Genesis of high magnesium andesites from Nagasaki, Northwest Kyushu, Southwest Japan

Hidehisa Mashima[1]; Toshihiko Tajima[2]

[1] Tono Geoscience Center, JAEA; [2] Dept. Environmental Sci., Kumamoto Univ

High magnesium andesites (HMAs) with island arc geochemical signatures are distributed in Nagasaki, Northwest Kyushu, Southwest Japan. The genesis of HMA magma in subduction zones is explained by partial melting of hydrous mantle or by the reaction between hydrous felsic melts and the mantle. However, partial melting of hydrous mantle cannot explain the genesis of the Nagasaki HMA magmas since mantle xenoliths from NW Kyushu suggest that the NW Kyushu mantle is anhydrous. Effective hydrous felsic melts/mantle reaction would also require hydrous mantle to reduce the mantle solidus temperature to that of hydrous melts. Thus, the hydrous melt/mantle reaction would also not explain the genesis of the Nagasaki HMA magmas. Normative Jd+CaTs-Ol-Qz compositions of the HMAs suggest that they were separated from their source mantle at 0.5 GPa. This abnormally low pressure partial melting would have been caused by the large contrast of lithospheric strength between the land area composed of the Nagasaki metamorphic rocks and the sea area where sedimentary basins have been formed. The large contrast of lithospheric strength would have concentrated mantle upwelling at the boundary between the land and the sea areas. This large contrast of lithospheric strength would have developed during the formation and extinction of sedimentary basins under strike-slip tectonics developed by the oblique subduction of the Philippine Sea plate. Thus, the oblique subduction of the Philippine Sea plate played an essential role as the driving force of strike-slip tectonics in the genesis of the Nagasaki HMAs.