

IOWave20

Progress Report



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Commission

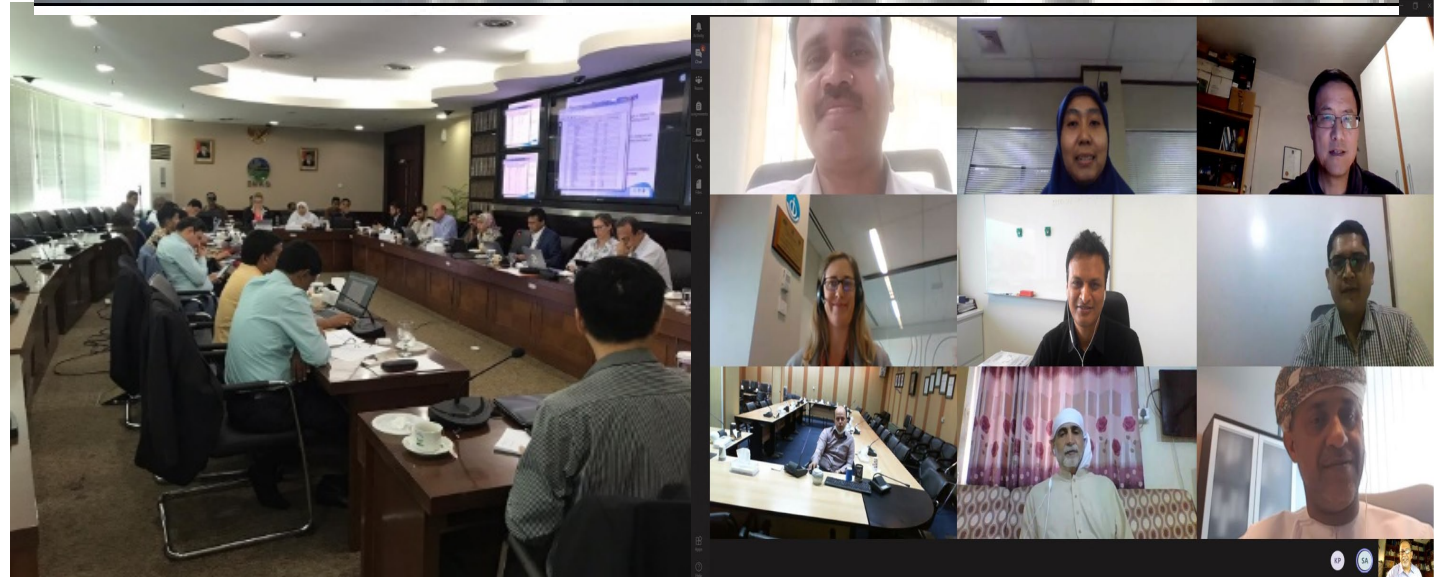
Chair

Weniza – BMKG, Indonesia –
23-24 November 2021

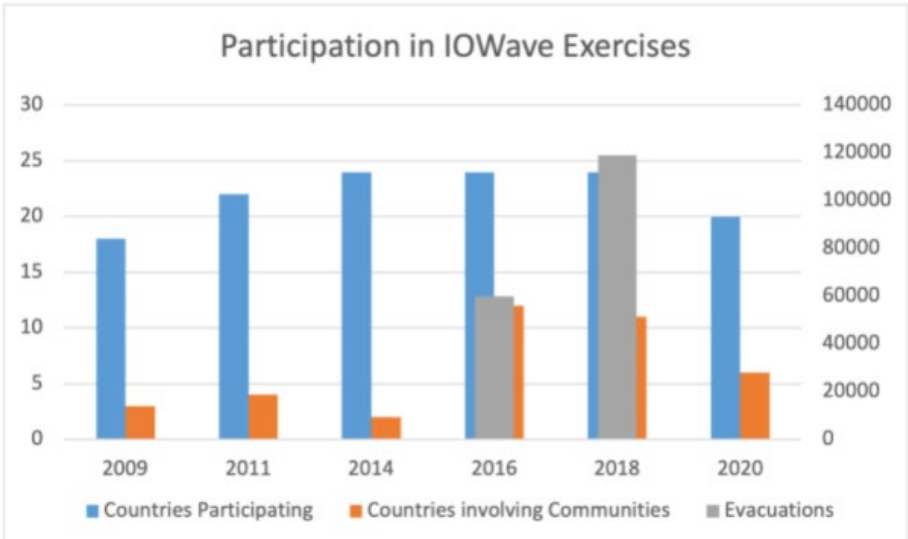
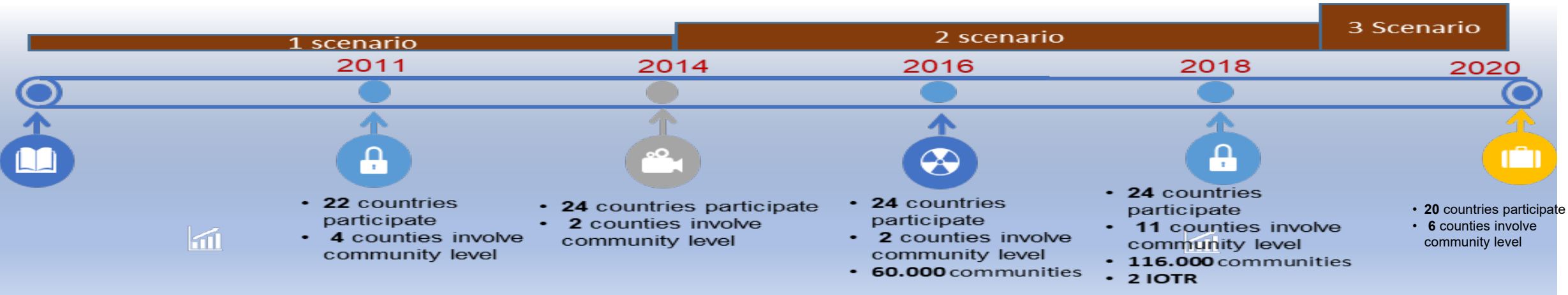
***Acknowledge : Secretariat ICG/IOTWMS –
Mr. Rick Bailey, Ms. Nora Gale –**

IOWave20 Task Team

- △ **Ms. Weniza**, BMKG, Indonesia – Chair
- △ **Dr. Ali Khoshkholgh**, INIOAS, Iran – Vice Chair
- △ **Dr. Simon Allen**, BoM, Australia - Member
- △ **Mr. Ajay Kumar**, INCOIS, India - Member
- △ **Badar Al-Rumhi**, Oman – Member
- △ **Khalid Al-Wahaibi**, Oman – Member
- △ **Alyaqdhan Al-Siyabi**, Oman – Member
- △ **Ameer Hyder**, Pakistan - Member
- △ **Tariq Ibrahim**, Pakistan - Member



History of Indian Ocean Exercises



Evolution of Ocean Wide Exercises in the Indian Ocean

Nora Gale, Ardito M Kodijat, Weniza, Ali Khoshkholgh, Ajay Kumar Bandela, and Simon Allen

POSTED ON JULY 6, 2021

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IOWave20 Scale & Objectives

Scale:

- Due to the ongoing Covid-19 pandemic, **the scale of IOWave20 was reduced in comparison with previous exercises.**
- Member States were encouraged to **test communication protocols and conduct a “virtual” table-top exercise (as a minimum).**
- Emphasis was placed on **updating organisational Standard Operating Procedures, plans and policies for tsunami warning and emergency response during a pandemic.**

Objectives:

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.

Methodology

Intergovernmental Oceanographic Commission
Technical Series

153



EXERCISE INDIAN OCEAN WAVE 20

An Indian Ocean-wide Tsunami
Warning and Communications Exercise

6–20 October 2020

Volume 1

Exercise Manual

- IOWave20 was held **during the Covid-19 pandemic**, which is affecting countries around the world and in the Indian Ocean region
- Exercise Indian Ocean Wave 2020 was held over two-weeks, **6-20 October 2020 --- 1 week intervals on 6, 13 and 20 October**
- Exercise Indian Ocean Wave 2020 contained **three earthquake scenarios with all scenarios run in real-time --- Each scenario was held in real time over a 1-hour duration.**
- For each scenario, the **TSPs issued four tsunami bulletins in real time over a 1-hour period.**
- IOC-UNESCO conducted **on online assessment** that was coordinated in country by the IOWave20 National Contacts.
- To date **20 Indian Ocean Member States** reported their participation in the IOWave20 evaluation survey.

