

EARTHQUAKE COUNTS FROM DETECTED EVENTS

EARTHQUAKE COUNTS

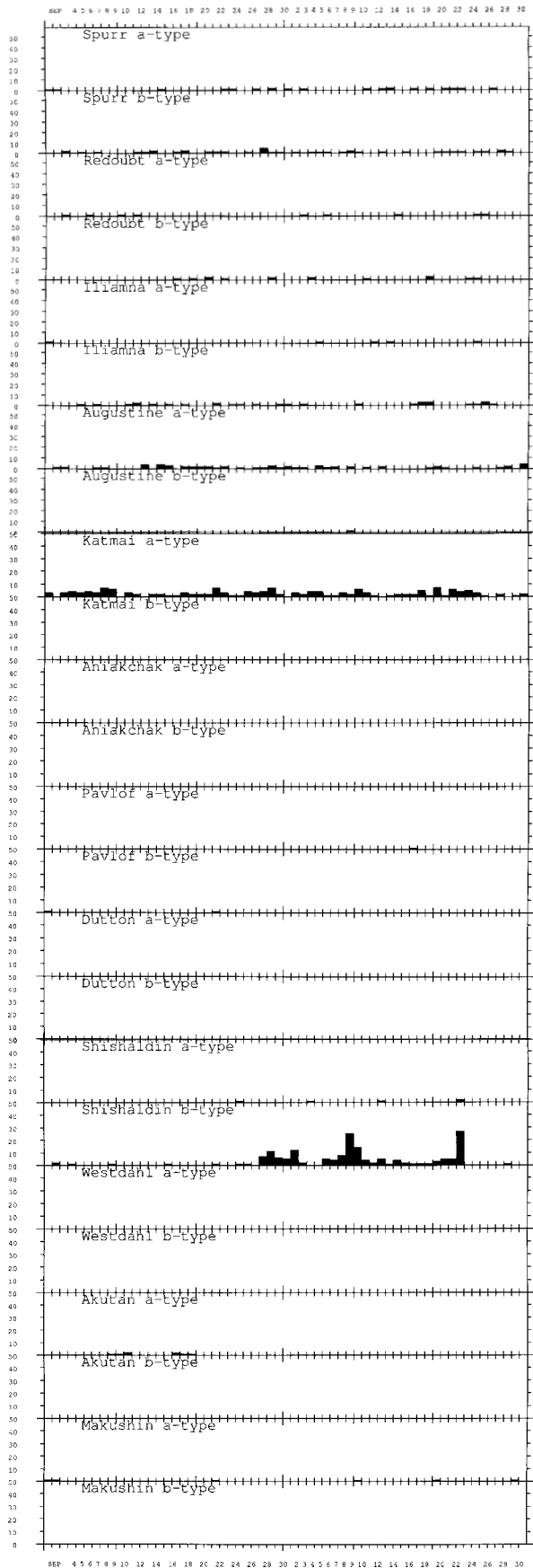


Figure 21a: Histogram of computer detected ("Willie system") seismic events during September through October.

