

## Aluminous phases in subducted MORBs at mantle transition zone depths; experimental constraints to 20 GPa

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[http://www.earth.sinica.edu.tw/lab\\_e.htm](http://www.earth.sinica.edu.tw/lab_e.htm)

Geophysical modelling of subduction zones suggests the occurrence of temperatures lower than 1200 °C in large portions of the mantle at depths within the transition zone. Despite the relevance of these relatively low temperature regions, there is a very limited number of experimental studies devoted to unravel phase relationships in complex bulk compositions. Complexities in this P-T region might have been overlooked because of the sluggish kinetics and of the short duration of most multianvil experiments.

Long duration experiments (up to 300 hours) were performed in a 6/8 multianvil apparatus calibrated using phase transformations in Bi and GaAs at room T, and coesite/stishovite and Mg<sub>2</sub>SiO<sub>4</sub> at 1000 °C and 1200 °C. Dry gels, dry seeded gels, and hydrous glasses representative of MORB compositions were used as starting materials. The pressure-temperature field investigated ranges from 14 to 22 GPa and temperatures from 1000 °C to 1200 °C. Even though majorite and stishovite were expected to be the only major phases stable at such conditions, a prismatic euhedral aluminous phase, have been identified in most of the runs performed. This phase is relatively Si-enriched compared to the other Al-rich phases reported in a number of experimental studies at lower mantle conditions (e.g. Miyajima et al. 2001). As previously noted, at higher pressure conditions, the Al-rich phase contains large amounts of alkali, Na<sub>2</sub>O to ca. 5wt.% at 20 GPa, 1200 °C. Some runs show the appearance of a Fe-rich aluminous phase, possibly of garnet structure, further complicating phase relationships. The demonstration of the presence of such aluminous phases are expected to affect density calculations and element partitioning at mantle transition zone depths.