Draft Report

Intergovernmental Oceanographic Commission
Technical Series **153**



EXERCISE INDIAN OCEAN WAVE 20
An Indian Ocean-wide Tsunami Warning
and Communications Exercise

6–20 October 2020

Volume 2 Exercise Report

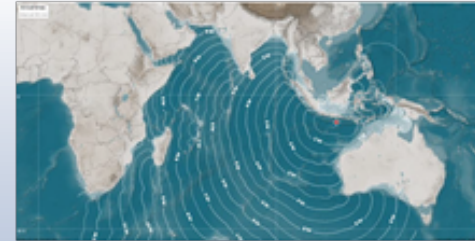
UNESCO

- Report based on **online evaluation survey and post-IOWave20 workshop (Nov. 2020)**
- Available of **ICG/IOTWMS Intersessional Meeting website**
- Draft **report shared with TNCs and National Exercise Contacts**
- Final feedback requested by **end of November 2021**
- Publication anticipated by **end of 2021 / early 2022**

Scenarios

1. Java Trench

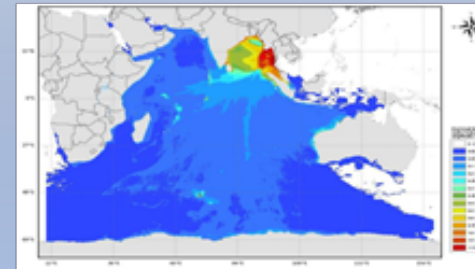
6 October 2020; 03:00 UTC; M9.1; 10 Km; 10.40 S,
112.80 E, South of Java, Indonesia



20 countries under threat

2. Andaman Trench

13 October 2020; 04:00 UTC, M9.2, 10 Km, 12.65 N,
93.50 E, Off West Coast of Andaman Islands, India



18 countries under threat

3. Makran Trench

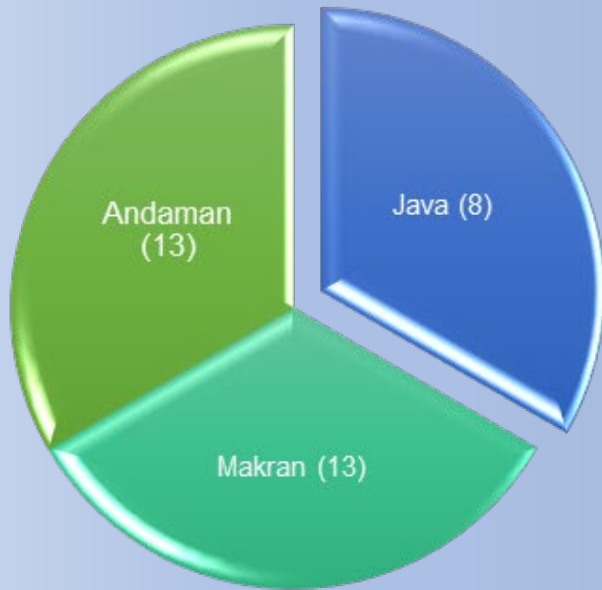
20 October 2020; 06:00 UTC, M9.0, 10 Km, 24.8 N,
62.2 E, Off Coast of Pakistan



