



Effect of Opening of Yamato Basin on Miocene Adakites in Northeast Japan

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Among the geneses of adakites in subduction zones, partial melting of the oceanic crust of the subducted slab (ca. slab melting) is thought to occur when the subducted slab is very young ($< \sim 25$ Ma). However, the sporadic distributions of the adakites in Northeast Japan from Early to Middle Miocene cannot be explained by slab melting because the subducted slab during the period was too old (~ 100 Ma) to be molten. Thus, numerous studies suggested that the heat source for increasing the slab surface temperature was originated from the back-arc mantle (e.g., active or passive injection of the hot asthenosphere into the mantle wedge during the opening of the Yamato Basin). Although the opening of the Yamato Basin was concurrent with the eruptions of the adakites in Northeast Japan, the basin opening was not considered in most of the numerical model studies. In this study, we evaluate the effect of the opening of the Yamato Basin on the Miocene Adakites in Northeast Japan. Our three-dimensional numerical models consider buoyancy and rheology of the mantle wedge and back-arc mantle. The subduction history of the Pacific plate since 60 Ma is considered. The symmetric opening of the Yamato Basin is assumed to occur from 21 to 15 Ma at a spreading rate of 1.5 cm/y and the spreading axis was migrated to the back-arc at a rate of 1.5 cm/y to consider the retreat of the Pacific plate. Our model calculations show that strengthened vigor of the mantle inflow into the mantle wedge during the back-arc opening resulted in localized increases of the slab surface temperature, yielding the sporadic eruptions of the adakites in Northeast Japan. Since the opening of the Yamato Basin ceased, temperature of the mantle wedge decreased because of the weakened mantle inflow into the mantle wedge, and hot finger-like temperature anomalies were developed and sustained to the present. Our model calculations indicate that the opening of the Yamato Basin is responsible for the sporadic distribution of the Miocene adakites in Northeast Japan.