[JJ] Evening Poster | S (Solid Earth Sciences) | S-SS Seismology

[S-SS15]Fault Rheology and Earthquake Physics

convener:Hideki Mukoyoshi(Department of Geoscience Interdisciplinary Graduate School of Science and Engineering, Shimane University), Wataru Tanikawa(Japan Agency for Marine-Earth Science and Technology, Kochi Instutute for Core Sample Research), Takanori Matsuzawa(国立研究開発法人　防災科学技術研究所, 共同), Keisuke Yoshida(Tohoku University)

Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

The goal of this session is to integrate theoretical, experimental, observational, and numerical perspectives from various fields such as seismology, geodesy, geology, mineralogy, and so on, to define what is known about earthquake source processes and the physical and chemical elementary processes of faulting. This session welcomes studies that address such issues as pre-, co-, and post-seismic processes, the rheology of seismogenic faults and fault rocks, laboratory experiments on elementary processes, numerical models based on frictional laws, and estimates of the stress field in the seismogenic zones. We also welcome studies on fault-zone drilling projects and in situ stress measurements.

[SSS15-P18]Stress drops of moderate-sized earthquakes on the Pacific Plate off the Tohoku region, Japan.

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An earthquake rupture occurs at a point where the shear stress reaches the shear strength. As the difference between the initial and residual stress levels of an earthquake is defined as a stress drop, the vales of stress drops can be used to infer the frictional properties on the fault plane.

In this study, we analyzed stress drops of 2456 moderate-sized earthquakes with magnitudes of 4.2 to 5.0 on the Pacific Plate off the Tohoku region, Japan, from June 2002 to December 2016. We used 100-sps velocity waveforms observed at NIED Hi-net stations as well as Japanese universities and Japan Meteorological Agency. We assumed that the source spectra can be described by the omega-squared model (Boatwright, 1978) and investigated the corner frequency of the earthquakes by deconvolving the spectra by collocated smaller earthquakes with M3.5.

Figure 1 shows the spatial pattern of obtained stress drops. Earthquakes close to the hypocenter of the 2011 Tohoku earthquake indicate higher stress drops. In addition, our results are similar to Uchide et al. (2014), who analyzed the spatial pattern of stress drop before the 2011 earthquake. This would suggest that the frictional properties are stable in time, consistent with Yamada et al. (2017).

We are going to report the relation to the focal depth and temporal characteristics at the presentation.