

The 2019 Activity of Kamchatkan and Kurile Islands Volcanoes and Danger to Aviation

*Olga Girina¹, Dmitry Melnikov¹, Alexander Manevich¹, Anton Nuzhdaev¹, Elena Petrova²

1. Institute of Volcanology and Seismology, Far East Division, Russian Academy of Sciences, 2. Lomonosov Moscow State University, Geography Faculty, Russia

Strong explosive eruptions of volcanoes are the most dangerous for aircraft because they can produce in a few hours or days to the atmosphere and the stratosphere till several cubic kilometers of volcanic ash and aerosols. Ash plumes and the clouds, depending on the power of the eruption, the strength and wind speed, can travel thousands of kilometers from the volcano for several days, remaining hazardous to aircraft, as the melting temperature of small particles of ash below the operating temperature of jet engines.

There are 68 active volcanoes in the Kamchatka and the Kurile Islands, and several of them are continuously active. Scientists of KVERT monitor Kamchatkan volcanoes since 1993, and Kurile Islands volcanoes since 2003. In 2019, six of the volcanoes (Sheveluch, Klyuchevskoy, Bezymianny, Karymsky, Ebeko, and Raikoke) had strong and moderate explosive eruptions.

The eruptive activity of Sheveluch volcano began since 1980 (growth of the lava dome) and it is continuing at present. In 2019, strong explosions sent ash up to 10-11.5 km a.s.l. on 09 March, 10 April, 29 August, 02 and 06 October, 03 and 11 November; and up to 6-8 km a.s.l. –in April, and August-November; ash plumes extended more 1300 km to different directions of the volcano. A resuspended ash was observed on April, May, September, and October: ash plumes extended for 250 km to the southeast of the volcano. Satellite data showed a thermal anomaly over the volcano all year. Activity of the volcano was dangerous to international and local aviation. The moderate explosive events (ash up to 5-6 km a.s.l.) of Klyuchevskoy volcano were observing on 21-22 April, 12 and 26 June, 01-02 July, 23-24 October, 29-30 December. Ash plumes extended for 200 km to different directions of the volcano. Explosive eruption of Strombolian type began on 01 November and continues in 2020. Satellite data sometimes showed a thermal anomaly over the volcano. Activity of the volcano was dangerous to local aviation. Two strong explosive eruptions occurred on Bezymianny volcano in 2019. 20 January explosions sent ash up to 10-12 km a.s.l., ash plumes extended for 900 km to the northwest of the volcano. 15 March explosions rose ash up to 15 km a.s.l., ash plumes extended for 1000 km to the east of the volcano. The eruption of 15 March was predicted by scientist of KVERT for 6.5 hours before this strong explosive event: www.kscnet.ru/ivs/kvert/ Activity of the volcano was dangerous to international and local aviation. The thermal anomaly over Karymsky volcano was noted on satellite images from time to time. According to visual and satellite data, explosions rose ash up to 6 km a.s.l. (21 August), ash plumes and clouds drifted for 500 km to the different directions from the volcano. The most intense eruptive activity of the volcano was observed in February, March, April, May, July, and August. Activity of the volcano was dangerous to local aviation. Moderate explosive eruption of Ebeko volcano began on October, 2016, and it is continuing at present. Daily occurred from one till eight-nine (27 April and 27 May) explosions, that raised ash up to 4.5 km a.s.l. Ash clouds drifted mainly to the eastern directions from the volcano. Ashfalls were noted at Severo-Kurilsk on January, February, and August-December. Activity of the volcano was dangerous to local aviation. The strong explosive eruption of Raikoke volcano occurred on 21-26 June. Paroxysmal phase of eruption continued for 15 hours. Explosions send ash up to 13.5 km a.s.l., a large ash cloud 750-800 km wide extended more 2500 km to the east from the volcano. Aerosol clouds were noting till 31 June from Baikal Lake till Arctic. A thermal anomaly was registered over the volcano from 21 June till end of year. Activity of the volcano was dangerous to international and local aviation.

Keywords: volcano, explosive eruption, Kamchatka, Kuriles, Aviation