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Cover photo: Panoramic view of Kanaga Volcano taken June, 2000, by Chris Nye³.

Highlights and Summary

- ◆ *Shishaldin Volcano produced many small explosions, prompting a brief return to YELLOW in early February.*
- ◆ *Karymsky Volcano (Kamchatka) resumed strombolian activity after a two-month quiescence.*
- ◆ *A small earthquake swarm occurred beneath Iliamna.*
- ◆ *Mean rates of seismicity for monitored volcanoes have been recalculated by addition of 1999 data.*

The usual chimneys, Karymsky and Shishaldin, are smoking. We welcome the new year/century/millennium with a picture of Kanaga Volcano near Adak, Alaska. As you may recall, Kanaga was a very busy volcano during 1994, even shutting down air traffic to and from Adak for a time. The eruption, however, produced much more lava than ash. Kanaga sits within a caldera, a good portion of which has slid off into the depths. This is a reminder that those of us who stay above sea level are getting only part of the story, and that some day our investigation of the Aleutian Arc must go deeper.

John C. Eichelberger

Eruptions

Summary

Seismic activity at Shishaldin is reevaluated, a pilot reports a plume over Pavlof, and minor eruptive activity occurs at several Kamchatkan volcanoes.

Pavlof Volcano 55°25'N, 161°54'W

On February 21, a National Weather Service observer in Cold Bay forwarded a Reeve Aleutian Airways pilot report of a "smoke plume" rising about 600 m above the summit of Pavlof. Nothing was visible on satellite images and no anomalous seismicity was recorded.

Shishaldin Volcano 54°45' N, 163°58'W

Following the anomalous seismicity that briefly occurred in late December, 1999, a series of seismic events caused by small explosions were identified on January 15, 2000. No plumes or thermal anomalies appeared on satellite images. Re-analysis of seismic data for the previous several months revealed that similar small "explosion" seismic signals had been occurring intermittently since September, 1999. The events were very low-level and not discernable during the frequently inclement weather when background noise was high. The explosions prompted AVO to begin mentioning the activity in the weekly update; however, the color code remained GREEN. On January 28 and 29, vigorous steam plumes were observed rising up to about 1000 m over Shishaldin (elevation 2857 m). By early February, the frequency and amplitude of the overall seismicity, including the explosion events, had increased (up to 200 per day) and were accompanied by reports of steam plumes rising up to about 1000 m above the summit. The activity was interpreted to be small phreatic explosions. Noting that a similar pattern had developed in February 1999 prior to the onset of strombolian eruptive activity, AVO upgraded the color code to YELLOW on February 3. Abruptly, the number of seismic events decreased the next day, on February 4. The color code was lowered to GREEN on February 18. A small steam plume was observed in satellite images on February 22 that extended 15-20 km east of the

volcano (however, no thermal anomaly), and small, low-frequency seismic events continued through the remainder of February.

Klyuchevskoi Volcano, Kamchatka 56°03'N, 160°39'E

On January 30, 2000, Tom Miller was enroute to Petropavlovsk and observed a vigorous steam eruption from Klyuchevskoi that reached 7.5 km ASL. Another short-lived eruption occurred on February 3 that placed an ash-poor plume up to about 8 km ASL. A plume extending about 40 km downwind was visible on satellite images. KVERT raised the color code to YELLOW on February 4 and another brief emission occurred on February 8 sending a plume 200-500 m above the summit (elevation 4750 m). The color code was lowered to GREEN on February 11.

Sheveluch Volcano, Kamchatka 56°39'N, 161°21'E

A fumarolic plume was observed on January 21 and seismic events recorded on January 23 and 26 indicated short-lived gas-ash explosions were occurring. The western flank of the volcano was covered in ash. KVERT raised the color code to YELLOW on January 28 and returned it GREEN on February 4 as the activity subsided.

