

Alternation and/or metamorphism and dehydration of subducting oceanic plate and its relation to earthquake phenomena

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An oceanic plate is thought to be composed of sediment layer, basaltic layer, gabbroic layer and peridotite upper mantle. Those layers may be altered and/or metamorphosed during generation, and transportation. The metamorphic minerals and weathered minerals always have H₂O or OH and/or CO₂ in crystal structure. In this sense, metamorphism and alternation can be translated as chemical reactions in association with H₂O and/or CO₂. During the subduction process, sediment, basaltic or gabbroic layers are altered and/or metamorphosed and hydrated minerals are produced. In particular, clay minerals, zeolite, and serpentine play important role in earthquake generation process because of their weak mechanical strength.

From seismic observation, recent OBS-controlled studies suggested that low seismic activity zones in the Japan Trench have high seismic reflection intensities. The possible interpretation is presence of low velocity material at plate boundary. The low velocity material can be explained by hydrated material or water. The low seismicity in the Izu-Bonin subduction zone is also explained by serpentine as one of hydrated minerals.