



United Nations
Educational, Scientific and
Cultural Organization

Organisation
des Nations Unies
pour l'éducation
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Organización
de las Naciones Unidas
para la Educación
la Ciencia y la Cultura

Организация
Объединенных Наций по
вопросам образования
науки и культуры

• Intergovernmental
Oceanographic
Commission

• Commission
océanographique
intergouvernementale

• Comisión
Oceanográfica
Intergubernamental

• Межправительственная
океанографическая
комиссия

Indian Ocean Tsunami Warning and Mitigation System (IOTWMS)

Dr. Juma Al-Maskari, Vice Chair, ICG/IOTWMS & Chair, NWIO-WG

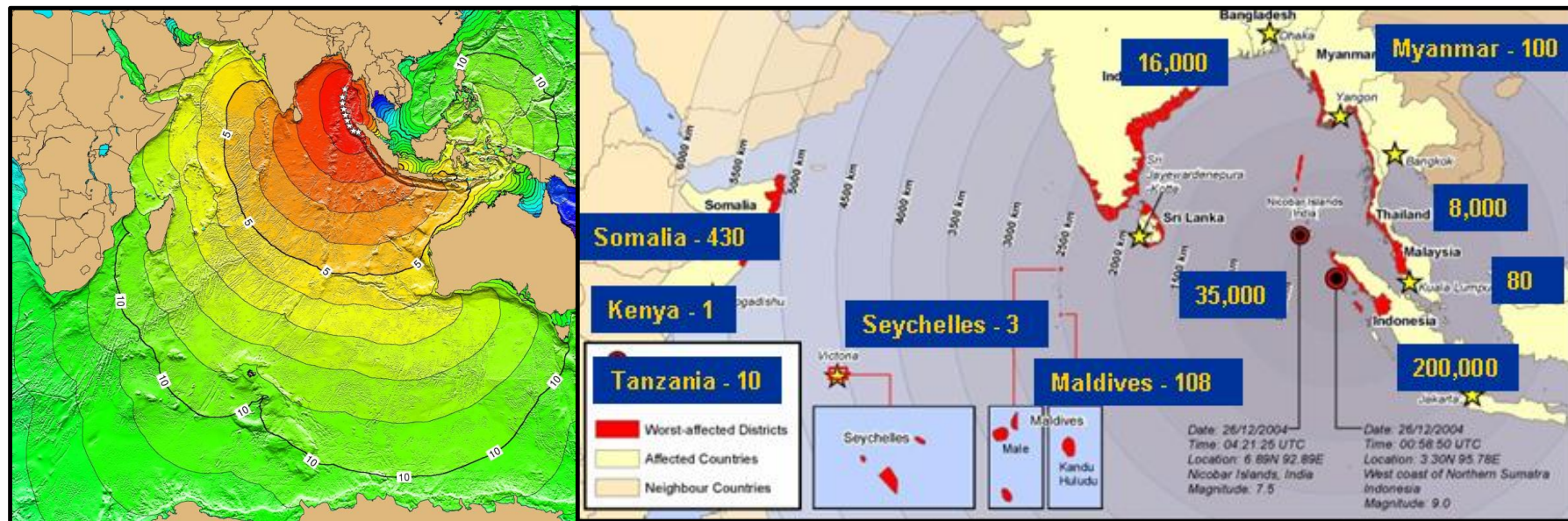
j.almaskari@met.gov.om

Dr. Srinivasa Kumar Tummala, Head, IOTWMS Secretariat

iotwms@unesco.org

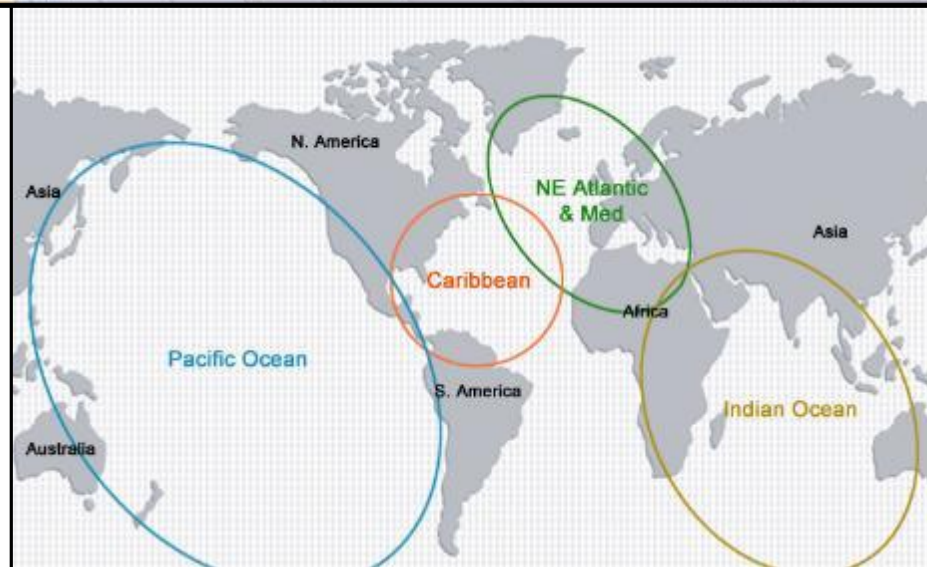
Presentation to RSAHC, Muscat, Oman; 20-22 February, 2017