Karymsky Volcano, Kamchatka 54°03'N, 159°27'E

On February 12 (local), after two months of quiescence, Karymsky resumed the strombolian activity that has characterized it for the past four years. A short-lived gas-ash explosion occurred followed by an increase in seismicity that gradually built to over 40 events per hour during the next several days. The color code was raised to YELLOW on February 13 and remained there through the rest of February. By February 16, the events numbered 40-60 per hour and then during a two-hour interval the count jumped to >200 events. Satellite images showed no plume. However, a 4-pixel thermal anomaly was observed. During the next week, the number of gas and ash explosions decreased from 600 per day to about 25. Pilots reported the explosions lofted debris up to 1500 m above the volcano (elevation 1536 m).

Game McGimsey

Monitoring

Satellite Observations of Alaska and Kamchatka Volcanoes

AVO monitors volcanoes in Alaska and Kamchatka using the relatively high spatial resolution and nadir view of Polar Orbiting satellite data, and the high temporal resolution of Geostationary satellite data. All of these systems include visible and thermal infrared wavelength data.

The Polar Orbiting system is the Advanced Very High Resolution Radiometer (AVHRR) on the NOAA-12, -14 and -15 satellites. Images are recorded in five spectral bands at a spatial resolution of 1.1 km at nadir. The satellite data on volcanoes of Alaska and Kamchatka is received by the ground station at the Geophysical Institute, University of Alaska Fairbanks, and is analyzed to detect volcanic eruption clouds and thermal anomalies at volcanoes in the North Pacific region. Repetitive coverage by these data is 8 images per 24 hours for Alaskan Volcanoes and approximately 4 images per 24 hours for Kamchatka Volcano. The time interval between passes may vary depending on data acquisition schedule.

Geostationary data are received from GOES Satellites via computer networks at AVO-Anchorage, and provide observations of the eastern North Pacific. GOES data is available at 15 minute intervals at resolutions of ~2 km at 60° N (visible band), and at 30 minute intervals at 8 km at 60° N (visible and thermal infra red (TIR) bands), respectively within 45 minutes after receiving by a ground station.

During January and February 2000, thermal anomalies and eruption clouds were observed at Karymsky Volcano, Kamchatka Peninsula, Russia, which has been in a state of unrest since January 1996 (Table 1). Our attention was also focused on Shishaldin volcano, which showed seismic signals interpreted as possible explosive events. However, because of the small size of these events they were not observed in satellite imagery.

Karymsky Volcano

The current episode of activity at Karymsky began on January 2, 1996. During 4 years the volcano showed

continuing low-level strombolian activity characterized by frequent explosions, intermittent extrusion of blocky lava flows and rare pyroclastic flows. During 1998-99 the activity of Karymsky become more sporadic, the number of explosions per day decreased and fluctuated significantly. In December 1999 and January 2000 Karymsky was quiet, the seismicity was at background level and no thermal anomalies was observed in satellite imagery. KVERT reports the activity resumed on Feb.11, when seismic data indicated a large explosion followed by smaller events. The number of registered explosions increased from 5-10 per hour on Feb.11 to 40-60 per hour on Feb.15, and then gradually decreased to 10-50 events per hour at the end of the month.

The first clear AVHRR image, n12.100047.1843, received by AVO on Feb.16 showed no plume, but a 4-pixel thermal anomaly that was 65°C above background temperatures. Two days later on Feb.18 a 25-km long plume and a two-pixel hot spot with radiant temperatures close to saturation was observed in n14.00049.0404 (figure 1). This activity continued on following days, seen as 1-7 pixel thermal anomalies with maximum temperatures varied from 10°C to 75°C (table 1). On Feb.27 an 11-km long plume was observed in image n15.00058.0732.

