



## **Geological and petrological evidences for mingling and mixing of magmas in the Me-akan and Taisetsu volcanoes, eastern and central Hokkaido, Japan**

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Both the Me-akan volcano, eastern Hokkaido, and the Taisetsu volcano, central Hokkaido, are exactly the clear fields showing geological evidences for magma mingling and magma mixing, such as coexistence of basaltic andesite scoria and dacite pumice in plinian fall deposit, heterogeneous juvenile ejecta (banded pumice, etc.) in pyroclastic flow, mafic inclusions in lavas, and banded structure in lavas.

Throughout the eruption history of Me-Akan volcano, the largest eruptions occurred about 12000-13000 years ago. The main eruptions of this stage were continuously eruptive sequence of pumice-scoria pyroclastic flows and pumice-scoria plinian fallout, which show the multi-stage processes of magma mixing and mingling in the magma plumbing system through mineralogical and petrological analyses of the juvenile products. Each deposit contains pumice ( $\text{SiO}_2=63\text{wt.}\%$ ), scoria ( $\text{SiO}_2=55\text{wt.}\%$ ) and heterogeneous scoria. The core composition of plagioclase phenocrysts of these scoria and pumice shows a same bimodal distribution of low-An plagioclase ( $\text{An}=59$ ) and high-An plagioclase ( $\text{An}>70$ ). These indicate that heterogeneous ejecta such as banded pumice were exactly mingling products of both mixed mafic and felsic magmas, which were derived from continuous magma mixing of felsic and mafic end-member magmas in a zoned magma chamber.

The lavas in Taisetsu volcano frequently show the banded structure of andesite and dacite magmas, and are characterized by containing a number of mafic inclusions with coarse- and fine-grained types. These inclusions were originated from two kinds of mafic end-member magmas and have different resident times in magma chamber. Some coarse-type inclusion was probably brought out from dacite crystal mush layer. The plagioclase phenocrysts in the host lava show trimodal An-content distributions ( $\text{An}<60$ ,  $60<\text{An}<80$ ,  $\text{An}>80$ ). Heterogeneous structures at the outcrop, phenocrysts compositional variety in the host lava, and diversity of mafic inclusions suggest that three mixed (andesite, dacite and mafic) magmas were minglingly erupted and those magmas were precedingly formed at different stage of mixing events in the zoned magma chamber with mush layers injected by two kinds of mafic end-member magmas.