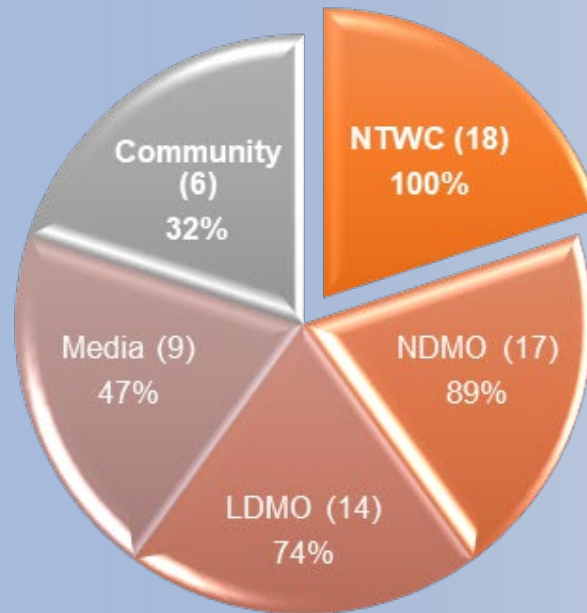
21 countries under threat

Participation

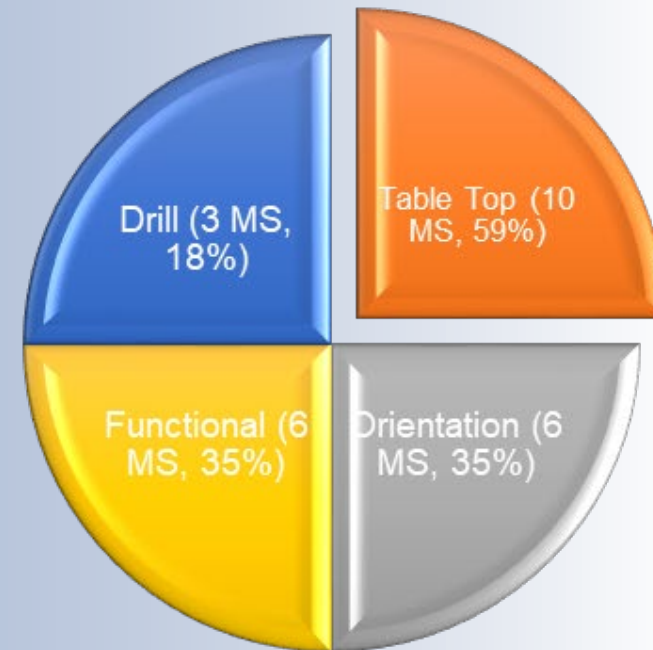
20 Countries completed online survey: Australia, Bangladesh, Comoros, India, Indonesia, Kenya, Madagascar, Malaysia, Mauritius, Mozambique, Myanmar, Oman, Pakistan, Seychelles, Singapore, South Africa, Sri Lanka, Thailand, United Arab Emirates and Yemen