Indian Ocean Tsunami: 26 December 2004



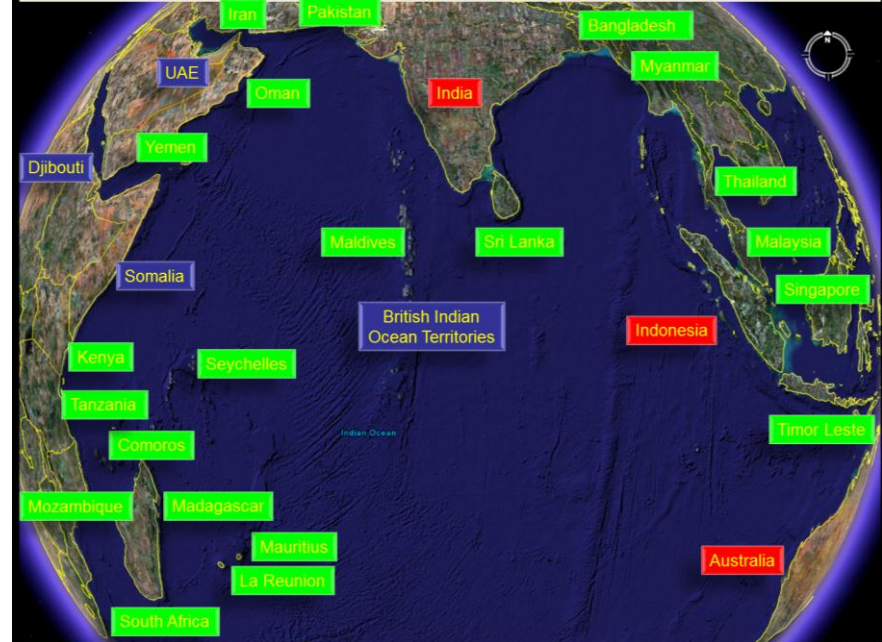
- c.230,000 Dead – Nations of the region react
- International coordination meetings in early 2005
- IOC invited to lead TWS establishment

- ICG/IOTWMS established by 23rd IOC Assembly, June 2005



ICG/IOTWMS Structure

- Executive Secretary,
UNECSSO IOC
 - Tsunami Unit, Paris
 - ICG/IOTWMS Secretariat, Perth
- Elected officers (2015-17):
 - Chair: Dr Srinivasa Kumar Tummala (India) – stepped down in Oct 16
 - Vice Chair: Dr Juma Al-Maskari (Oman)
 - Vice Chair: Dr Sam Hettiarachchi (Sri Lanka) – current acting Chair
- Steering Group
- Tsunami Service Providers (TSPs): Australia, India, Indonesia
- Network of National Tsunami Warning Centres (NTWCs)
in 24 Member States



Working Groups & Task Teams

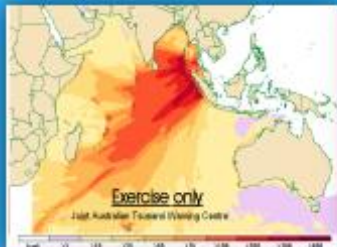
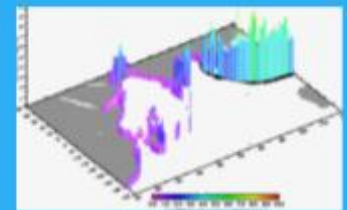
- WG1: Tsunami Risk, Community Awareness and Preparedness
- WG2: Tsunami Detection, Warning and Dissemination
- Sub-regional Working Group for the North West Indian Ocean
- Exercise Indian Ocean Wave 2016 Task Team



