

Serpentinite textures and mode of hydration along the ancient subduction zone beneath the Horokanai Ophiolite, Hokkaido,

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Along convergent plate boundaries, the mantle peridotites are serpentized as water fluids are supplied from the subducted slab. Because serpentinites are less frictional than peridotites, it might play an important role on the deformation characteristics and seismic activities. However, there are still poor observations on the ways how water is supplied and how hydration proceeds in deep subduction zones.

Serpentines of mantle origins occur in contact with a metamorphic rock of oceanic plate origins crop out in the Horokanai area located 30km to the northwest of Asahikawa, Hokkaido. It is prospective that contact relations between, and element transports across the plate boundary of a deep part of the subduction zone is preserved. In this study, field mapping and sampling were made mainly along two routes, which traverse the boundary between the serpentines and the metamorphic rocks. By optical and electron microscopy, occurrences of serpentinites and related minerals and reaction textures are here described.

The serpentinite body is dominated by low-temperature serpentinites occasionally with relic olivine, opx, spinel, and rarely cpx. Antigorite more commonly occurs in parts close to the metamorphic rocks, accompanied by reaction rocks such as talc and/or carbonate rocks. In olivine-antigorite serpentinites, antigorite typically occurs penetrating olivine and opx along with their grain boundaries. Trace amounts of talc instead of antigorite occurs along the grain boundaries between olivine and opx in an antigorite-free peridotite. These occurrences suggest that percolation along grain boundaries was a major mode of water supply in the mantle, as well as by hairline cracks indicated by antigorite serrate veins.

Some antigorite serpentinites also contain diopside and tremolite useful to estimate metamorphic temperature. Several types of reaction textures are observed: (a) opx is surrounded by tremolite corona with secondary olivine at their tips, and (b) symplectic Ol + Cpx + Atg + Mag pseudomorphs presumably after tremolite. Retrogressive hydration from amphibole peridotite to antigorite serpentinite is supposed by these textures. Water supply might have been heterogeneous and intermittent because textures of incomplete hydration are not uncommon.