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海洋地殻最上部の変質が沈み込み帯の変形に及ぼす影響
Alteration of uppermost oceanic crust and its effect on deformations in subduction zones

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Simultaneous deformation and diagenesis characterize shallow parts (depths of <10 km) of subduction zones. While the relationships between diagenesis and deformation of hemipelagic and terrigeneous sediment in subduction zones have been discussed for many years, those of basaltic basement have not been evaluated well. To explore the role of diagenesis in subducting basalt, we examined mineralogy and geochemistry of ocean floor basalt at Site C0012, where oceanic crust entering the Nankai Trough, as well as on-land greenstone body within the Mugi melange in Shimanto Accretionary Complex, Japan, which subducted down to 150 - 200 degrees C and 6 - 7 km depth, metamorphosed and then exhumed.

Severe low-temperature alteration is encountered throughout the core samples from Site C0012. Matrix glass is mostly replaced by saponite/celadonite/Fe-hydroxide, olivine is completely replaced by saponite, and plagioclase is partly replaced by saponite and zeolites. Alteration is classified into two stages: broad oxidizing alteration accompanying Fe-hydroxide, and limited reducing alteration accompanying pyrite and intense saponitization, which is concentrated in the topmost ˜20 m-thick part of basaltic rocks. These two alterations would correspond to open- and closed-system hydrothermal circulation (i.e. circulation before and after deposition of overlying sediment), respectively (Lister, 1982). On the other hand, corrensite, saponite-chlorite mixed layer clay is the dominant clay mineral phase of basaltic rocks in the Mugi melange (Kameda et al., 2011). Whole-rock geochemistry data shows smaller LOI and K2O number in the Mugi melange in comparison to Site C0012.

Saponite releases water in response to temperature rise, and is progressively converted to chlorite at temperatures of 150?250 degrees C (Kameda et al., 2011). This diagenetic reaction would build up excess fluid pressure especially within highly saponitized part of ocean floor basalt where off-axis reducing alteration encountered, and enhances underplating of oceanic crust and fluxing of fluid-mobile elements along subductuion thrust. Deformation and mass flux of subducting basalt could be controlled by alteration pattern formed prior to subduction.