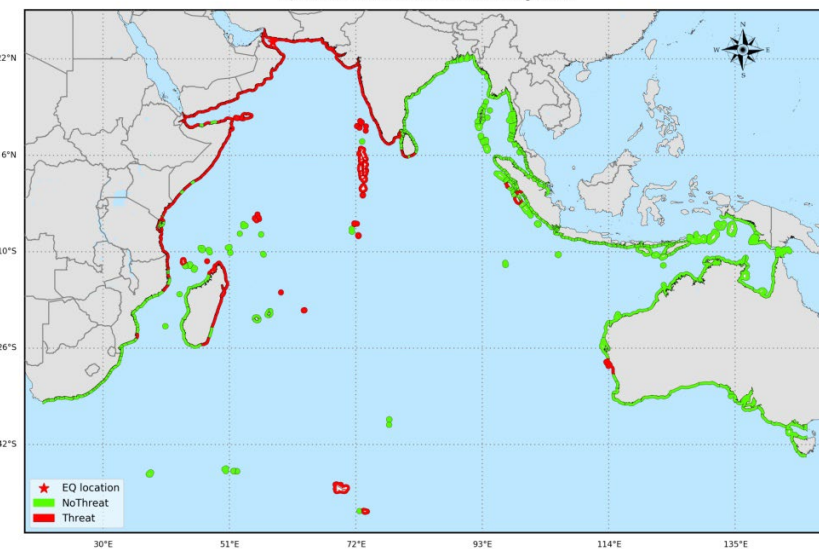


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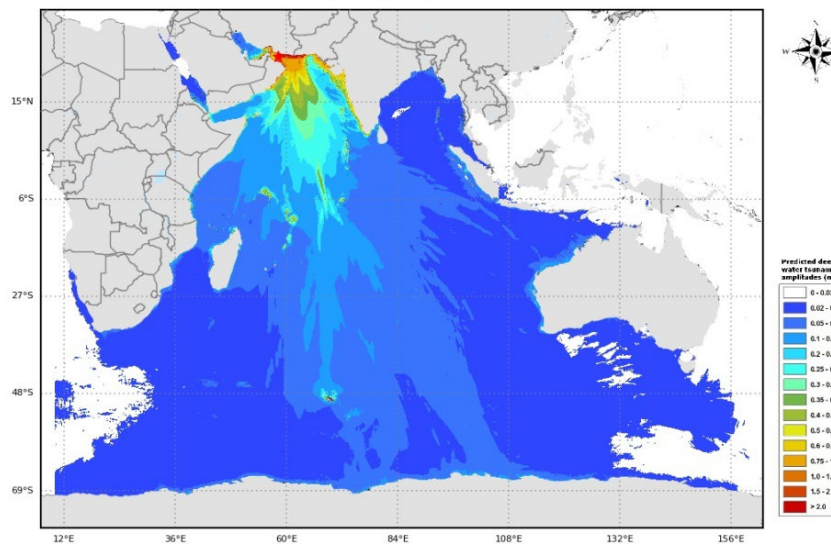
Date: 11 October 2023, Origin Time: 0600 UTC, Mag ~9, Epicentre: 24.80N 58.20E

Threat Map  
EQ location: TEST Scenario12 OFF COAST OF IRAN Magnitude: 9



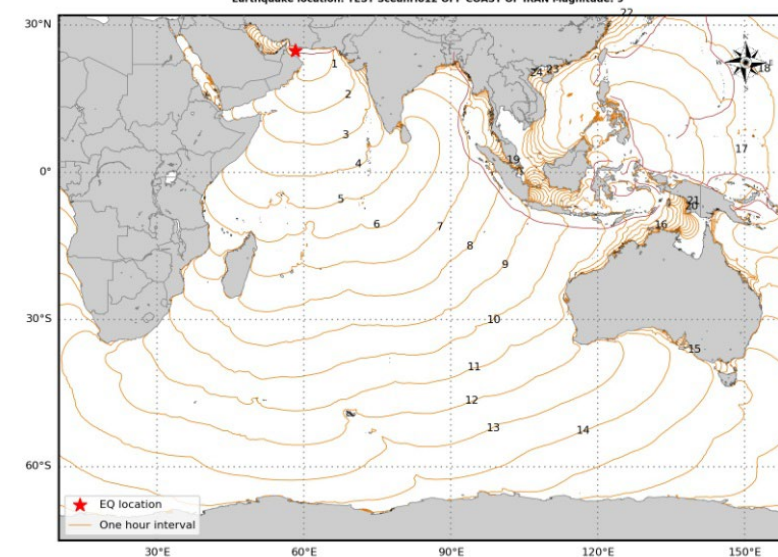
Threat Map

Maximum Wave Amplitude Map



Maximum Wave Amplitude Map

Tsunami Travel Time map  
Earthquake location: TEST Scenario12 OFF COAST OF IRAN Magnitude: 9



