Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.27894

Reconstruction of magma plumbing system in monogenetic volcano using primary volcanic glasses: a case study in the Suwolbong tuff ring, Jeju Island, SE Korea

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Volcanic materials, which are juvenile and accidental in origin, can include particles of various origins, such as magma, fragments of lava, tuff, and sedimentary rocks, depending on the geology of the eruptive site. Proper chemical analysis of juvenile particles is essential for reconstructing the chemistry of the source of magma and the nature of the magma plumbing system. The volcanic glasses in the Suwolbong tuff ring could be divided into juvenile particles with vesicular without alternation rim and accidental particles with non-vesicular with alternation rim, based on particle texture and geochemical composition. The accidental particles are interpreted to have been derived from the volcaniclastic layers deposited before the eruption of the Suwolbong tuff ring. When removing the effects of the accidental particles and considering only the geochemical characteristics of the juvenile particles, the Suwolbong tuff ring is interpreted to have had a relatively simple magma plumbing system, in contrast to the previous model, in which a congested plumbing system fed by independently ascending multiple magma batches. This study shows that the interpretation of the properties of the source magma and the magma plumbing system in monogenetic volcanoes must be performed after clearly distinguishing between juvenile and accidental particles based on rigorous microscopic analysis of pyroclastic materials.