Structural development in mantle associated with hydration during transform faulting

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The Southwest Indian Ridge (SWIR) is one of the slowest spreading ocean ridges, where peridotites are partially exposed on the seafloor. We analyzed 7 deformed peridotites derived from the Prince Edward transform fault along the SWIR during PROTEA.5 cruise in 1983. These peridotites show various textures from coarse-granular to ultramylonites and include hydrous minerals such as amphibole. Chemical compositions of olivine and spinel grains are in the range of Olivine-Spinel Mantle Array (OSMA) of Arai (1994) regardless of their textures. Amphibole grains are in the chemical components of tremolite, magnesio-hornblende and pargasite. The occurrence of amphiboles indicates that the peridotites were affected by water under temperature condition up to 800 ˚C. Olivine crystal-fabrics within deformed amphibole bearing peridotites have B and E types developed under hydrous conditions, whereas olivine fabrics within undeformed amphibole bearing peridotites have A and D types developed under anhydrous conditions. As a consequence, the petrophysical characteristics of peridotites in this study indicate that the uppermost mantle below the Prince Edward transform fault has been locally but intensely hydrated during shearing due to transform movement.

Keywords: transform fault, peridotitic ultramylonite, hydrous shearing

