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# Mechanism of the historical and the ongoing Vulcanian eruptions of Ebeko volcano, Northern Kuriles

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Ebeko is one of the most active volcanoes of the Kurile island arc, producing frequent mild Vulcanian explosions with eruption clouds up to 5 km high. The volcano poses a serious threat to Severo-Kurilsk town with a population of 2500 inhabitants, located at a distance of 7 km on a fan of the volcano's laharic deposits. The eruptions of Ebeko span a range of mechanisms from purely magmatic to phreatic/hydrothermal. Three of its historical eruptions (the 1934–1935, 1987–1991, and the 2016– ongoing) involved fresh magma, while during the others (1967–1971, 2009–2011) fresh magma was not erupted. Juvenile material of the ongoing eruption represents highly crystalline and highly viscous (more than 108 pa s) low-silica (56–58 wt% SiO2) andesite.

Historical data and our observations of the ongoing eruption allowed us to suggest a functional model of the volcano where Vulcanian explosions are caused by shallow intrusions of small diapir-like batches of strongly crystallized and highly viscous andesitic magma ascending into water-saturated, hydrothermally altered rocks composing the volcano summit. We suggest that the diapir's ascent is governed by their positive buoyancy. Some of the diapirs reach and breach the ground surface producing magmatic eruptions of Ebeko, while the others are stuck at the shallow subsurface level and feed intensive hydrothermal activity and phreatic eruptions of the volcano. Positive buoyancy of the diapirs is too weak to allow them to extrude high above the ground surface to form lava domes. Arrival of the first magma diapir of the diapir chain at the surface marks the onset of a new series of Vulcanian magmatic explosions composing (together with the accompanying phreatic and phreatomagmatic Vulcanian explosions) one magmatic eruption of Ebeko.
Arrival of the next magma diapir to the ground surface marks the onset of the next magmatic eruption.