



Postseismic deformation near Istanbul: evidence from long-term InSAR observation and modelling

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A sequence of large earthquakes has occurred along the North Anatolian Fault Zone (NAFZ) during the past century. These earthquakes occurred in an apparent association, and have been identified to display a westward propagation towards the Marmara Sea. Consensus exists that the Princes Island segment of the main Marmara fault is a seismic gap that is prone for a major earthquake. The seismic potential along the Princes Island segment is also of great importance for the Megacity Istanbul, one of the largest cities in the world, which is located immediately north of the seismic gap. No consensus exists concerning the nature of the seismic gap, as it may display different scenarios such as a locked or a creeping section of a fault.

The slip character of a fault hence plays a crucial role in time-dependent seismic hazard assessment. Within Marsite, a European Union project (<http://marsite.eu/>), here we determine the long-term ground displacement by a 20 year satellite radar image time series, interferometrically processed employing the small baseline subset (SBAS) approach. These InSAR observation allow to investigate the present-day slip activity along the part of the NAFZ including the Princes Island segment. Inversions of the data reveal a significant fault creep near the Princes Islands, that commenced following the 1999 Izmit and Duzce earthquakes, with a maximum creep rate that exaggerates the rate of the slip-deficit accumulation. In similarity to creeping faults known elsewhere, we conjecture that the creeping fault segment may release accumulated stress with important implications for the seismic hazard at Istanbul. The potential for a major earthquake therefore might be less than thought previously.