GEOCHEMICAL CONSTRAINTS ON THE PETROGENESIS OF HIGH-MG BASALTIC ANDESITES FROM THE NORTHERN TAIWAN VOLCANIC ZONE

1Wang, K.L., 1Chung, S.L. and 2Chen, C.H. 1Department of Geology, National Taiwan University, Taipei, Taiwan; 2Institute of Earth Sciences, Academia Sinica, Taipei, Taiwa

Northern Taiwan Volcanic Zone (NTVZ) is a Late Pliocene-Quaternary volcanic field that occurred behind the southern Okinawa Trough-Ryukyu arc system. Mienhuayu, a volcanic islet in the central part of the NTVZ, is composed of lava flows and subordinate scoria of basaltic composition. Whole-rock Ar-Ar dating indicates that the Mienhuayu volcanic activity began at ~2.6 Ma, in good accordance with the time proposed for the onset of extensional collapse of the northern Taiwan mountain belt which resulted in the NTVZ. The basaltic andesites (SiO2= 52.7~54.5 wt.%) show uniform composition marked by high magnesium (i.e., MgO= 5.9~8.1 wt.%, Mg-value= 56~62). This feature has been observed in either silica-saturated melts from the intraplate extension environment or high-Mg andesites from the fore-arc settings. In the incompatible element variation diagram, although the Mienhuayu rocks exhibit moderate enrichments in the large ion lithophile and light rare earth elements and lead, they do not display depletions in the high field strength elements as other NTVZ volcanics. Their overall geochemical features, especially unradiogenic Nd isotopic ratios (epsilon Nd= +7.2~5.1), are similar to the Miocene (~23-9 Ma) intraplate tholeiitic basalts from NW Taiwan and contemporaneous (~13 Ma), extension-related high-Mg andesites from the Iriomote-jima, southern Ryukyu. We therefore suggest that the Mienhuayu magmas originated from decompression melting of an ascended asthenospheric mantle which had been subtly affected by adjacent Ryukyu subduction zone processes. This further implies that significant asthenosphere upwelling was achieved in the beginning stage of lithospheric extension in the nor