

# Role of pyroxenite partial melting in basalt genesis

# Tetsu Kogiso[1]

[1] IFREE/JAMSTEC

I review experimental phase equilibria associated with partial melting of mafic lithologies (pyroxenites) at high pressures to reveal systematic relationships between bulk compositions of pyroxenite and their melting relations. An important aspect of pyroxenite phase equilibria is the existence of the garnet-pyroxene thermal divide, defined by enstatite - Ca-Tschemak pyroxene - diopside plane in CMAS projections. This divide appears at pressures above about 2 GPa where garnet and pyroxenes are the principal residual phases in pyroxenites. Bulk compositions that reside on either side of the divide have distinct phase assemblages from subsolidus to liquidus, and produce distinct types of partial melt ranging from strongly nepheline-normative to quartz-normative compositions. Solidus and liquidus locations are little affected by the location of natural pyroxenite compositions relative to thermal divide and are instead controlled chiefly by bulk alkali contents and Mg#s. Changes in phase volumes of residual minerals also influence partial melt compositions. If olivine is absent during partial melting, expansion of the phase volume of garnet relative to clinopyroxene with increasing pressure produces liquids with higher Ca/Al and low MgO contents compared with garnet peridotite-derived partial melts.