Travel Time Map

# Scenario 2: Northwest Indian Ocean, Makran Trench



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## Estimated Tsunami Arrival Times and Maximum Amplitudes

No	Country	T2 (UTC)	Max Beach (m)
1	Australia	19:40	1.0
2	Bangladesh	-	-
3	Comoros		0.8
4	Djibouti	11:12	2.0
5	France (Indian Ocean Territories)	13:30	1.0
6	India	07:48	2.5
7	Indonesia	-	-
8	Iran	06:00	9.0
9	Kenya	13:00	1.2
10	Madagascar	12:18	0.7
11	Malaysia	-	-
12	Maldives	09:22	1.6
13	Mauritius	11:52	1.2
14	Mozambique	15:23	0.6
15	Myanmar	-	-
16	Oman	06:12	11.7
17	Pakistan	06:00	8.3
18	Seychelles	10:38	1.6
19	Singapore	-	-
20	Somalia	09:22	1.3
21	South Africa	-	-
22	Sri Lanka	10:48	0.8
23	Tanzania	12:52	0.6
24	Thailand	-	-
25	Timor-Leste	-	-
26	United Arab Emirates	06:28	4.7
27	Yemen	08:28	1.3

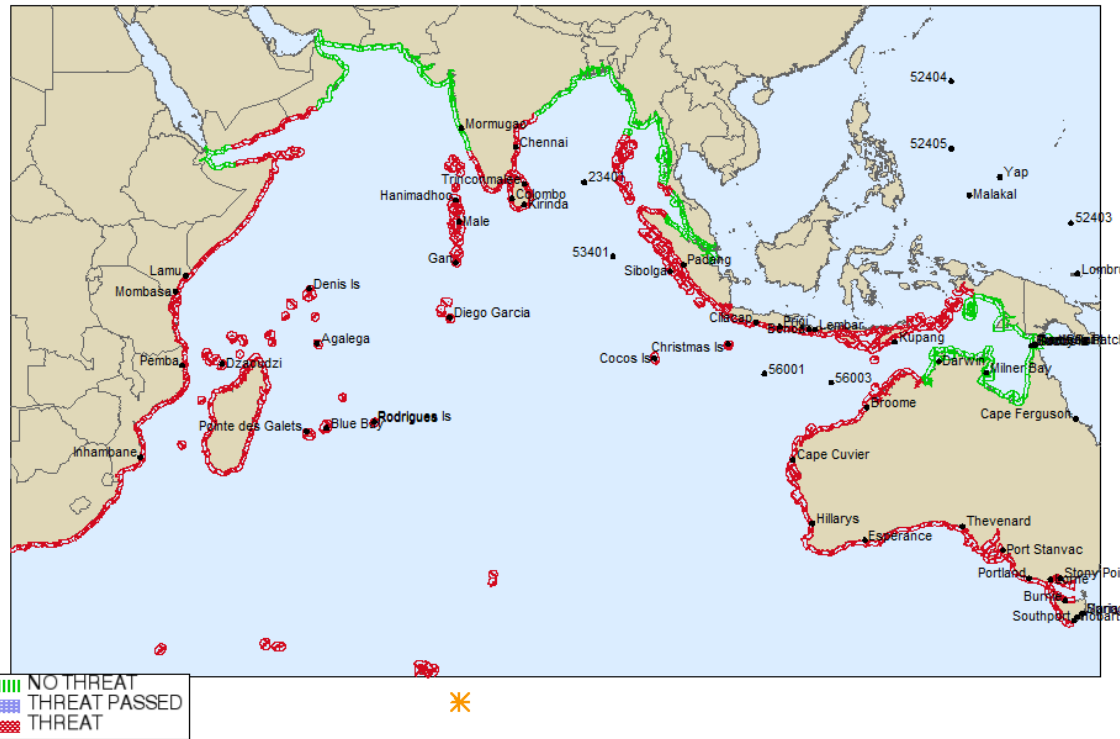
# Scenario 3: Heard Island Volcano, Southern Ocean



