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Cover photos: Cone A of Okmok Caldera in eruption, February, 1997, by John Sease, NOAA.

Highlights and Summary

♦ Sheveluch Volcano, Kamchatka, produced a short but energetic ash bursts on September 3.

♦ The new Westdahl seismic net and expansion of the Katmai seismic net were placed on line.

♦ A small swarm of seismicity occurred under Martin and Mageik Volcanoes, with 29 earthquakes located under Mageik in one day.

♦ Significant seisimicity occurred under Shishaldin Volcano during September and October.

♦ AVO's Annual Coordination Meeting was held in Fairbanks and marked completion of the observatory's first decade.

♦ Work has been completed on characterizing the geology and geochemistry of Mageik Volcano.

♦ Reviews are presented on aspects of the seismicity at Shishaldin Volcano, Mount Dutton, and the Andreanof Islands – the latter in preparation for installation of a new network in 1999.

♦ A COSPEC flight over Chiginagak Volcano indicated that reported increased fumarolic activity is normal passive outgassing.

♦ Analysis of AVHRR imagery reveals a clear record of growth and subsequent cooling of the Okmok Caldera lava flow of 1997.

♦ Brief summaries are provided of current activities of AVO staff.

In This Issue

AVO is now ten years old and has monitored three explosive eruptions. I can say with the miraculous foresight of a tardy report editor that number four is just around the corner. We are beginning to accumulate interesting comparative data on a range of volcanic behaviors. This is being broadened to include not just seismic data but also satellite thermal imagery and, we can hope in the near future, extensive geodetic data. It is broadened even more by rapidly accumulating geological and geochemical data at the surface. Although with 20 volcanoes to monitor in real time we might be inclined to complain that we are stretched rather thinly, the fact is that we are in an enviable position to meld insights from a variety of data sets and contribute fundamentally to understanding the passage of subduction zone magmas through Earth's crust. But the capability of an observatory, whose function is to sound an alarm, to do basic science is not unlimited. To fully benefit scientifically from the level of activity that the Aleutian Arc provides, it is necessary to draw in those whose focus is on gaining fundamental insights with the hope of practical application, to work with AVO where the focus is practical application with the hope of fundamental insights. That, I believe should be a near-term goal: to alert science agencies outside the Department of Interior, and their constituencies, that an impressive scientific infrastructure is now in place for the study of Aleutian volcanism, from which their programs can benefit. Indeed, this message need not stop at our borders, but can extend to productive collaborations with other countries. The proposal for an Aleutian Science and Technology Center was an early attempt at

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this sort of synthesis of applied and basic volcanological and seismological goals. The workshop in Kamchatka last summer was an effort to find common ground for collaborations with our neighbors. A new proposal for a multi-disciplinary and multi-agency investigation of the the dynamics of the Okmok magma system has taken shape. Sooner or later, one of these initiatives will be successful and we will begin to realize the scientific as well as the societal benefits of monitoring one of Earth's outstanding magmatic arcs.

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Eruptions

A short-lived but apparently energetic ash burst from Sheveluch volcano in Kamchatka (56°39' N, 161°21'E) was detected by the Japan Meteorological Agency in satellite imagery from 0300UT 9/3/98 (7:30 pm ADT, 9/2/98). AVO, using satellite imagery, followed the small ash cloud, about 80 km long and 20 km wide, as it drifted easterly and shrank in size, at an altitude of approximately 25,000 ft asl. The cloud diffused completely before reaching 173°E by 0130UT 9/4/98 (5:30pm ADT 9/3/98) as tracked by satellite imagery. No visual observations of the event or the ash clouds have been received either from KVERT or pilot reports. However, ash explosions on September 3, 16:22 KDT, are reported in the KVERT Information Release 98-38 of September 8. The small ash burst and ash cloud are well documented with satellite imagery. This burst is typical of Sheveluch which most recently had similar activity on 6/15/98 and 5/30/98.

