Distances to stations

We generated a table showing distances between the AVO seismic stations and the various volcanic centers. The distances appearing in the table were determined using the *Nearest* program which was written by Dr. Anthony Qamar at University of Washington. This program has been in use for several years by the Alaska Earthquake Information Center to determine distances from earthquake epicenters to various points of interest. Recently, Bob Hammond produced a data file containing the coordinates of the various Alaskan volcanoes and other landmarks which is accessed by the AVO version of *Nearest*. The data file, along with *Nearest,* were employed to compute the distances appearing in the table below. In general, stations at distances greater than about 200 km from volcanic centers were not included in this table.

Distances from seismic stations to the various volcanoes in kilometers.

Akutan stations	Akutan	Makushin
AHB	11.4	76.9
AKS	19.1	84.1
AKT	14.1	80.4
AKV	1.8	68.3
HSB	7.6	74.0
LVA	4.3	65.6
ZRO	4.8	65.9

Aniakchak stations	Vent Mountain	1931 Vent
ANIA	6.1	1.9
ANNE	6.7	9.0
ANNW	10.4	7.2
ANPB	11.8	12.0
ANPK	4.5	8.3

Augustine stations	Augustine	Iliamna	Redoubt
AUB	2.1	75.0	129.0
AUC	0.6	77.3	131.3
AUE	3.5	76.8	130.5
AUH	0.6	77.1	131.1
AUI	3.2	80.0	133.9
AUL	2.1	75.0	129.0
AUP	0.7	77.0	130.9
AUR	0.1	77.1	131.0
AUS	0.4	77.4	131.3
AUW	7.1	76.6	130.7

Distances from seismic stations to the various volcanoes in kilometers.

Dutton stations	Dutton	Pavlof	Pavlof Sister
BLDY	32.5	62.1	66.3
DOL	26.6	29.8	33.8
DRR3	23.9	55.5	60.4
DT1	8.3	42.6	47.5
DTN	3.8	37.6	42.5

Iliamna stations	Iliamna	Redoubt	Augustine	Spurr	Crater Peak
ILI	9.1	46.8	84.3	141.5	137.9
ILS	8.4	61.6	69.4	156.3	152.7
ILW	4.0	52.2	79.5	146.5	143.0
INE	3.6	50.6	80.6	145.2	141.6
IVE	4.5	54.5	76.5	149.2	145.6
IVS	2.6	56.3	74.7	151.0	147.4

Katmai stations	Martin	Mageik	Novarupta	Trident	Katmai	Griggs	Snowy
ACH	4.8	4.7	11.8	13.6	22.7	21.1	40.3
ANCK	8.4	14.2	21.2	23.5	32.5	29.3	50.1
CAHL	13.8	16.1	25.4	23.6	32.2	35.8	48.2
CNTC	32.4	37.9	42.7	46.2	54.1	47.5	71.0
KBM	14.8	9.4	2.8	7.4	14.0	10.9	31.2
KCE	13.1	6.8	3.0	5.0	13.6	13.5	31.2
KCG	21.2	15.3	5.4	8.1	9.1	5.2	25.2
KEL	37.1	39.5	39.3	43.9	48.1	39.2	63.1
KJL	18.2	24.6	34.1	34.5	43.9	43.8	61.2
KVT	23.7	21.0	15.2	19.9	12.3	12.3	36.3
MGLS	12.5	8.6	14.8	11.8	24.8	24.8	36.0

Makushin stations	Makushin	Akutan
MCIR	7.0	62.8
MGOD	11.0	69.5
MNAT	15.8	53.6
MSOM	8.5	72.5
MSW	9.6	57.7
MTBL	18.3	49.0

Distances from seismic stations to the various volcanoes in kilometers.

Pavlof stations	Pavlof	Pavlof Sister	Dutton
BLHA	33.9	31.3	59.7
DOL	29.8	33.8	26.6
HAG	11.1	15.5	28.1
PN7A	7.1	9.9	33.2
PS1A	9.3	7.4	43.3
PS4A	8.1	11.8	32.5
PV6	4.6	4.8	37.8
PVV	7.8	9.4	37.6

Redoubt stations	Redoubt	Iliamna	Spurr	Crater Peak	Augustine
DFR	12.3	66.4	82.4	78.8	143.3
NCT	13.3	60.0	90.0	86.5	136.8
RDN	4.2	58.8	90.6	87.0	135.1
RDT	21.0	71.3	81.5	77.8	146.7
RDW	3.7	52.6	96.1	92.5	129.7
RED	7.5	46.8	102.2	98.6	123.6
REF	2.3	55.4	93.7	90.1	132.1
RS0	2.7	51.5	97.3	93.8	128.4

Shishaldin stations	Shishaldin	Isanotski	Roundtop Mountain
BRPK	19.0	13.4	19.8
ISNN	14.8	8.3	12.7
ISTK	17.0	3.7	10.6
SSLN	6.5	18.4	26.2
SSLS	5.3	18.8	28.2
SSLW	10.1	25.7	34.4

Distances from seismic stations to the various volcanoes in kilometers.

Spurr stations	Spurr	Crater Peak	Redoubt	Iliamna
BGL	8.2	7.0	89.3	143.1
BGK	21.9	25.6	70.3	124.5
CGL	13.2	14.2	100.1	154.2
CKL	8.9	12.4	82.4	136.3
CKN	6.3	9.2	87.9	142.0
CKT	7.9	11.3	85.0	139.1
CP2	4.0	0.9	91.1	145.1
CRP	6.3	5.5	92.9	147.0
NCG	16.2	12.7	107.3	161.3
SPU	14.5	6.9	86.3	140.3
STLK	31.5	34.5	123.4	177.5

Scott Stihler, Steve McNutt and Bob Hammond

AVO Seismic Stations, Magnitudes, and Detection Thresholds

Each week we present data on the numbers of located earthquakes at each volcano. The data are not uniform, however, because of different distances and magnifications of the stations in each network, and variable noise levels at the volcanoes. Therefore we have determined detection thresholds for each network.

For each monitored volcano, we present a summary of the closest station, smallest magnitude recorded to date, and detection threshold for located events. Dates of study are 960901 to 971022. Note that in many cases the smallest events did not trigger the system; larger events and/or noise accompanied the relatively small earthquakes. Information is as complete as possible at this time.

Note that these values may change if individual stations fail or if more earthquakes occur.

Steve McNutt and Scott Stihler

VOLCANO	*CLOSE STN*	*MIN MAG*	*DETECTION THRESHOLD*	*COMMENT*
Akutan:	*1.8*	*+0.5*	*0.9*	*from b-value*
Aniakchak:	*<1*	*+0.8*		*too few earthquakes*
Augustine:	*0.1*	*-0.5*	*0.0 f*	*rom b-value*
Dutton:	*3.8*	*+0.7*		*too few earthquakes*
Iliamna:	*2.6*	*-0.9*	*0.3*	*from b-value*
Katmai Group:	*2.8*	*-0.5*	*0.5*	*from b-value*
Martin	*4.8*		*0.5*	*from b-value*
Mageik	*4.7*		*0.5*	*from b-value*
Novarupta	*2.8*			
Trident	*5.0*		*0.5*	*from b-value*
Katmai	*9.1*		*0.6*	*from b-value*
Griggs	*5.2*			
Snowy	*25.2*			
Makushin:	*7.0*	*+0.3*		
Pavlof:	*4.6*	*+1.1*	*0.6*	*from reduced displacement*
Redoubt:	*2.3*	*-0.2*	*0.4*	*from b-value*
Shishaldin:	*5.3*	*+0.3*		*too few earthquakes*
Spurr:	*0.5*	*-0.4*	*0.1*	*Crater Peak - from b-value*
			0.9	*Strandline Lake - from b-value*

Augustine deformation

There is some news from Augustine. Tom Murray made a maintenance visit in July. Everything was working well, so we had just planned to get more tiltmeters up and running. Tom was successful in getting ORCA (near AUH) going again.

GPS

All GPS receivers are working well. The MOUND-DOMO (fig. 14) and MOUND-WINDY (fig. 15) data show no significant changes and long term trends remain the same. No maintenance was done to any GPS sites.

Tiltmeters

The MOUND x-axis deflation that started in March continues (fig. 16). The jump in the data in July is the visit by Tom. WINDY (fig. 17) and DOMO (fig. 18) show nothing unusual. As mentioned above, ORCA (fig. 19) is now working once again. Tom replaced the tiltmeter, so it took several weeks for the tiltmeter to once again stabilize itself, but it now appears stable.

