

# Geochemical Constraints on the Petrogenesis of High-Mg Basaltic Andesites from the Northern Taiwan Volcanic Zone and Their Geodynamic Significance

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Northern Taiwan Volcanic Zone (NTVZ; Chen, 1997) is a Late Pliocene-Quaternary volcanic field that occurred in a post-collisional setting and behind the southern Ryukyu arc-Okinawa Trough system. In contrast to the calc-alkaline geochemical features observed in most NTVZ volcanics, magmas from the Mienhuayu (MHY) in central part of the NTVZ are high-Mg basaltic andesites which mark with higher magnesium (MgO = 5.9~8.1 wt.%, Mg-value = 0.6) relative to silica contents (SiO<sub>2</sub> = 52.8~54.5 wt.%). In the mantle-normalized element variation diagram, the MHY magmas exhibit mild enrichments in the large ion lithophile (LILE) and light rare earth elements (LREE), coupled with a positive lead spike. They do not display depletions in the high field strength elements (HFSE), a feature shared by other NTVZ volcanics (Wang et al., 1999). These MHY high-Mg basaltic andesites have the highest Nd ( $\epsilon_{Nd} = +5.1\sim7.2$ ) isotope ratios among the NTVZ rocks. Despite the LILE and Pb enrichments, their overall geochemical and isotopic characteristics are similar to those of extension-induced Miocene intraplate basalts emplaced in the Taiwan-Fujian region (Chung et al., 1994, 1995; Shinjo, 1999). Therefore, we interpret the MHY magmas as silica-saturated melts derived from decompression

melting of the ascended asthenosphere that had been subtly affected by the adjacent Ryukyu subduction zone processes. <sup>40</sup>Ar/<sup>39</sup>Ar dating results indicate that the MHY volcanic activity began ~2.6 Ma coincides with the initiation time of extensional collapse of the northern Taiwan mountain belt (Teng, 1996) and represents the earliest phase of eruptions in the NTVZ. This implies that beneath the northern Taiwan mountain belt significant asthenosphere upwelling was achieved as soon as post-collisional lithospheric extension started, which we infer to have resulted in the NTVZ volcanism.

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