

Regional and temporal variation of Kita-matsuura basalts

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Recently, the origin of cenozoic volcanism in the southwestern part of Japan, including the eastern part of China and Korea has been argued to have been derived from a mantle plume with minor involvement of a subducting plate (Nakamura et al.,1989,1990, Iwamori,1989,1991). There are many large-scale Cenozoic volcanisms all around Kyushu(Nagao et al.,1995). The Kita-matsuura basalt, which is distributed in Matsuura Peninsula, northwestern Kyushu, has been thought to be one of the most voluminous basaltic volcanisms in southwestern Japan. The Kita-matsuura basalt started its activity about 8 Ma (Uto et al.,1998) and has been thought to be different from subduction volcanism (Nakamura et al.,1989,1990). To investigate its spatial and temporal variation, two eruption sequences from the lowermost to the upper most lavas are carefully reconstructed from the easternmost and the central part of the Kita-matsuura basalt.

Generally, in both the eastern part and the central part of the Kita-matsuura basalt, volcanism started from comparatively primitive composition. They become differentiated once, gradually went back to primitive and finally differentiated again. Most primitive lavas have FeO^*/MgO less than unity in the both areas. There are rarely nepheline normative basalts, and the Na_2O+K_2O abundance is definitely higher than that of basalt characteristic for subduction volcanism.

As mentioned above, eastern and the central parts have some common characters in terms of temporal compositional variations. There are, however, some differences between them in petrographical features and whole rock chemical compositions. The most undifferentiated lavas (FeO^*/MgO less than 1) which erupted in the later stage contain almost only olivine as phenocrysts in the central part, but have both olivine and augite as phenocrysts in the eastern part. The amount of TiO_2 , Na_2O and K_2O is higher in the eastern part than in the central part for the same SiO_2 concentration. The MgO and CaO contents for the eastern part decrease rapidly as the SiO_2 contents increases, whereas those of the central part decreases slowly. The FeO^*/MgO ratio increases rapidly in the low SiO_2 range in the eastern part, whereas it slowly increases until high SiO_2 field in the central part. The contrasting features can be observed even if aphyric basalts are considered.

The similarity in the pattern of the temporal compositional variation for the major elements and systematic difference in the major and trace elements as well as petrographic differences between the central and the easternmost area of the Kita-matsuura basalt suggest that they reflect a single magmatic activity of regional-scale with lateral variability. The implication of the single activity and origin of the variability will be discussed.