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Commission

SUBREGIONAL WORKING GROUP FOR THE NORTH WEST INDIAN OCEAN (NWIO)

Chair Report

Dr. Mohammad Mokhtari

Chair

Ms V. Sunanda Manneela,

Vice-Chair

05.02.2024

Subregional Working Group For The North West Indian Ocean (NWIO)

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Terms-of-Reference

1. To evaluate capabilities and ascertain requirements of countries in the northwest Indian Ocean region for providing end-to-end tsunami warning and mitigation services within a multi-hazard framework and within the framework of the ICG/IOTWMS.
2. To promote and facilitate tsunami hazard and risk studies and research in the region.
3. To facilitate cooperation in the establishment and upgrading of seismic, sea level and GNSS stations and networks and communication systems in the region.
4. To facilitate improvement of the education programs on tsunami mitigation in the region.
5. To facilitate capacity building and the sharing of tsunami-related data and information in the region.

Members

- **Chair: Dr. Mohammad Mokhtari (Iran)**
- Vice-Chair : Ms V. Sunanda Manneela (India)
- Dr. Dipankar Saikia (India)
- Dr. Behnam Saeidi (Iran)
- Mr. AlYaqdhan Al-Siyabi (Oman)
- Mr. Jaifar Al-Busaidi (Oman)
- Mr. Ameer Hyder (Pakistan)
- Mr. Tariq Ibrahim (Pakistan)
- Major Muhammad Amjad Iqbal (Pakistan)
- Mr. Majed Naser Alshkeili (UAE)
- Mr. Ahmed Awad Alkatheeri (UAE)
- Mr. Mohammed Al-Eryani (Yemen)
- Mr. Ahmed Al-Jabal (Yemen)
- India DMO Representative - tba

Current Group is composed of members representing NTWC & DMO from each of the Member states of India, Iran, Oman, Pakistan, United Arab Emirates, Yemen

Progress on Activities

UNESCAP Project

Strengthening Tsunami Warning in the North West Indian Ocean through Regional Cooperation

Timely delivery of national tsunami warnings to at-risk coastal communities who are prepared to respond effectively (*Tsunami Ready*)

- Phase 1: Hazard & risk assessment and National tsunami warning chain development (India, Iran, Pakistan + Oman and UAE self-funded)
- Phase 2: Inundation and evacuation mapping capacity development
- Phase 3: At-risk coastal community preparedness

Progress on Activities

UNESCAP Project

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Phase 1: Hazard and risk assessment National tsunami warning chain development

Objectives

1. Better understanding of the risk knowledge to inform and underpin warning and mitigation systems in the NWIO to enable appropriate and effective community responses to the tsunami threat.

1. ***Expert Team 1*** to jointly develop a seismo-tectonic model for the Makran region to be used for the unified PTHA. The main outcome should be a catalogue of representative tsunamigenic scenarios with recurrence rates. Principles of model construction will be defined (by end of December 2019).

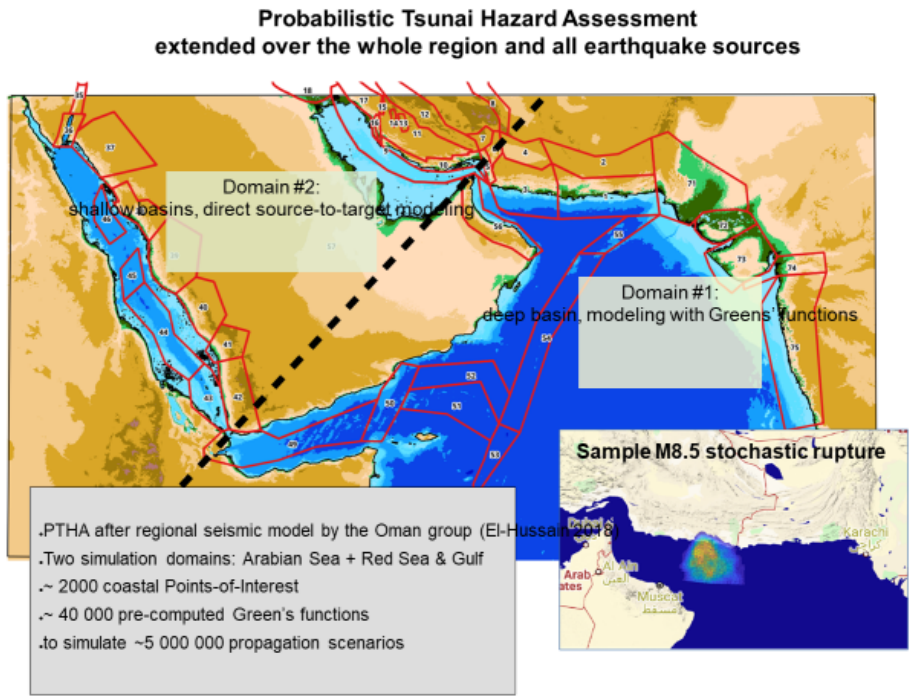
2. ***Expert Team 2*** to consider and identify tsunami propagation models, existing and required data sets, amplification factors, etc., to be used for the unified PTHA and future inundation modelling (by end of December 2019).