Gene Iwatsubo

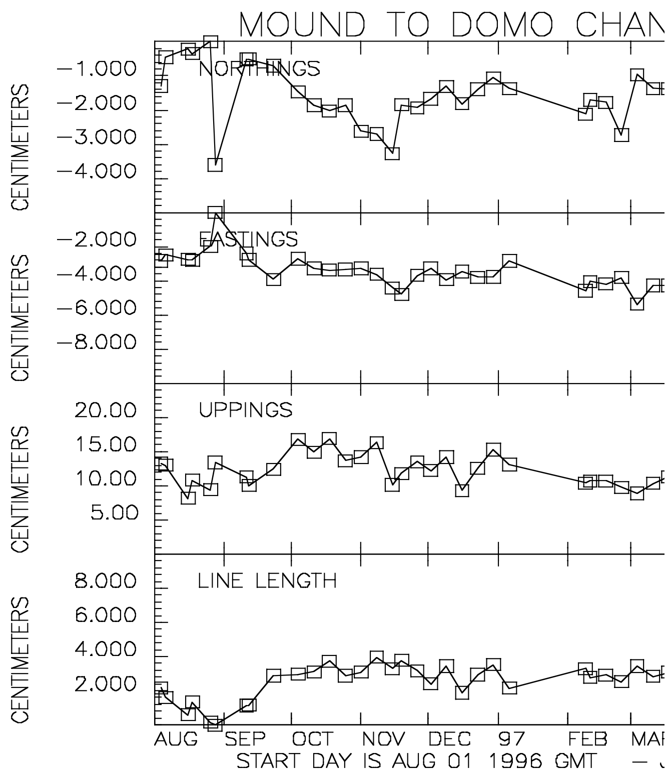

Figure 14: MOUND-DOMO GPS data through July. No significant changes in the data and long term trends.

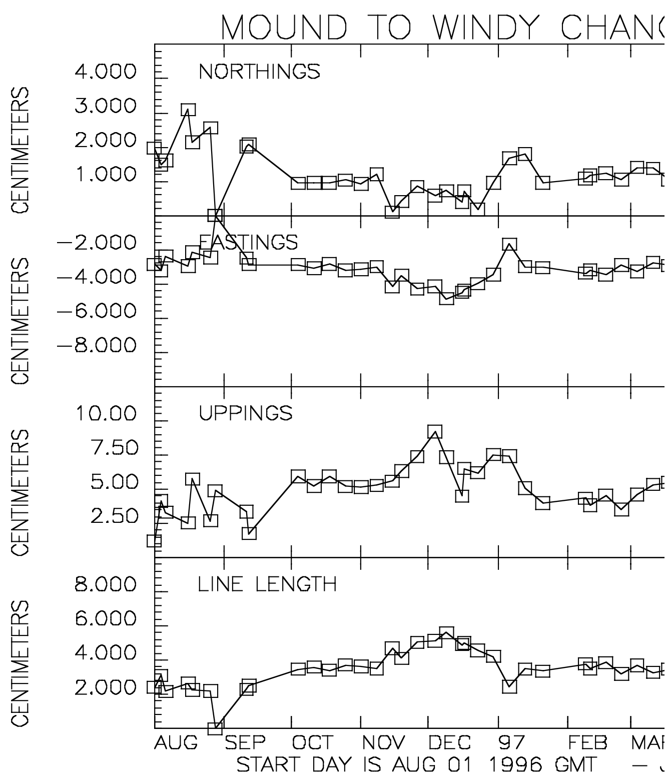

Figure 15: MOUND-WINDY GPS data through July. No short or long term anomalies detected.

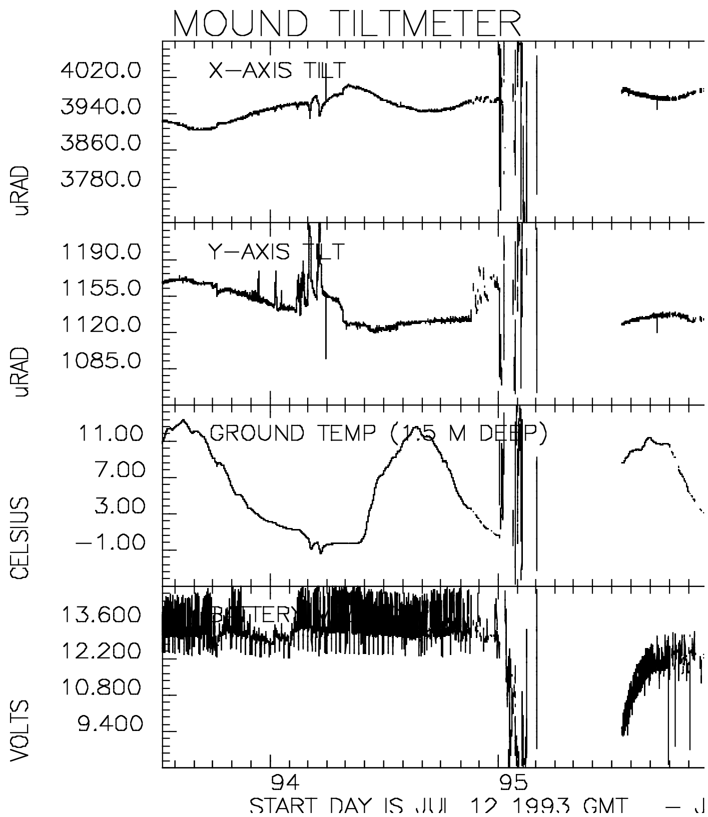

Figure 16: MOUND tiltmeter data. Jump in data corresponds to site visit.

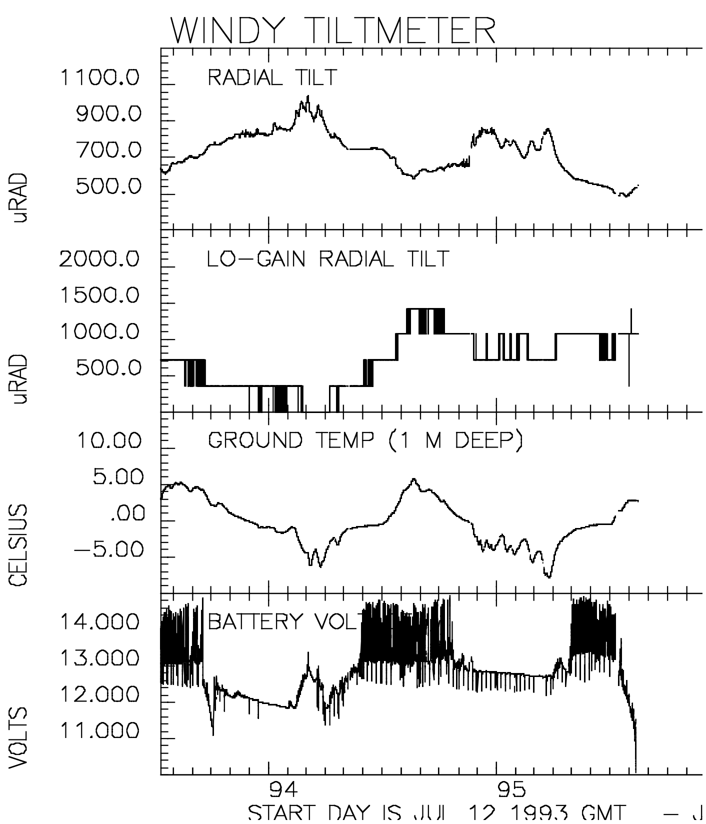

Figure 17: WINDY tiltmeter data. No changes in trends.

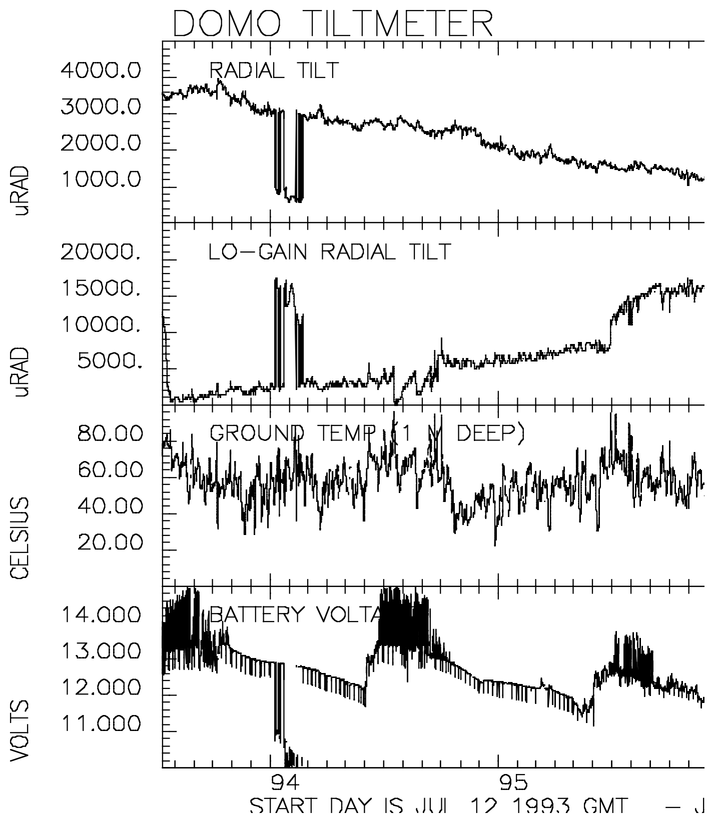

Figure 18: DOMO tiltmeter data. Long term trends continue.

