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Searching non-impulsive earthquakes using a full-waveform, cross-correlation detection method.

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Some seismic events, which have low P-wave amplitude, pass undetected by regional or global networks. A subset of these events occur due to fast mass movement as in the case of rapid glacial movements (Ekström, et al., 2003; Ekström, et al., 2006) or landslides (Ekstrom and Stark, 2013). Some other events depleted in high frequencies are related to volcanic activity (e.g. Schuler and Ekstrom, 2009) or to non-volcanic tremors (Obara, 2002). Furthermore, non-impulsive earthquakes have been located on oceanic transform faults (OTF) (Abercrombie and Ekstrom, 2001). A suite of methods can be used to detect these non-impulsive events. Correlation, matched filter, or template event methods (e.g. Schaff and Waldhauser 2010; Rubinstein & Beroza 2007) are very efficient for detecting smaller events occurring in a similar place and with the same mechanism as a larger template event. One such method (Ekström, 2006), that is applied on the scale of the globe, routinely detects events with magnitudes around Mw 5 and larger.

In this work we want to lower the detection threshold by using shorter period records registered by regional networks together with a full-waveform detection method based on time reversal schemes (Solano, et al., in prep.). The method uses continuous observed seismograms, together with moment tensor responses calculated for a 3D structure. Looking for events on the East Pacific Rise (EPR) around 9 N in one month of data from the National Seismological broadband Network (Servicio Sismologico Nacional, SSN), we found one new event. However, we also had 435 false detections due to high noise levels at several stations, gaps in the data or detection of teleseismic phases. To manually discard these events is a time consuming task that should be automated. We are working on several strategies, including weighting the input traces by their signal to noise ratio, correlation of a template peak associated to the detection function and the coincidence in time of the detections from various stations.