



Temporal variation in fault friction and its effects on the slip evolution of a thrust fault over several earthquake cycles

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The friction coefficient is a key parameter for the slip evolution of faults, but how temporal changes in friction affect fault slip is still poorly known. By using three-dimensional numerical models with a thrust fault that is alternately locked and released, we show that variations in the friction coefficient affect both coseismic and long-term fault slip (Hampel and Hetzel, 2012). Decreasing the friction coefficient by 5% while keeping the duration of the interseismic phase constant leads to a four-fold increase in coseismic slip, whereas a 5% increase nearly suppresses slip. A gradual decrease or increase of friction over several earthquake cycles (1–5% per earthquake) considerably alters the cumulative fault slip. In nature, the slip deficit (surplus) resulting from variations in the friction coefficient would presumably be compensated by a longer (shorter) interseismic phase, but the magnitude of the changes required for compensation render variations of the friction coefficient of >5% unlikely.

Reference

Hampel, A., R. Hetzel (2012) Temporal variation in fault friction and its effects on the slip evolution of a thrust fault over several earthquake cycles. *Terra Nova*, 24, 357–362, doi: 10.1111/j.1365-3121.2012.01073.x.