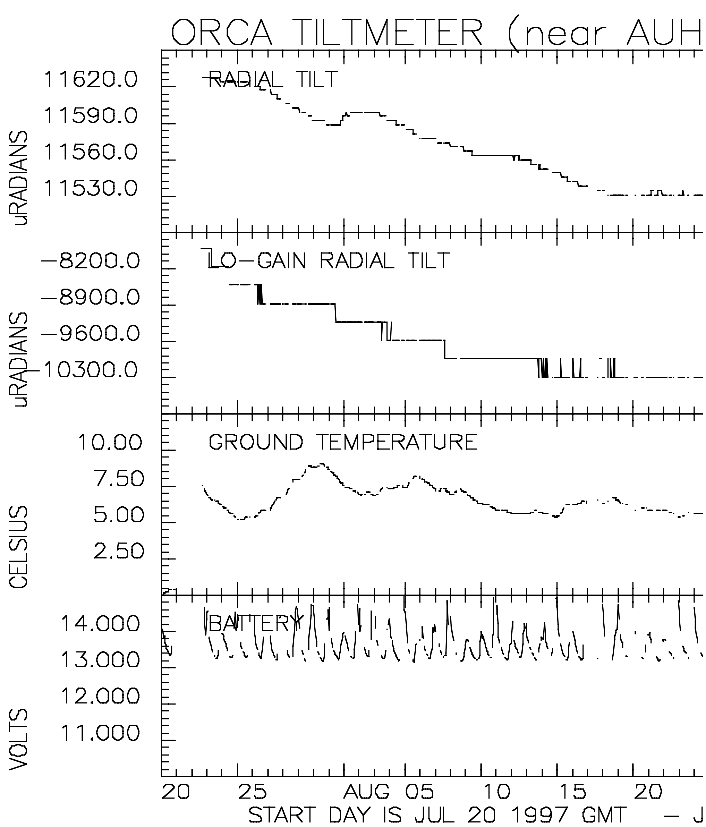

Figure 19: ORCA tiltmeter data. ORCA (near AUH seismic station) took several weeks to stabilize, but now appears fine.

Reconnaissance geologic fieldwork during August 1997 at Shishaldin Volcano, Alaska

Shishaldin Volcano (2870 m, 9414 ft) on Unimak Island in the easternmost Aleutians is the most active and highest volcano in the Aleutian Islands. In 1997, in conjunction with the installation of the new seismic network, we conducted a preliminary investigation of the volcanology and eruption history of this volcano. Little geologic fieldwork has been previously done on the volcano other than John Fournelle's Ph.D. studies, which were restricted to the northwest flank. There is no preexisting detailed geologic map of the volcano.

We constructed a preliminary geologic map of the southern and western flanks, and found stratigraphic sections which detailed the recent eruption history of the volcano. We identified deposits of a large debris avalanche on the northwest flank of the volcano. The debris avalanche deposit is found more than 20 km from Shishaldin along the shore of the Bering Sea, and bathymetry suggests it extends several more kilometers offshore. The avalanche deposits are overlain by the Fisher Caldera tephra fall and coeval ignimbrite deposits, dated to ca. 9000 yr B.P. Remnants of an older Shishaldin cone, now mostly buried by younger lavas, comprise the "Somma" rocks at 1675-1860 m (5500-6100 ft) elevation on the SW flanks of the volcano (fig. 20). The Somma was formerly thought to have been beveled off by glaciation, but our mapping indicates it is a remnant of the pre-collapse cone. The modern edifice of Shishaldin Volcano has been formed since edifice collapse, requiring a sustained eruption rate on the order of one cubic kilometer per millenium during the last 9000 years. This is about an order of magnitude greater than the average long-term effusion rate for Aleutian volcanoes, and also very high by global arc volcano standards.

Other evidence exists for a very high eruption rate at Shishaldin Volcano. Several dozen large cinder cones and local lava flows on the northwest flank of Shishaldin have buried the upper parts of the debris avalanche. Also, more than 90 postglacial tephras and numerous unglaciated lava flows are preserved on the flanks of the volcano, recording frequent explosive and effusive eruptions from the central vent of Shishaldin. The large number of tephras suggests that explosive eruptions large enough to be hazardous to aircraft overflights occur very frequently at this volcano. Postglacial lava flows were found in almost every valley draining the volcano and extended more than 10 km from the current cone on both the north and south flanks. Numerous lahars and unvegetated volcanic sandur plains (fig. 21) probably record interactions between magma and glaciers during eruption.

Preliminary radiocarbon dates are pending on some of these postglacial deposits. Additional fieldwork is planned to investigate geochemical and petrologic interactions between central and flank vent eruptions, to finish the geologic map of the volcano, and to precisely determine the age and style of explosive Holocene eruptions.

Christopher Nye, Jim Beget, and Peter Stelling

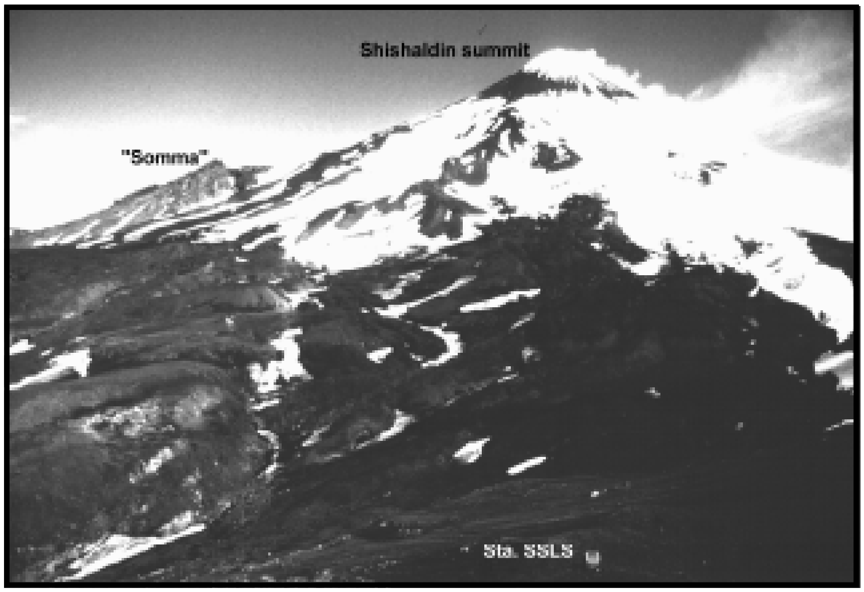

Figure 20: Shishaldin Volcano from the south. Remnants of the older cone ("somma") are on the left skyline. Station SSLS is in the foreground.

Figure 21: Stream-cut cross section through a sandur plain 10 km north of the summit of Shishaldin. Jim Begét (bottom of out crop) for scale. The large block illustrates the intensity of the floods that left these deposits.

Shishaldin network installation, Pavlof network maintenance, and other exciting happenings

The Shishaldin/Pavlof field trip was conducted between July 8 and July 29, 1997. Because this campaign involved working on both the Pavlof Net for some maintenance and modifications, and the Shishaldin Net for installation, we ended up being based out of Cold Bay and False Pass simultaneously. Depending on the weather, we would work on one network or the other. This turned out to be a logistical challenge at times. The network diagram for both the Pavlof and Shishaldin networks is shown in figure 22.

The Shishaldin Network Installation:

The Shishaldin network has three stations around the north (SSLN), west (SSLW) and south (SSLS) sides of Shishaldin Volcano (fig. 23). The south side station is a three component station and also is the closest station (~5 km) to the summit of Shishaldin Volcano. Two stations were installed on the north (ISNN) and south (ISTK) sides of Isanotski Volcano as well, closing the gap of the network. A sixth station was installed on Brown Peak (BRPK), a hill about 13 km south of Isanotski, which is used as a repeater between the south and west Shishaldin stations and Deer Island, 5 km south of King Cove. From Deer Island, these signals are sent to King Cove where the Alascom circuit to Fairbanks is located. The two north stations are repeated through Mount Baldy to Cold Bay, where the signals are sent to Fairbanks through a second Alascom circuit. A pressure transducer was also installed at the station north of Shishaldin Volcano (SSLN).

We started the installation of the Shishaldin Network on July 11. The fiberglass enclosures and gear were deployed very rapidly for most of the stations, until July 15 when the bad weather returned. The rest of the installation was done in marginal conditions, with a good weather day here and there. Although the weather slowed us down at times, Bill Springer, the helicopter pilot, did a wonderful job of bringing us to sites in often marginal, but workable conditions. Luck was not always with us however, and we did have to spend the night in the helicopter at one site.

The Pavlof Network Maintenance:

We found the Pavlof network (fig. 24) in rather good condition, except for the two north stations (PV6 and PN7A) which have suffered some abrasion, probably from wind-blown ash. Each also had one broken solar panel. PV6, the closest station to the summit of Pavlof Volcano, barely escaped a lahar during last year's eruption. A deep gully was cut by the flow only 40 m from the station. All stations had all their batteries fully charged, and with the above exceptions their equipment was in good working condition.