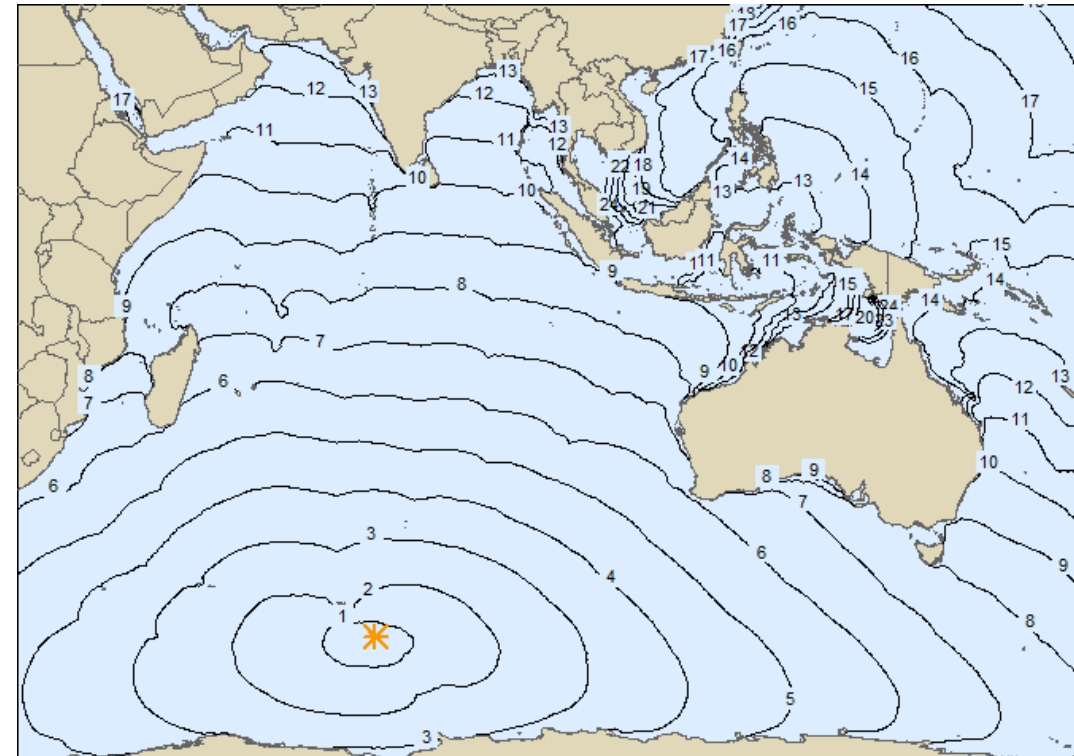
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Date: 18 October 2023, Origin Time: 0400 UTC, Epicentre: 53.10S 73.52E



Threat Map



Travel Time Map

# Scenario 3: Heard Island Volcano, Southern Ocean



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## Estimated Tsunami Arrival Times and Maximum Amplitudes

No	Country	T2 (UTC)
1	Australia	10:15
2	Bangladesh	-
3	Comoros	12:18
4	Djibouti	-
5	France (Indian Ocean Territories)	05:34
6	India	14:31
7	Indonesia	12:44
8	Iran	-
9	Kenya	13:29
10	Madagascar	09:54
11	Malaysia	-
12	Maldives	13:03
13	Mauritius	09:55
14	Mozambique	11:02
15	Myanmar	15:55
16	Oman	15:36
17	Pakistan	-
18	Seychelles	11:33
19	Singapore	-
20	Somalia	13:28
21	South Africa	07:53
22	Sri Lanka	13:54
23	Tanzania	13:08
24	Thailand	15:45
25	Timor-Leste	14:12
26	United Arab Emirates	-
27	Yemen	14:46