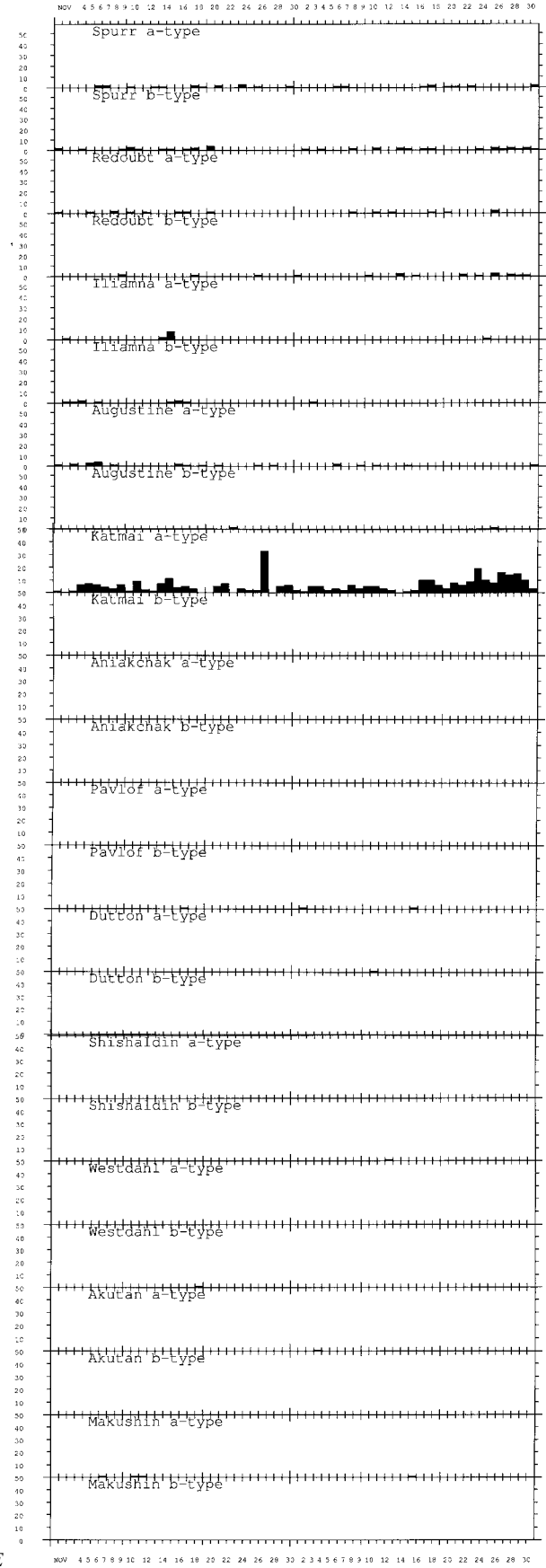


Figure 21b: Histogram of computer detected ("Willie system") seismic events during November through December.

TIME

Distances to Stations - The next generation

The following table shows the distances between the AVO seismic stations and the various volcanic centers. This table is an updated and expanded version of a similar table that appeared in the July/August 1997 Bimonthly Report. A few corrections have been made to the previous table and the pertinent data for the new Katmai and Westdahl networks have been added. The distances appearing in the table were determined using the *nearest* program which was written by Dr. Anthony Qamar while at University of Washington. 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	Westdahl	Fisher	Shishaldin
AHB	11.4	76.9	88.2	107.1	139.7
AKS	19.1	84.1	82.0	101.3	133.4
AKT	14.1	80.4	84.5	103.4	136.0
AKV	1.8	68.3	96.0	114.3	147.4
HSB	7.6	74.0	90.1	107.9	141.3
LVA	4.3	65.6	98.5	116.2	149.7
ZRO	4.8	65.9	98.7	117.3	150.2

Aniakchak stations	Vent Mountain	1931 Vent	Ukinrek Maars
ANIA	6.1	1.9	146.3
ANNE	6.7	9.0	138.6
ANNW	10.4	7.2	140.9
ANPB	11.8	12.0	156.8
ANPK	4.5	8.3	147.2
ANSL	5.9	5.5	126.2

Augustine stations	Augustine	Iliamna	Redoubt	Crater Peak	Spurr
AUC	0.6	77.3	131.3	222.3	225.9
AUE	3.5	76.8	130.5	220.3	223.9
AUH	0.6	77.1	131.1	222.2	225.8
AUI	3.2	80.0	133.9	225.0	228.6
AUL	2.1	75.0	129.0	220.1	223.7
AUP	0.7	77.0	130.9	222.0	225.6
AUR	0.1	77.1	131.0	222.1	225.7
AUS	0.4	77.4	131.3	222.4	226.0
AUW	2.3	76.9	130.9	222.0	223.6

