S027-0016
Small Magnitude Seismicity Helps Identify Transient Signals of Fault Creep on the North Anatolian Fault in Noisy GPS Recordings

Thursday, 10 December 2020
Poster

***Eric Beauce**, Massachusetts Institute of Technology, Cambridge, MA, United States, Michel Campillo, Univ Joseph Fourier and CNRS, Grenoble, France and Robert D van der Hilst, Massachusetts Institute of Technology, Cambridge, United States*

Abstract:
The North Anatolian Fault (NAF), a major continental plate boundary, accommodates the motion between Eurasia and Anatolia with right-lateral strike-slip motion. Shallow aseismic slip has first been identified on the Ismetpasa segment of the NAF in 1970 (cf. Ambraseys, 1970), and has been observed more recently as postseismic slip after the M7.6 Izmit earthquake. Several studies (e.g. Çakir et al., 2012; Hussain et al., 2016; Aslan et al., 2019) have described this postseismic slip using geodetic data such as interferometric synthetic aperture radar (InSAR) and GPS survey data. In this study, we used an automatic earthquake detection and location method (Beaucé et al., 2019) to analyze the seismic activity in the rupture area of the 1999 Izmit earthquake (Izmit-Sapanca lake segment to Karadere segment) from 2008 to 2020. This earthquake catalog is then used to extract the signal associated with high seismic activity from the noisy GPS recordings. By leveraging continuous GPS data with one day resolution, this approach achieves better temporal resolution than previous studies based on InSAR, and thus allows us to reveal the non-stationary nature of aseismic slip in this region. Our results show that periods of high seismic activity are systematically accompanied by strong deviations from the long-term motion in the GPS time series, with eastward or southeastward motion of the GPS stations located in the northern block of the NAF. These deviations are evidence for the existence of transient aseismic slip episodes (deep slow slip or shallow creep). We identify groups of earthquakes, taking place on different faults, that are associated with different styles of motion. Thus, our study sheds new light on the temporal and spatial complexity of aseismic slip on the North Anatolian Fault.

[<< Previous Abstract] | [Next Abstract >>]