



United Nations
Educational, Scientific and
Cultural Organization



Intergovernmental
Oceanographic
Commission

TSP-India Status Report for *Intersessional Period*

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TSP-India



Intersessional Meeting of the ICG/IOTWMS(13th Session at Bali) -November 2022

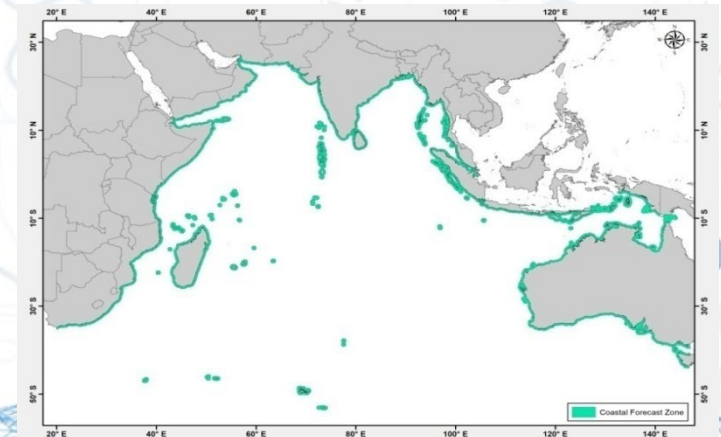
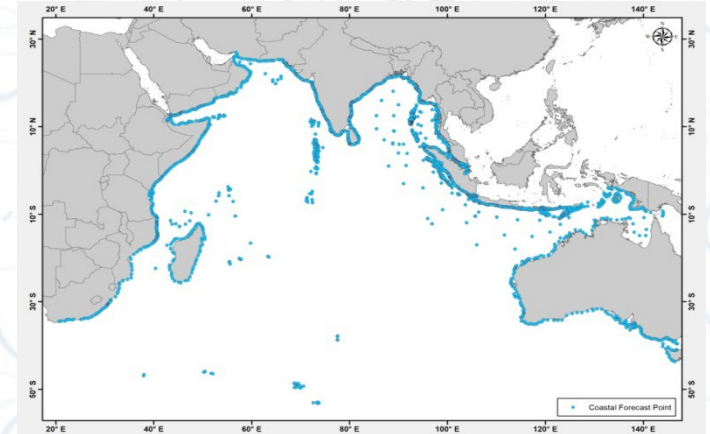
TSP India Activities during Intersessional Period

- Update on CFZs of India
- Probabilistic Tsunami Hazard Assessment for Makran Subduction Zone
- Monitored 81 Tsunamigenic earthquakes and issued bulletins as per the TSP Service Definition
- Participated in IOWAVE20 & IOTWMS Communications Test conducted during reporting period
- TSP India Performance



