Multi hazard risk assessment system for the coast of Oman: Tsunami and storm surge scenarios database development and operational system

Íñigo Aniel-Quiroga (1), Mauricio GOnzalez (1), Fernando Méndez (1), José Antonio ÁLvarez-Gómez (2), Felipe Fernández (1), Jara MArtinez (1), Pino Gonzalez-Riancho (1), Ana Rueda (1), Antonio Espejo (1), Ignacio Aguirre-Ayerbe (1), Raúl Medina (1), and Sultan Al-Yahyai (3)

(1) Environmental Hydraulics Institute, Universitiy of CAntabria, Spain (anieli@unican.es), (2) Department of Geodynamics, Faculty of Geology, Complutense University of Madrid, Spain, (3) Directorate General of Meteorology and Air Navigation, DGMAN. Public Authority for Civil Aviation, PACA, Muscat, Oman.

In this work, the Multi Hazard Risk Assessment System (MHRAS) for the coast of the sultanate of Oman is presented. In this system two main phenomena are included: tsunamis and tropical cyclones.

The occurrence of Tropical Cyclones in the Sultanate of Oman is not as frequent as in other tropical areas of the world. However, in the past few years there have been devastating events in the Arabian Sea (i.e. Cyclone Gonu in 2007 or Phet in 2010). Tropical cyclones in Oman caused more than 60 fatalities in 2007 (Gonu) and an estimated 727 deaths in 1890 On the other hand, although Tsunamis are a relatively infrequent phenomena, they represent a larger threat than earthquakes, hurricanes, and tornados and have caused more than 420,000 casualties since 1850. Recent advances in the understanding and forecasting of tsunami impacts allow the development of new strategies to reduce the risk on coastal areas. In this sense, the tsunami warning systems are a useful tool to achieve it.

This work presents the tsunami scenarios and tropical cyclones database that was created to feed the Multi Hazard risk Assessment system for the coast of Oman and the operational system that utilizes the generated data.

To carry out the tsunami scenarios database initially a seismotectonic analysis of the area has been carried out. This analysis allowed the authors to point the seismic areas whose earthquakes could generate tsunamis affecting the coast of Oman. This analysis also presents the seismic tsunamigenic sources characterization, given by their focal mechanisms. 3000 sources were selected in the study area to generate the tsunami database. This database includes scenarios with magnitude between Mw=6.5 an Mw=9.25 that could be generated in the seismic areas within the study area, but it is specially focused on the Makran Subduction Zone (MSZ), as it poses the main tsunami hazard in the western Indian Ocean.

In the same way, for the elaboration of the tropical cyclones database for the early warning system on the coast of Oman hundreds of cases have been numerically propagated and included in the system.

The results of these simulations are included in the Multi Hazard Risk Assessment System of Oman and they work as pre-computed scenarios in case of tsunami or tropical cyclone.