

アウターライズ断層の強度に対する岩石・水相互作用の影響

Influence of water-rock interactions on the strength of outer-rise faults

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Knowledge of the amount of water stored in oceanic plates is important for understanding subduction zone water budgets (e.g., Hatakeyama et al., 2017, *Sci. Rep.*). Beneath the outer rise, the incoming oceanic plate bends down into the trench, resulting in the formation of extensional normal faults (i.e., outer-rise faults). Seismic reflection studies have shown that these normal faults penetrate into the upper mantle and act as a permeable fluid pathway. How deep outer-rise faults can develop primarily depends on the depth extent of strain localization within the oceanic lithosphere. Infiltration of seawater into outer-rise faults may promote the growth of mechanically weak hydrous phases such as talc and serpentines, perhaps leading to further strain localization. In order to understand effects of water-rock interactions on the strength of the upper mantle, I have conducted high-pressure deformation experiments on simulated peridotite fault gouges in the presence of hydrothermal water (Hirauchi et al., 2016, *Nat. Commun.*). I found that at a temperature of 500°C and a confining pressure of 1 GPa, the development of talc-bearing, localized shear zones leads to an order-of-magnitude reduction in strength. This finding indicates that water-rock interactions along outer-rise faults play a role in deepening the fault depth and increasing water budgets in the oceanic upper mantle.

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