

Blueschist metamorphism in an active subduction zone

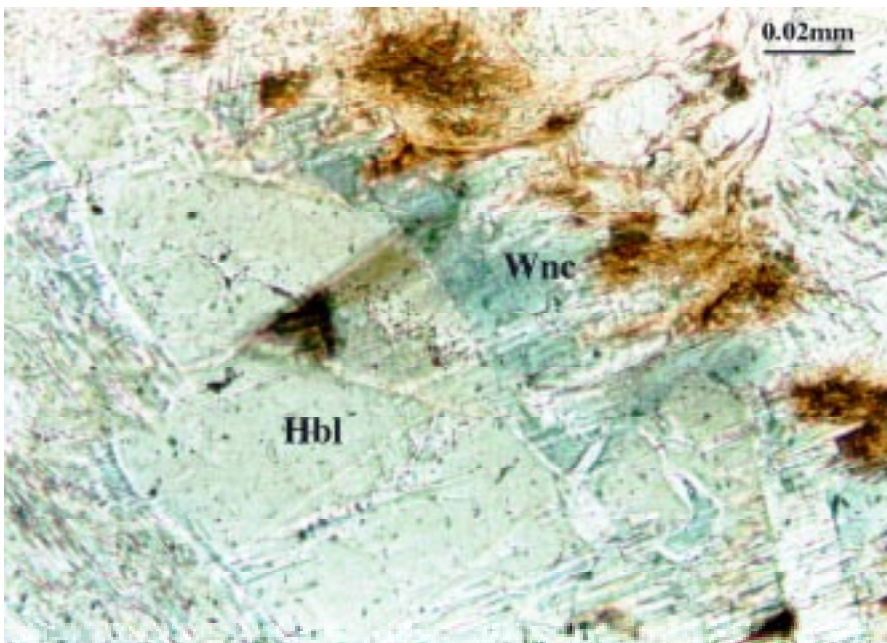
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The high-pressure, low-temperature metamorphic rocks known as blueschists have long been considered to form in subduction zones, where the descent of a relatively cold slab leads to the occurrence of unusually low temperatures at mantle pressures. Until now, however, the link between blueschist-facies rocks and subduction zones has been indirect, relying on a spatial association of blueschists with old subduction complexes, and estimates of the geothermal gradients likely to exist in subduction zones. Here we strengthen this link, by reporting the discovery of blueschist-facies minerals, lawsonite, aragonite, sodic pyroxene, and blue amphibole (winchite), in clasts from a serpentinite seamount in the forearc of the active Mariana subduction zone during ODP Leg 125 [Maekawa *et al.*, 1993]. The metamorphic conditions estimated from the mineral compositions are 150-250°C and 5-6 kbar (16-20 km depth). The rocks must have been entrained in rising serpentinite diapirs, and extruded onto the seafloor. Recently, we found blueschist facies minerals (winchite and aegirine-augite) in

clasts obtained by dredging samples of high pressure rocks from the two serpentinite seamounts in the Izu-Ogasawara forearc, that is the Torishima forearc seamount [Maekawa, 1995] and the Hahajima seamount [Hashimoto *et al.*, in prep.]. Blueschist facies rocks are common in forearc and drilling has showed at least one way to get them to the surface by carrying them along in the serpentinite diapirs. Further study of these rocks may provide new insight into the tectonics of trench-forearc systems, and in particular, the processes by which blueschist facies clasts come to be associated with forearc sediments in ancient subduction complexes.

References:

- Maekawa, H., M. Shozui, T. Ishii, P. Fryer, and J.A. Pearce, Blueschist metamorphism in an active subduction zone, *Nature*, 364, 520-523, 1993.
Maekawa, H., Metamorphic rocks from serpentinite seamounts in the Mariana and Izu-Bonin forearcs, In Tokuyama, H. et.al. (eds.): *Geology and Geophysics of the Philippine Sea, Japan-Russia-China Monograph*, Terra Scientific Publishing Company, Tokyo, 357-369, 1995.



Mode of occurrence of winchite (Wnc). Winchite occurs along the rims of relict hornblende (Hbl). Sample 125-778A-13R,CC (piece No. 4, 6-10 cm).