After an inspection of nearly all the stations of the Pavlof network which were installed last year, it is evident that the new type of installation used for the "Aleutian Expansion" project is highly successful. The fiberglass enclosures used to house the electronics and antennae seem to work out well, and the hardware was well protected from the harsh Aleutian environment. Evidence of bear claw marks were visible on the side of the enclosure at station PVV, although no further damage was visible at the station. The major advantage of this design is that, aside from the solar panels, none of the equipment is accessible from the outside.

A pressure transducer was added to station PN7A, which is the second closest station to the summit of Pavlof (~6 km). It is hoped that in some subsequent eruptions of Pavlof, the explosions which were visible on several seismic stations in the past, could be better analyzed with the signal from this transducer.

Finally, the most significant modification to the Pavlof telemetry network was the separation of the north and south legs of the network. Last year, all the stations from Pavlof were telemetered to a central receiving site in King Cove. The problem with this scheme was that if the Alascom circuit failed, we would lose the entire monitoring capability for Pavlof Volcano. This year we split the network in two. The north side of Pavlof and Shishaldin are all received in Cold Bay, while the south sides of these two volcanoes are received in King Cove. This scheme has the further advantage of reducing the number of repeaters used to bring the signals back from the north side of Pavlof.

Additional changes made to the AVO seismic networks:

First, due to the evident success of the fiberglass enclosure design, we have started to upgrade some of the sites in the Cook Inlet network most affected by the elements.

Station ILI, located on the northeast side of Iliamna Volcano has been upgraded in such a way. The antenna and solar panel of this station were destroyed by ice and snow movement every spring during breakup. We feel confident that the new design will be able to resist breakup better.

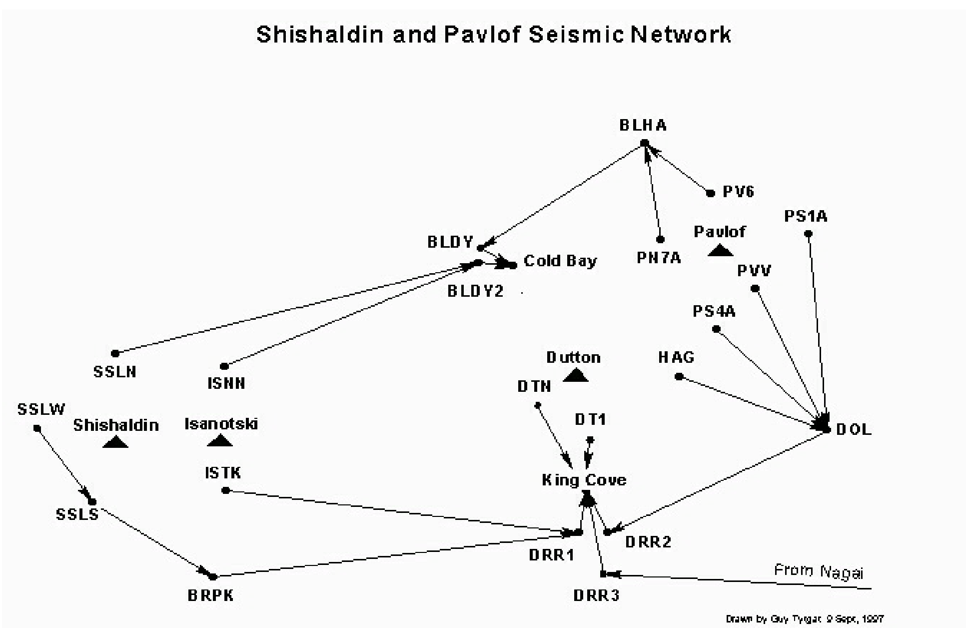

Figure 22: Telemetry layout of the Shishaldin/Pavlof seismic network. Number in parentheses are VCO frequencies.

Station AUS, on the summit of Augustine Volcano, was also upgraded this way. For many years the combination of rime ice and extreme winds were destroying the AUS antenna every winter. Although it is still early in the winter, the station has not failed yet. It is planned to outfit station AUH, on the west side of Augustine, the same way next summer.

Finally, another new addition to the network is a wind generator (fig. 25). Broadband digital seismic instruments are becoming quite common in most seismic networks. AVO is starting to deploy such instruments, but the major problem is the power consumption. A solar panel and a small set of batteries is not anywhere near the amount of power necessary to run a broadband digital instrument in Alaska. In an attempt to find an alternate source of power for these type of seismic stations, we are testing a wind generator. It was installed in the last part of August at the site of station AUB and AUL, where a short period analog station (AUL) and a digital broadband station (AUB) are collocated. Unfortunately, only days after it was installed, the generator failed for unknown reasons. The bad weather has kept us from revisiting the site to see what went wrong and possibly to replace the unit with a spare. At this time, we believe that the failure was not caused by the environment, but rather by a manufacturing flaw.

Guy Tytgat, Steve McNutt, John Benoit, and Milton Garcés

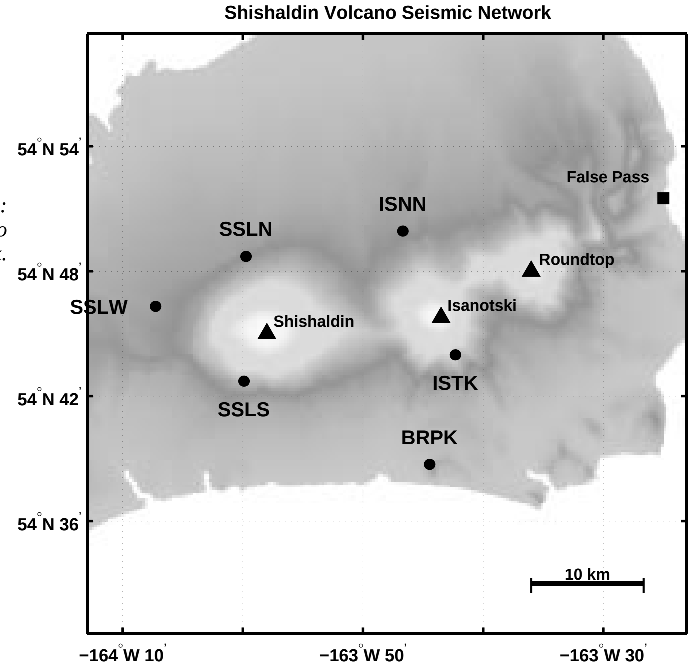

Figure 23: Shishaldin Volcano seismic network.

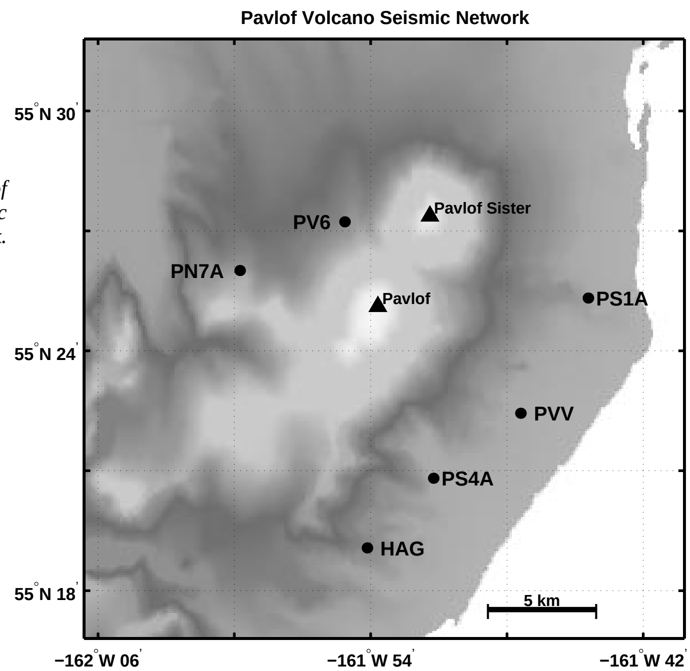

Figure 24: Pavlof Volcano seismic network.

Figure 25: Wind generator installed at station AUP/AUB on Augustine Volcano. Iliamna Volcano is showing in the background.

Operations

Augustine mapping

As in past years, a brief 1997 Augustine visit by Waitt for mop-up of field stratigraphy was logistically attached to the annual geodetic expedition (*q.v.* report herein by T.L. Murray). The main purpose of my visit was to detail field relations in a score of specific areas of incomplete or conflicting field data, or where cartographic problems or disagreement between co-authors had (inevitably) emerged during 1994–1996 compilation of provisional geologic map (Waitt, Begét, Kienle, 1996). Jim Begét couldn't join, but Mark Reid (USGS-GD Volcano Hazards Team, Menlo Park) accompanied me, partly to explore whether numerical modeling might be profitably applied to Augustine's debris avalanches or to the controversial issue of whether its avalanches into the sea initiate sizable tsunami. We accomplished about 3 days of fieldwork on Augustine between 21 and 24 July. Clouds prevented Reid from aerial rephotographing of the upper volcano flanks (continuing photogrammetry-monitoring experiment headed by Ren Thompson).