Pavel Izbekov, Jon Dehn, Dave Schneider, Ken Dean and Kevin Engle

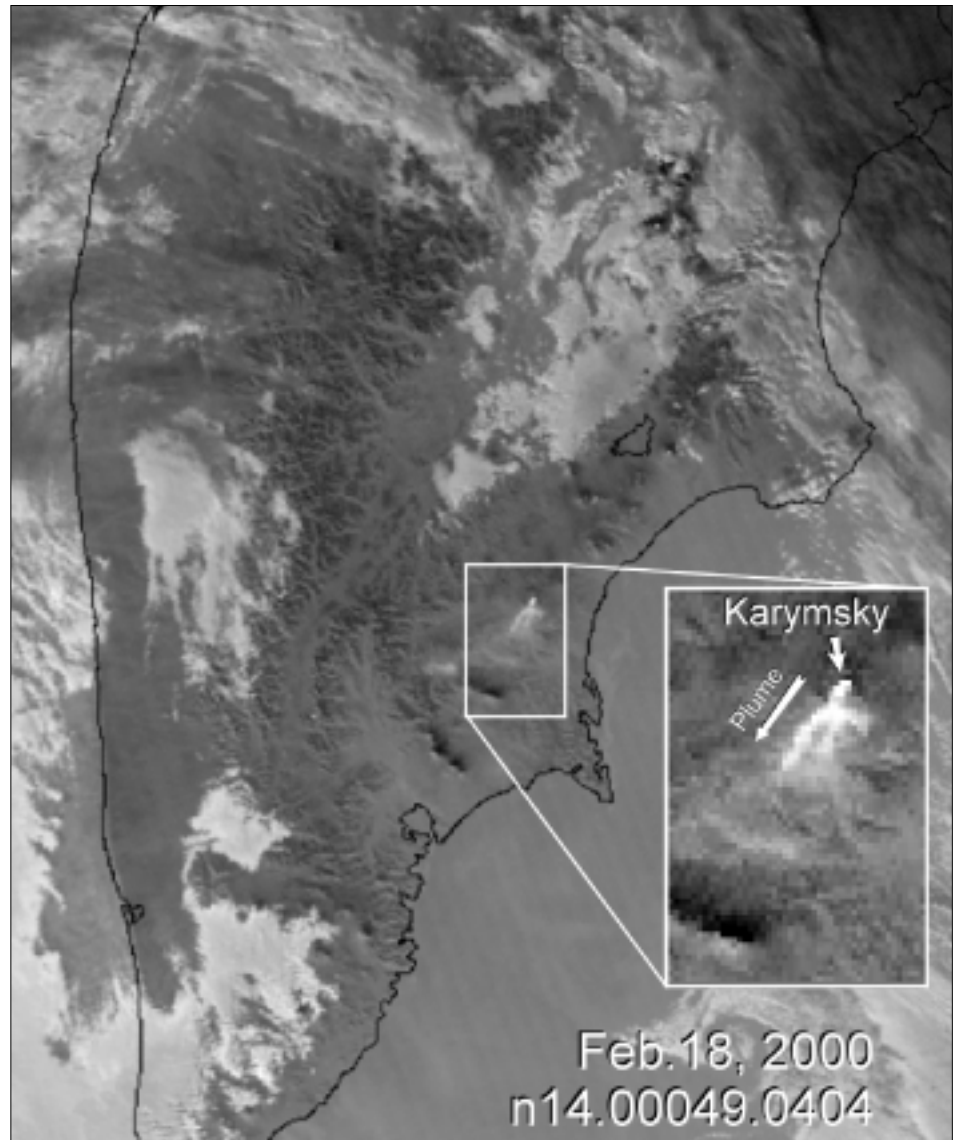


Figure 1. AVHRR thermal infrared band image of Karymsky volcano on February 18, 2000. The size of the thermal anomaly is 2 pixels; V-shape volcanic ash plume extends on 25 km from the volcano in SSW direction.

Table 1. Satellite Observations of Alaska and Kamchatka Volcanoes for the Months of January-February, 2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
January																															
No activity																															
February																															
Karymsky																	X		XP	X	XR	R			X		XP	X	X		
X = Hot Spot																															
P = Plume																															
R = pilot report																															