• Scenario



• Participants



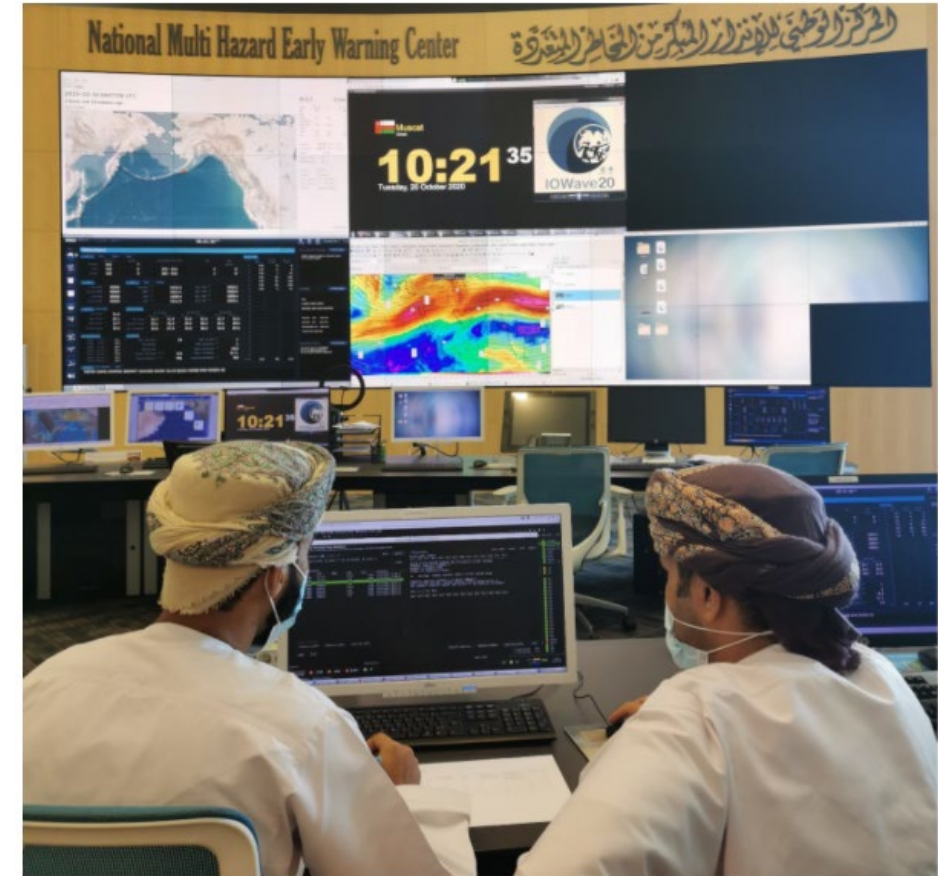
• Type of Exercise

Downstream Response

Despite the ongoing pandemic, six countries reported community involvement.

- Indonesia held an evacuation drill at the New Yogyakarta International Airport involving 120 people.
- Kenya involved 3 coastal communities (Kwale, Mombasa, Kilifi) in tsunami awareness activities.
- Mauritius conducted a simulation exercise in a small coastal community.
- Seychelles involved community stakeholders in a full scale exercise.
- Mozambique and Thailand responded to the survey that communities were involved, but did not provide details.

Upstream Response



Scientists at the Oman National Multi Hazard Warning Center participate in Exercise IOWave20 (October 2020).

EXERCISE OBJECTIVES AND RESULTS

Objective 1 – Tsunami Service Provider Message Dissemination

Objective 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

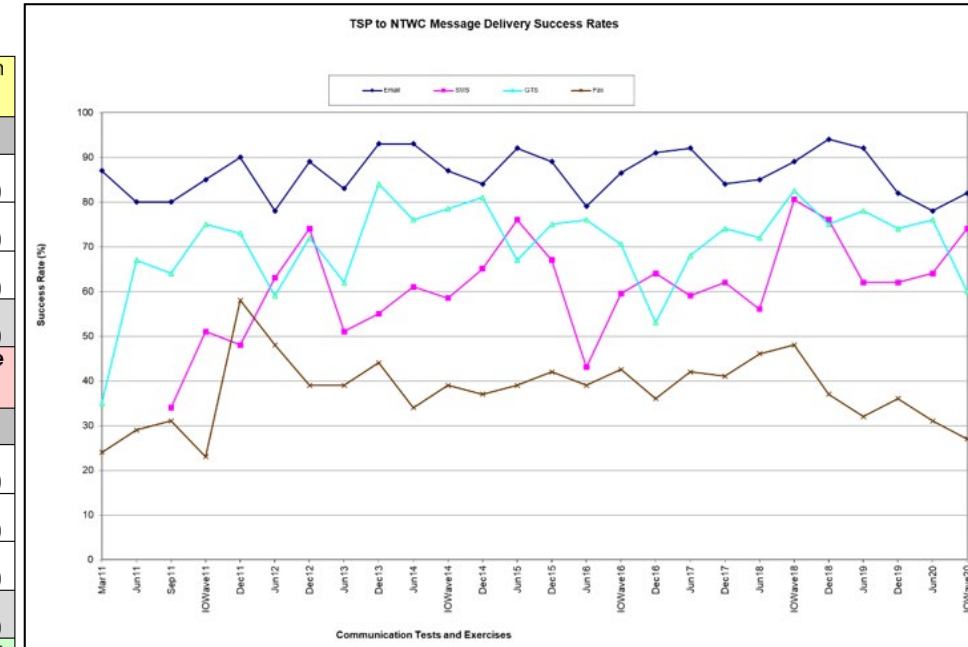
Summarizes the NTWC responses for each exercise scenario

IOTWS-TSP	Java Scenario (out of total 8 responses)			
	Email	GTS	SMS	Fax
Australia	75%	86%	63%	25%
India	75%	100%	75%	38%
Indonesia	75%	86%	88%	25%
Average	75%	90%	75%	29%
IOTWS-TSP	Andaman Scenario (out of total 12 responses)			
	Email	GTS	SMS	Fax
Australia	83%	92%	67%	33%
India	75%	92%	58%	33%
Indonesia	75%	83%	75%	25%
Average	78%	89%	67%	31%
IOTWS-TSP	Makran Scenario (out of total 12 responses)			
	Email	GTS	SMS	Fax
Australia	67%	82%	75%	27%
India	83%	82%	58%	36%
Indonesia	92%	91%	45%	18%
Average	81%	85%	60%	27%