The briefness of our field trip, inclement weather, and lack of helicopter support all conspired to limit our visits to about a third of the desired sites. Highlights are (names and landflorms of 1996 report):

1. Soon before departure for field, Augustine veteran Bob Forbes (UAF, ret.) called with the suggestion that preglacial early-Pleistocene volcanic rocks crop out on Augustine's south flank. Forbes's 1972 samples had been recently analyzed by students of Paul Layer at UAF. Reappraisal of the site and its stratigraphy became imperative, lest we argue about an ambiguous location and possibly conflicting field stratigraphy. With xeroxes of Forbes's 1972 photos in hand, I found the site exactly, one both Jim Begét and I had visited twice each. But this time, I dug it out, sampled it, and photographed it far better than before. Our field "call" of glacial outwash, late Pleistocene in age, stands. An outcrop of Mesozoic conglomerate important to Forbes's 1972 thinking I could not find. It must be buried by thick 1976 ignimbrite, which nearby also obliterated the late-1940's pumice quarry.

2. Further data on the last (1883 Burr Point) Augustinian debris avalanche: A large-bouldery deposit high on North Slope lava flow (as at "Windy" GPS site) is surely an 1883 avalanche levee. It overlies the so-called "1883 lava flow", which therefore must *predate* the1883 eruption.

3. Additional data delimiting the boundary between 1883 and penultimate (Rocky Point) debris avalanches.

4. Oldest, north-flank large diamict ("North Bench diamict" of provisional report) is unambiguously a debris-avalanche deposit, its overlying stratigraphy including tephra "B" now far more complete.

5. North-flank debris-avalanche deposit at Grouse Point appears in the field to be clearly separate and younger than a higher lobate bouldery deposit just to west—as the landforms viewed by airphotos had suggested. The high lump (overlain by "B" tephra) may be the west part of the North Bench debris-avalanche deposit.

6. Additional data confirms my earlier suspicion that lumpy debris-avalanche deposit on the south side of the western tidal stream of lagoon is stratigraphically—as well as geomorphically—part of the West Island debris-avalanche deposit.

Figure 26: View south-southwest up along deposit overlying Augustine's conspicuous north-flank prehistoric lava flow at altitude about 650 m. This linear ridge of large very angular boulders of somewhat mixed rock types (but all andesite) apparently is left-lateral levee of 6 October 1883 Burr Point debris-avalanche deposit. The underlying lava flow therefore must predate 1883 eruption. Photo by R.B. Waitt 21 July 1997.

Reference:

Waitt, R.B., and Begét, J.E., with contributions by Juergen Kienle, 1996, Provisional geologic map of Augustine volcano, Alaska: U.S. Geological Survey Open-File Report 96–516, 44 p. and map at 1:25,000 scale.

Richard Waitt

1986 Augustine dome fumarole temperatures

Measurements of fumarole temperatures were made around the base of the spine on the 1986 Augustine summit dome on July 21, 1997. Temperatures in 4 cracks at the eastern edge of the spine were measured and 1 fumarole roughly 5 meters to the east of the spine. Temperatures were measured with an Omega 873C thermocouple. The 4 cracks at the base of the spine had temperatures of 90.1, 94.5, 93.6, and 90.5 degrees C. The wire on the thermocouple was inserted in each crack roughly 30 to 40 cm. The hottest temperature measured was in the fumarole roughly 5 meters east of the spine. The temperature here was 96.0 C. Note that the theoretical boiling point of water at 4000 feet is 95.9 C. The elevation of the base of the 1986 spine is about 3964 feet (1208.31 meters is the elevation of the A-15 benchmark).

None of the temperatures measured in 1997 differed greatly from those measured in past years. In past years temperatures of roughly 100.0 C were measured with an oven thermometer, which is not as precise as the thermocouple used in 1997.

John Power

Geology and geochemistry in the Valley of Ten Thousand Smokes

Wes Hildreth and Judy Fierstein spent 5 weeks based at Baked Mtn Hut in the Valley of Ten Thousand Smokes during July and August 1997, with daily helicopter support for geologic mapping and stratigraphic studies of the Katmai volcanic cluster. Relatively good weather and a can-do pilot permitted them to greatly advance the work on Martin, Mageik, and Griggs volcanoes initiated by helicopter in 1996. (Their work in previous years at Katmai had been directed toward the great 1912 eruption, and only incidentally toward the stratovolcano cluster). Moreover, in 1997 they were able by helicopter to reach parts of Trident and Katmai volcanoes that had eluded their previous work on foot. Stratigraphic, chemical, and K-Ar geochronologic work (with M.A. Lanphere) have progressed well, and the prospects are good that a publishable map, eruptive history, and attendant hazards analysis for the whole cluster can be completed after the Summer 1998 field season.

Highlights include:

(1) Mount Martin is a small, exclusively Holocene volcano, and the extensive remnants of glaciated andesite and dacite south and west of it erupted from a discrete stratovolcano, which we have called Alagogshak. The Alagogshak volcano is centered on the rangecrest 3 km SW of Martin, where radial dips on proximal ejecta and a glacially gutted, hydrothermally altered core define the central vent of a mid-Pleistocene edifice that was once as large as Mount Katmai.

(2) Mount Mageik is as old as 100 ka but is a compound stratocone consisting of four overlapping centers. The East Peak is the source of all 12 Holocene andesite-dacite lava flows. The acid crater lake and active fumaroles occupy a phreatic crater blown out between the young East Peak and the much older Central Peak (True Summit 7100+). The North Peak has an ice-filled crater, which is surrounded by severely solfatarically altered andesite. The badly altered SW face of the Southwest Peak is the source of a clay-rich (Holocene but prehistoric) debris-avalanche deposit. This in turn is overrun medially by a smaller avalanche deposit of fresh blocky andesite derived on 6 June 1912 from a local cliff down at 2800' and highlighted by Griggs (1922) as the “Mageik Landslide”. All four centers put out numerous andesite-dacite lava flows, many as thick as 50-150 m.

(3) East Trident (peak 6010), Trident I (peak 6115), and West Trident (peak 5605) are discrete Pleistocene andesite-dacite cones, flanked on the south and west by six peripheral dacite domes of Pleistocene age and by the small (0.55 km3) fragmental cone of Southwest Trident, which grew between 1953 and 1974 and issued andesite-dacite lava flows in 1953, 1957, 1958, and 1959-60.

(4) Mount Katmai consists of two adjoining stratocones, both of which were beheaded on 6-7 June 1912 by collapse of a 5-km3 caldera, owing to withdrawal of subjacent magma toward Novarupta, a new flank vent that originated through Jurassic sedimentary rocks on 6 June 1912 at the base of Trident, some 10 km west of Mount Katmai. Both Katmai cones span wider compositional ranges than the other edifices of the cluster, each including sparse basalt. Northeast Katmai, the older edifice, extends to 66% SiO_2 dacite, but Southwest Katmai has further evolved rhyodacite magma and was the source of lava flows, ignimbrite, and a plinian eruption of rhyodacite. Southwest Katmai had at least two Holocene dacite eruptions prior to the Horseshoe Island dacite dome on the caldera floor in 1912.

(5) Mount Griggs is an andesite-dacite stratocone with nested summit craters and actively sulfur-depositing fumaroles. As the source of several Holocene debris avalanches, angular blocks of Griggs lavas are found from Broken Mountain to Three Forks.

(6) About 25 different tephra layers have supplied as many as 100 samples from Holocene and latest Pleistocene surficial deposits north and south of the volcanic cluster. A few are andesitic, but most are more silicic. Two or three are of plinian dispersal. Numerous samples of associated organic material are being dated as part of an ongoing effort to associate each fall layer with a source volcano. These studies bear significantly on the Holocene and late Pleistocene glacial record of the area, a field that appears to warrant much additional work, tighter age control, and some revision of published interpretations.

In addition to the broader studies just described, Hildreth and Fierstein were accompanied (for a fourth summer) by Bruce Houghton and Colin Wilson of New Zealand’s USGS-equivalent agency, IGNS. They concentrated on completing our detailed studies of the ultracoarse proximal fall deposits and high-energy proximal ignimbrites within 3 km of the Novarupta vent. In few great plinian-cum-ignimbrite eruptions is the vent region so well preserved and exposed for investigating the ultraproximal deposits of complex explosive processes that act both sequentially and concurrently. In both the proximal and regional efforts, the party was ably and cheerfully helped by Michelle Coombs of UAF (for a second summer). The gratifying productivity of the field season also reflected, in considerable degree, greatly improved communications and logistical arrangements, which resulted in great measure from the virtuosity and hard work of John Paskievitch.

Wes Hildreth and Judy Fierstein

Ongoing Investigations

Gas studies of Aniakchak and Katmai, July 1997

Aniakchak Gas Studies:

In July, Bob Symonds joined an AVO crew at Anaikchak to sample a bubbling spring within Aniakchak caldera. The spring is located on the northeast shore of Surprise Lake. Gas bubbles from several tens of sites within the spring. A 1976 analysis of the spring water by Ivan Barnes shows that it contains 388 ppm HCO_3, which suggests that the discharging gas might contain significant CO_2. The purpose of Bob's work is to determine the composition and origins of the discharging gases to see if there is evidence for degassing magma at Aniakchak. Gas samples were collected to determine bulk gas composition, d^{13}C in CO_2, and $^3He/^4He$ and water samples were collected for analyses of anion, cations, dD and d^{18}O in H_2O, and $\delta^{13}C$ in dissolved inorganic carbonate.