Achievements

➤ Risk Assessment & Reduction

- Tools, Methods & Guidelines for Tsunami Risk Assessment
- Indian Ocean regional Tsunami Hazard Maps
- Assessment and awareness of Makran tsunami hazards
- Regional Trainings on Tsunami Risk Assessment

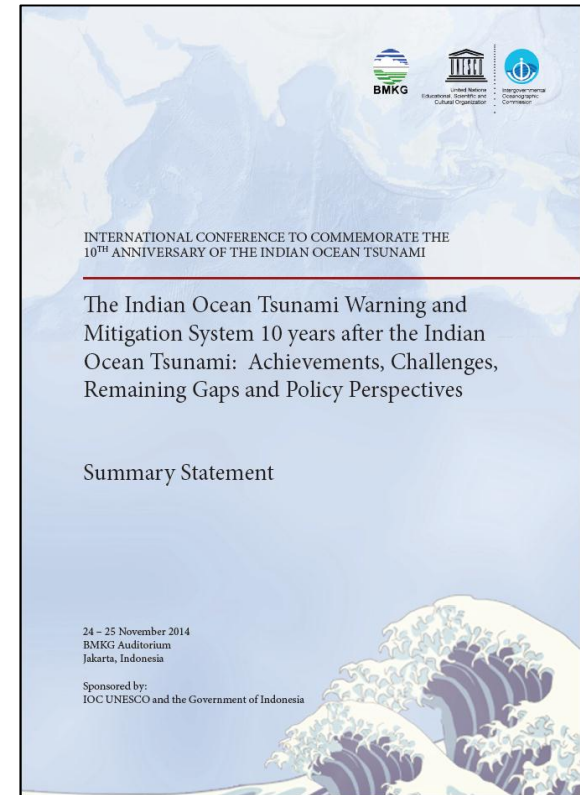


➤ Awareness & Preparedness

- Material to educate NTWCs, Emergency managers, Communities, Schools, Tourism, etc
- Indian Ocean-wide "IOWAVE" Exercises
- Communication tests
- The Indian Ocean Tsunami Information Centre (IOTIC)

International Conference to Commemorate the 10th Anniversary of the Indian Ocean Tsunami Jakarta, November 2014

- Conference reported on the development of the IOTWMS, outstanding needs, donor perspectives, sustainability, international cooperation, and towards the 3rd UN conference on DRR.
- The cost of establishing the IOTWMS has been US \$630 million
(extrapolation based on Nature 2014 estimate)
- IOTWMS annual operational cost is US \$90 million (excluding mitigation measures)
- National investment including an ongoing maintenance budget is paramount
 - To ensure long-term sustainability, the IOTWMS should link to the disaster management community and form part of a multi-hazard warning system.



ICG/IOTWMS-X Key Outcomes

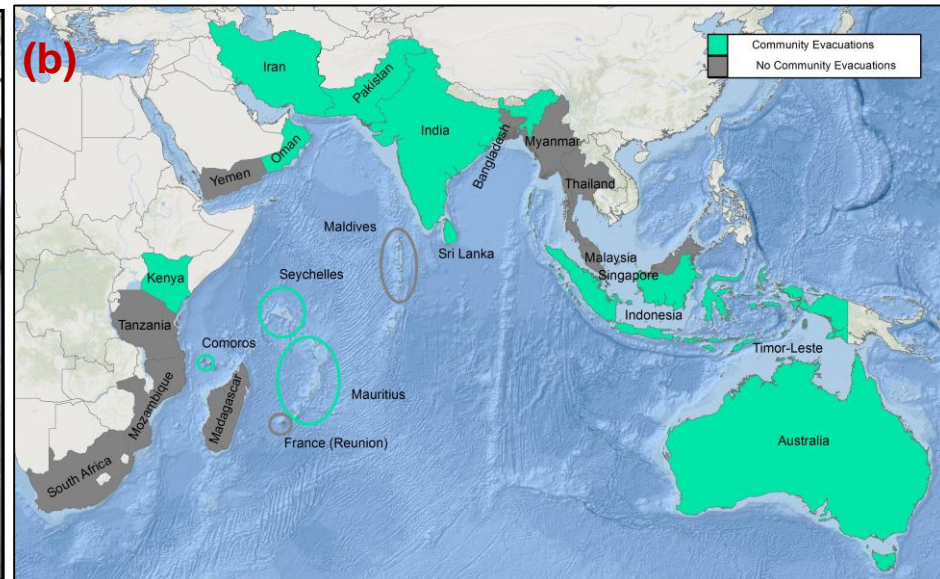
- **Decided** to place greater emphasis on community awareness and preparedness to help ensure more appropriate responses to tsunami warning information
- **Decided** to establish a new Working Group 1 on Tsunami Risk, Community Awareness and Preparedness
- **Decided** to establish a new Sub-Regional Working Group for the North West Indian Ocean
- **Decided** to conduct an IOWave16 exercise in 2016
- **Decided** to conduct Joint TSP/NTWC/DMO/Media SOP workshop and Post-IOWave14 Workshops
- **Decided** to conduct a workshop on coastal hazards and risk assessment in 2016
- Adopted the ToRs of IOTIC
- Adopted the new/enhanced Service Definition Document
- Continue work with TOWS WG on global harmonisation