UPDATES In CFP and CFZ Version 2018 Mar 14

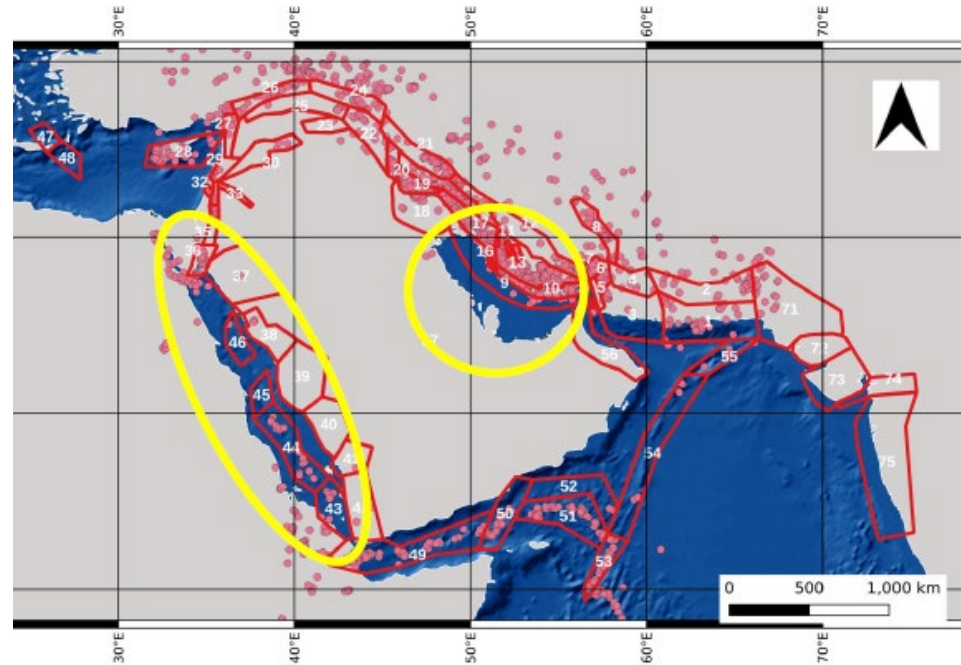
- ❑ CFZs : 581 and CFPs : 2251
- ❑ As part of NTWC SL III operational requirements, added 9 CFZs and modified 1 CFZ of India.
- ❑ Total **79** CFZ are identified for India and generated official list of Tsunami hazard districts approved by NDMA, India
- ❑ Linking CFZs With new GADM (Version 3.6).
- ❑ Verification of Place names, District, State/Province and Country names, naming standards against the ISO standard documents is under progress.
- ❑ CFZ files will be circulated to TSP Australia and Indonesia for comments and suggestions and will be released as a new version with approved date.



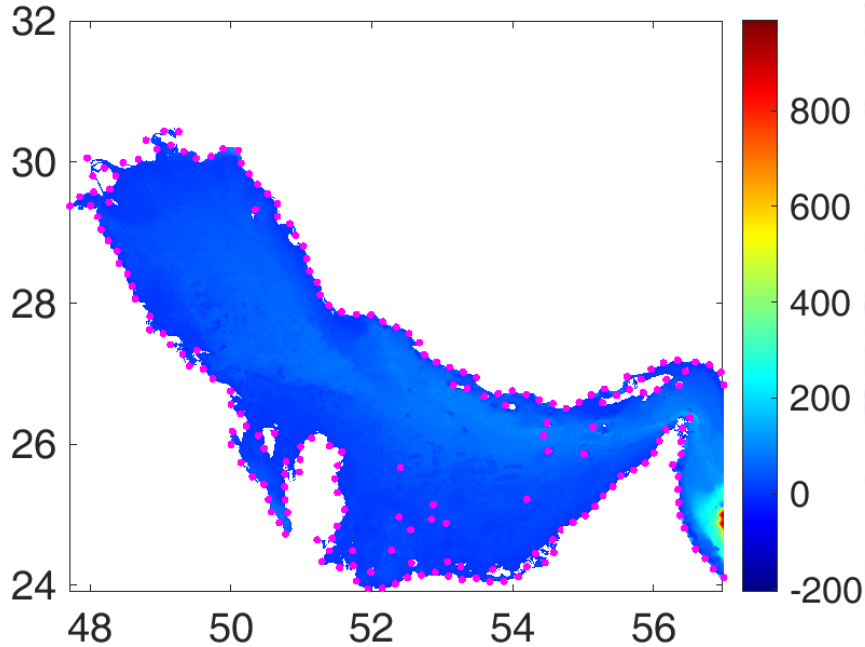
Probabilistic Tsunami Hazard Assessment

- TSP-India is actively participating in UNESCAP project of PTHA for Makran Subduction Zone
- Millions of Tsunami propagation simulations were carried out using ADCIRC for the Persian Gulf and Red Sea regions in two phases.
- Results (max elevation) were shared with the Task team on PTHA for these two regions at POIs.
- Few simulations in phase 2 for Red sea are under run.