Katmai Gas Studies:

In July, with ample AVO helicopter support, Bob Symonds and Bea Ritchie (AVO volunteer) investigated volcanic degassing in Katmai NP. This project, started in 1992, is part of a larger effort by Symonds and Ritchie to obtain data on baseline fumarole emissions from potentially restless volcanoes in the Western US and Alaska. This year's Katmai work focused on Mount Griggs, Mount Mageik, and Trident Volcano. From each site, we measured vent temperatures and collected samples for bulk gas composition. Where possible, we also collected samples to determine $\delta^{13}C$ in CO_2, $^3He/^4He$, and dD and d^{18}O in H_2O; d^{34}S in total sulfur will be determined from the bulk gas samples. Finally, at the crater lake of Mount Mageik, we collected water samples from the lake for analyses of anion, cations, and dD and d^{18}O in H_2O.

At Mount Griggs, we investigated and sampled the flank (latitude: 58°20.94'; longitude: 155° 06.68') fumarole fields. The flank field contains 3 major jets (97 - 99°C) with sulfur chimneys plus other smaller vents. Temperatures have declined by 0.6 - 3°C since we last sampled the jets in 1995; the lower and hottest jet has declined from 105°C in 1979 (measured by David Johnston), to 104°C in 1993, to 99.8°C in 1995, to 99.2 °C in 1997. The analyses of the 1993 and 1995 samples show that these flank gases contain 97-99% H_2O, 0.5-2.7% CO_2, 0.1-0.2% H_2S, and < 0.1% N_2, CH_4, O_2, Ar, H_2, NH_3, and He. Isotopic data indicate that CO_2 ($\delta^{13}C = -5$) and He ($^3He/^4He$ [R/Ra] = 8.0) derive from a magmatic source.

At Trident, we investigated and sampled the east flank field (latitude: 58° 13.87'; longitude: 155° 04.94') and the fumaroles on new Trident cone. The east flank field consists of numerous boiling-point fumaroles up to 94°C and two, diffusely degassing, 7-meter-wide collapse pits (2 meters deep). There is a persistent H_2S odor at the site and past analyses show that these gases contain (excluding H_2O) 69-77% CO_2, 16-20% H_2, 2-7% H_2S, 1-3% CH_4, 0.3-2.5% H_2S, 0.9-1.3% NH_3, variable amounts of air (N_2, O_2, Ar), and <0.01% He. Isotopic data indicate that He ($^3He/^4He$ [R/Ra] = 7.5-7.6) derives from a magmatic source, but CO_2 ($\delta^{13}C = -10$) probably is a mixture of magmatic CO_2 and CO_2 from the thermogenic breakdown of sediments. The new Trident cone contains numerous sub-boiling point fumaroles, none of which discharge gases with an H_2S odor. Maximum fumarole temperatures on new Trident have declined from 97 to 95°C since we last measured them in 1993.

At Mount Mageik, last visited in 1995, we investigated and sampled the fumaroles and acidic lake in the summit crater (latitude: 58° 12.00'; longitude: 155° 14.68'). Degassing in the crater occurs from several jets on south side of the crater (up to 173°C), a drowned jet on the north shore of the lake, a less vigorous fumarole field (up to 102°C) on the northeast crater wall, and from several vents beneath the lake. The hottest vent in the crater has increased from 167°C in 1985 to 173°C in 1997. The analyses of the 1995 Mageik samples show that these gases contain 96% H_2O, 3.2-3.6% CO_2, 0.2-0.3% H_2S, and < 0.1% H_2, NH_3, CH_4, Ar, O_2, and He. Isotopic data indicate that CO_2 ($\delta^{13}C = -6.6$) and He ($^3He/^4He$ [R/Ra] = 7.5) derive from a magmatic source. The lake is about 100 m in diameter, bluish green in color, and sulfur froth floats on the surface. Several jets discharge into the lake. The largest vent, on the eastern lake shore, causes vigorous upwelling. The composition of the lake in 1995 is as follows: T = <65°C, pH = 2.0, conductivity = 5.68 mS, 968 ppm SO_4, 562 ppm Cl, 157 ppm SiO_2, 84 ppm NH_4, 62 ppm Al, 56 ppm B, 46 ppm Ca, 38 ppm Fe, 26 ppm Na, 17 ppm Mg, 10 ppm H_2S, 5 ppm K, 1.4 ppm F, and <1 ppm Mn, Br, As, Sr, V, Zn, Ba, I, Rb, Ti, Cr, Cu, and Cs. Since our visit to the lake in 1995, upwelling in the lake has become much more vigorous, the temperature has increased to 72°C, the pH has decreased to 1.6, and the conductivity has increased to 8.58 mS. These changes along with the slightly higher fumarole temperatures are consistent with shallow intrusion of new magma, probably during the October 1996 seismic swarm.

Bob Symonds

Figure 27: Photograph showing Bob Symonds sampling gases from the superheated fumarole on the south side of Mageik crater.

New network updates

Shishaldin

The Shishaldin network was completed this weekend. The station SSLS is being recorded on a Helicorder in Fairbanks. It is functioning well.

The new Shishaldin network is being recorded on the "Focus" PC and ready to be recorded on the "Willie" PC systems.

Much thanks goes to John Paskievitch & Art Jolly for sending spare radios from King Salmon to Cold Bay at the last minute so Guy & Steve could get the Brown Peak station/repeater going. (We were lucky on this one.)

Pavlof

But not lucky everywhere. Only one or two of the Pavlof stations received 1997 VCO upgrades. And the pressure sensor work was not completed. BLHA (Black Hills) is currently un-usuable because of equipment problems in Cold Bay (AM modulation of the tone). Several other stations share this malady but to a lesser degree.

Aniakchak

The phone line from Port Heiden went out again at 970728 17:28. A trouble report has been filed.

We took this opportunity to measure circuit parameters. Measured: (round trip measurements) 606ms +/- 5 ms delay on telemetry from GI to Port Heiden and back amplitude referred to 1000 Hz tone- 6 dB from 300Hz to 3100+ Hz - 20dB from 150Hz to 3650 Hz

A partially dead zone exists from 3100 to 3500 Hz. Likely a E&M signaling filter is the cause.

Last week's failure of this circuit was reported to be a "local telco problem".

Steve Estes

New Hires

Welcome to our team, Jessica Faust, Post Doc for John Eichelberger. She comes to us from UC Santa Cruz with impressive credentials. Welcome Jess!!

Personnel

Brooke Foster an undergraduate, AVO summer intern returned to the University of Virginia to finish her degree. She helped with the volcano monitoring while Angie, Kevin and Ken were in the field or on vacation. Her summer project was to process 311 Okmok AVHRR images collected from 13 February to 21 May. These data were geometrically corrected, radiometrically calibrated, and a 40 x 40 pixel size area around the volcano was extracted from these data. She analyzed these data by generating several time vs. temperature and albedo graphs showing the relationship between the eruption and radiometric response. These data will be provide a basis to refine the Okmok Algorithm used to monitor volcanoes in the region.

Volunteers at AVO-Anchorage during the July-August period:

Emily Constantine - Michigan Technological University grad student in satellite remote sensing worked with Dave Schneider

Bernadette Johnson - long-time AVO volunteer continued keeping the photographic and reprint files in order

Don Richter - USGS Scientist Emeritus worked on Akutan map production and on the Shrub mud volcano and subsequent reports with Wrangell-St. Elias National Park personnel and with Game McGimsey

Bea Ritchie - Portland State University PhD student worked with Bob Symonds sampling volcanic fluids at the Katmai National Park volcanoes adjacent to the Valley of 10,000 Smokes

Cheryl Searcy - participant in AVO-Anchorage seismology work

Susan Walker - assisted John Paskievich with geophysical field work at Katmai National Park

Terry Keith

Publications

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Begét, J., Keskinen, M., and Severin, K., 1997. Tephrochronologic constraints on the Late Pleistocene history of the southern margin of the Cordilleran Ice Sheet, Western Washington. Quaternary Research 47, 140-146.

Miller, T.P., et al., Mount Dutton Volcano, Alaska: An Aleutian arc analog to Unzen Volcano, Japan, submitted to Journ. of Volcanol. and Geotherm. Res., 1997.

Muhs, D., Ager, T., Stafford, T., Pavich, M., Beget, J., and McGeehin, J., 1997. The last interglacial-glacial cycle in late Quaternary loess, central interior Alaska. Beringian Paleoenvironments Workshop Abstracts and program, p. 32-35.

Schaefer, J. R., Layer, P. L., Begét, J. E., and Drake, J. 1997. 40Ar/39Ar dating of Quatenary low-K hornblende from a fine-grained Alaskan tephra. Eos, (in press).

Yuengling, K., Beget, J., Hopkins, D. M., Layer, P. W. 1997. Cosmogenic (10Be/26Al) exposure ages and erosion rates of tors in Arctic and subarctic Alaska. Geol. Soc. Am. Abst. Prog. 1997 annual meeting, v. 29, p. A-346.

