Geophysical Research Abstracts
Vol. 12, EGU2010-5812, 2010
EGU General Assembly 2010

Large Historical Earthquakes and Tsunami Hazards in the Western Mediterranean: Source Characteristics and Modelling

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The western Mediterranean region was the site of numerous large earthquakes in the past. Most of these earthquakes are located at the East-West trending Africa-Eurasia plate boundary and along the coastline of North Africa. The most recent recorded tsunamigenic earthquake occurred in 2003 at Zemmouri-Boumerdes (Mw 6.8) and generated $\sim$ 2-m-high tsunami wave. The destructive wave affected the Balearic Islands and Almeria in southern Spain and Carloforte in southern Sardinia (Italy). The earthquake provided a unique opportunity to gather instrumental records of seismic waves and tide gauges in the western Mediterranean. A database that includes a historical catalogue of main events, seismic sources and related fault parameters was prepared in order to assess the tsunami hazard of this region. In addition to the analysis of the 2003 records, we study the 1790 Oran and 1856 Jijel historical tsunamigenic earthquakes (Io = IX and X, respectively) that provide detailed observations on the heights and extension of past tsunamis and damage in coastal zones. We performed the modelling of wave propagation using NAMI-DANCE code and tested different fault sources from synthetic tide gauges. We observe that the characteristics of seismic sources control the size and directivity of tsunami wave propagation on both northern and southern coasts of the western Mediterranean.