



Is the Marmara Sea segment of the North Anatolian Fault Creeping or loading ?

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During the last century, the North Anatolian Fault has experienced a migrating $M_w > 7$ earthquakes sequence that ruptured about 1000 km of the fault westward. The last major earthquakes occurred in 1999 in Izmit ($M_w 7.4$) and Duzce ($M_w 7.2$). Only the segments located directly offshore of Istanbul, in the Marmara Sea, remain unbroken in this series of events. This region represents a major issue in terms of seismic hazard with more than 13 millions inhabitants in the city of Istanbul. However, a strong controversy remains over whether the central segment of the Main Marmara Fault is locked and likely to experience a major earthquake, or not. Recent studies based on geodetic data suggest indeed that, contrary to the Prince's Island segment which is fully locked, the central segment is accommodating the strain by aseismic fault creep. So it has not the potential to generate a $M_w \sim 7$ event. These results, mostly based on relatively simple strain accumulation models over infinitely long faults, is contested by a recent seismic data study, which suggests on the contrary that this fault segment is fully locked and mature to generate such a great earthquake.

In this study, we revisit the available geodetic data considering a 3D geometry of the fault, allowing to take into account the lateral variations of behavior along the fault. In particular, we evaluate if current geodetic datasets are sufficient to constrain strain accumulation and thus to conclude about the seismic hazard in the region.