Source Zones



PTHA Simulations on the Persian Gulf



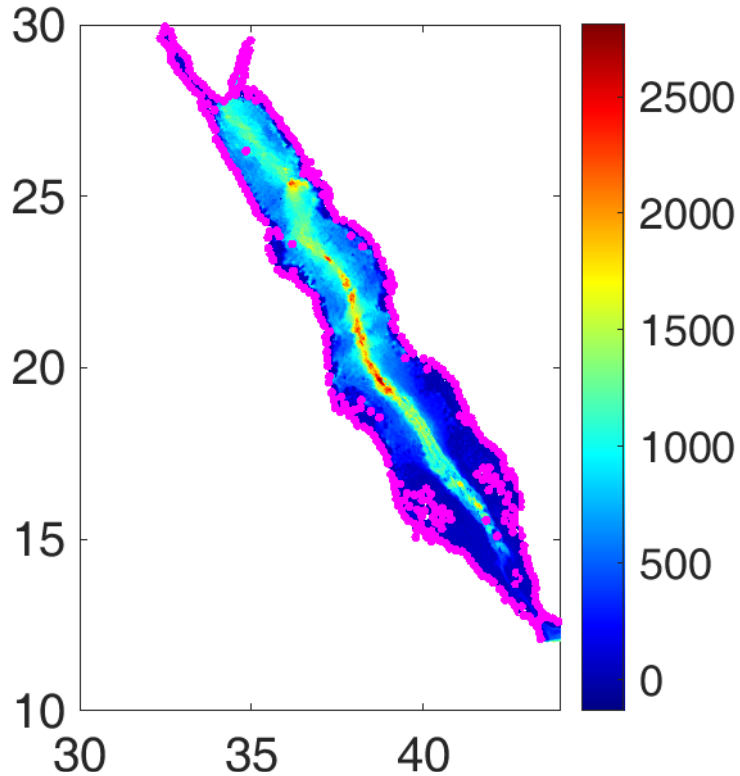
Persian Gulf region for which PTHA simulations were carried out. The magenta dots show the POIs

	Simulations	Status
Phase 1	75707	Completed
Phase 2	321991	Completed
	397698	

nele = 1737915;
nnodes = 874620;
Simulation time = 12 hrs;
Computational time = 1 min;
No of Processors = 180



PTHA simulations on the Red Sea



Red Sea region for which PTHA simulations were carried out. The magenta dots show the POIs

	Simulations	Status
Phase 1	354890	Completed
Phase 2	706124	75% completed
	1061014	

