The Samrangjin Magmatic System: its Petrologic Evolution

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There are exposed Samrangjin Tuff, rhyolitic rocks emplaced as postcollapsed central and ring intrusions within the Samrangjin caldera, and fine-grained granodiorite and biotite granite as regional tectonic intrusions nearby.

The Samrangjin Tuff is principally composed of fallout tuffs and ash-flow tuffs. The ash-flow tuffs have a feature in common-namely internal characteristics indicating en-masse, viscous lavalike flowage. On the basis of the tabular nature of the ash-flow tuffs, their broad areal extents, the local preservation of pyroclastic textures at the bases, and the welding foliation including very flattened pumice clasts in the ubiquitous outcrops, we have concluded that the tuffs are emplaced as ash flows at extremely high temperatures and that they nearly coalesced to liquids before final emplacement and cooling.

Flow-banded rhyolite among the rhyolitic rocks was emplaced in the outer part of the ring intrusions. But rhyodacite porphyry was emplaced only inside the flow-banded rhyolite in the inner part of the eastern ring intrusion, and porphyritic dacite and dacite porphyry only inside the flow-banded rhyolite in the inner part of the northwestern ring intrusion. The features of successive intrusions commonly include various xenoliths of the flow-banded rhyolite within the rhyodacite porphyry, alternatively, considerable thickness of contact breccia at the contact of the porphyritic dacite with the flow-banded rhyolite or the dacite porphyry.

The volcanic successions that were emplaced along the caldera cycle in Samrangjin form a magmatic system. The magmatic system is calc-alkalic dacite to rhyolite containing as much as 62-77% SiO2. Rb-Sr isotopic data of the Samrangjin Tuff and the rhyolitic rocks yield an age of 80.8 $\pm 1.5(2\sigma)$ Ma with the initial 87Sr/86Sr ratio of 0.70521 $\pm$ 0.00010(2σ). the continuous compositional zonations generally define a large stratified magma system in the postcollapse magma chamber. The Sr isotopic data suggest that the compositional zonations might have resulted from the differentiations of a parental dacitic magma, without crustal assimilations even near the chamber roof and wall. But spatially and temporally distinct regional tectonic intusions might have been originated from different magma batch.