

THE ERUPTION OF SHEVELUCH VOLCANO, KAMCHATKA, ON MAY 10, 2004

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Sheveluch is one of the most active volcanoes of Kamchatka. This volcanic massif began to develop approximately 60,000-70,000 years ago. The historical catastrophic eruptions from this volcano occurred in 1854 and 1964. In 1980, a new lava dome began to grow on the floor of the 1964 explosive crater. The lava dome grew continuously during the 1980-1984 period, after which the growth stopped until 1993. In 1984, a new phase of the dome activity began - occasional gas-ash explosions up to 5-7 km ASL started to occur.



Fig.1. Activity of the Sheveluch volcano at 18:30 UTC on May 09, 2004. Photo by Yu.V. Demyanchuk.



Fig.2. A front of pyroclastic and mud flows on May 09. Photo by Yu.V. Demyanchuk.

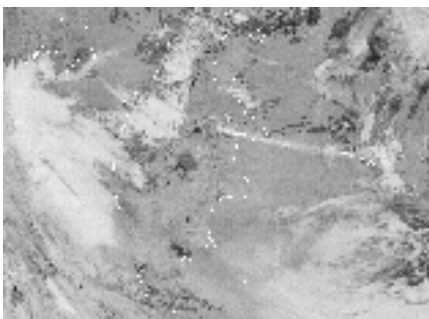


Fig.3. An ash plume extended from Sheveluch volcano up to Bering Island on May 11. Satellite data from KEMSD GS RAS.

Large explosive eruptions from the lava dome took place in 1993 and 2001. On April 22, 1993 ash explosions rose to 16-18 km ASL with pyroclastic flows and mudflows propagating to 5-8 km and 28 km, respectively (Khubunaya et al., 1995). The extrusive phase of the dome growth resumed in 1993 and continued until 1995. From 1995 to 2001 the volcano produced intermittent short-lived ash explosions up to 10 km ASL accompanied by a variable intensity of seismic events (Girina et al., 2002). The large explosive eruption of the volcano occurred on May 19-21 - explosions sent ash to 10-12 km ASL, which drifted to the southwest. The length of pyroclastic flows and mudflows exceeded 18 km and 30 km, respectively (Fedotov et al., 2001). This was followed by an extrusive growth of the dome during 2001-2002.

The next large explosive eruption of the volcano began at 13:10 UTC on May 09, 2004. According to seismic data, a height of first ash explosions had been 8,000-10,000 m (or 26,400-33,000 ft.) ASL in that time. Continuous spasmodic volcanic tremor 14.8×10^{-6} mps was recorded. The tremor decreased till 0.3×10^{-6} mps from 20:40 UTC on May 09 till 08:50 UTC on May 10, and increased again from 08:50 till 10:25 UTC on May 10 up to $5-6 \times 10^{-6}$ mps. The most active phase of the eruption was from 13:10 till 18:30 UTC on May 09. According to video and visual observation, ash explosions send ash up to 8,000-11,000 m (or 26,400 - 36,300 ft.) ASL from 16:30 till 22:40 UTC on May 09 (Fig.1). Ash plumes extended to the east-southeast. From 22:40 UTC on this day rich ash clouds closed the volcano up to 5,000-6,000 m (or 16,500-

19,800 ft.) ASL. At 22:14 UTC on May 09, a front of pyroclastic and mud flows was observed on the south-east slope of the volcano (Fig.2). The run-out distance of these



Fig.4. Ash deposits are to the south-east from the Sheveluch volcano on May 11, 2004. Satellite data of USA.



Fig.5. The road and the dam in the area of river Bekesh were destroyed with mud flows. Photo by Yu.V. Demyanchuk.



Fig.6. Pyroclastic flows in the central sector of the southern volcanic slope. Photo by Sergey V. Ushakov.

flows was about 7-8 km (or 4.3-5 mi). According to satellite data from the USA and Russia, 9-pixel thermal anomaly was observed over the lava dome at 10:36 UTC and 6-pixel – at 17:42 UTC on May 09. From 18:25 through 02:02 UTC on this day, an ash plume extended > 450 km (or 280 mi) to the south-east from the dome and on May 11, ash plume reached up to Bering Island (Fig.3). Ash deposits in the wide sector (~ 50 degr.) to the south-east from the volcano were observed on May 11 (Fig.4). According to data from Ust-Kamchatsk, the ash falls occurred on May 09-10. The thicknesses of orange-brown ash deposits were about 1-2 mm at Ust-Kamchatsk and 5-7 mm in 30-50 km (or 18-30 mi)

from this settlement. On May 10, airport at Ust-Kamchatsk was closed. The road and the dam in the area of river Bekesh were destroyed with mud flows (Fig.5).

On May 21, the lava dome of the volcano and eruptive pyroclastic flows were observed and studied by volcanologist. A part of the dome was destroyed and small viscose lava flow was noted on the top of the dome. The deposits of typical gas-rich juvenile pyroclastic flows with high temperature situated in the

central sector of the southern volcanic slope (Fig.6). The temperature of the general flow was about 300°C at a depth of 15 cm. The flow matrix averages up to 60-70 % of the flow mass. Possible deposits of block and ash pyroclastic flow situates in a central part of juvenile pyroclastic flows. A study of this eruptive products will continues.

References

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