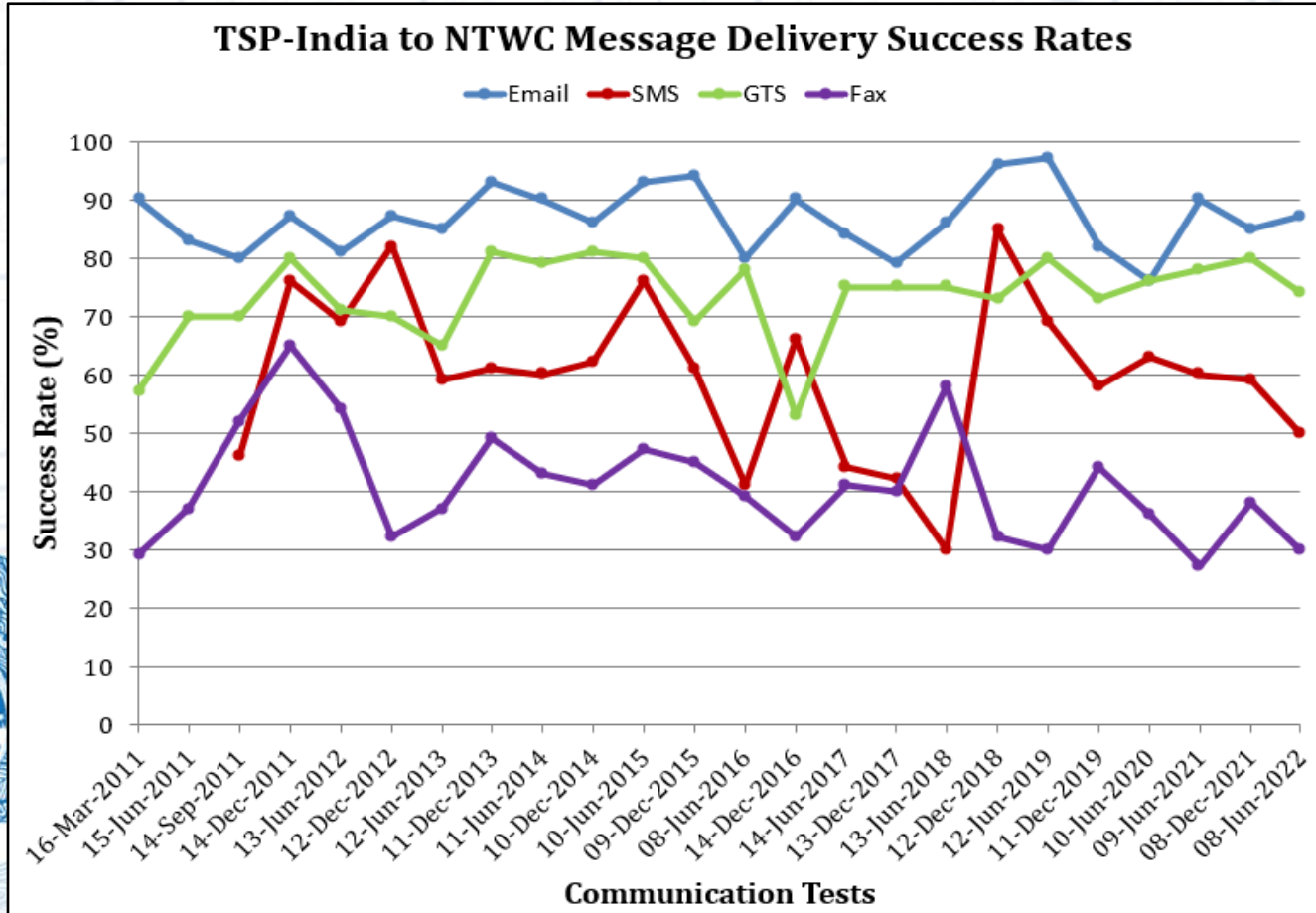
nele = 2650346;
nnodes = 1333616
Simulation time = 12 hrs;
Computational time = 2 min
Processors = 288

Tsunami Awareness & Response

- Participated in **Six Communication Tests** during April 2019 to October 2022.
- Participated in IOWAVE 2020 Exercise in Oct 2020
- Participated in IOTWMS Pre and Post IOWave20 webinars during 28-30 September 2020 and 11-12 November 2020
- Conducted a webinar on “**Tsunami Preparedness and Implementation of Tsunami Ready**” to Odisha Disaster Management Officials in coordination with Odisha State Disaster Management Authority (OSDMA) on 19 February 2021
- INCOIS and the National Institute of Disaster Management (NIDM) jointly organized a Webinar on “**Tsunami Risk Reduction and Resilience**” on 10 August 2021
- Participated in IOTWMS **Regional SOP Workshop for Broadcasting Media and DMOs** during 7-9 September 2021, 12-14 October 2021 and 26-28 October 2021
- **World Tsunami Awareness Day** commemorated during 2019, 2020 , 2021 and 2022 with various activities such as Open Day for school children, Tsunami Science Models exhibition, Drawing/Painting/Essay writing competition, Tsunami webinars and sensitization workshops.
- **On 05th Nov 2021 & 2022, conducted Tsunami Mock drill to Odisha Tsunami Ready Villages.**



TSP-India Message delivery success in COMMs Test



TSP India Performance

KPI 1: Elapsed Time of Issuing First Earthquake Bulletin after Earthquake – Target 10 minutes

