



Seismic and aseismic slips controlled by interplate coupling variations

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Key characteristics of mega-earthquakes and seismic cycles can be interpreted in terms of an asperity model, in which strong patches of an unstable slip are surrounded by weaker, stable sliding areas. Structural and material heterogeneities, such as subducted seamounts, ridges and sediments, are thought to be responsible for interplate coupling variations.

The model with slip dependent friction enables us to reproduce irregular earthquake sequences, complex rupture patterns, interplays between seismic and aseismic slips, and earthquake scalings. Distributions of strengths and critical slips displacements along the plate interface control the model behaviour. Specifically, the strength to critical slip ratio decides about more brittle failure or more stable sliding; larger critical slips make slips smoother at shallow depths.