3. ***Expert Team 3*** to provide guidance on inclusion of tsunamis generated by non-seismic effects such as landslides, mud volcanoes, etc.) and inclusion of Red Sea and Persian Gulf in the proposed PTHA framework, or through other measures to inform risk assessments and decision makers (by end of May 2020).

Progress on Activities

UNESCAP Project

1. Better understanding of the risk knowledge to inform and underpin warning and mitigation systems in the NWIO to enable appropriate and effective community responses to the tsunami threat.

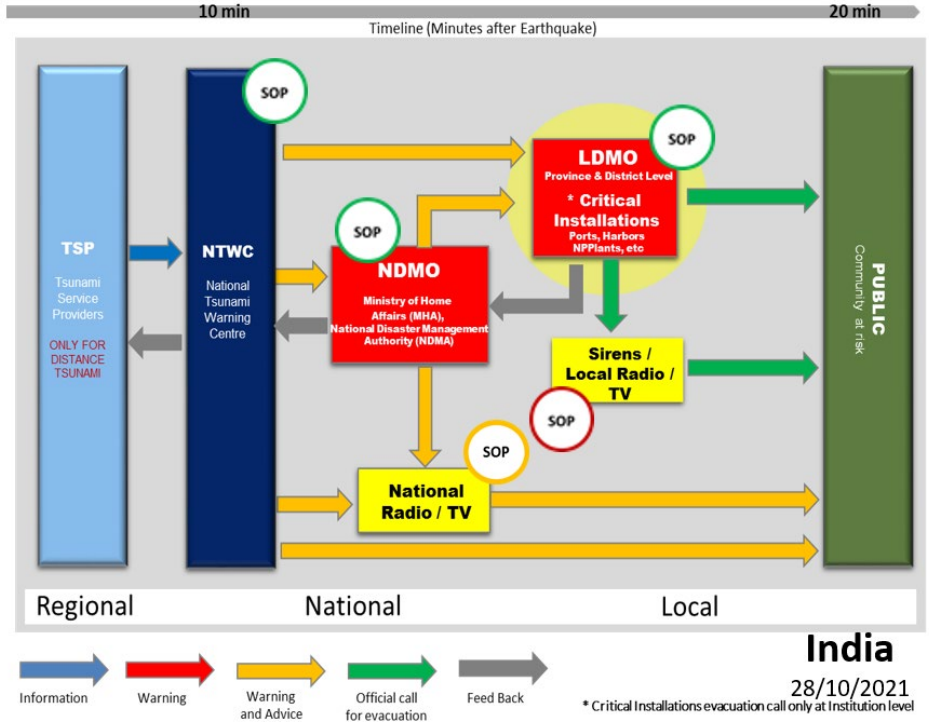


- Meetings of the Makran Probabilistic Tsunami Hazard Assessment (PTHA) in (1) December 2019, (2) May, 2020 (3) June 2020 (4) August 2020 & Nov 2021
- Virtual meetings after COVID-19 impact. No break in progress, but slowed down.
- Initial benchmark PTHA model simulations run at INCOIS [India] with guidance from GFZ [Germany], INGV and University of Malaga .
- Examining the possibility of the tsunami threat in the neighbouring Persian Gulf, specially Metotsunami, and Red Sea.
- Working towards data exchange through MOUs
- To consider hazard from atypical tsunamis from non-seismic sources (eg submarine landslides, splay faults, meteotsunami,....)

Progress on Activities

UNESCAP Project

2. Improvement of warning services at NTWC level and the organization of the national warning chains to assure timely warnings.



