

Volcanic activity and magma plumbing system during caldera and post-caldera stage of Mashu volcano, eastern Hokkaido

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Mashu volcano, characterized by a caldera of 6 x 7 km diameter generated about 7500 years ago, is located at eastern ridge of Kutcharo caldera in the Akan-Shiretoko volcanic chain in eastern Hokkaido (Katsui et al., 1975). Mashu volcano started activities around 35 thousand years ago and has repeated explosive eruptions many times (Sumita, 1990; Hasegawa et al., 2009). Volcanic sequence of caldera stage and post-caldera stage during 14 thousand years has been well studied by Kishimoto et al. (2009) based on previous research of Katsui et al. (1975 and 1986). However, magma plumbing system during caldera stage and the following post-caldera stage, and stratigraphic relationship between post-caldera lavas and tephra deposits have not been cleared by petrological approach. We show plural magma chamber models at the caldera stage and eruptive sequence of post-caldera stage including four lavas. Major caldera formation of tephrostratigraphy of Ma-j, Ma-i, Ma-h, Ma-g, Ma-f (Kishimoto et al., 2009) was reviewed. According to the change of lithic fragments and existence of lithic-rich thin layers between pumice fall deposits, the location of the crater may have changed during the plinian eruptions. The most mafic compositions of bulk and minerals in Ma-g tephra has different compositional trend compared with other eruptive products of caldera-forming series. Ma-f large-volume pyroclastic flow deposit shows a wide compositional variations including the range of all other caldera-forming series products. These suggest existence of two different magma chambers of Ma-j, Ma-i, and Ma-h units and of Ma-g unit. It seems that both of the magma chamber eventually reached the catastrophic eruption of Ma-f unit. During the post-caldera stage (6000?-1000 years ago) magma activity was changed to the new plumbing system based on the bulk chemistry. Kamuishu-island lava dome ($\text{SiO}_2=73.9\text{wt.}\%$) in the center of the caldera erupted at the beginning of a long dormant period after the caldera formation, after that Kamuinupuri small strato-cone was formed in the eastern edge of the caldera. The eruptive sequence of three lavas from Kamuinupuri was deduced by bulk and minerals chemistry. Kamuinupuri northwestern lava ($\text{SiO}_2=68.5\text{wt.}\%$) erupted during the main activity of Kamuinupuri strato-cone formation (Ma-d tephra; $\text{SiO}_2=63.9\text{-}69.4\text{wt.}\%$). After the Ma-d tephra activity Kamuinupuri western lava ($\text{SiO}_2=54.5\text{-}61.6\text{wt.}\%$) effused. The Kamuinupuri north lava ($\text{SiO}_2=70.6\text{wt.}\%$) can be erupted after the Ma-c tephra layer eruption (2500-1500 years ago). At about 1000 years ago the latest explosive eruptions including plinian fall and pyroclastic flow (Ma-b tephra; $\text{SiO}_2=67.0\text{-}69.3\text{wt.}\%$) occurred.

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