Dutton stations	Dutton	Pavlof	Pavlof Sister	Roundtop Mountain	Isanotski	Shishaldin
BLDY	32.5	62.1	66.3	67.8	76.9	90.2
DOL	26.6	29.8	33.8	117.4	126.8	142.0
DRR3	23.9	55.5	60.4	87.3	96.6	112.1
DT1	8.3	42.6	47.5	90.7	100.1	115.2
DTN	3.8	37.6	42.5	94.3	103.7	118.6

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	Stellar
ACH	4.8	4.7	11.8	13.6	22.7	21.1	40.3	60.2
ANCK	8.4	14.2	21.2	23.5	32.5	29.3	50.1	69.8
CAHL	13.8	16.1	25.4	23.6	32.2	35.8	48.2	68.3
CNTC	32.4	37.9	42.7	46.2	54.1	47.5	71.0	89.6
KABR	23.6	18.2	18.7	14.0	16.6	25.9	28.4	47.7
KAHC	57.1	52.7	43.5	46.4	41.3	33.3	39.8	43.4
KAHG	59.8	53.2	43.8	43.4	34.2	35.5	19.4	11.6
KAIC	39.5	34.6	25.2	28.0	23.4	14.9	27.0	38.9
KAPH	76.0	69.5	60.0	59.7	50.5	51.3	35.1	18.7
KARR	53.0	46.7	37.0	37.4	28.7	27.8	18.1	19.8
KAWH	40.6	34.0	24.7	24.2	15.1	17.5	8.7	24.6
KBM	14.8	9.4	2.8	7.4	14.0	10.9	31.2	50.7
KCE	13.1	6.8	3.0	5.0	13.6	13.5	31.2	51.1
KCG	21.2	15.3	5.4	8.1	9.1	5.2	25.2	44.3
KEL	37.1	39.5	39.3	43.9	48.9	39.2	63.1	79.1
KJL	18.2	24.6	34.1	34.5	43.9	43.8	61.2	81.3
KVT	23.7	21.0	15.2	19.9	22.5	12.3	36.3	53.3
MGLS	12.5	8.6	14.8	11.8	20.0	24.8	36.0	56.1

Distances from seismic stations to the various volcanoes in kilometers

Makushin stations	Makushin	Akutan	Westdahl	Fisher	Shishaldin
MCIR	7.0	62.8	159.4	176.7	210.4
MGOD	11.2	69.5	166.2	184.6	217.6
MNAT	15.8	53.6	150.5	168.7	201.9
MSOM	8.5	72.5	169.4	187.5	220.8
MSW	9.6	57.7	154.7	172.5	205.9
MTBL	18.3	49.0	145.8	163.5	197.0

Pavlof stations	Pavlof	Pavlof Sister	Dutton	Roundtop Mountain	Isanotski	Shishaldin
BLHA	33.9	31.3	59.7	139.8	148.6	160.7
DOL	29.8	33.8	26.6	117.4	126.8	142.0
HAG	11.1	15.5	28.1	122.3	131.8	146.2
PN7A	7.1	9.9	33.2	123.8	133.1	146.9
PS1A	9.3	7.4	43.3	136.9	146.3	160.5
PS4A	8.1	11.8	32.5	126.6	136.0	150.4
PV6	4.6	4.8	37.8	129.2	138.5	152.2
PVV	7.8	9.4	37.6	131.6	141.0	155.4

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	Fisher	Westdahl	Dutton	Pavlof
BRPK	19.0	13.4	19.8	47.9	60.5	111.5	146.5
ISNN	14.8	8.3	12.7	48.4	66.3	103.9	137.2
ISTK	17.0	3.7	10.6	50.4	65.6	104.5	139.0
SSLN	6.5	18.4	26.2	34.6	53.4	117.7	150.6
SSLS	5.3	18.8	28.2	31.4	47.3	122.4	144.3
SSLW	10.1	25.7	34.4	25.4	44.3	126.9	159.8

