[EE] Evening Poster | S (Solid Earth Sciences) | S-CG Complex & General

[S-CG53]Science of slow earthquakes: Toward unified understandings of whole earthquake process

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Accumulating observational studies on various types of slow deformation events, such as tectonic tremors, very low frequency events, and slow slip events, portrays some universal characteristics in generally complex behavior, including interaction among events and influence by various outer loadings. Some of these phenomena seem to have causal relation with the occurrence of very large earthquakes. A unified understanding of these slow and fast earthquake processes requires an approach integrating geophysics, seismology, geodesy, geology, and non-equilibrium statistical physics. We welcome presentations based on, but not limited to, geophysical observation, data analysis, analytical theory, numerical simulation, field study, and laboratory experiments.

[SCG53-P15]Repeating earthquakes and interplate coupling along the North Anatolian Fault

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The North Anatolian Fault (NAF) is a ~1200 km long strike-slip fault between Eurasian and Anatolian plates. The Sea of Marmara segment of the NAF remains the only part of the NAF that has not ruptured during the last century and close (~20km) to Istanbul, the largest city in Turkey. Therefore, it is important to understand the interplate coupling in this fault segment. In this study we use repeating earthquakes to infer interplate coupling. The repeating earthquakes are earthquakes that occur repeatedly due to fault creep in the surrounding area. They provide independent constrain to the interplate slip that usually estimated from geodetic data. Previous studies suggest the occurrence of two repeater sequences in west Marmara Sea but the activity in a wide area is not investigated yet. Here, we examined the activity of small repeating earthquakes in and around the Marmara Sea from long-term seismic observations. We used data from12 broadband seismic stations operated by Bogazici University Kandilli Observatory and Earthquake Research Institute (KOERI) for the period from April 2005 to May 2013. A method evaluating waveform similarity is used to select repeating earthquakes. We evaluated waveform similarity of all earthquakes pairs that is located within 20 km in their epicenters from the earthquake catalogue of Bogazici University KOERI. A 40 second waveform of up-down component is used to evaluate coherence in the frequency range of 1 to 10 Hz. We selected earthquake pairs with coherence larger than 0.95 as a candidate of repeating earthquake sequence. The pairs of earthquakes are merged if they share the same event. We regarded earthquake sequence with one year or more duration as repeating earthquakes. This procedure is similar to that used in Japan subduction zone in previous studies. As a selection result, we found 21 repeating earthquakes with magnitude 2.3 to 3.2 that are grouped into 9 sequences. They are distributed along the main NAF consisting three groups of activity to the west, in the west and to the east of the Marmara Sea. The three groups are located near the boundary of the previous earthquake ruptures, suggesting relatively weak coupling there. We also estimated the fault creep rate from the cumulative slip of repeating earthquakes by using scaling

relationship proposed by Nadeau and Johnson (1998). The slip rate for these three groups are similar (3-4 cm/year) and comparable to those expected from global plate model (∼2.4 cm/year).

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