The temporal variation of magma plumbing system of the Kattadake pyroclastic rocks in the Zao volcano, northeastern Japan

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Base on geologic and petrologic data, we examined the structure and the temporal change of the magma plumbing system of the Kattadake pyroclastic rocks (around 10 ka), Zao volcano, NE Japan. This unit is composed of more than 20 pyroclastic layers. We sampled Juvenile fragments succesively from these layers except for lower layers where many of the rocks were altered.

The rocks belong to medium-K, calc-alkaline rock series, and are olv- cpx-opx basaltic-andesite to andesite. Rocks are plotted on same linear trends in SiO_2 variation diagrams. The silica content becomes slightly poorer upward.

The plagioclase phenocrysts usually have oscillatory zoned cores, which are superimposed by patches, and have dusty zone inside of the rim. Some show homogeneous clear cores with normal zoned outer parts. The pyroxene phenocryst have homogeneous Mg-poor cores with sparse melt inclusions and have narrow Mg-middle zones (~78 Mg#) inside of the rim. Olivine phenocrysts usually have homogeneous clear cores and normal zoned outer parts. Based on the chemical composition of phenocrysts, following three groups are recognized. Group A includes low-An zones ($An_{ca.58\text{-}70}$) of oscillatory plagioclase, orthopyroxene, and clinopyroxene Mg-poor cores. Group A peak compositions are similar among layers. Group B includes clear plagioclase An-rich core ($An_{ca.88\text{-}92}$) and olivine core ($Fo_{ca.74\text{-}85}$). Group C includes middle-An zone ($An_{ca.70\text{-}80}$) of oscillatory plagioclase, the dusty zone, pyroxene Mg-middle zone, and small orthopyroxene (ca.70 Mg#). We note thin An-poorer or Mg-poorer thin rims are observed in many of phenocrysts.

The plumbing system was relatively simple, composed of shallow andesitic magma (ca. 59% SiO_2; precipitated group A) which was injected by mafic magma (ca. 52% SiO_2; precipitated group B) repeatedly. Based on the modal composition and the mixing ratio, the magma was estimated to be crystal mush, thus the mixing was promoted by the forced injection. The group C was formed during the injection. The dusty zone and the Mg-middle zone just inside rim were formed by the eruptiom triggered injection and mixing. Upward decreasing silica content indicates temporally increased parcentage of mafic magma involved in the mixing.