Addendum

Log of Current Period Updates

Alaska Volcanoes Update
Thursday, July 3, 1997, 10:30 AM ADT (1830 UTC)
Alaska Volcanoes:
Seismic activity is monitored in real time at the following volcanoes. Some of the volcanoes listed below may have anomalous seismicity at present but they are not considered to be at a dangerous level of unrest (repeated each week).
Other Volcanoes:
Spurr, Redoubt, Iliamna, Augustine, Griggs, Katmai, Novarupta, Trident, Mageik, Martin, Pavlof, Dutton, Akutan, and Makushin volcanoes are all at or near normal levels of background seismicity (repeated each week).

ABBREVIATED COLOR CODE KEY

GREEN volcano is dormant; normal seismicity and fumarolic activity occurring
YELLOW volcano is restless; eruption may occur
ORANGE volcano is in eruption or eruption may occur at any time
RED significant eruption is occurring or explosive eruption expected at any time

VOLCANO INFORMATION ON THE INTERNET: http://www.avo.alaska.edu

Alaska Volcanoes Update
Friday, July 11, 1997, 11:30 AM ADT (1930 UTC)

repeat of July 3 update

KVERT Information Release 97-18
Monday, July 14, 1997, 19:00 KDT (0600 UTC)
KVERT IS BACK IN OPERATION AS OF TODAY!
The following Release was received by e-mail from KVERT (Kamchatkan Volcanic Eruptions Response Team). All times are Kamchatkan Daylight Time (21 hours ahead of ADT)

Klyuchevskaya Group of Volcanoes: 56°03' N, 160°39' E; Elevation 4,750 m
CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN
During the last week (July 8-14), seismicity under Klyuchevskoy volcano remained at background level. On July 14, a gas and steam plume rose from two vents to a height of 50 m above the summit crater.
Sheveluch Volcano: 56°38' N, 161°19' E; Elevation 2,800 m

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

On July 13, a steam and gas plume rose 800 m above the crater and drifted off 10 km to the southeast. On July 14, a gas and steam plume rose 200-1000 m above the crater, moving 10 km to the west. The snow cover on the extrusive dome in the crater is melting at a rapid rate.
Bezymianny Volcano: 55° 58'N, 160°36'E
On July 14, a gas and steam plume rose 1000 m above the crater, moving 25 km to the east.
Karymsky Volcano: 54°03'N, 159°27'E

CURRENT LEVEL OF CONCERN COLOR CODE IS ORANGE

Seismicity remains above background level. No visual observations were made during the past week. Seismic activity indicates that the low level strombolian eruptive activity that has characterized the volcano for more than a year continues.
Avachinskaya Group of Volcanoes: 153°15'N, 158°51'E

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

Seismicity at Avachinsky and Koryaksky volcanoes remains at normal levels.

KVERT Information Release 97-19
Kamchatka Volcanic Activity
Monday, July 20, 1997, 19:00 KDT (0600 UTC)
Klyuchevskaya Group of Volcanoes: 56°03' N, 160°39' E; Elevation 4,750 m
CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

During the last week (July 15-20), seismicity under Klyuchevskoy volcano remained at background level.
Sheveluch Volcano: 56°38' N, 161°19' E; Elevation 2,800 m

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

On July 13, a steam and gas plume rose 100 m above the crater and drifted off 5 km to the west.
Bezymianny Volcano: 55°58'N, 160°36'E
On July 15-20, a gas and steam plume rose 100-400 m above the crater, moving 5-10 km km to the east and southeast.
Karymsky Volcano: 54°03'N, 159°27'E

CURRENT LEVEL OF CONCERN COLOR CODE IS ORANGE

Seismicity remains above background level. No visual observations were made during the past week. Seismic activity indicates that the low level strombolian eruptive activity that has characterized the volcano for more than a year continues.
Avachinskaya Group of Volcanoes: 153°15'N, 158°51'E

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

Seismicity at Avachinsky and Koryaksky volcanoes remains at normal levels.

Alaska Volcanoes Update
Friday, July 25, 1997, 11:30 AM ADT (1930 UTC)

repeat of July 3 update

KVERT Information Release 97-20
Kamchatka Volcanic Activity
Sunday, July 27, 1997, 22:00 KDT (0900 UTC)
Klyuchevskaya Group of Volcanoes: 56°03' N, 160°39' E; Elevation 4,750 m
CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

During the last week (July 20-27), seismicity under Klyuchevskoy volcano remained generally at background level with the exception of an hour of more intense activity on July 23 between 3-4 AM KDT. On July 21, a gas and steam plume rose to a height of 200 m above the summit crater and on July 25-26 to a height of 100 m.
Sheveluch Volcano: 56°38' N, 161°19' E; Elevation 2,800 m

CURRENT LEVEL OF CONCERN COLOR CODE IS YELLOW
LAST LEVEL OF CONCERN COLOR CODE WAS GREEN

On July 21 and 27, an incandescent gas emission with a temperature of 200-500°C rose 300-400 m above the extrusive dome inside the crater. Gas explosions rose 1-

1.5 km above the crater and drifted W-SW 15-50 km. On July 22-26, gas explosions (with a small amount of ash on July 23) rose 700-1,500 m above the crater moving 20-6- km to the N and NE.

Bezymianny Volcano: 55°58'N, 160°36'E

On July 21, a gas and steam plume rose 50 m above the crater and on July 27, 300 m above the crater moving 20 km to the W.

Karymsky Volcano: 54°03'N, 159°27'E

CURRENT LEVEL OF CONCERN COLOR CODE IS ORANGE

Seismicity remains above background level. No visual observations were made during the past week. Seismic activity indicates that the low level strombolian eruptive activity that has characterized the volcano for more than a year continues.

Avachinskaya Group of Volcanoes: 153°15'N, 158°51'E

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

Seismicity at Avachinsky and Koryaksky volcanoes remains at normal levels.

Alaska Volcanoes Update

Friday, August 1, 1997, 10:00 AM ADT (1800 UTC)

repeat of July 3 update

KVERT Information Release 97-21

Kamchatka Volcanic Activity

Monday, August 4, 1997, 22:00 KDT (0900 UTC) ahead of ADT)

Klyuchevskaya Group of Volcanoes: 56°03' N, 160°39' E; Elevation 4,750 m

CURRENT LEVEL OF CONCERN COLOR CODE IS YELLOW LAST LEVEL OF CONCERN COLOR CODE WAS GREEN

During the last week (July 28-August 4), seismicity under Klyuchevskoy volcano was above background level. Seismic activity within the crater was recorded August 1-4. On August 1, a gas and steam plume rose to a height of 600 m above the summit crater. On other days, the volcano was obscured by clouds.

Sheveluch Volcano: 56°38' N, 161°19' E; Elevation 2,800 m

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN LAST LEVEL OF CONCERN COLOR CODE WAS YELLOW

Volcano was obscured by clouds all week.

Bezymianny Volcano: 55°58'N, 160°36'E

Volcano was obscured by clouds all week.

Karymsky Volcano: 54°03'N, 159°27'E

CURRENT LEVEL OF CONCERN COLOR CODE IS ORANGE

Seismicity remains above background level. On August 2, V. Kirianov visited volcano by helicopter and reported that the low level strombolian eruptive activity that has characterized the volcano for more than a year continues. The gas and ash explosions occurred every 15-20 minutes. Ash and gas plume rose to 300-800 m above the new crater and a new blocky lava flow is moving from the crater down the west slope.

Avachinskaya Group of Volcanoes: 153°15'N, 158°51'E

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

Seismicity at Avachinsky and Koryaksky volcanoes remains at normal levels.

Alaska Volcanoes Update

Friday, August 8, 1997, 10:00 AM ADT (1800 UTC)

repeat of July 3 update

KVERT Information Release 97-22

Kamchatka Volcanic Activity

Sunday, August 10, 1997, 22:00 KDT (0900 UTC)

Klyuchevskaya Group of Volcanoes:

Klyuchevskoy Volcano: 56°03' N, 160°39' E; Elevation 4,750 m

CURRENT LEVEL OF CONCERN COLOR CODE IS YELLOW LAST LEVEL OF CONCERN COLOR CODE WAS GREEN

During the last week (August 5-10), seismicity under Klyuchevskoy volcano was above background level. On August 7, several strong volcanic earthquakes were registered inside the crater. On August 5-6, a gas and steam plume rose to a height of 150-500 m above the summit crater. On other days, the volcano was obscured by clouds.

Sheveluch Volcano: 56°38' N, 161°19' E; Elevation 2,800 m

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN LAST LEVEL OF CONCERN COLOR CODE WAS YELLOW

On August 5-6, a fumarolic gas plume rose 150-200 m above the volcano.

Bezymianny Volcano: 55°58'N, 160°36'E

On August 5-6, a gas and steam plume rose 50 m above the crater.