On September 22, a satellite image from 7 pm ADT showed an apparent 350-km-long plume extending eastward from either Kluychevskoy or Bezymianny. The cloud height could not be determined but a minor ash signature was indicated in the 4 minus 5 bands. FAA and NWS were notified and several unsuccessful attempts were made to contact KVERT scientists to verify the eruption and acquire further information. However, because the eruption could not be confirmed and height of the cloud was unknown, no official warning (NOTAM) was issued by FAA. A Volanic Ash Advisory was issued by the Tokyo VAAC and available information was conveyed to pilots in the vicinity via a PIREP. Subsequent communication with KVERT later that evening revealed no seismic indication of an eruption.

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Monitoring

AVO monitors volcanoes in Alaska and Kamchatka using the relatively high spatial resolution and nadir view of polar orbiting satellites and the high temporal resolution of geostationary satellites. 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 and -14 satellites. Images are recorded in five spectral bands at a spatial resolution of 1.1 km at nadir. These data are received by the ground station at the Geophysical Institute, University of Alaska Fairbanks, and are analyzed daily to detect volcanic eruption clouds and thermal anomalies at volcanoes. Repetitive coverage consists of 8 images per 24 hours for Alaska Volcanoes and approximately 4 images per 24 hours for Kamchatka Volcanoes. The timing of satellite passes are not distributed evenly over the 24-hour time frame.

Geostationary data are received from the GMS and GOES Satellites via computer networks at AVO-Anchorage, and provide off-nadir observations of the western North Pacific (GMS), and the eastern North Pacific (GOES). Hourly GMS data (~8km resolution at 60°N in the visible and TIR) are available for analysis within ~1 hour after reception by a ground station. GOES data are 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 (Vis and TIR bands), respectively within 45 minutes after reception by a ground station.

During this reporting period, activity was observed at Bezymianny, Karymsky and Sheveluch Volcanoes and at Karymsky Lake. Observations include hot spots and plumes. Activity at Karymsky Volcano is ongoing and includes explosive lava flows and short-lived explosive bursts.

Possible plumes and hot spots were observed at Bezymianny volcano on September 23 and 24. The plume was approximately 254 km long and blowing to the east. On September 24, two low-altitude plumes were observed that were less than 5 km in length. No seismic signals attributed to an eruption were observed during this time period. The observed plumes may have been orographic clouds and/or snow and ash lofted by the extremely high-velocity winds during this period.

Karymsky activity continued through December. Many hot spots were observed throughout this period with temperatures ranging from 49.42 (near sensor satutation) to -2°C, and background as low as –30°C. The number of hot pixels observed on a single image ranged from 1 to 11. Numerous plumes were observed between October 10 to Dec 26 with the longest (210 km) on December 16. Most plumes were relatively short, narrow and low altitude, and composed of mostly water vapor.

A plume was observed at Sheveluch Volcano on September 3 in images n14.98246.0142 and n14.98246.0453. In the second image there were low band 4 minus 5 values, approximately –6.5, suggesting volcanic ash was present. The leading edge of the plume was 45 km east of the vent and 25 km across. The plume had spread to the east to 425 km from the vent and approximately 80 km long east-west, 20 km north-south. Estimated height of the plume was 8 to 10 km based on comparing Puff tracking model output to satellite images. Activity was not observed after these two images.

Karymsky Lake was observed on October 30 to November 19. The anomaly ranged from 4 to 11 pixels with temperatures ranging from -5.08 to 12.08°C. Background temperatures were approximately –15°C.

