Geophysical Research Abstracts
Vol. 16, EGU2014-9655-1, 2014
EGU General Assembly 2014

The July, 7th 2011 ML 5.4 earthquake offshore western Corsica (Western Mediterranean)

Christophe Larroque, Bertrand Delouis, Françoise Courboulex, Françoise Sage, and Anne Deschamps
CNRS-IRD-UNS, UMR 7329 Géoazur, Valbonne, France

On July, 7th 2011, a moderate earthquake (ML 5.4) occurred 80 km westward Corsica in a very low seismicity area of the Ligurian Sea. This event is the major one of a sequence of five moderate earthquakes that has been set there since July 2011 (2011/07/02, ML 4.0; 2011/07/07, ML 5.4; 2012/03/04, ML 4.4; 2013/04/05, ML 3.9; 2013/04/06 ML 3.8). The western Mediterranean-Alpine area is a complicated puzzle of basins and ranges embedded in the Africa-Eurasia collision zone. It displays strong changes of crustal nature and thickness with many inherited structures, such as the transition between the Ligurian oceanic basin, the southern Ligurian margin and the Corsica range. The 5 epicenters are gathered in the Ligurian oceanic basin, close to the transition zone with the thinned continental crust of the southern Ligurian margin. In the epicentral area, the bathymetry displays a very flat morphology and no scarp of tectonic origin has been pointed out. In 2012, the FABLES geophysical survey crosses the epicentral area. The MCS profils display subhorizontal sedimentary layers dismembered by messinian salt diapirsm but from the sea floor until 3 km depth (maximum penetration depth), no inherited fault is evidenced. Therefore, from the morphotectonic analysis the activated structure remains unknown. The july 7th event has been well recorded by tens of broad band stations in France, Italy and beyond. Despite this correct azimuthal coverage, determining the depth of the event is problematic. Using a full waveform modeling for regional data, our best fit was found for an hypocentral depth of 9 km, and a compressional focal mechanism (strike 40, dip 45, rake 90) corresponding to crustal faulting. Nevertheless, using teleseismic data with another location method, it has been proposed a much deeper hypocenter (around 26 km) with a focal mechanism close to ours. Whereas this focal depth does not correspond to our best-fit determination it cannot be totally excluded. Nevertheless, a so deep faulting, really in the mantle, remains questionable in the regional tectonic context. The contrast is sharp between the northern and the southern part of the Ligurian sea. To the north, from the short time window of the instrumental seismicity there is a dense microseismic activity, some strong historical earthquakes are recorded (e.g. 1887/02/23 Mw 6.7-6.9) and large cumulated deformations are located at the ocean-continent transition zone since 5 Myr and attest for the inversion of the Ligurian continental passive margin. While to the south, the seismicity is quiet with no historical earthquake and without morphotectonic evidence of active deformation. Nevertheless, the five recent earthquakes attest that part of the deformation at the western Mediterranean-Alpine area could be accommodated along faults bounding the western side of the Corsica-Sardinia block.