Petrological implications of peridotite xenolith bearing alkali basalt at Kurose,SW Japan

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Alkali basalt from Kurose,Fukuoka,SW Japan,includes a lot of peridotite xenoliths which are considered to be derived from upper mantle.The depth of origin of such basalt must be deeper than those of peridotite xenoliths.Such basalt must have ascended quickly from the upper mantle.Therefore the basalt has genetic implications for primitive magma. SiO2 contents were around 48wt% and (Na2O+K2O) contents were nearly 5.5wt%.It was noteworthy that FeO*/MgO ratios of the basalt are about 1.2 which are higher than 0.9, the maximum value of melts which can be equilibrated with a mantle.Petrographic and chemical characteristics of them suggest that the basalt generated at the depth of 25kb,captured peridotite xenoliths,mixed with the evolved magma,and finally erupted to the surface.

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Major element compositions of bulk rocks of the basalt were determined.SiO2 contents were around 48wt.% and (Na2O+K2O) contents were nearly 5.5wt.%.It was noteworthy that FeO*/MgO ratios of the basalt are about 1.2 which are higher than 0.9, the maximum value of melts which can be equilibrated with a mantle.

Compositins of the basalt were compared with results of peridotite melting experiments.The compositins of the melts adopted are from Hirose and Kushiro(1993).MgO contents of the basalt were surely lower than those of melts while other element contents of the basalt were almost same to those of the melts.

The MgO shortage of the basalt may be considered to be due to olivine fractionation which occurred when the basalt were ascending.It was tested whether the composition of the basalt become identical to those of melts by adding olivine.By adding of olivine,CaO content of the basalt however leave off from those of melts.Accordingly it was impossible to explain the compositions of the basalt by the olivine fractionation.

Both peridotite xenoliths and plagioclase phenocrysts occur in the basalt.The compositions of plagioclase phenocrysts are nearly An40.It is too low.These plagioclase phenocrysts seem to be derived from cumulates from an evolved magma.The groundmass of the basalt was heterogeneous in composition.Furthermore the basalt contains vermicular plagioclase and opasited amphibole.With these lines of evidence,we finally found that the basalt is a mixture of primitive and evolved magmas.Then compositions of the basalt were compared with those of experimental melts and evolved basalt from Genkaijima.They lie on a single line connecting the melts at 25kb and the evolved basalt,suggesting that the basalt generated at the depth of 25kb,captured peridotite xenoliths,mixed with the evolved magma,and finally erupted to the surface.