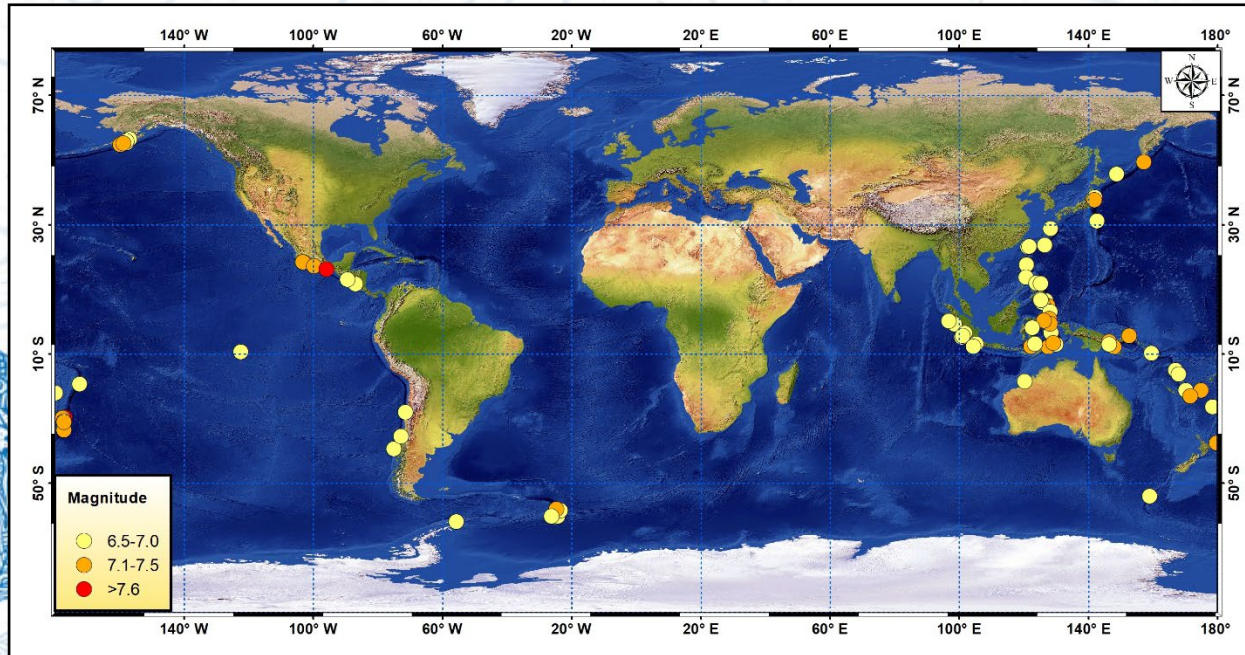
Reporting Period April 01, 2019 to October 31, 2022

Number of TSP INDIA events those crossed the USGS final $M \geq 6.5$

81

Average Elapsed Time to issue first Bulletin

11 min



TSP India Performance

KPI 2-Probability of Detection of Indian Ocean Earthquakes with Magnitude 6.8 or above – Target 100%

Reporting Period April 01, 2019 to October 31, 2022	
Total Number of Indian Ocean Earthquakes $M \geq 6.8$ (USGS)	04
Number of Indian Ocean Events detected by TSP INDIA	04
Number of events those issued first bulletin	04

Target = 100%; Result = 100%



TSP India Performance

KPI 3: Accuracy of Earthquake Magnitude (Target 0.3)

KPI4: Accuracy of earthquake hypocenter Depth (Target 30km)

KPI 5: Accuracy of earthquake hypocenter Location (Target 30km)

Reporting Period April 01, 2019 to October 31, 2022

Number of events those issued first bulletin

81

	Target	Achieved
Magnitude	0.3	0.13
Depth	30 km	27.6 km
Location	30 km	17.6 km



TSP India Performance

KPI 6: Elapsed Time of Issuing First Tsunami Threat Assessment Bulletin after Earthquake – Target 20 min

