Heterogeneous magnesium isotopes of the Cenozoic mantle-derived volcanics on SE Tibetan Plateau: Implication for the subduction of Indian Plate

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The mantle metasomatism caused by Indian-Eurasian continent collision and succedent subduction of Indian Plate beneath Southeastern Tibetan Plateau, are essential for the postcollisional mantle-derived volcanic rocks. We present new element compositions and Sr-Nd-Mg-Pb isotopes of Eocene-Oligocene (36.6~29.0 Ma) volcanics sampled from Maliqing, Runanshao and Houshan. These samples vary from low-SiO_2 and high-MgO picrite to high-SiO_2 and low-Mg trachandesite (SiO_2=43.43~63.56 wt%; MgO=2.65~27.57 wt%). They mainly show Nb-Ta-Ti negative anomalies, enriched Sr-Nd isotopes ($^{87}Sr/^{86}Sr$=0.7054~0.7076; εNd=-5.2~-1.8) and heavy Mg isotopes ($\delta^{26}Mg$=-0.31~-0.13 ‰). It suggests that these rocks were possibly derived from metasomatized lithospheric mantle, which had been enriched by subduction-related fluids.

According to previous studies, the Tengchong volcanics (17.8~0.003 Ma) consist of trachybasalt, basaltic trachyandesite and trachyandesite. They exhibit lower K_2O/Na_2O ratios (0.43~1.23) and lighter Mg isotopes ($\delta^{26}Mg$=-0.51~-0.27 ‰), which were proposed as the product of the partial meling of carbonated lithospheric mantle [1]. Therefore, lithospheric mantle beneath the SE Plateau recorded by these two periods of volcanics experienced distinct metasomatism. Thus, a subduction-induced mantle enrichment had been taken place between 29.0~17.8 Ma. As Neo-Tethyan Oceanic slab had broken off before 40 Ma [2], this enrichment indicates the subduction of Indian Plate, which are also recorded by the shifting of Pb isotopes from Tengchong volcanics towards Indian continent. Our results reveal that Indian plate had subducted beneath SE Tibetan Plateau between 29.0~17.8 Ma.

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