Indian Ocean Wave Exercises

- IOWave09, IOWave11, IOWave14, IOWave16
- Community level participation:
2009 (0), 2011 (4), 2014 (2), 2016 (12)
- IOWave16: Focus on community involvement
- IOWave 16 Exercise Report will document results of the online evaluation

Photos: IOWave16 (a) Emergency responders in Timor-Leste; (b) Community evacuations



Towards NWIO-WG & RSAHC Collaboration

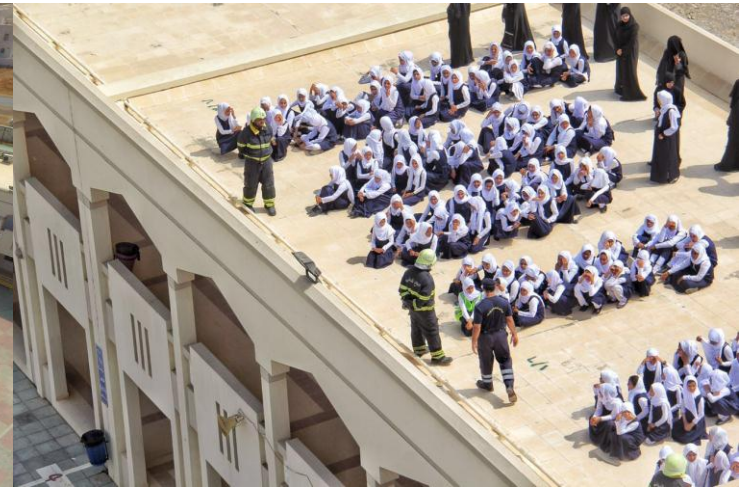
IOWave16 NWIO participation

Drills

Objective 6 - Evacuations

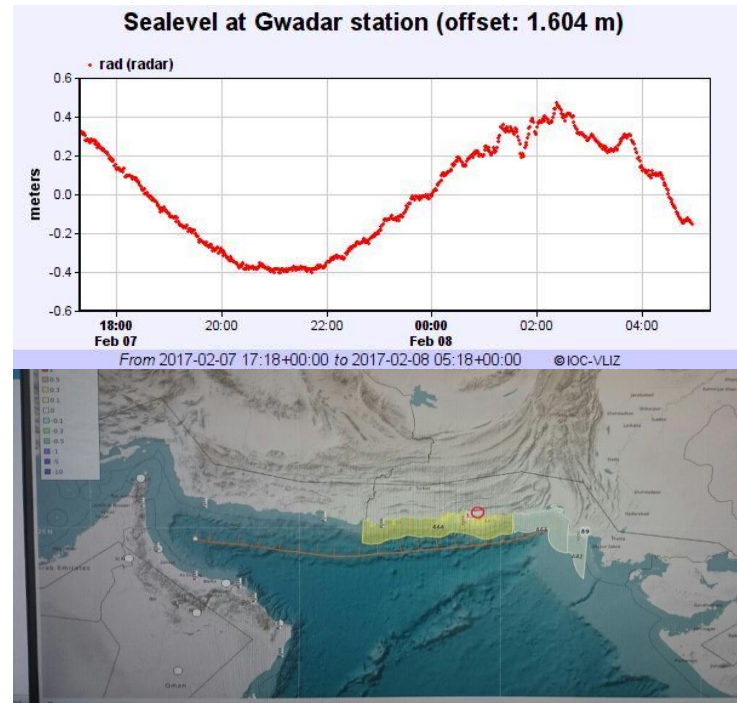
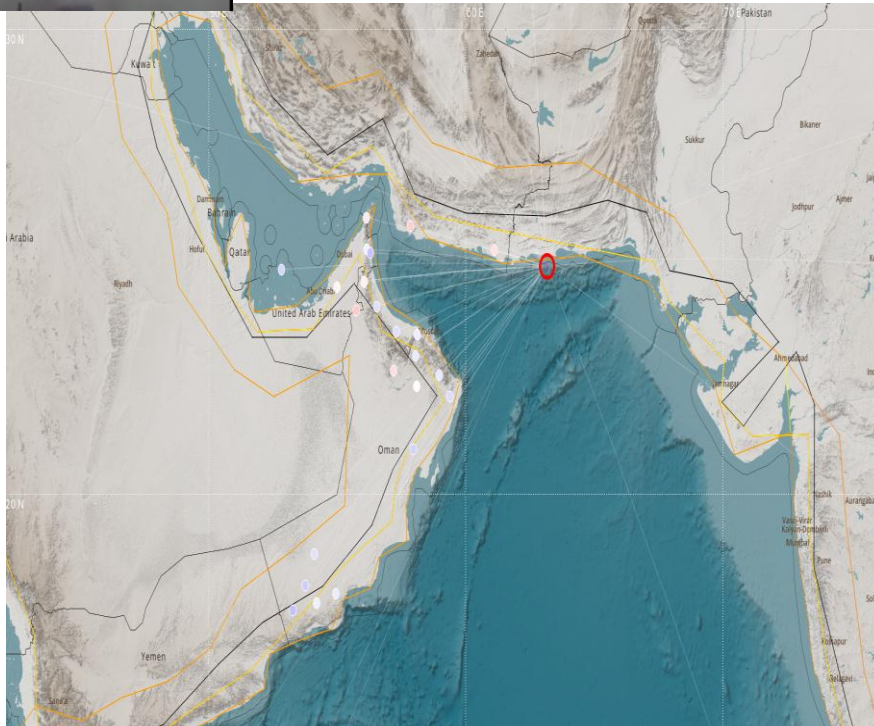
