Geophysical Research Abstracts
Vol. 18, EGU2016-3101, 2016
EGU General Assembly 2016

Static and dynamic parameters of deep earthquakes from global seismic data

Piero Poli and German Prieto
EAPS MIT

We study the radiated energy and rupture duration for more than 500 deep and intermediate depth earthquakes (depth>50km and M>5.5). The average source time function is obtained by stacking broadband P-wave pulses recorded globally and used to measure the rupture durations, by comparing alternative versions of the same waveform. The radiated energy is obtained by integration of velocity spectrum observed at each station and corrected for radiation pattern and propagation effects.

The global analysis of the rupture duration show how beyond the scattering of the scaled duration seen on the data, the depth reduction of the duration can principally be explained by incremental shear velocity with depth. Furthermore, the duration to moment comparison shows how 1/3 scaling is not valid for deep seismicity, suggesting a difference in dynamic for small and large events. The existence of a different scaling law is further corroborated by the analysis of scaled energy, which is not constant as function of moment.

The radiated energy and rupture duration are combined to derive stress drop, apparent stress, efficiency and other parameters of the rupture. The global analysis of these parameters suggests how deep and intermediate depth events are systematically different from shallow earthquakes. We further derive rupture velocity for some of the studied events, to get further information on the dynamic properties of the rupture process.

Coherent variation of the derived rupture parameters are seen when along strike events are analyzed by clusters, suggesting how deep earthquakes cannot be reduced in a single group, while a diversity of deep and intermediate depth earthquakes should exists. Comparison of our measures with independent geophysical properties of slabs as plate age, thermal parameter and convergence rate is done, in order to unravel any possible relation between the subudction zone style and its associated seismicity.