

Peridotite ultramylonites derived from Prince Edward Transform fault, Southwest Indian Ridge: evidence of hydrous shearing in the lithospheric mantle

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Southwest Indian Ridge (SWIR) is located to the southwest of Rodriguez Triple Junction where three Indian ocean ridges meet, and one of the slowest spreading ocean ridges in the world. We analyzed microstructure of 21 peridotites samples derived from Prince Edward transform fault on SWIR by PROTEA5 cruise in 1983. Peridotites contained olivine, orthopyroxene, clinopyroxene and spinel. Some samples also contained amphibole. Analysis of major elements indicated the origins of most samples were mantle. Compositions of amphibole were in the range of tremolite and magnesiohornblende. Based on microstructures provided by observation of thin sections, 21 samples was categorized into 4 groups: ultramylonites mainly consist of extremely fine grained matrix ($3\sim 5\ \mu\text{m}$), heterogeneous tectonites consisting of coarse-grained crystals and fine-grained matrix, cataclasite and strongly serpentinized peridotites. Amphibole was in matrix or existed as porphyroclasts, so that amphibole could be generated before deformation of peridotites. Boudin structures of pyroxene and spinel were in some of the heterogeneous tectonites. Crystallographic preferred orientations of peridotites with amphibole were B- and E-type, whereas those of samples without amphibole were A- and D-type. These results suggest mantle flow under transform fault is affected by water, and possibly water moves into mantle from transform fault.