- 12 Indian Ocean countries
- 391 community evacuations were conducted
- Over **58,000** people evacuated

Australia	50	1
Comoros	500	2
India	40,000	350
Indonesia	4,783	3
Iran	30	1
Kenya	300	1
Mauritius	198	6
Oman	5,000	7
Pakistan	200	1
Seychelles	900	4
Sri Lanka	5,963	14
Timor Leste	900	1
Total	58824	391



EventID: dgmet2017crhg
Southwestern Pakistan,
Mag: 6.4,T: 2017-02-07- 22:03:36 UTC,
Lat:25.41 N, Lon: 64.43 E, Dep: 10km

Real Time Obs.
&Disseminations of
Alerts





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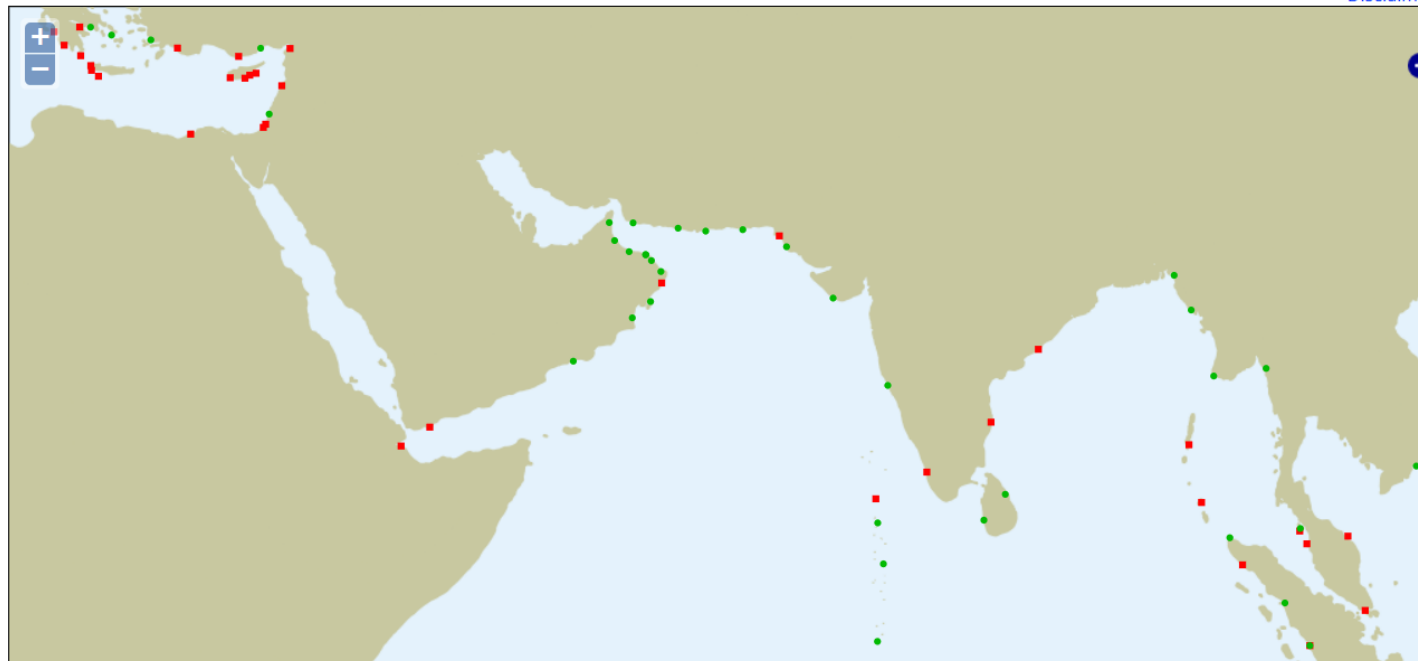


