SECOND EUROPEAN CONFERENCE ON EARTHQUAKE ENGINEERING
AND SEISMOLOGY, ISTANBUL AUG. 25-29, 2014

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THE MW6.7 OCTOBER 12, 2013 WESTERN HELLENİC ARC MAİN SHOCK AND İTS AFTERSHOCK SEQUENCE

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In the Hellenic Arc area, the oceanic plate of eastern Mediterranean, the front part of the northward moving African lithospheric plate, is subducting northeasterly beneath the Aegean microplate, the southern portion of Eurasian lithospheric plate in this area, at a rate of 4.5 cm/yr (Papazachos et al., 1998). Large destructive earthquakes with magnitudes M≥6.5 have frequently occurred along the main thrust zone (Papazachos and Papazachou, 2003). The western almost rectilinear part of the convergent front accommodated the great 365 AD Mw8.3 earthquake (Papadimitriou and Karakostas, 2008), the largest event ever reported in the Mediterranean area. Historical and instrumental information reveals that strong (M≥6.0) earthquakes, both shallow and intermediate ones are frequent in the area, although there is not any reference to any other such strong event. Plate motion is far above the manifestation of seismicity, probably due to the fact that the seismic coupling coefficient at this plate boundary has been estimated at approximately 10% or less (Papadimitriou and Karakostas, 2005).

The 2013 earthquake is the largest that occurred in the last four decades along the western part of the Hellenic subduction zone and caused light damage in western Crete. The rupture dimensions of subduction events are in general more difficult to estimate due to their position in relation with seismological networks geometry. Thus the occurrence of this event provides an opportunity to investigate its rupture characteristics as in detail as possible, and consequently to shed more light in the geometry of the descending slab.

The main shock occurred on a thrust fault at a depth of 17 km, onto the coupled part of the overriding and descending plates, with the compression axis being oriented in the direction of plate convergence. The first 2–days relocated seismicity shows activation of the upper part of the descending slab, with most activity being concentrated between 10 and 25 km, where the main shock is also encompassed. Based on the aftershock distribution, the size of the activated area estimated at about 25km long and 20km wide. Based on numerous investigations worldwide, in areas with densely distributed seismic monitoring stations and perfect azimuthal, shown that aftershocks which occur on or very near the mainshock rupture are actually quite rare in large–slip regions; instead, aftershocks seem to occur mostly outside or peripheral to these large–slip zones (Karakostas et al., 2003, 2004, for the area of Greece; Kato and Igarashi, 2012 and reference therein). Cross sectional views of the relocated seismicity evidenced the extent of the main rupture, along with the off fault aftershock activity. This later is proved to be immediately triggered by the downdip stress transfer because of the coseismic slip of the main shock.

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This research has been co-funded by the European Union (European Social Fund) and Greek national resources under the framework of the “THALES Program: SEISMO FEAR HELLARC” project of the “Education & Lifelong Learning” Operational Programme.

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