

## Tremor activity and slip modes controlled by the permeability of the megathrust boundary

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Tremor activity in southwest Japan shows a sharp variation along the strike, but factors controlling such variation remain largely unknown. We carry out seismic tomography using a large number of arrival time data to characterize seismic properties around tremor activity, and find a close link between tremor activity and seismic properties above the plate interface. Tremor is active underneath the moderate- to high-velocity overlying plate, while it is absent in areas overlain by distinct low-velocity materials. High permeability along the plate interface enhances metamorphism of the overlying plate and prevents pore-fluid pressures from reaching near-lithostatic values. As a result, the plate interface is somewhat strengthened and slow slip no longer occurs at short intervals. Our hypothesis explains the occurrence of long-term slow slip, instead of short-term slow slip, along the inferred high-permeable plate interface in the Kii channel and eastern Kyushu.

Keywords: permeability, Philippine Sea plate