SEA LEVEL STATION MONITORING FACILITY

[Intro](#)[Map](#)[Station lists](#)[Station details](#)[Services](#)[GLOSS](#)[Disclaimer & policy](#)

Sealevel stations

Status at 2017-02-19 08:51 GMT

[Disclaimer](#)Type 

Legend:

- Station is offline, or data is outdated
- Station is online
- Station is not available at this site

Offline = No data received since 3 times the transmit interval.

The status is checked every 5 minutes.

The quality of the transmitted data is not checked.

- To obtain more details about a station - move mouse over station and click.
- To zoom in - hold down the Shift-key while holding down the mouse button and drawing a rectangle or use the Scroll mouse button, or use the control buttons in upper left part of map.
- To pan - drag the map, or use the control buttons in upper left part of map.
- Or use the [KML file](#).

Lat: 26.94 Lon:105.64

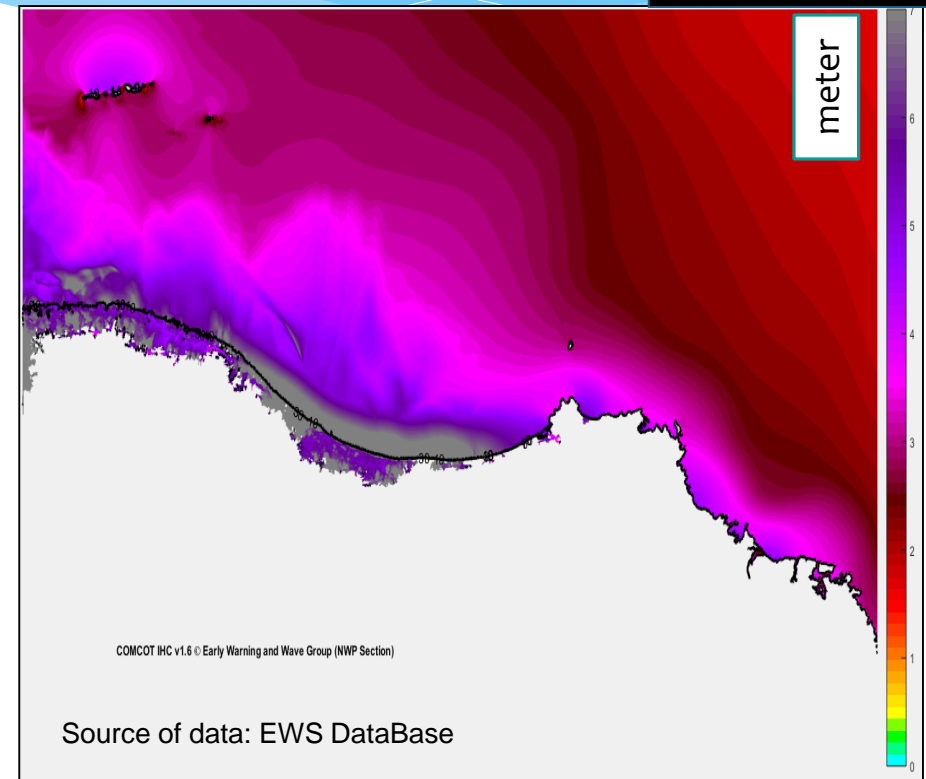
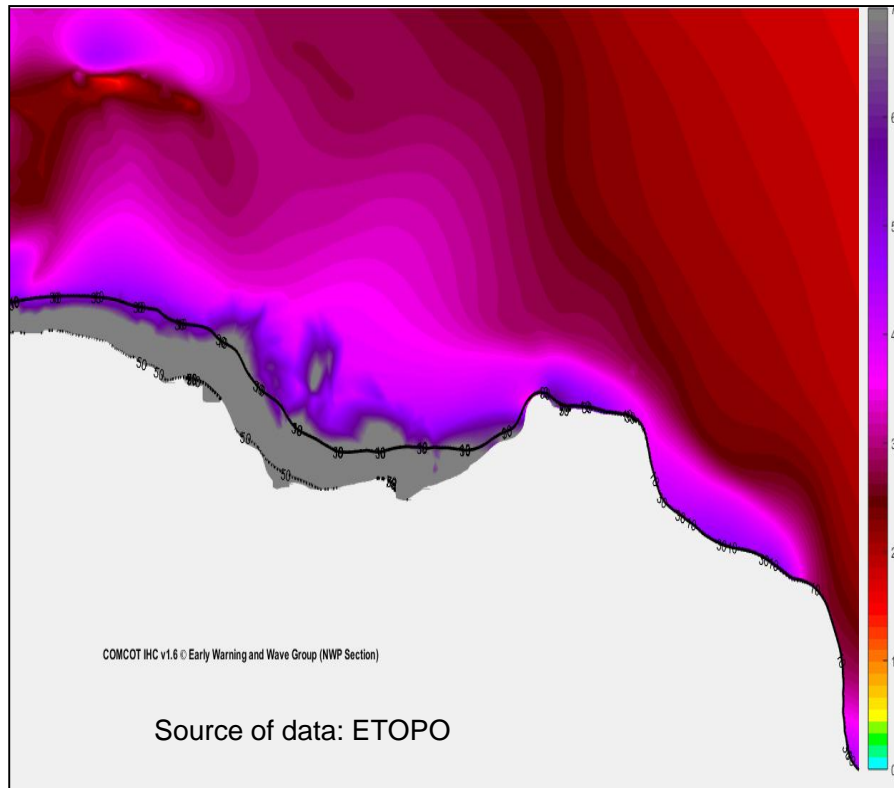
<http://ioc-sealevelmonitoring.org/map.php>

Tsunami Simulation generated from 9.25Mw Earthquake

Low Resolution
(1.8km downscale to 45 m)