# Scenario 4: South of Java, Java Trench

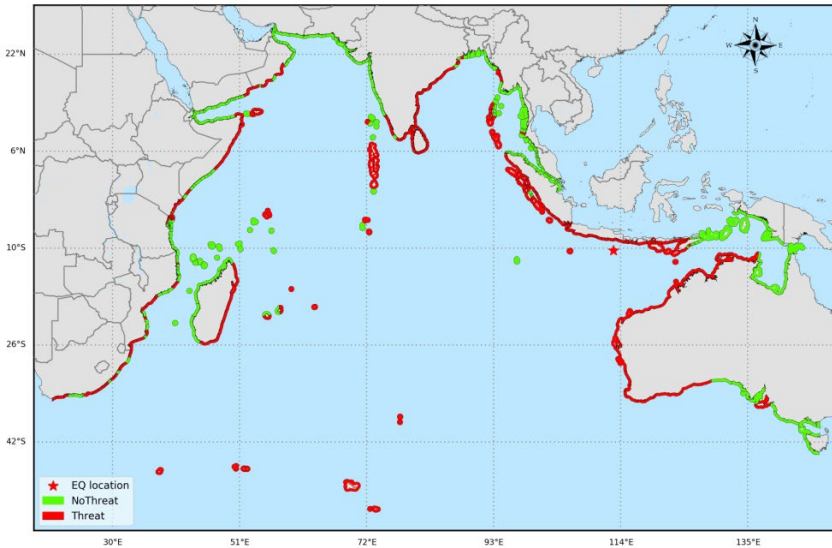


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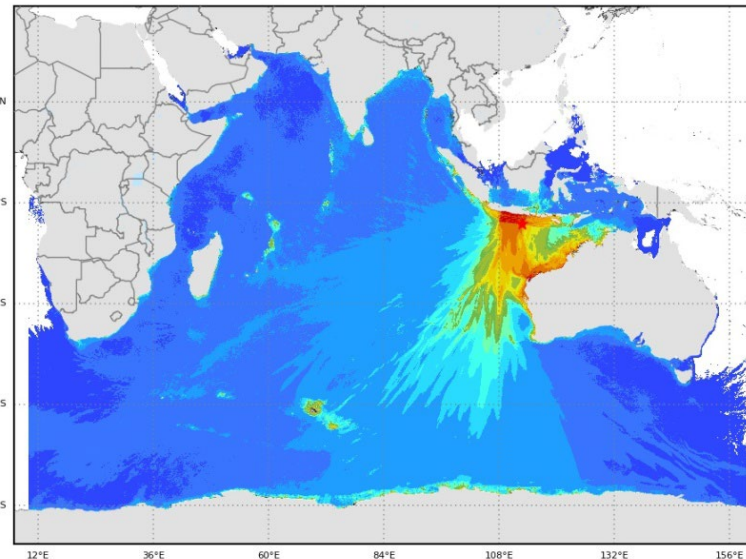
Date: 25 October 2023, Origin Time: 0200 UTC, Mag ~9, Epicentre: 10.40S 112.80E

Threat Map  
EQ location: TEST Sceanrio10 SOUTH OF JAVA2 Magnitude: 9.1



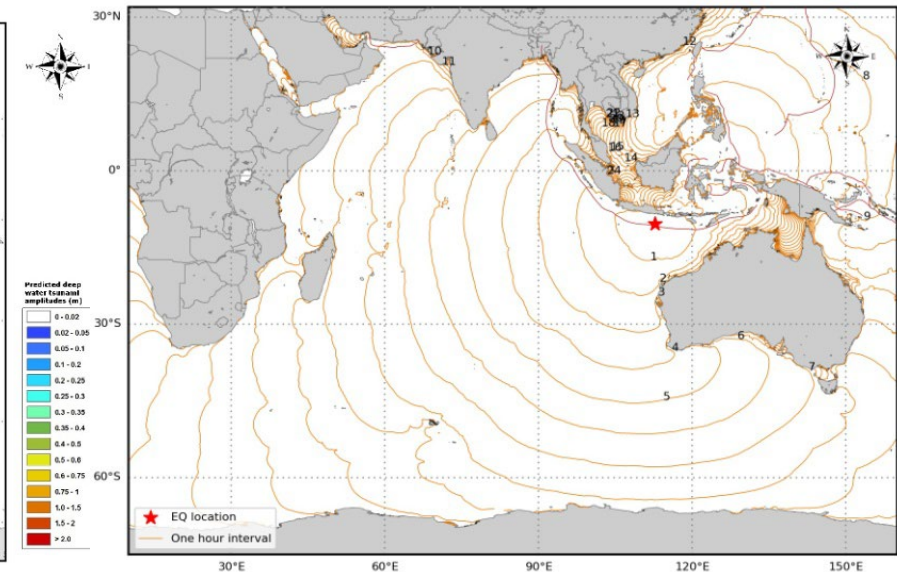
Threat Map

Maximum Wave Amplitude Map



Maximum Wave Amplitude Map

Tsunami Travel Time map  
Earthquake location: TEST Sceanrio10 SOUTH OF JAVA2 Magnitude: 9.1



