

# 沈み込み帯の地震の発生機構

## —地殻流体に規定されて発生する沈み込み帯の地震—

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### Mechanism Generating Earthquakes in Subduction Zones: Vital Role of Geofluids in Earthquake Generation

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#### Abstract

The mechanisms that generate the three main types of earthquake in subduction zones are discussed addressing their relations to geofluids. Studies on the spatial distribution of earthquakes and seismic velocity structure within the subducted slab provide evidence that strongly supports the dehydration embrittlement hypothesis for the generation of intermediate-depth intraslab earthquakes. Investigations of recurrent earthquakes show that the asperity model is applicable to interplate earthquakes. Detailed imaging of the seismic velocity structure in and around plate boundary zones suggests that interplate coupling is mainly controlled by local fluid overpressure. Seismic tomography studies show the existence of inclined sheet-like seismic low-velocity zones in the mantle wedge, not only in Tohoku but also in other areas in Japan, which perhaps correspond to the upwelling flow of the subduction-induced convection system. These upwelling flows reach the Moho directly beneath the volcanic areas, suggesting that those volcanic areas are formed by the upwelling flows. Aqueous fluids derived from the slab are probably transported up through the upwelling flows to the arc crust, where they might weaken the surrounding crustal rocks and finally cause shallow inland earthquakes. All of these observations suggest that geofluids expelled from the subducting slab play an important role in the generation of earthquakes in subduction zones.

**Key words** : geofluids, subduction zone, earthquake generation mechanism, fluid overpressure, asperity, dehydration embrittlement, mantle upwelling flow

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