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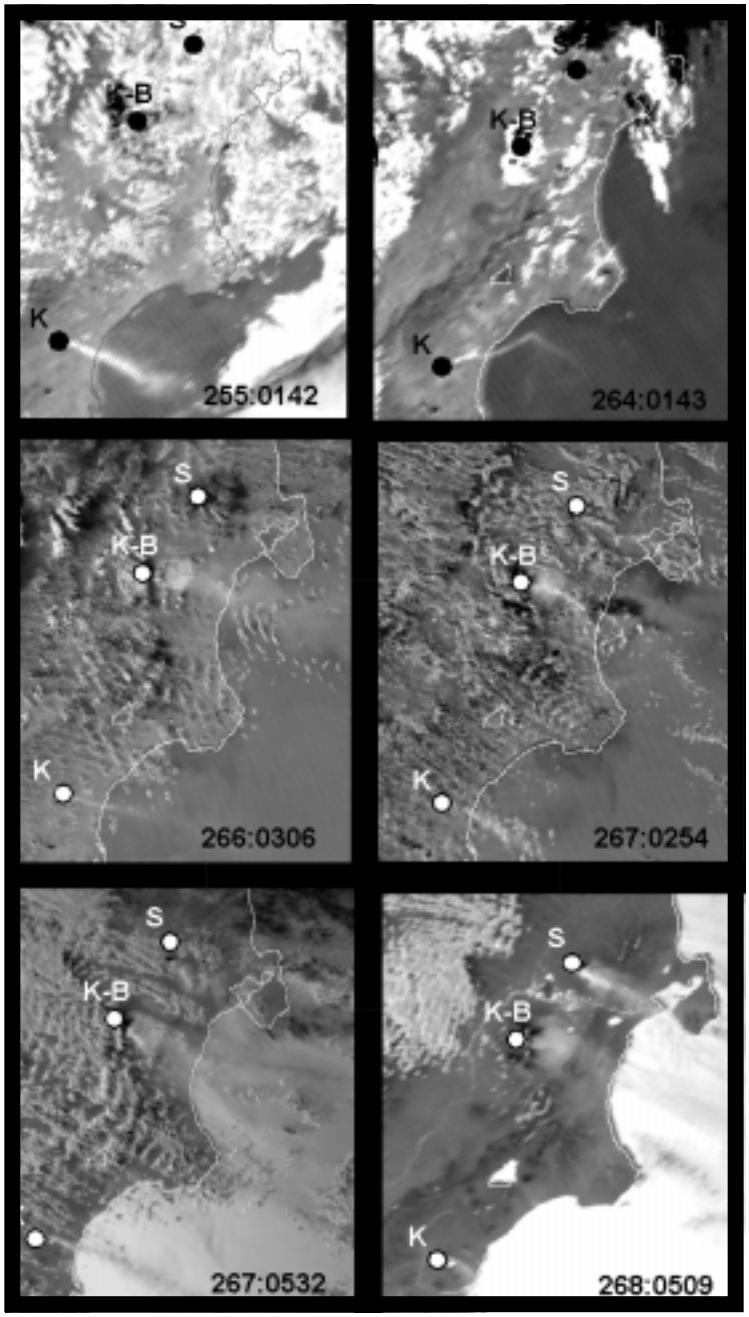

Figure 1: Thermal infrared (Band 3) satellite images of a portion of the Kamchatka Peninsula, Russia. A narrow plume blowing to the SE can be seen emanating from Karmysky Volcano. A combination of orographic clouds, re-suspended snow and ash, and possible volcanic plumes can be seen at Kluchevskoy Bezymianny and Sheveluch Volcanoes. The Julian day and UT time are shown on each image.

Table 1. Satellite Observations of Alaska and Kamchatka Volcanoes for the Months of September-December, 1998

September	**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**
Bezymianny/Kluchevskoy							**x**																			**x**	**x**	**x**		
Sheveluch			x																											
Karymsky Lake									x	x							x											x		
Karymsky	x			x	x		x	x	x	x	x	x					x	x		x	x		x	x	x	x	x	x	x	x

October	**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**
Bezymianny/Kluchevskoy																			x	x											
Karymsky Lake					x		x						x																x	x	
Karymsky	x	x			x		x							x					x			x	x	x			x	x	x	x	x

November	**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**
Karymsky Lake			x								x						x		x											
Karymsky	x		x				x	x			x	x		x	x	x	x	x	x	x	x		x	x	x		x	x		x

December	**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**
Karymsky	x		x	x	x	x	x	x		x			x	x	x	x					x	x			x	x				x	