NTWCs receiving each TSP notification message

IOTWMS-TSP	Java Scenario – Messages received anytime (within 15 minutes)			
	Email	GTS	SMS	Fax
Australia	76% (74%)	76% (62%)	52% (50%)	24% (24%)
India	69% (60%)	83% (71%)	69% (66%)	29% (29%)
Indonesia	74% (66%)	77% (69%)	54% (49%)	23% (14%)
Average	73% (67%)	79% (67%)	58% (55%)	25% (22%)
IOTWMS-TSP	Andaman Scenario – Messages received anytime (within 15 minutes)			
	Email	GTS	SMS	Fax
Australia	87% (87%)	82% (82%)	64% (64%)	53% (27%)
India	82% (73%)	75% (75%)	49% (49%)	33% (33%)
Indonesia	76% (67%)	65% (65%)	62% (51%)	18% (18%)
Average	82% (79%)	74% (74%)	58% (55%)	35% (26%)
IOTWMS-TSP	Makran Scenario – Messages received anytime (within 15 minutes)			
	Email	GTS	SMS	Fax
Australia	98% (69%)	73% (73%)	85% (75%)	16% (9%)
India	80% (67%)	62% (62%)	51% (45%)	29% (24%)
Indonesia	91% (91%)	69% (69%)	56% (45%)	22% (18%)
Average	90% (76%)	68% (68%)	64% (55%)	22% (17%)

Comparison TSP to NTWC message delivery success rates



EXERCISE OBJECTIVES AND RESULTS

Objective 2 – NTWC Access to TSP Website and Use of TSP Information

Objective 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.

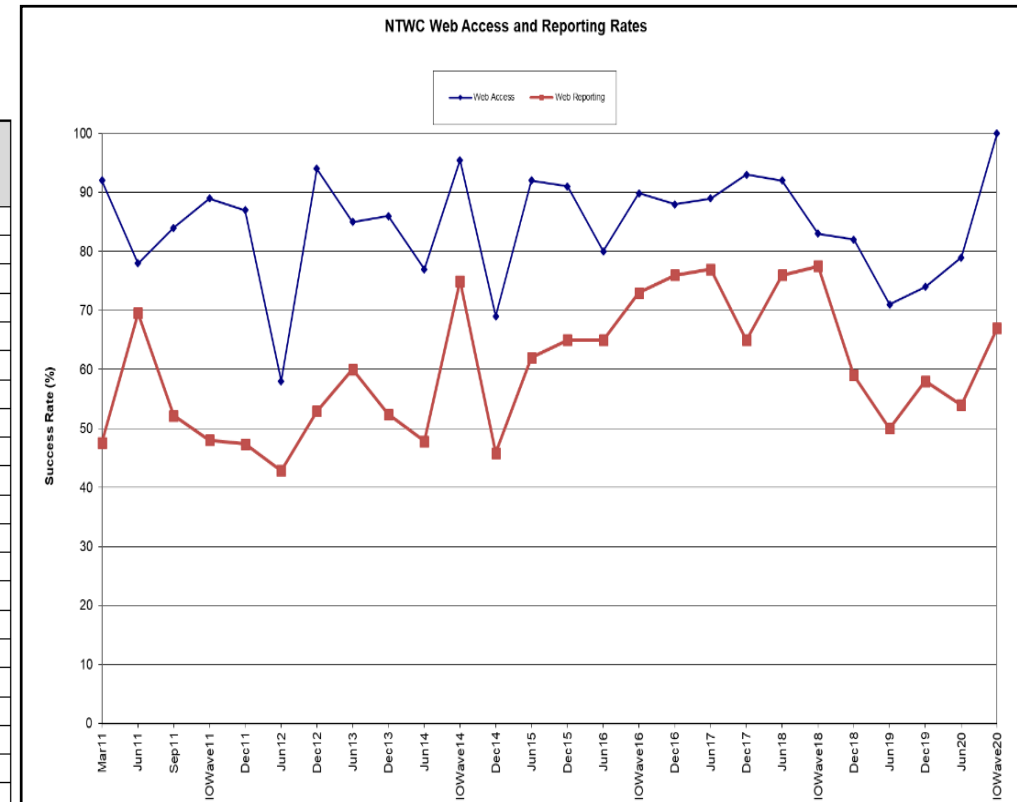
Summarizes the NTWC responses on web access

