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The 1996 Eruption of Karymsky Volcano and the Composition of its Products Kamchatka, Russia

A Y Ozerov

Y D Muraev

Inst. Volcanology, Piip 9, Petropavlovsk-Kachatsky, 683006, Russia Far East

ozarov@volcan.kamchatka.su

A J Frisbie

Dept. Geology and Geophysics, Yale University

frisbie@love.geology.yale.edu

On 2 January, 1996, eruptive activity on Karymsky volcano resumed after 14 years of inactivity. The Stromboli-type eruption occurred in three stages: the explosive terminal--lateral stage; the explosive terminal stage; the explosive--effusive terminal stage. The first stage occurred from 2-3 January. Simultaneous eruptions occurred from the summit crater of Karymsky volcano and from Karymsky lake, located six km from each other. Nearly continuous gas and ash plumes were observed from Karymsky's summit crater. The eruption in Karymsky Lake, 6 km away, occurred underwater, from an eruption center located 500 meters off-shore. Strong freato--magmatic explosions from the underwater eruption were observed every 10--15 minutes. The result of the underwater eruption formed the New Year Peninsula on the lake's north shore (~0.7 km²), comprised mainly of subaqueous cinder cone debris. During the second stage, from 4-13 January, 1996, eruption occurred only from the summit crater on Karymsky volcano. The third stage began on 13 January, 1996, and continues to the present. Three boulder--lava flows from the summit crater occurred sequentially along the southwest slope of the volcano. The longest extent of the lava flow is ~1.5 km. Diffused gas and ash plumes have been observed 50-120 km away from the eruption center. The products of the 1996 eruption include a suite of three rock types with contrasting compositions: Basalt from Karymsky lake (average SiO₂ = 52.81%), andesite from Karymsky volcano (average SiO₂ = 61.54%), and rhyolite from Karymsky lake (average SiO₂ = 74.78%). The vast majority of rocks are basalt and andesite, with rhyolite appearing in much smaller proportions. Basalt and andesite belong to the mid--potassium series and by the correlation of FeO*/MgO, they are located at the boundary between calc--alkaline and tholeiitic series. The rhyolites correspond to high--potassium rocks and are characterized by tholeiitic FeO*/MgO correlation. The basalt, andesite, and rhyolite rocks produced by the 1996 Karymsky eruption, in conjunction with rocks produced by past eruptions in the Karymsky complex, appear to be part of a rock series that may have originated from a single magmatic system. We propose that all rock compositions produced by the 1996 eruption are explained by the rise of deep, primary, basaltic magma and shallow, rhyolitic magma from a magma chamber ~5-10 km beneath the volcano. These are the magmas that comprise the New Year Peninsula on Karymsky Lake. As a result of the mixing of basalt and rhyolite magmas, andesite magmas are being produced, and, are currently flowing from the crater on Karymsky volcano.

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