- Key stakeholders involved in the national tsunami warning chains brought together to enhance ownership, communication and coordination across national and local levels
- Series of virtual National Consultative Meetings with India, Iran, Oman, and Pakistan
- National tsunami warning chains developed, tested and refined for each country
- Evolution of national tsunami warning chains at different stages between the countries
- Standard Operating Procedures (SOPs) completed or in development for NTWCs, DMOs, and Broadcast Media
- Pilot communities identified and Local Disaster Management Organizations and other stakeholders engaged
- Several Workshops and Webinars: February 2020, November 2020, June 2021, September 2021, twice in October 2021,
- COVID-19 guidelines provided to all IOTWMS Member States in 2020

Progress on Activities

IGCP Project

West Makran Paleo-tsunami Investigation

Objectives

- Investigate the relationship between great earthquakes and associated tsunamis in Makran Subdcution Zone, duration of the tsunami recurrence, probability of it happening in populated places, identification of the most affected places, extent of the potential damage, time needed for tsunami hazard alert, probability of major earthquakes occurrence, leading to the reduction of humanitarian and property damage.
- Develop a building stone for further analysis to support the identification of the most probable tsunami occurrence from geological point of view, including identification of the major locations that have been affected by past (paleo) tsunami.
- The first workshop was held virtually on October 29, 2021
- The first site visit and trenching is conducted

Progress on Activities

IGCP Project

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West Makran Paleo-tsunami Investigation

STUDYING TSUNAMI SEDIMENT

Remote Sensing

Satellite and aerial images can provide a bird'seye view of the effects of a tsunami over a large area, and can help identify areas where tsunami sediment is likely to be found. This can be particularly useful in areas that are difficult to access.

1

Sampling Techniques

2

Techniques to collect and analyze tsunami sediment, including coring, sieving, and chemical analysis. These methods can provide information about the sediment's composition, age, and location.

Micropaleontology

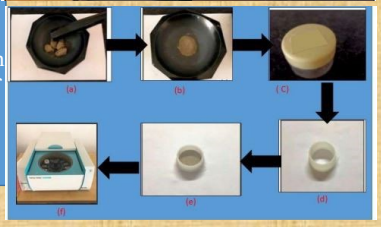
By examining microfossils in tsunami sediment, scientists can learn more about the timing and magnitude of past tsunamis, and can even identify tsunamis from thousands of years ago. This can be particularly useful in areas where there are no written records of tsunamis.

3

Geochemical Analysis

4

By analyzing the chemical composition of tsunami sediment, scientists can learn more about the source of the sediment, and can track the movement of water and debris during the tsunami. This can provide insights into the nature of the tsunami, and can help with hazard assessment.



Dating Method (OSL)

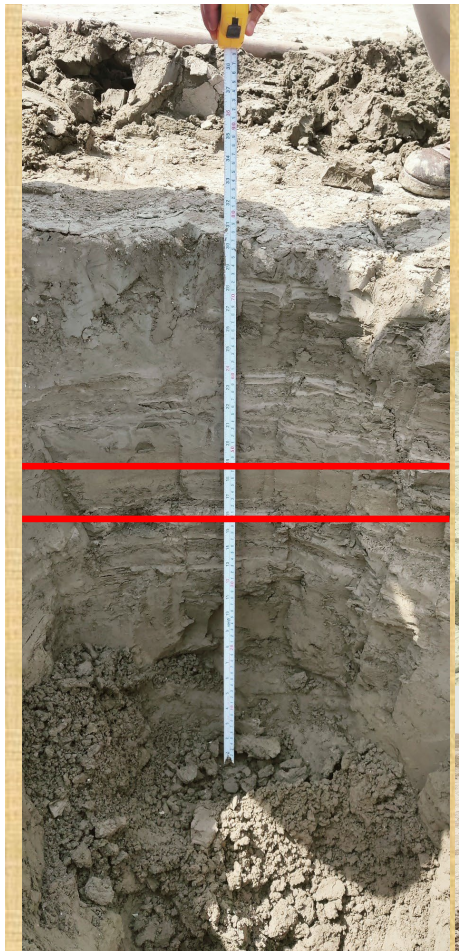
5

To obtain Chronological Event

Progress on Activities

IGCP Project

West Makran Paleo-tsunami Investigation



SITE 1 GABRIK

- Depth of trench- 80 cm
- Sand layer from top 28 cm and thickness 7cm
- Collected 2 OSL samples
- 10 samples for Geochemical

