

Stress Drop

- In the context of earthquake rupture stress-drop is the difference between the stress across a fault before and after an earthquake rupture. Effective stress most often refers to the difference between lithostatic stress and hydrostatic stress. These are two different types of stress and are not directly related.
- Stress-drop is related to the energy released as a consequence of an earthquake rupture (expressed by its seismic moment or magnitude) and to the dimensions of the rupture. A constant stress-drop with increasing magnitude implies a specific amount of energy released per unit area of fault rupture as rupture size increases. One factor that may cause stress-drop to vary from earthquake to earthquake or with the dimensions of an earthquake is the changing physical properties of the Earth, particularly with depth. Effectively some parts of a fault may be stronger than another and can affect the amount of stress stored and released on different portions of the fault.
- Simply put, the energy released during an earthquake travels as seismic waves. These earthquake ground motions are thus related to the stress-drop for that earthquake. Hence stress drop is important in modeling the earthquake source for ground-motion attenuation relations. The behavior of stress drop with increasing magnitude is the subject of much debate among seismologists. This debate has a very practical impact on estimated ground-motions and seismic hazard, which the general earth science and engineering communities need to be aware of. Thus our concern that this be expressed appropriately in a report to that community.