

Volcanic Evolution of the Samrangjin Caldera, Southern Miryang, Korea

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The 73.5 Ma-old Samrangjin Caldera, about 5.7 x 7.9km, developed within older sequences of intermediate composition volcanics, equivalent to the Miryang Andesite in the southern Miryang. Numerous intrusions dominate the early sequence within the caldera. The caldera collapsed in a trapdoor fashion when more than 28km³ of rhyolitic to dacitic ash-flow tuffs of the Samrangjin Tuff erupted from major vent area near the center and margin of the caldera. Normal faulting along a northern ring fault system dropped the tuffs down to the north with a maximum displacement of more than 550m. The Samrangjin Tuff is more than 630m thick inside the northern caldera, with its base not exposed, and rapidly southward thinning to be less than thick in its southern exposure. Rhyolitic to dacitic dikes and slightly younger granitic stock were emplaced along the central vent and/or the caldera margins, and the eastern dikes among them were cut much younger granodioritic to granitic stocks along northwest trending regional structure.

The caldera volcanism eviscerated the magma chamber by a series of explosive eruptions during which silicic magma was ejected to form the Samrangjin Tuff. The explosive eruptions began with phreatoplinian ash-falls, gradually progressed through small plinian pumice-falls and transmitted with ash-flows. During the ash-flow eruption, contemporaneous collapse of the roof of the chamber resulted in the formation of the Samrangjin caldera, a subcircular depression subsiding above 550m deep. Following the collapse, flow-banded rhyolite was emplaced as central plug along the central vent and ring dykes along the caldera margins. Subsequently rhyodacite porphyry and dacite porphyry were intruded along the inner side of the ring dike. After the intrusion, residual magma was emplaced as a hornblende biotite granite stock into the southwestern caldera margin. Finally in the northeastern part, another pluton of granodioritic to granitic composition was emplaced along N50°W trending fault zone.