

Tsunami Hazard, Vulnerability and Risk assessment for the coast of Oman

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Tsunamis are relatively infrequent phenomena representing a greater threat than earthquakes, hurricanes and tornadoes, and causing the loss of thousands of human lives and extensive damage to coastal infrastructures around the world. Advances in the understanding and prediction of tsunami impacts allow the development of new methodologies in this field. This work presents the methodology that has been followed for developing the tsunami hazard, vulnerability and risk assessment for the coast of Oman, including maps containing the results of the process.

Oman is located in the south eastern corner of the Arabian Peninsula and of the Arabian plate, in front of the Makran Subduction Zone (MSZ), which is the major source of earthquakes in the eastern border of the Arabian plate and Oman (Al-Shaqsi, 2012). There are at least three historical tsunamis assigned to seismic origin in the MSZ (Heidarzadeh et al., 2008; Jordan, 2008). These events show the high potential for tsunami generation of the MSZ, being one of the most tsunamigenic zones in the Indian Ocean.

For the tsunami hazard assessment, worst potential cases have been selected, as well as the historical case of 1945, when an 8.1 earthquake generated a tsunami affecting the coast of Oman, and prompting 4000 casualties in the countries of the area. These scenarios have been computationally simulated in order to get tsunami hazard maps, including flooding maps. These calculations have been carried out at national and local scale, in 9 municipalities all along the coast of Oman, including the cities of Sohar, Wudam, Sawadi, Muscat, Quriyat, Sur, Masirah, Al Duqm, and Salalah.

Using the hazard assessment as input, this work presents as well an integrated framework for the tsunami vulnerability and risk assessment carried out in the Sultanate of Oman. This framework considers different dimensions (human, structural) and it is developed at two different spatial resolutions, national and local scale. The national vulnerability assessment is carried out for the entire Oman coastal area comprising 30 coastal wilayats, whereas the local sensitivity assessment is performed for the 9 coastal study areas.

This work also connects vulnerability-risk assessment results to site-specific and target-oriented risk reduction measures. Results identify high risk areas along the coast of Oman in which measures for risk reduction are proposed. The identification and prioritization of mitigation measures were supported by a panel of local and international experts developed during a Risk Assessment Workshop held in Oman and a handbook containing the mitigation measures at national and local scales was developed and delivered to the stakeholders.

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