Geophysical Research Abstracts
Vol. 15, EGU2013-6294, 2013
EGU General Assembly 2013

Exploring aftershock properties with depth using Bayesian statistics

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Stress magnitudes and frictional faulting properties vary with depth and may strongly affect earthquake statistics. Nevertheless, if the Anderson faulting theory may be used to define the relative stress magnitudes, it remains extremely difficult to observe significant variations of earthquake properties from the top to the bottom of the seismogenic layer. Here, we concentrate on aftershock sequences in normal, strike-slip and reverse faulting regimes to isolate specific temporal properties of this major relaxation process with respect to depth. More exactly, we use Bayesian statistics of the Modified Omori Law to characterize the exponent p of the power-law aftershock decay rate and the duration c of the early stage of aftershock activity that does not fit with this power-law regime. Preliminary results show that the c-value decreases with depth without any significant variation of the p-value. Then, we infer the duration of a non power-law aftershock decay rate over short times can be related to the level of stress in the seismogenic crust.