

NATIONAL REPORT

Contribution of DGMAN to ROPME meeting

BASIC INFORMATION

Oman is exposed to local tsunamis (Makran trench Zone) and distant tsunamis (Sunda trench zone). Other extreme hazards in Oman are tropical cyclones and flash floods. The Makran Trench Zone generated an earthquake of magnitude 8.3 in 1945, which made 4000 casualties in Pakistan and hit the Sur area in Oman with waves of 3 meters height. Tropical cyclones have hit the Omani coast several times; cyclone Gonu in 2007 made 49 casualties, while in 1890 a cyclone took 727 lives. Flash floods happen almost every year with infrequent casualties but important economic impact.

The Directorate General of Meteorology and Air Navigation (DGMAN) was tasked by the government of Oman to develop and establish a National Multi Hazard Early Warning System (NMHEWS). Within this framework the Ministry of Transport and communication of Oman and UNESCO signed MOU in 2009 towards developing NMHEWS under the technical assistance of UNESCO's Intergovernmental Oceanographic Commission (IOC). The project is fully funded by Oman and was launched in 2010. It includes infrastructure for monitoring, processing, developing of SOPs (Standard Operating Procedure) and building the capacity in Oman for an end to end TEWS (Tsunami Early Warning System). All procurement process is done directly by Oman with technical assistance from UNESCO/IOC.

The development of the TEWS has been designed and divided into 9 work packages after the agreement between IOC/UNESCO and the Ministry of Transportation. The Work Packages (WP) are;

- WP1. Staff recruitment and training
- WP2. Network of coastal Sea Level gauges
- WP3. Network of Seismic sensors and GPS Network
- WP4. Communication system for dissemination
- WP5. Education & Public Awareness
- WP6. Risk Analysis and Hazard Mapping
- WP7. Computer hardware for the center
- WP8. Software and tsunami modeling
- WP9. IOTWS Coordination, conference, SOP

Below is the report related to the sea level and GPS networks.

1. National Sea Level Network

The current sea level network consists of 3 stations, has been operated by UHSLC (University of Hawaii, Sea Level Center) since 1987 in collaborate with DGMAN. Now, DGMAN is installing 7 additional stations for tsunami monitoring purposes as seen in Figure 1 and table 1. The new stations will be in operation by arch 2013.



Figure-1. Sea level network in Oman, consists of 3 current stations (black circles) and new stations (red triangles).

Table-1. List of sea level stations. Enc=float gauge, prs=pressure gauge, rad=radar gauge. GTS=Global Telecommunication System, BGAN=Broadband Global Area Network, Ir=Iridium

No.	Location	Name	latitude	Long	Status	Sensor	Com
1	Muscat	MUSC	23.63	58.57	Operational	Enc, prs, rad	GTS, BGAN
2	Masirah	MASI	20.68	58.87	Operational	Enc, prs, rad	GTS
3	Salalah	SALA	16.93	54.00	Operational	Enc, prs, rad	GTS
4	Daba Bayah		25.65	56.27		Rad, prs	GTS, Ir, GSM
5	Majis		24.52	56.61		Rad, prs	GTS, Ir, GSM
6	Wudam		23.82	57.53		Rad, prs	GTS, Ir, GSM
7	Qurayat		23.26	58.93		Rad, prs	GTS, Ir, GSM
8	Sur		22.58	59.53		Rad, prs	GTS, Ir, GSM
9	Ashkhara		21.86	59.57		Rad, prs	GTS, Ir, GSM
10	Duqm		19.66	57.72		Rad, prs	GTS, Ir, GSM

2. GPS network

The current GPS stations in Oman is operated by PDO (Petroleum Development of Oman), consisted of several fix GPS stations around the exploration oil field, but only one station is transmitted to ITRF (International Terrestrial Reference Frame). DGMAN develops a network with 10 more stations with sampling rate 1 minute and transmitted in real time to DGMAN for tsunami purposes as seen in figure 2 and the list of station in table-2.



Figure-2. GPS stations in Oman collocated with sea level stations and meteorological stations. Current station is located in PDO (Petroleum Development of Oman).

Table-2. List of GPS stations

No.	Location	Code	latitude	Longitude	Status
1	Yibal, PDO site	YBL	22.14	56.03	Operational, ITRF
2	Masirah, TG-station		20.68	58.87	
3	Sur, TG-station		22.58	59.53	
4	Wudam, TG-station		23.82	57.53	
5	Majis, TG-station		24.52	56.61	
6	Salalah, Met station		17.03	54.08	
7	Marmul, Met station		18.14	55.18	
8	Q Alam, Met station		21.37	57.05	
9	Nizwa, Met station		22.86	57.54	
10	Buraimi, Met station		24.24	55.79	
11	Khasab, Met station		25.90	56.14	

3. Information on Tsunami occurrences

There was a big earthquake in April 2012, off Sumatra coast with Magnitude 8.3. The earthquake generated tsunami and was monitored using sea level stations around the Indian Ocean. In Figure 3, we show the record of tsunami in 3 sea level stations in Indonesia, Male and in Oman.

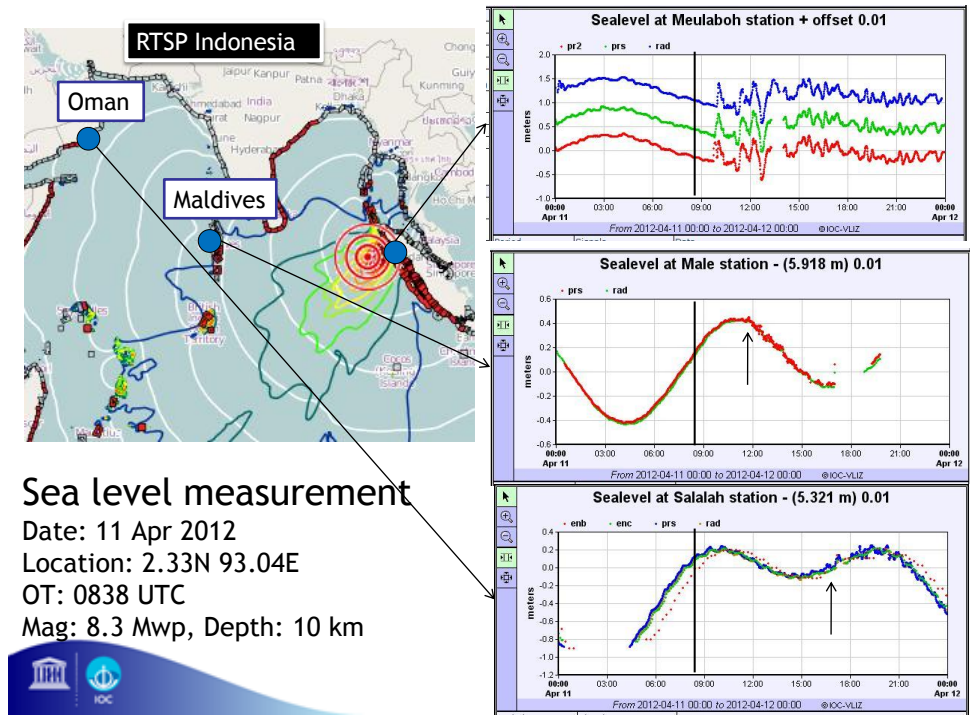


Figure 3. Record of tsunami wave in tide gauge stations of Meulaboh (Indonesia), Male (Maldives) and Salala (Oman).

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