Reporting Period April 01, 2019 to October 31, 2022	
Number of Events Threat Assessment Bulletin issued	5#
Number of Events for which "THREAT" Bulletin issued	0
Number of Events for which "NO THREAT" Bulletin issued	5
Average Elapsed Time for all Events	24.6 min

7.4 M South Sandwich Islands Region on 12 Aug 2021 : Though this event has no threat for the Indian Ocean, since there could be a wave activity as per TSP- Australia, TSP-India had also monitored this event closely and issued the type-II No threat Bulletin and Type-IV Final bulletin with recorded sea-level observations. Since the 7.4 magnitude is below the threshold of 8.0, hence, this event may not be considered for the KPI6 evaluation as per the SDD.

Event	Elapsed Time of First EQ Bulletin (min)	Elapsed Time of First Threat Assessment Bulletin (min)	Threat Assessment	No of Bulletins	Threat Cancel Time (mins)
			Threat Zones and Countries		
M 6.7 Southern Sumatra, Indonesia on 13 Mar 2022	10	26	-	2	No Threat Issued
M 6.5 Sunda Strait, Indonesia On 14 Jan 2022	10	25	-	2	No Threat Issued
M6.5 Southern Sumatra, Indonesia On 18 August 2020	09	25	-	2	No Threat Issued
M6.6 Off West Coast of Northern Sumatra On 14 May 2021	09	29	-	2	No Threat Issued
M6.5 Southern Sumatra, Indonesia On 18 August 2020	09	25	-	2	No Threat Issued
M6.8 Southwest of Sumatra, Indonesia on 02 Aug 2019	09	18	Issued threat for 3 Zones in Indonesia (BANTEN PANDEGLANG P.PANAITAN; BANTEN PANDEGLANG S; LAMPUNG TANGGAMUS B)	3	202 Mins

TSP India Performance

KPI 7: Probability of detection of tsunamis above threat threshold - Target: 100%

Reporting Period April 01, 2019 to October 31, 2022

Number of events those generated above threat threshold waves (> 50 cm)

None

KPI 8: Accuracy of tsunami wave height predictions - Target: factor of 2

Event	Elapsed Time of First EQ Bulletin (min)	Elapsed Time of First Threat Assessment Bulletin (min)	Threat Assessment		Number of Bulletins Issued	Threat Cancel Time (mins)
			Threat Zones and Countries	Highest Predicted Wave Amplitude		
NA	NA	NA	NA	NA	NA	NA

TSP India Performance

Summary of Performance Indicators during the reporting period

S. No	Performance Indicator	Target	TSP India Performance
PI 1	Elapsed time of issuing first earthquake bulletin after earthquake	10 min	11 min
PI 2	Probability of Detection of IO EQ with Mw >= 6.8	100 %	100%
Accuracy of Earthquake Parameters, in comparison with final estimates from USGS			
PI 3	Magnitude	0.3	0.13
PI 4	Depth	30 km	27.6 km
PI 5	Location	30 km	17.6 km
PI 6	Elapsed time of issuing first tsunami threat assessment bulletin after earthquake	20 min	24.6 min
PI 7	Probability of detection tsunamis above threat threshold	100%	NA
PI 8	Accuracy of tsunami wave height predictions	Factor of 2	NA

Future Plans

- ❑ Work on **Operational procedures (SOP)** for **atypical tsunami** sources such as Submarine landslides, Volcanic eruption and meteoric sources.
- ❑ Utilization of **real-time GNSS & SMA data** for rupture characterization of the tsunamigenic earthquakes.
- ❑ Mounting efforts on Integrated inversions for tsunami source characterization
- ❑ Continue to contribute strongly to IOTWMS activities in the next intersessional period, including:
 - The planning, conduct and reporting of biennial IOWave exercises
 - The planning, conduct and reporting of 6-monthly Communication Tests
 - Regular NTWC/DMO/Media SOP Training Workshops
 - ICG/IOTWMS Working Groups and Task Teams



THANK YOU