Travel Time Map

# Scenario 4: South of Java, Java Trench

## Estimated Tsunami Arrival Times and Maximum Amplitudes

No	Country	T2 (UTC)	MAX BEACH (m)
1	Australia	02:22	28.3
2	Bangladesh	-	-
3	Comoros	-	-
4	Djibouti	-	-
5	France (Indian Ocean Territories)	07:58	2.8
6	India	10:03	1.4
7	Indonesia	02:02	29.6
8	Iran	-	-
9	Kenya	17:48	0.8
10	Madagascar	10:52	2.6
11	Malaysia	-	-
12	Maldives	07:14	1.2
13	Mauritius	08:40	1.6
14	Mozambique	14:52	1.0
15	Myanmar	22:16	0.7
16	Oman	13:02	0.9
17	Pakistan	-	-
18	Seychelles	13:23	0.9
19	Singapore	-	-
20	Somalia	13:58	1.2
21	South Africa	13:20	2.0
22	Sri Lanka	08:28	1.3
23	Tanzania	16:28	0.8
24	Thailand	00:32 on 26 Oct	0.5
25	Timor-Leste	03:36	1.3
26	United Arab Emirates	-	-
27	Yemen	12:28	0.9

# IOWave23 Check List & Timelines

No	Activity	Timeline
1	Announcement by <a href="#">IOC Circular Letter 2945</a>	May 2023
2	Set up IOWave23 Exercise National Coordination Committee involving NTWC, LDMOs, NDMOs, and all other important stakeholders including private industry participants.	May 2023
3	Decide on level of participation and identify communities for evacuation (where applicable).	May 2023
4	Assign agency roles including exercise controller, key participants, and observers.	May 2023
5	Nominate a National Contact for IOWave23.	May 2023
6	Issue of IOWave23 Exercise Manual by the Secretariat.	July 2023
7	Secure funding and support for community activities.	Ongoing
8	Develop a National IOWave23 Exercise Manual to plan/guide activities, including those at community level.	July 2020
9	Address indicators of UNESCO-IOC Tsunami Ready Recognition Programme or similar national initiative (where appropriate).	Ongoing
10	Share IOWave23 Exercise in-country participation plans with the ICG/IOTWMS Secretariat.	July 2023
11	UNESCO-IOC Standard Operating Procedure (SOP) Training Workshops (regionally online and nationally face-to-face).	July and August 2023
12	Organise and hold pre-exercise national workshop(s) and meeting(s) with key stakeholders including media.	July – September 2023
13	Ensure SOPs are in place and up to date.	August – September 2023
14	Prepare and issue a media press release.	One week before the exercise
15	Participate in IOWave23 Exercise.	4 / 11 / 18 / 25 Oct. 2020
16	Hold post-exercise hot and cold debriefs.	After the Exercise
17	Complete the IOWave23 online post-exercise evaluation.	November 2023
18	Revise and improve SOPs in accordance with lessons learnt during the Exercise.	After the Exercise
19	IOC-UNESCO Post-IOWave23 Exercise Lessons Learnt Workshop (online).	November 2023