Progress on Activities

IGCP Project

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West Makran Paleo-tsunami Investigation

Progress on Activities

Status of Action Items from Intersessional Steering Group December 2020

Sl No.	Actions & Recommendations	Status
1	Requests the ICG/IOTWMS to encourage all Member States to work on their tsunami warning chain with a view to minimize the number of steps (between the NTWC and Public) in the warning chain, and with clear authorization of responsibilities amongst the NTWCs, NDMOs, LDMOs and Public.	As part of UNESCAP Project Warning Chains of all MSZ member states were refined and SOPs are being prepared
2	NWIO-WG member states are urged to exchange real-time data with the TSPs. It is also strongly suggested to go toward the multi-lateral.	Currently bi-lateral agreements between member states is in progress
3	The reaction to atypical tsunami events needs to be incorporated into tsunami early warning systems including community evacuation and emergency plans.	'Atypical' events needs to be further studied to incorporate them in TEWS
4	On-job training also needs to be initiated among NWIO member countries, may be when international travel is safe we can start with one by one member state.	Member states to consider after COVID-19 situation comes under control
5	Initiate building knowledge-based database of risk assessment (approaches adopted for hazard, vulnerability and risk assessment) that is accessible to all Member States (possibly IOTIC site or other portal).	Yet to initiate. NWIO will coordinate with IOTIC
6	Paleotsunami study has been initiated in Iran by the University of Hormozgan, to be extended in the region, this can help us to know more historical seismicity and also achieve the required Mmax for hazard studies.	First field visit for trenching is expected to be in June 2023
7	Encourage the participation of North West Indian Ocean representatives in webinars and workshops with a focus on the Makran region.	On going
8	Chairs of WG1, WG2, WG-NWIO, and Task Teams to prepare a proposal for UN Ocean Decade with support from IOTIC and the Secretariat for enhancement by the Steering Group. Consider focusing on 1) Near-field tsunami warning and mitigation including: transforming tsunami warning services through new technology (GNSS, smart cables) through to community preparedness and infrastructure; and/or 2) Tsunami monitoring gaps in NWIO. In-particular enhancing the observing networks, PTHA development, and data sharing. These activities could be expanded to the entire Indian Ocean basin	On going ??
9	Working Groups to review the recommendations of the Capacity Assessment of Tsunami Preparedness: Status report 2018.	To review
10	WG-2 and WG-NWIO to provide advice to Makran project team on harmonisation issues of NTWC products and warnings in the NWIO	Completed

Challenges

- Identifying all potential sources of tsunami in Makran Subduction Zone
- Assess and mitigate local tsunami threat , based on the ongoing UNESCAP Project
- Maintaining effective national tsunami warning chains for rare events such as tsunami, strengthen local and community level activities
- Integrating national tsunami warning chains with other multi-hazard frameworks
- Timeliness of tsunami warnings for near-field tsunami events, ongoing should follow now the 2nd phase.
- Need to further research the seismicity of the region and how to include features such as splay faulting in the PTHA, an example has been shown on this under PhD student
- To include atypical tsunamis in the PTHA, as mentioned in the above items.
- Optimal network design for Data Sharing , this will very important item that need to find a solution.
- Strengthening of observation network with advanced technologies (GNSS/SMART Cables/OBS etc.)
- Strengthening tsunami awareness and preparedness especially for near-field threat this is a vitally important subject for the Makran region.
- The tsunami ready for NWIO should an intregated part og the group. Learn and help WG-3, may be act as a pilot area.

Way Forward & New Opportunities

- Increase the geosciences information and historical/Paleo data to improve the parameter for more accurate modeling. It is highly desirable to use the uniform model (regional) in the local sense.
- UNESCAP Project knowledge transfer implementation.
- Paleo-tsunami project…..ongoing and approved for the year 2024
- Identify new projects on the Non-Seismic and complex sources in regional senses.
- Utilize National Tsunami Working Groups established by UNESCAP Project to further coordinate, maintain and develop national tsunami warning chains
- Utilize national and next IOWAVE exercises to test and enhance national tsunami warning chains mainly in the Pilot area.
- Engage local communities in pilot areas identified by UNESCAP Project
- Tsunami Ready implementation will be introduced in this meeting for NWIO.
- Ocean Decade – Tsunami Programme