



Strong ground motion in southern Portugal due to the 1755 Lisbon earthquake

R. Grandin (1), J. F. Borges (1,2), B. Caldeira (1,2), M. Bezzeghoud (1,2), F. Carrilho (3) and C. S. Oliveira (4)

(1) Centro de Geofísica de Évora (CGE), Universidade de Évora, Évora, Portugal, (2) Departamento de Física, Universidade de Évora, Évora, Portugal, (3) Departamento de Observação e Vigilância Sismológica e Geofísica (DSG), Instituto de Meteorologia, I. P. , Lisboa, Portugal, (4) Departamento de Engenharia Civil, Instituto Superior Técnico, Lisboa, Portugal

The strong earthquake ($M=8.8$) that struck a large part of the Iberian Peninsula and Northern Morocco on November 1, 1755, was caused by the motion along a fault which localisation and spatial extent are still uncertain. According to recent numerical modelling of tsunami wave travel times, it seems that the tsunamigenic fault may be located off the southwestern coast of Portugal. Multi-channel seismic profiles in the area showed the existence of large submarine hills of tectonic origin, 100 km offshore Cabo de São Vicente, and led to the identification of active faults that may be responsible for the earthquake. E3D, a finite-difference seismic wave propagation code, is used to implement various source rupture scenarios. Based on available geophysical data and geological evidences, we propose a 3D velocity model of the upper mantle, crust, and sedimentary cover, for south Portugal and the adjacent Atlantic area. The model is constrained thanks to data available from recent instrumental earthquakes. We are able to test several possibilities, and to compare synthetic ground motion obtained onshore with historical evaluations of seismic intensity. Directivity of the source, as well as site effects, may explain the particular distribution of strong ground motion observations.