On the Rigidity and Asperity of Plate Interfaces at Subduction Zones

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We have investigated dynamic correlation between the fault asperity and rigidity of the tectonic plate interfaces at subdduction zones. Considering recently identified aseismic weak areas at parts of the plate interface near the northern Japan trench, the reported location of seismic asperities, and possible dynamic fracture mechanisms, we cannot assign the uniform rigidity on the plate interface. However, most of recent studies of inversion analyses based on seismic waveform data assumed uniform rigidity on the fault, even when to estimate detailed spatio-temporal distribution of seismic displacements during large earthquakes.

By taking into account a simple dynamic model of fault strength and long-term relative plate motions, we inferred that the spatial distribution of rigidity of the plate interface is not uniform but variable.