Percentage of NTWCs using TSP tsunami threat information to formulate national warnings

Comparison with Previous Exercises and Tests – Web Access

TSP	Exchange Product Viewed	Any scenario (17 NTWCs reporting)
TSP-Australia	Bulletins	88%
	Coastal Zone Threat Map	82%
	Threat Table	88%
	Maximum Amplitude Map	88%
	Tsunami Travel Time Map	82%
TSP-India	Bulletins	76%
	Coastal Zone Threat Map	76%
	Threat Table	76%
	Maximum Amplitude Map	76%
	Tsunami Travel Time Map	76%
TSP-Indonesia	Bulletins	82%
	Coastal Zone Threat Map	88%
	Threat Table	88%
	Maximum Amplitude Map	88%
	Tsunami Travel Time Map	88%

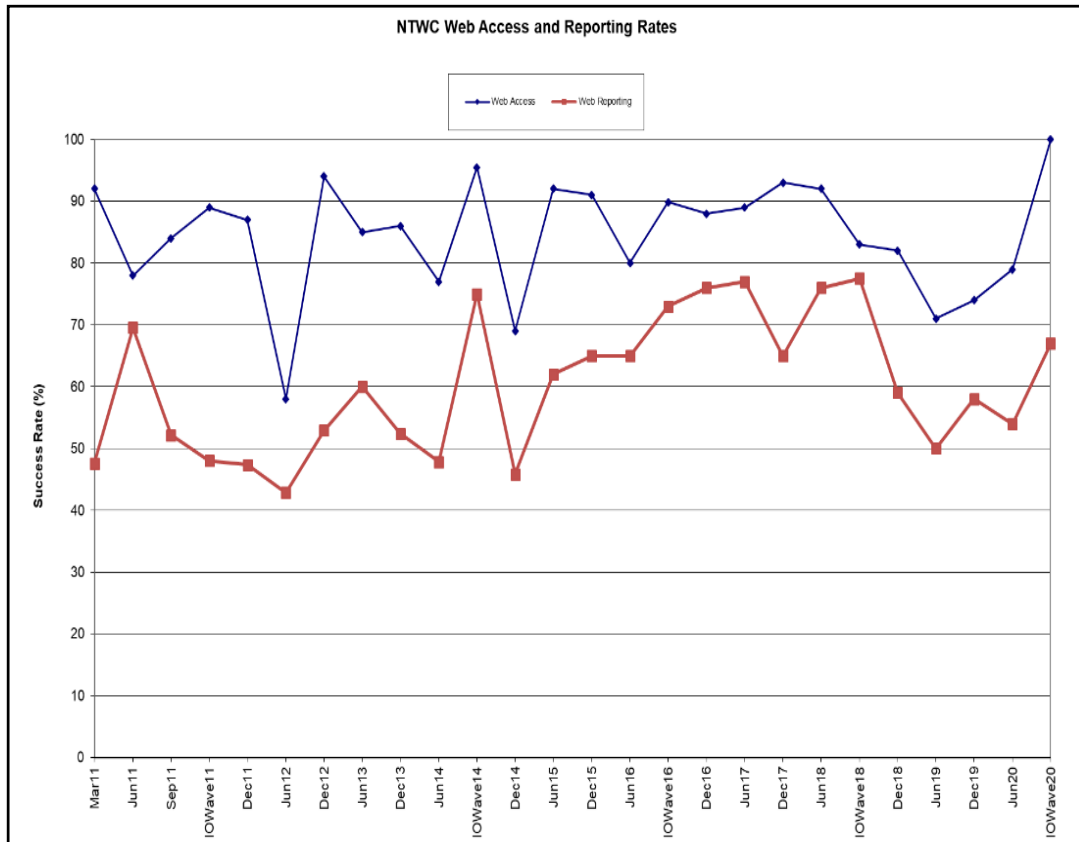
TSP	TSP Tsunami Threat Information	All Scenarios (15 NTWCs reporting)
TSP-Australia	Tsunami Wave Observations	53%
	T1 Predicted Wave Arrival Time	53%
	T2 Predicted Wave Arrival Time	53%
	T3 Predicted Wave Arrival Time	40%
	T4 Predicted Wave Arrival Time	40%
	Predicted Maximum Wave Amplitudes	73%
	Coastal Forecast Zone Threat Levels	33%
	Other	20%
TSP-India	Tsunami Wave Observations	73%
	T1 Predicted Wave Arrival Time	60%
	T2 Predicted Wave Arrival Time	73%
	T3 Predicted Wave Arrival Time	53%
	T4 Predicted Wave Arrival Time	33%
	Predicted Maximum Wave Amplitudes	67%
	Coastal Forecast Zone Threat Levels	53%
	Other	13%
TSP-Indonesia	Tsunami Wave Observations	53%
	T1 Predicted Wave Arrival Time	60%
	T2 Predicted Wave Arrival Time	47%
	T3 Predicted Wave Arrival Time	47%
	T4 Predicted Wave Arrival Time	40%
	Predicted Maximum Wave Amplitudes	80%
	Coastal Forecast Zone Threat Levels	53%
	Other	20%



