



Interplate coupling and seismic-aseismic slip patterns

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Numerical simulations were carried out to explain the seismic and aseismic slip paradox. Recent observations of megathrust faults show that stable and unstable slip movements can occur at the same locations. This contradicts the previous view based on frictional sliding theories.

In the present work, an asperity fault model with the slip-dependent friction and stress dependent healing is used to show that the character of slip can change, even if friction parameters, such as strength and slip-weakening distance, are fixed.

The reason is that the slow versus fast slip interplay is more than just about the friction law problem. The character of slip depends both on the local friction and on the system stiffness. The stiffness is related to the slipping area size and distribution of slips, so it changes from one event to another.

It is also shown that the high strength interplate patches, such as subducted seamounts, can both promote and restrain large earthquakes, depending on the slip-weakening distance lengths.