

KVERT PROJECT: DANGER FOR AVIATION DURING ERUPTIONS OF KAMCHATKAN VOLCANOES IN 2009-2010

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The Kamchatkan Volcanic Eruption Response Team (KVERT) is a collaborative project of scientists from the Institute of Volcanology and Seismology, the Kamchatka Branch of Geophysical Surveys, and the Alaska Volcano Observatory. The purpose of KVERT is to reduce the risk of costly, damaging, and possibly deadly encounters of aircraft with volcanic ash clouds. To reduce this risk KVERT collects all possible volcanic information and issues eruption alerts to aviation and other emergency officials. There are 30 active volcanoes in Kamchatka and 4 of them continuously active. In 2009-2010 six strong explosive eruptions of Klyuchevskoy, Sheveluch, Bezymianny, Kizimen, Karymsky and Koryaksky took place. In addition, higher fumarolic activity of Gorely volcano was observed in 2010.

Sheveluch: a Aviation Color Code (ACC) was mainly Orange owing to continuous of lava dome growth and moderate or strong explosive activity of the volcano. It was Red on 26-28 April, 2009; 10 September, 2009; and 27-29 October, 2010; because in these days explosions produced ashes up to 10-15 km above sea level (ASL). Strong paroxysmal explosive eruption of the volcano occurred on October 27, 2010. Ash plumes rose ~ 12 km ASL and extended about 2500 km to the east from the volcano. A pyroclastic flow deposits area was 20 km².

Klyuchevskoy: ACC was Orange on 1-28 January, 2009; Yellow - on 29 January – 10 June, 2009; Green on 11 June - 31 July, 2009. And after that: Yellow on 01 August - 07 October, 2009; Orange on 08 October, 2009 - 21 October, 2010; Red on 22-29 October, 2010; Orange on 30 October – 16 December, 2010; Yellow on 17-31 December, 2010. Explosive-effusive eruptions of the volcano occurred from October 2008 till January 2009, and from August 2009 till November 2010. Paroxysmal phase of last eruption was on October 22-27, 2010: ash plumes rose up to 8-9 km ASL and extended > 2300 km to the east from the volcano. Five lava flows effused from the terminal crater down different flanks of the volcano.

Bezymianny: ACC was Yellow on 01 January – 15 December, 2009; Red on 16 December, 2009; Orange on 17-20 December, 2009; Yellow on 21 December, 2009 - 06 February, 2010; Orange on 07-10 February, 2010; Yellow on 11 December - 23 May, 2010; Orange on 24-30 May, 2010; Red on 31 May, 2010; Orange on 01-02 June, 2010; Yellow on 03 June - 31 December 2010. During of paroxysmal phases of the eruptions ash plumes rose ~10 km ASL and extended from the volcano ~ 400 km to the west on 16 December, 2009; and ~250 km to the west and later 160 km to the north-east and > 600 km to the south on 31 May, 2010.

Kizimen volcano woke up after repose in beginning November 2010 (previous eruption was 1928-1929). ACC was Green on 01 January - 29 July, 2009; Yellow on 30 July - 30 August, 2009; Green on 31 July - 09 October, 2009; Yellow on 10 October - 11 November, 2009; Green on 12 November, 2009 – 24 November, 2010. And after that in 2010: Yellow on 25 November – 09 December; Orange on 10-11 December; Red on 12 December; Orange on 13-26 December; Red on 27-28 December; Orange on 29-31 December. Strong explosive events began to registering from 09 December, 2010. On December 12, 2010, ash plumes rose up to 10 km ASL and extended > 500 km from the volcano. During the eruption ash falls were noted in the different areas of Petropavlovsk-Kamchatsky, Yelizovo, Paratunka and the others. Eruption of the volcano continued in January-May 2011.

Karymsky: ACC was mainly Orange owing to moderate and strong explosive activity of the volcano. ACC was in 2009: Orange on 01 January - 23 April; Yellow on 24 April - 30 August; Green on 31 August - 20 September; Yellow on 21-23 September; Orange on 24 September - 31 December. In 2010 it was: Orange on 01 January - 24 February; Yellow on 25 February - 28 March; Orange on 29 March - 31 December. The very strong explosive events were registered at the volcano on June 11, 2010: ash plumes extended about 196 km to the east from the volcano.

Koryaksky volcano woke up in December 2008_(previous eruption was 1956-1957). In 2009 ACC was Orange on 01-06 January; Yellow on 07 January - 02 March; Orange on 03 March - 27 April; Yellow on 28 April - 16 August; Orange on 17 August - 02 September; Yellow on 03 September – 04 November; Green on 05 November – 31 December. During the intensification of the volcano in 2008-2009, there were three periods when gas-steam plumes contained ash, and the volcano represented a danger to aviation: 23-28 December, 2008; 4 March - 18 April, 2009, and 13-27 August, 2009. The most activity of the volcano was in March-April, 2009: the greatest height of ash-gas-steam plumes was 5.5 km a.s.l. and length - about 680 km.

Gorely. Strong fumarolic activity of the volcano began to noting from June 2010. A new vent on the wall of Gorely active crater was discovered on June 17. A temperature of magmatic gas was of 800-900⁰C. ACC was Green in 2009 and 01 January - 23 June 2009; Yellow on 24 June - 31 December, 2010.