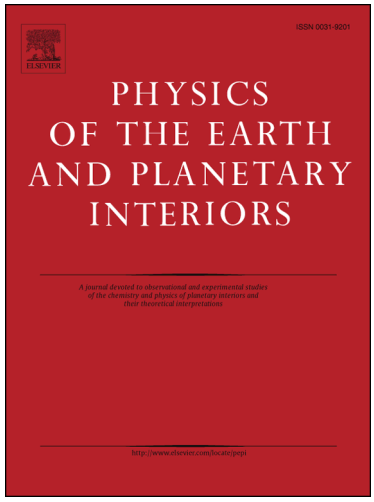

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Effects of fault heterogeneity on seismic energy and spectrum

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Abstract

We study the effects of friction heterogeneity on the dynamics of a seismogenic fault. To this aim, we consider a fault model containing two asperities with different static frictions and a rate-dependent dynamic friction. We consider the seismic events produced by the consecutive failure of the two asperities and study their properties as functions of the ratio between static frictions. In particular, we calculate the moment rate, the stress evolution during fault slip, the average stress drop, the partitioning of energy release, the seismic energy, the far-field waveforms and the spectrum of seismic waves. These quantities depend to various extent on the friction distribution on the fault. In particular, the stress distribution on the fault is always strongly heterogeneous at the beginning of the seismic event. Seismic energy and frictional heat decrease with increasing friction heterogeneity, while seismic efficiency is constant. We obtain an equation relating seismic efficiency to the parameters of the friction law, showing that the efficiency is maximum for

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