Distances from seismic stations to the various volcanoes in kilometers

Spurr stations	Spurr	Crater Peak	Redoubt	Iliamna	Augustine
BGL	8.2	7.0	89.3	143.1	220.1
BKG	21.9	25.6	70.3	124.5	201.2
CGL	13.2	14.2	100.1	154.2	230.8
CKL	8.9	12.4	82.4	136.3	213.3
CKN	9.2	6.3	87.9	142.0	218.9
CKT	7.9	11.3	85.0	139.1	216.0
CP2	4.0	0.9	91.1	145.1	222.1
CRP	6.3	5.5	92.9	147.0	223.9
NCG	16.2	12.7	107.3	161.3	238.3
SPU	14.5	16.9	86.3	140.3	216.8
STLK	31.5	34.5	123.4	177.5	254.1

Westdahl stations	Westdahl	Fisher	Shishaldin	Isanotski	Roundtop Mountain	Akutan	Dutton
WESE	6.6	24.0	51.0	64.7	74.1	98.7	168.4
WESN	7.5	13.5	44.6	59.4	68.8	103.7	163.0
WESS	6.4	27.2	57.8	72.1	81.6	90.8	175.9
WFAR	8.5	25.2	58.0	73.0	82.4	90.3	176.4
WPOG	10.7	19.5	53.4	68.7	78.1	95.7	171.6
WTUG	40.3	19.6	28.9	43.8	51.7	130.6	140.4



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Augustine deformation

GPS -

It is a quiet reporting period at Augustine. All is well with the 3 GPS units. The Mound-Domo (fig. 22) and Mound-Windy (fig. 23) lines show no unusual activity.

Tiltmeters -

All tiltmeters (figs. 24-29) continue to operate and show signals that are typical for this time period. Domo (fig. 26) radial tilt started to get noisy (electronics) in mid-December. Otter (fig. 28) was fixed by Tom Murray's visit in September and appears to be working fine.

