

Lateral magma intrusion from a caldera-forming magma chamber: Constraints from geochronology and geochemistry of volcanic products from lateral cones around the Aso caldera, SW Japan

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We investigated the K-Ar ages, and the petrological and geochemical features of lava units from lateral cones (Omine and Akai volcanoes) and lava distributed area around the Aso caldera in central Kyushu, Japan, in order to constrain the spatial range of lateral magma intrusion during the caldera-forming stage. The results of K-Ar age determination showed that most of the analyzed lava units erupted almost simultaneously with the Aso caldera-forming pyroclastic eruptions (266 to 89 ka; Matsumoto et al., 1991). In addition, the petrography, major- and trace element compositions, and Sr isotope ratios of these lava units are indistinguishable from the caldera-forming pyroclastic products. In particular, the decrease in Sr isotope ratios over time observed in these lava units is consistent with that of the caldera-forming pyroclastic products. The contemporaneous activities of compositionally similar magmas inside and outside of the caldera presumably indicate the occurrence of a lateral intrusion of caldera-forming magma, which had accumulated in a huge magma chamber beneath the caldera system. In the Aso volcano, it is thought that a total of 6.3 volume percent of caldera-forming magma migrated more than 20 km from the center of the caldera.