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Stress Drops from Trench to Depth in the Northern Chilean Subduction Zone

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At the northern Chilean subduction zone the IPOC network monitors seismicity since 2007. During the observation time period two very large earthquakes occurred, the 2007 MW 7.7 Tocopilla earthquake and the 2014 MW 8.1 Iquique earthquake and until today the subduction zone shows a vast amount of seismic activity. A large catalog was compiled and published including over 100000 events by Sippl et al. 2018. Therein, seismicity ranges from close to the trench till deep into the mantle to about 300km depth. Consequently, events occur under a broad variability of physical conditions.

We extend the aforementioned catalog by applying a template matching technique to identify additional events, that are collocated with catalog events. Based on these events we apply an empirical Green's function method called spectral ratio approach to estimate stress drops. The results cover different nucleation provinces i.e. the data set includes stress drops obtained at the interface, within the subducting plate, from crustal events, intermediate depth events, and from deep to very deep seismicity. The study therefore bears a great potential to better understand the stress drop distribution within an entire subduction zone.

First results show no depth dependency in the shallowest 100 km but spatial variability with high stress drops focused to particular regions on the interface. We also find increased stress drop values in the crust when compared to events close or at the interface.