Explosive Volcanism of Kamchatka

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This presentation intends to introduce the recent volcanic activities of representative volcanoes in Kamchatka, Russia. The activities we introduce are Shiveluch volcano April 1993, Klyuchevskoy volcano September-October 1994, and Karymsky Volcanic Center April 1995.

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Shiveluch volcano: The northernmost and most dangerous andesitic volcanoin Kamchatka. In April 1993, a new stage of growing of the extrusive intracrater dome started at Shiveluch. The eruption was not unexpected. The results of many-years geochemical monitoring and short-term seismicforecasts pointed out to its possibility. A sharp increase in volcanic and seismic activity occurred in April 1993. The number of earthquakes increased from 7 events on April 4, to 300 events per day on April 20. Then earthquakes ceased and on April 22 a paroxysmal ash-gaseous eruption took place from the dome. The eruption column reached 16 km altitude, which was followed by the formation of pyroclastic flows 8 km long and mudflows extending along river valleys for 30 km. The extrusive dome started to grow from the beginning of increase in seismic activity. The growth rate was highest during the earthquake swarm and then it was decreasing. In 1993-1994, the height of the dome increased from 92 to 340 m, its volume reached 0.2 km3. The process developed like that during the catastrophic eruptions of Bezymianny in 1956, Mt St. Helens in 1980 and probably Unzen.

Klyuchevskoy volcano: The giant basaltic and most productive volcano of Kamchatka. In September-October 1994, a strong summit eruption of Klyuchevskoy volcano took place. The eruption was of the Vulcanian-Strombolian type on the whole but at the final stage it became subplinian with the formation of the eruptive column. The height of the column reached 20 km, the length of plume was about 2000 km. The volume of lava was about 0.25 km3. The eruption was accompanied by volcanic tremor and earthquakes.

Karymsky Volcanic Center: In April 1995 a swam of small earthquakes began at the area (M=2-3). On December, 1995 daily number of earthquakes increased dramatically and its magnitude reached as high as 7 and on January 1,1996 followed by a summit eruption of Karymsky volcano with a rate of adnesite-dacite lava discharge of 0.8-0.2 tons/s. This eruption is continuing during 3 years continuously. On January 2-3, 1996 a phreatomagmatic eruption occurred in the old Akademii Nauk caldera (filled with Karymsky lake) with a rate of pyroclastic discharge about 800 tons/s resulted from an the injection of basalt through a fissure. The distance between the craters of these simultaneous eruptions was 6 km. An underwater cone of pyroclastic material with a crater of 650m across and volume of about 0.04 km3 grew in Karymsky lake forming a new peninsula. The fresh caldera lake, with a volume of 0.5 km3 was transformed into an acid lake (of pH3.2). It was found that the ground surface had experienced an extension till 2.3 m at a base 3km and new hot springs were formed. Successful foreseen of this activation according seismic and aerial visual observations may be mentioned.