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The 2017 Lesvos (Greece) Mw6.3 earthquake: Normal faulting in the Aegean Sea

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In June 12, 2017 a destructive, Mw=6.3 earthquake hit the area between Lesvos (Mytilini) and Chios Islands at the East Aegean Sea (Greece). The aftershock activity that followed the mainshock defined a focal zone correlating with a ∼600m deep marine basin south of Lesvos. At the center and eastern part of the Aegean Sea, active normal faulting dominates and the area has been hit in the last millennia by numerous earthquakes. Still, many aspects of the seismicity in this area remain unclear, as no strong normal faulting earthquakes have occurred in this region in the last decades, after modern seismological and crustal deformation data became available.
Here, we present a detailed finite fault modeling of the 2017 Lesvos earthquake based on the inversion of teleseismic body-waveform data and very low-amplitude GPS slip vectors. The obtained model indicates a shallow normal fault parallel to the SE Lesvos coast that is correlating with a fault-controlled marine basin and covers most of the area of aftershocks. In connection with geological data the model permits first, to shed some light to a local site amplification of seismic intensities at Vrisa village in Lesvos Island, and the possibility of a small, local tsunami. And second, to compare the predicted small co-seismic uplift with uplift derived from Quaternary and Late Holocene raised shorelines along the SE Lesvos coast, and to investigate the relationship between co-seismic and long-term uplifts in a normal faulting terrain.