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The inhibition of plant respiration by sunlight and its effect on leaf, plant and ecosystem carbon cycling: Evidence from oxygen isotopes to eddy co-variance

Understanding of earthquake source mechanics and their seismic radiation across multiple scales is fundamental to accurately assessing seismic hazard of great earthquakes. A holistic perspective on the earthquake rupture provides us clues on the scaling of physical processes between small and large events. Earthquakes are self-similar if their fault geometry, source duration, and slip follow known scaling relations that preserve the shape of the source pulse function. The most common source pulse only captures a single time scale, the duration of the earthquake. We find instead that two time scales better explain the shape of the large earthquake source pulses and their amplitude spectra. Both time scales exhibit a particular scaling between small and large earthquakes that strongly alters and distorts the spectral shape thereby violating the principle of self similarity. Interpretation of the duration and shape of pulses provides clues on why the amount of seismic radiation and stress release is invariant with earthquake size.
A detailed description of the seismic radiation during the earthquake rupture provides us clues on dynamical processes. We build new observational tools to image spatially and temporally the seismic radiation. We combine source spectrogram analysis with teleseismic back-projection and afford new observations that are relevant to earthquake dynamics, such as fault geometry and frictional properties. We apply these techniques to recent large megathrust earthquakes and discuss their interpretation in light of rupture mechanics.