EXERCISE OBJECTIVES AND RESULTS

Objective 3 – NTWC NATIONAL TSUNAMI WARNING STATUS REPORTING

Objective 3: Validate the reporting by NTWCs to the TSPs of their National Tsunami Warning Status.



- The overall NTWC warning status reporting rate was **67% for any scenario during the entire exercise.** This rate is slightly lower than previous exercise ---- reporting rates were much lower for individual scenarios with 40% for the Java scenario, 42% for the Andaman scenario, and 54% for the Makran scenario.
- The number of status reports that **each NTWC provided to TSPs has been diverse. The same phenomenon has also been observed in previous exercises**

Challenges

- Conducting **IOWave** and **PacWave** during the same year;
- Conducting **the exercise during a pandemic**;
- Participation of all Member States;
- **Ensuring timeline SOPs** are in place within and between agencies; and
- **NTWC receipt of TSP Notification bulletins via fax is very low**

Recommendations: General

- IOWave Exercises should use scenarios that are suitable for all Member States to participate, 3 scenarios worked well for coverage.
- Holding the scenarios 1-week apart worked well.
- The Exercise should be conducted in September to avoid cyclone season preparation [Australia; India]. However, after IOWave18 it was noted that September is inconvenient for some countries due to Monsoon and Floods [Pakistan, India, Sri Lanka] and hot weather [Oman].
- Coordinate with PTWS to ensure Exercises occur in opposite years [Australia, Indonesia, Timor Leste].
- International observers should be included in future exercises (such as IORA) [India] and virtual observations should be utilized more widely.
- Consider informing more national leaders of the Exercise in addition to the Tsunami National Contacts.
- Document the lessons learnt and changes triggered from the Exercise (i.e. establish a monitoring mechanism).

Recommendations: Global Coordination

- Conduct **IOTWMS** and **PTWS** exercises in opposite years.
 - 2022 PTWS
 - 2023 IOTWMS
- **Encourage to test/verify the UNESCO-IOC Tsunami Ready Indicators** during the Exercise.
- Provide guidelines for conducting **virtual table-top exercises**.
- Agree **common exercise objectives and Exercise success criteria** among all ocean basins.

Recommendations

11.0	Task Team on Indian Ocean Wave 2020 to complete its report on IOWAVE 20, taking into account Member State feedback on draft report	TT IOWAVE 2020	May 2022 (ICG XIII)
11.0	Next Indian Ocean Wave Exercise to be held in 2023 to avoid overlap for some countries also involved in PAC WAVE Exercise planned for 2022. Task Team on Indian Ocean Wave 2023 to be established, with same ToRs as Task Team on Indian Ocean WAVE 2020	Steering Group, Secretariat	May 2022 (ICG XIII)



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Thank you! Terimakasih!

Weniza

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