

AOB&COE Seminar



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Title: 地震のエネルギー配分と物理
(Energy partitioning and physics of Earthquakes)

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地震・噴火予知研究観測センター(別館)第一会議室

October 12, 2007 (Fri) 14:00-16:00

Research Center for Prediction of Earthquakes and Volcanic Eruptions
Meeting Room #1, AOB Annex

- Abstract -

We investigate the partitioning of energy released during an earthquake to radiated, fracture and thermal energies in an attempt to link various observational results obtained in different disciplines. The fracture energy, E_G , used in seismology is different from that commonly used in mechanics where it is the energy used to produce new crack surface. In the seismological language it includes the energies used for off-fault cracking, and various thermal processes. The seismic moment, M_0 , the radiated energy, E_R , and rupture speed, V_R , are key macroscopic parameters.

The static stress drop can be a complex function of space, but if an average can be defined as $\Delta\tau$, it is also a useful source parameter. From the combination of M_0 , E_R , and, $\Delta\tau$ we can estimate the radiation efficiency η_R , or E_G which can also be estimated independently from V_R . η_R provides a link to the results of dynamic modeling of earthquakes which determines the displacement and stress on the fault plane. Theoretical and laboratory results can also be compared with earthquake data through η_R . Also, the fracture energy estimated from the measurement of the volume and grain size of gouge of an exhumed fault can be linked to seismic data through η_R . In these comparisons, the thermal energy is not included, and it must be estimated independently from estimates of sliding friction during faulting. One of the most challenging issues in this practice is how to average the presumably highly variable slip, stress and frictional parameters to seismologically determinable parameters.

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