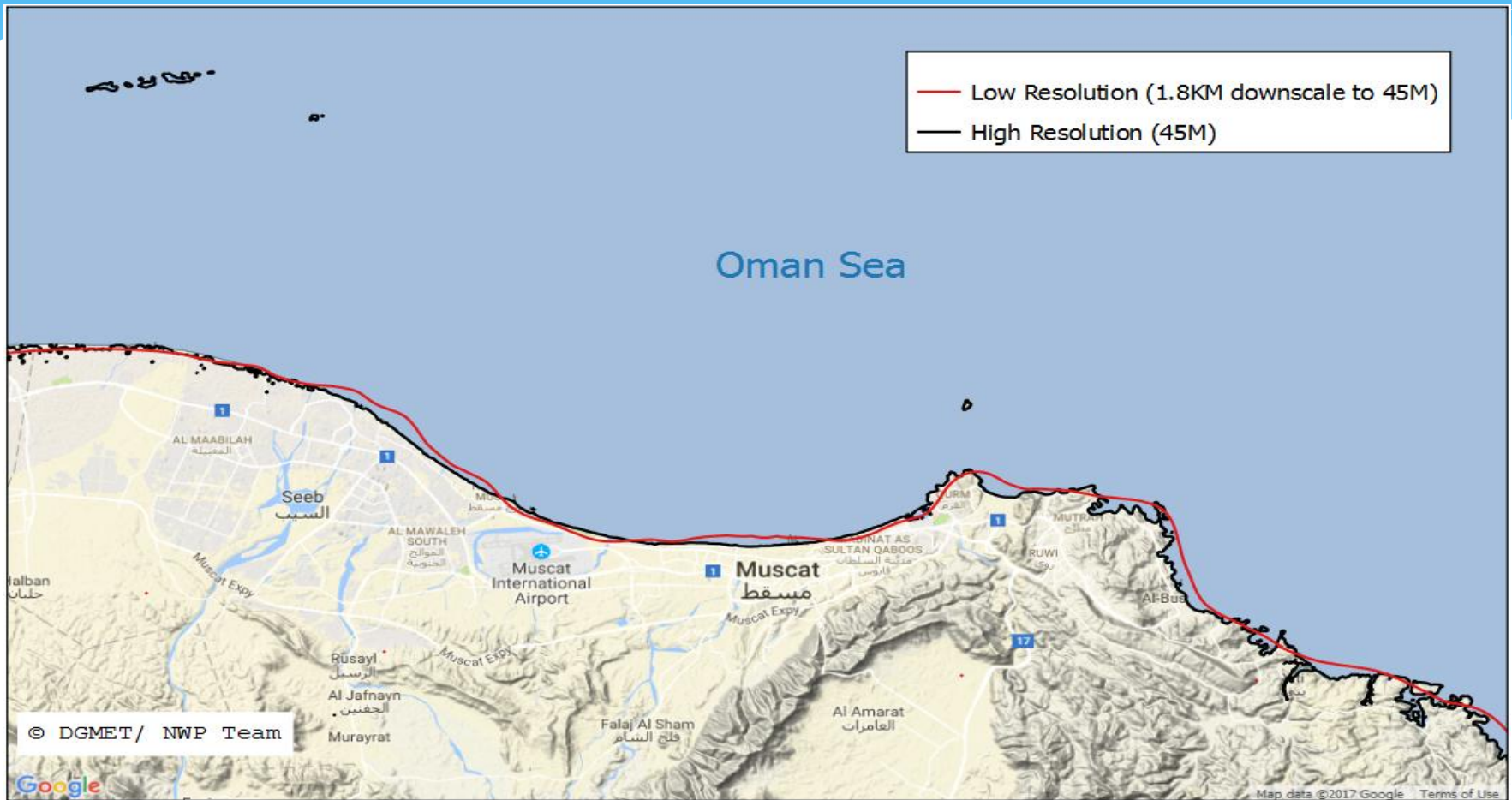
High Resolution
(measured 45m)

Bathymetry



Sea Elevation Height (meter)

Muscat Coastline Difference



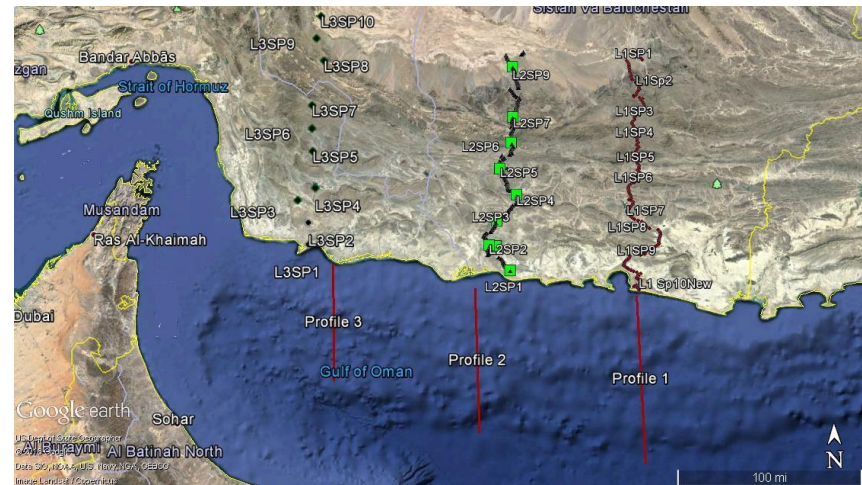
The Western Makran Seismic Transect

Research

International cooperating institutions

- * International Institute of Earthquake Engineering and Seismology, Iran
- * Sultan Qaboos University, Oman.
- * GFZ and GEOMAR, Germany.
- * The Portuguese Institute for the Ocean and the Atmosphere, Portugal.
- * SEGAL (UBI/IDL), Portugal.
- * NORSAR, Norway.
- * Faculty of Geosciences, University of Utrecht, The Netherlands.
- * Other National Institutions

Active Seismic Profiles Locations (Onshore and Offshore)



NWIO-WG & RSAHC Collaboration

- Engage with NAVAREA coordinators for tsunami drills and dissemination of tsunami alerts
- Strengthening of Real-time Tide Gauge networks which are a very important component of tsunami warning
- Bathymetry data is the basis for tsunami modelling
- Research
-etc.





www.ioc-tsunami.org/iotwms

