

Petrological characteristics of Kusasenrigahama tephra and coeval volcanic products from Aso volcano, Kyushu, Japan.

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Kusasenrigahama pumice cone, one of the Aso post-caldera central cones, has a double crater structure with diameters of 500m and 1 km. Thirty-thousand-year-old pumice eruptions from Kusasenrigahama cone forms 2.39km³ tephra (Miyabuchi et al., 2003), which is the largest after Aso-4 pyroclastic flow eruption.

The sequence of Kusasenrigahama eruption is represented by the following samples 1) Kusasenrigahama pumice, 2) coeval Kusasenrigahama welded pyroclastic rock, 3) Kusasenrigahama central cone lava.

Result of the whole-rock and mineral analyses of the above samples shows that they are all quite similar in composition, and suggest the homogeneity of the magma reservoir before eruption.

(a) Kusasenrigahama pumice and Kusasenrigahama welded pyroclastic rock are nearly identical in whole rock chemical composition (SiO₂=67-68 wt.%).

(b) Uppermost layer and lowermost layer of Kusasenrigahama pumice fall deposit show nearly the same chemical compositions of constituent minerals (plagioclase:core An₄₅₋₅₇, rim An₄₂₋₅₁ clinopyroxene:core Wo₄₁En₄₂Fs₁₃-Wo₄₄En₄₄Fs₁₆, rim Wo₄₂En₄₁Fs₁₃-Wo₄₄En₄₄Fs₁₆ orthopyroxene:core Wo₃En₆₄Fs₂₆- Wo₃En₇₁Fs₃₃, Wo₃En₆₈Fs₂₆-Wo₃En₇₁Fs₂₉).

(c) Equilibrium pre-eruption temperatures of magmas were almost the same. They were estimated by Wood and Banno (1973) and Wells (1977) for the coexisting two-pyroxene pairs the result all agreed: 950-1000 degrees.

(d) The Kusasenrigahama central cone lava in the last stage of activity shows more mafic whole rock chemical composition than the rest of Kusasenrigahama pumice (SiO₂=67 wt.%) and Kusasenrigahama welded pyroclastic rock (SiO₂=68 wt.%). This probably suggests that an injection of mafic magma occurred in a magma chamber under Kusasenrigahama volcano during the last stage of activity.

In addition, Sawatsuno lava, which were active for the same period as Kusasenrigahama pumice, show the same phenocryst mineral assemblage, whole rock chemical composition, and phenocryst mineral composition as the Kusasenrigahama pumice and welded pyroclastic rocks. Thus these rocks originated possibly from the same magma reservoir.