Karymsky Volcano: 54°03'N, 159°27'E

CURRENT LEVEL OF CONCERN COLOR CODE IS ORANGE

Seismicity remains above background level. The low level strombolian eruptive activity that has characterized the volcano for more than a year continues. The gas and ash explosions occurred every 15 minutes (4 per hour). Ash and gas plume rose to 200-500 m above the new crater and a new blocky lava flow (60 m wide and 350 m long) is still moving from the crater down the west slope of the volcano.

Avachinskaya Group of Volcanoes: 153°15'N, 158°51'E

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

Seismicity at Avachinsky and Koryaksky volcanoes remains at normal levels.

Alaska Volcanoes Update

Friday, August 15, 1997, 10:30 AM ADT (1830 UTC)

repeat of July 3 update

KVERT Information Release 97-23

Kamchatka Volcanic Activity

Sunday, August 17, 1997, 23:00 KDT (1000 UTC)

Klyuchevskaya Group of Volcanoes:

Klyuchevskoy Volcano: 56°03' N, 160°39' E; Elevation 4,750 m

CURRENT LEVEL OF CONCERN COLOR CODE IS YELLOW

During the last week, seismicity under Klyuchevskoy volcano remained somewhat above background level. A gas and steam plume rose to a height of 100-150 m above the summit crater.

Sheveluch Volcano: 56°38' N, 161°19' E; Elevation 2,800 m

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

The usual fumarolic activity was observed at the crater.

Bezymianny Volcano: 55°58'N, 160°36'E

continued

A gas and steam plume rose 50 m above the crater.

Karymsky Volcano: 54°03'N, 159°27'E

CURRENT LEVEL OF CONCERN COLOR CODE IS ORANGE

Seismicity remains above background level. The low level strombolian eruptive activity that has characterized the volcano for more than a year continues. The gas and ash explosions occurred every 20 minutes (3 per hour). An ash and gas plume rose 200-600 m above the new crater.

Avachinskaya Group of Volcanoes: 153°15'N, 158°51'E

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

Seismicity at Avachinsky and Koryaksky volcanoes remains at normal levels.

<u>Alaska Volcanoes Update</u>
Friday, August 22, 1997, 11:00 AM ADT (1900 UTC)

repeat of July 3 update

Please note: New seismic networks have been installed at Shishaldin and Aniakchak. AVO continues to test these new networks and examine preliminary data to determine background seismicity. Reports on these volcanoes will be added to our weekly update as data acquisition and analysis become reliable. We expect this to occur by mid-November.

<u>KVERT Information Release 97-24</u>
Kamchatka Volcanic Activity
Sunday, August 24, 1997, 22:00 KDT (0900 UTC)
Klyuchevskaya Group of Volcanoes
Klyuchevskoy Volcano: 56°03' N, 160°39' E; Elevation 4,750 m

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

During the last week, seismicity under Klyuchevskoy volcano remained slightly above background level. A gas and steam plume rose to a height of 100-150 m above the summit crater. On August 20 at 4:20 AM, several strong earthquakes were recorded from the summit crater. On August 21, a gas and steam plume rose 500 m above the crater.

Sheveluch Volcano: 56°38' N, 161°19' E; Elevation 2,800 m

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

A fumarolic gas plume continues to rise 100-500 m above the crater.

Bezymianny Volcano:55°58'N, 160°36'E

A gas and steam plume rose 50-150 m above the crater.

Karymsky Volcano: 54°03'N, 159°27'E

CURRENT LEVEL OF CONCERN COLOR CODE IS ORANGE

Seismicity remains above background level. The low level strombolian eruptive activity that has characterized the volcano for more than a year continues. Gas and ash explosions occurred every 15-20 minutes and a plume of ash and gas rose to 150-500 m above the new crater.

Avachinskaya Group of Volcanoes: 153°15'N, 158°51'E

CURRENT LEVEL OF CONCERN COLOR CODE IS GREEN

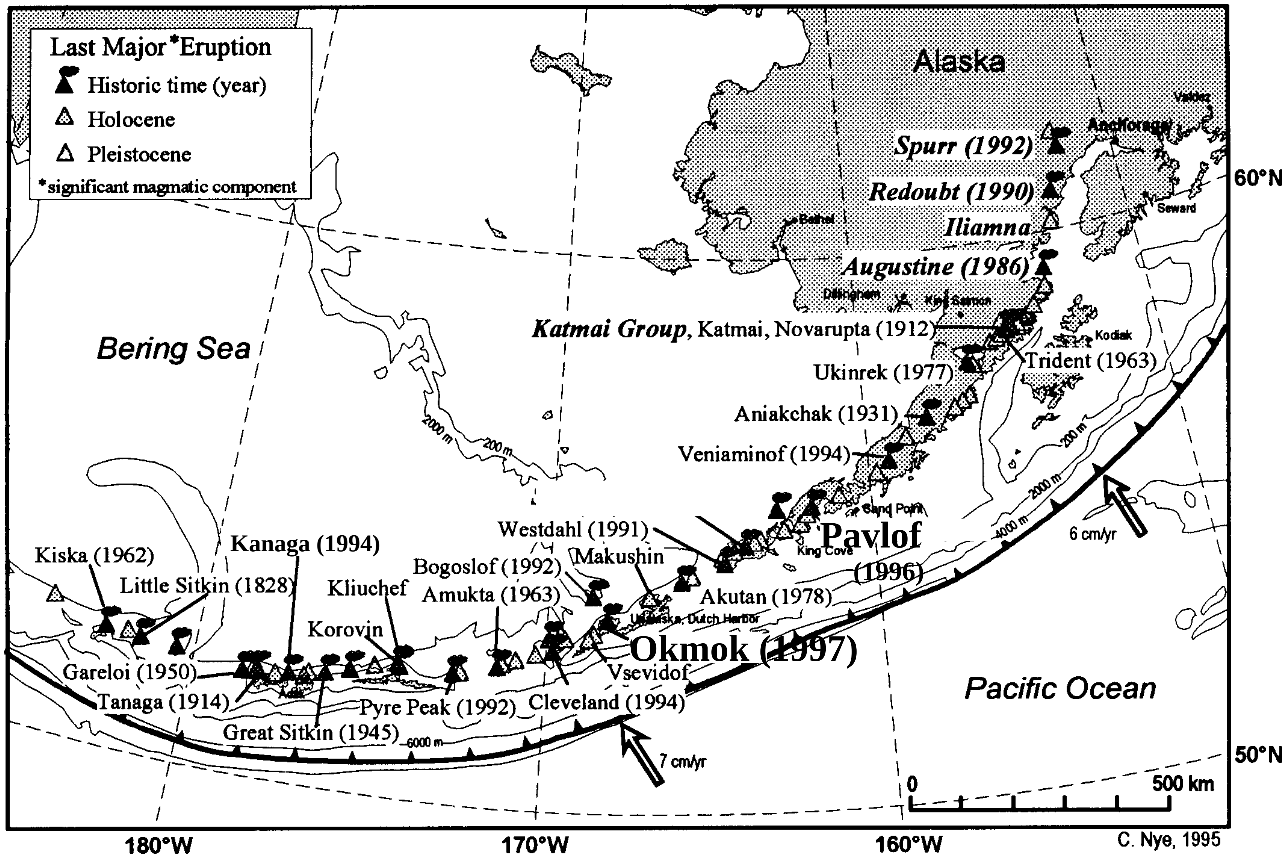
Seismicity at Avachinsky and Koryaksky volcanoes is at normal levels.

Alaid Volcano: 50°52'N, 155°51'E, 2339 m ASL

On August 23, a possible hot spot at Alaid volcano (Kurile Islands) was reported visible on US satellite imagery. The Russian coast Guard informed KVERT that ash had fallen on the southwestern part of the Kamchatka peninsula. No ash falls or other sign of eruptive activity were reported at Severo-Kurilsk (Paramushir island 35 km east of volcano) or from a fishing vessel located 10 km from the volcano.

<u>Alaska Volcanoes Update</u>
Friday, August 29, 1997, 11:30 AM ADT (1930 UTC)

repeat of July 3 udpate



Map showing locations of Aleutian Arc Volcanoes. Those active in historic times are named with the year of the last eruption. For the purpose of this map, major eruptions are those with significant magmatic components. As a result, some volcanoes commonly considered to be active, but characterized purely by phreatic activity (such as Iliamna) are omitted. Volcanoes mentioned in this report are labeled in bold italic type.

For further information and/or contributions to this newsletter please contact:

U.S. Geological Survey
Alaska Volcano Observatory
4200 University Ave.
Anchorage, AK 99508
(907) 786-7497

Alaska Volcano Observatory
Geophysical Institute
University of Alaska Fairbanks
P.O. Box 757320
Fairbanks, AK 99775-7320
(907) 474-5681

Alaska Division of Geological and Geophysical Surveys
Alaska Volcano Observatory
794 University Ave., Suite 200
Fairbanks, AK 99709
(907) 474-7147

U.S. Geological Survey
Cascades Volcano Observatory
5400 MacArthur Blvd.
Vancouver, WA 98661
(360) 696-7693

U.S. Geological Survey
Alaska Volcano Observatory
345 Middlefield Rd.
Menlo Park, CA 94025
(650) 329-4742