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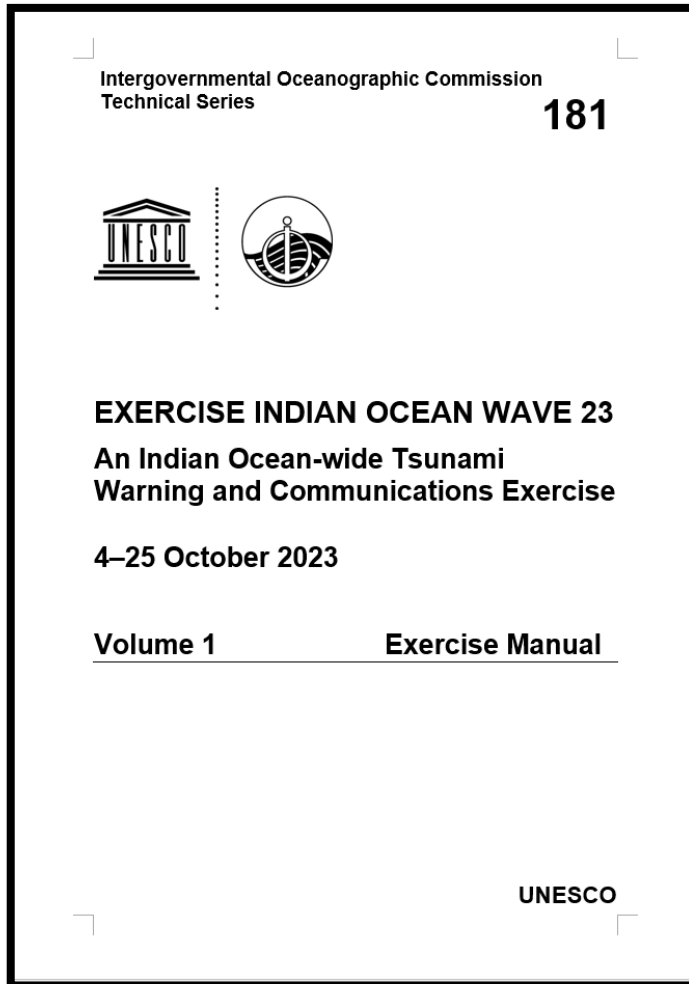


# IOWave23 Manual & Supplements



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- The IOWave23 **Exercise manual** completed in July and **Supplements (4)** completed in August 2023.
- The **manual** provides an overview *Purpose, Objectives, Scope, Exercise Success Criteria, Types of Exercise, Scenarios, Dates, Checklist of Activities for Member States, Exercise Evaluation, Exercise Observers*
- The **supplements** contains all TSP bulletins and products
- 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



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МЕЖПРАВИТЕЛЬСТВЕННАЯ ОКЕАНОГРАФИЧЕСКАЯ КОМИССИЯ  
اللجنة الدولية الحكومية لعلوم المحيطات  
政府间海洋学委员会

UNESCO – 7 Place de Fontenay - 75352 Paris Cedex 07 SP, France  
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E-mail: vryabin@unesco.org

**IOC Circular Letter No 2945**  
(Available in English only)

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

**To :** ICG/IOTWMS<sup>1</sup> 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 13<sup>th</sup> 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

<sup>1</sup> 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	Vice-Chairpersons		
Mr Anel Heman TROISI Technical Secretary Navy Hydrographic Service Av. Mates de Oca 2124 C1270ABV Buenos Aires ARGENTINA	Dr Maria-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 Jaceguai S/N 24048-900 Nilópolis BRASIL	Dr Karim HLM Directeur de Recherche Institut National de Recherche Halieutique (INRH) 02, Boulevard Sid Abderrahmane An Dab 20180 Casablanca MOROCCO
Dr Vladimir RYABININ Intergovernmental Oceanographic Commission — UNESCO 7 Place de Fontenay 75352 Paris Cedex 07 SP FRANCE	Dr Alexander FROLOV Assistant to the President Academika Kurchatova pl., 1 123182 Moscow RUSSIAN FEDERATION	Dr Srinivasa Kumar TUMMALA Director Indian National Centre for Ocean Information Services (INCOIS) Pragathi Nagar (BO), Nizampet (BO) Hyderabad 500090 INDIA	

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

### Nominations have been received from:

Australia, Bangladesh, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Malaysia, Mauritius, Mozambique, Myanmar, Oman, Seychelles, Singapore, Sri Lanka, Timor-Leste, and United Arab Emirates (18 Countries)

### Nominations are required from:

Comoros, France Indian Ocean Territories, Pakistan, South Africa, Tanzania, Thailand, and Yemen (7 Countries).

→ **Please ensure the ICG/IOTWMS Secretariat ([iotwms@unesco.org](mailto:iotwms@unesco.org)) receives your nomination without delay.**

The IOWave23 National Contact to oversee completion of **post-exercise evaluation**

Exercise Indian Ocean Wave 2023 (IOWave23) and Scenarios



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