Geophysical Research Abstracts
Vol. 13, EGU2011-13745, 2011
EGU General Assembly 2011

High energy seismic ruptures offshore the Iberian Peninsula: state of the art

Jean Roger (1), Alain Rabaute (2), Nuno Simão (1), and Nicolas Chamot-Rooke (1)
(1) ENS, Laboratoire de Géologie, Paris, France (roger@biotite.ens.fr), (2) GEOSUBSIGHT, Paris, France

On the 1st of November, 1755, an estimated magnitude Mw=8.5-9.0 earthquake struck the Iberian Peninsula and northern Morocco. It was immediately followed by a widespread devastating teletsunami which affected the entire North Atlantic coastlines with wave heights of more than 3 m in the Caribbean. Other tsunami-like events associated to powerful earthquakes located offshore the Iberian peninsula within the Horseshoe abyssal plain have been reported in the catalogues, such as the 31 March 1761 (On the 1st of November, 1755, an estimated magnitude Mw=8.5-9.0 earthquake struck the Iberian Peninsula and northern Morocco. It was immediately followed by a widespread devastating teletsunami which affected the entire North Atlantic coastlines with wave heights of more than 3 m in the Caribbean. Other tsunami-like events associated to powerful earthquakes located offshore the Iberian peninsula within the Horseshoe abyssal plain have been reported in the catalogues, such as the 31 March 1761 (M=7.5) and the 28 February 1969 (Mw=7.9) earthquakes.

Numerous studies have put much efforts in trying to determine the source(s) (earthquake and/or landslide) that may have triggered such tsunamis, including numerical inversion of macroseismic data, backward ray tracing of tsunami travel times, marine bathymetric and seismic campaigns, geological studies of the tsunami deposits, tectonic investigations of the fault systems. Yet the source remains unknown.

This study aims at clarifying the results of previous studies, based on a synthetic structural map of the Azores-Gibraltar boundary, an accurate search and validation of the submarine features, and a recollection of seismic events and focal mechanisms. Previous studies showed that there is no long-enough structure which rupture could produce a Mw>8 earthquake except the Gloria transform fault. However this scenario needs a vertical component. Using Coulomb-type modelling, we further examine the possibility that ruptures at the Gorringe Bank may have been triggered by highly energetic strike-slip earthquakes rupturing significant portions of the Gloria fault. Examples of such big earthquakes exist in the literature, such as the 1941 Mw=8.2 and the 1975 Mw=7.9 earthquakes.
M=7.5) and the 28 February 1969 (Mw=7.9) earthquakes.
Numerous studies have put much efforts in trying to determine the source(s) (earthquake and/or landslide) that may have triggered such tsunamis, including numerical inversion of macroseismic data, backward ray tracing of tsunami travel times, marine bathymetric and seismic campaigns, geological studies of the tsunami deposits, tectonic investigations of the fault systems. Yet the source remains unknown.
This study aims at clarifying the results of previous studies, based on a synthetic structural map of the Azores-Gibraltar boundary, an accurate search and validation of the submarine features, and a recollection of seismic events and focal mechanisms. Previous studies showed that there is no long-enough structure which rupture could produce a Mw>8 earthquake except the Gloria transform fault. However this scenario needs a vertical component. Using Coulomb-type modelling, we further examine the possibility that ruptures at the Gorringe Bank may have been triggered by highly energetic strike-slip earthquakes rupturing significant portions of the Gloria fault. Examples of such big earthquakes exist in the literature, such as the 1941 Mw=8.2 and the 1975 Mw=7.9 earthquakes.