



Geodynamic phenomena and ESI 2007 intensities of the 2017 June 12, Mw 6.3 Lesvos (North Aegean Sea, Greece) earthquake

Spyridon Mavroulis, Emmanouil Andreadakis, Varvara Antoniou, Emmanuel Skourtsos, and Efthymios Lekkas
National and Kapodistrian University of Athens, Faculty of Geology and Geoenvironment, Department of Dynamic Tectonic Applied Geology, Athens, Greece (smavroulis@geol.uoa.gr)

On June 12, 2017 (12:28 GMT) an Mw 6.3 earthquake struck Lesvos Island (Northeastern Aegean, Greece) with focal depth of about 13 km and epicenter located offshore southeastern Lesvos. It claimed the life of a woman and 15 injured. The fault plane solutions demonstrated a NW-SE striking and SW-dipping normal causative fault comprising the northern margin of the offshore Lesvos basin.

The induced environmental effects comprised ground cracks, slope movements and a small-scale tsunami. NW-SE (N310°) striking ground cracks were observed disrupting the embankment of a provincial road close and parallel to the main inland active fault of the affected area (Polichnitos fault). They were 50meters long and 1 cm wide. However, tectonic surface deformation and associated structures were not detected on both sides of the cracks. However, along the Polichnitos fault, large fragments of tectonic breccia were detached from fault surfaces formed on ophiolites and scree were detached from slopes and rolled down towards rural roads, while already existing joints in ophiolites were widened. Ground cracks were also observed close to Agia Katerina area and parallel to the banks of Almyropotamos River (western part of the affected area) with length of about 5 m and width of 1 cm as well as in Vatera coastal area close and parallel to the coastline with length of 10 m and width of 1 cm disrupting the asphalt pavement in both cases. Displacement was also not detected on both sides of the cracks in Agia Katerina and Vatera sites.

Slope movements were classified into landslides, rockfalls and rockslides and observed in several sites of the affected area. They resulted in partial damage to the road network including cracks and craters in the asphalt pavement and deformation of road protection barriers as boulders bounced across the roads, damage to adjacent building structures and related facilities and temporary or permanent traffic disruption. These phenomena are attributed to pre-existing instability conditions formed in geotechnically unstable areas and landslide zones, presence of active faults forming intense relief with high and abrupt slopes and scarps, as well as suitable geometry of beds and discontinuities dipping towards the free face of slopes.

A tsunami was generated offshore southeastern Lesvos and was reported by residents in Plomari port. It is characterized as a small tsunami of peak-to-peak amplitude of ~30 cm. Preliminary analysis of various tide-gauge stations in the Aegean Sea area showed disturbances with amplitudes of few cm due to the aforementioned tsunami.

The total area distribution of the secondary EEE was around 100 km² corresponding to an intensity VIII(ESI-07). VI(ESI-07) intensity is assigned to all sites with observed ground cracks based on their dimensions. VI(ESI-07) intensity is assigned to Plomari coastal area based on the peak-to-peak amplitude of the reported tsunami. V(ESI-07) intensity is assigned to Palaeochori, Plomari, Akrasi and Agios Isidoros sites and V-VI(ESI-07) intensity is assigned along the road from Plomari to Melinta based on the volume of the mobilized materials.