



2014 Mw6.8 Northern Aegean Earthquake: Rupture of a Partially Coupled Fault Segment?

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We obtained the source model of the 2014 Mw6.8 North Aegean earthquake using GPS and seismic data. The source duration is comparable to the 1999 Mw7.5 Izmit Earthquake despite 1 order of magnitude lower seismic moment, revealing that the 2014 event has an unusually long duration. The earthquake has ruptured a bilateral 90 km rupture, which is also longer than expected for its size. The rupture consists of three distinct slip patches; one large asperity located west of the hypocenter and two smaller asperities located at the east which are spatially separated. In this study, we also relocated the background seismicity in the region as well as the aftershocks of the North Aegean earthquake. The relocated pre-mainshock seismicity shows that the zones that slipped significantly during the 2014 were relatively silent during the 7 years prior to the earthquake. Most of the seismicity in this period is in the zones that did not rupture during the 2014 earthquake. In addition, the aftershocks of the mainshock are also in the regions surrounding the high slip patches, while the high slip areas are devoid of aftershocks. This indicates that the aftershocks are related to the post-seismic slip which tends to surround the co-seismic slip. By comparing the seismicity and the co-seismic slip distribution which consists of multiple patches, we infer that the North Aegean Through segment of the North Anatolian Fault is only partially coupled and the zones that are coupled have ruptured during the 2014 event.