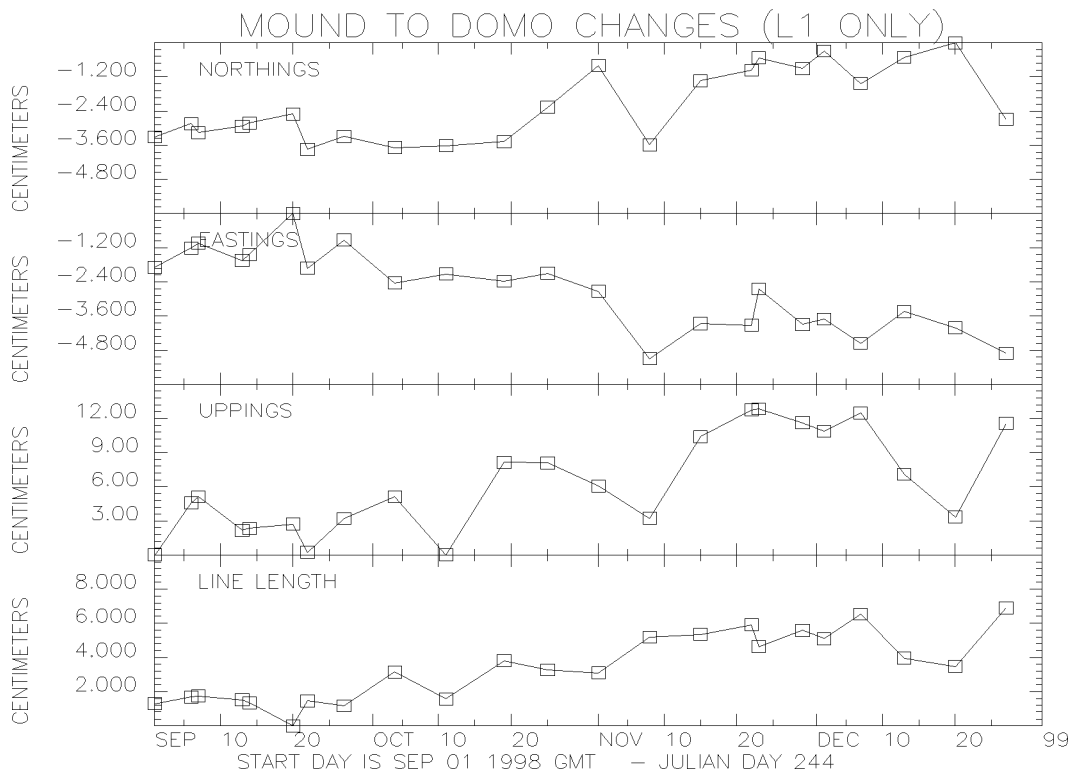


Figure 22: Mound-Domo GPS plots. Winter comes to the dome in November. Same scales as

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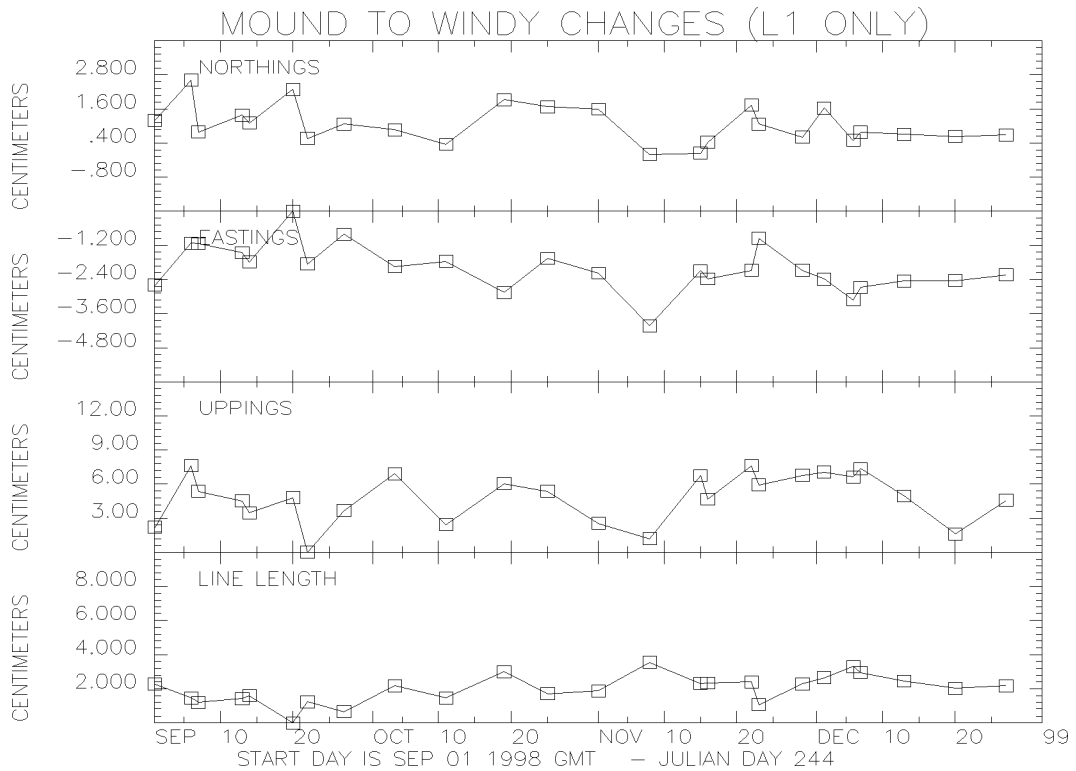


Figure 23: Mound-Windy GPS plots. Straight line data.

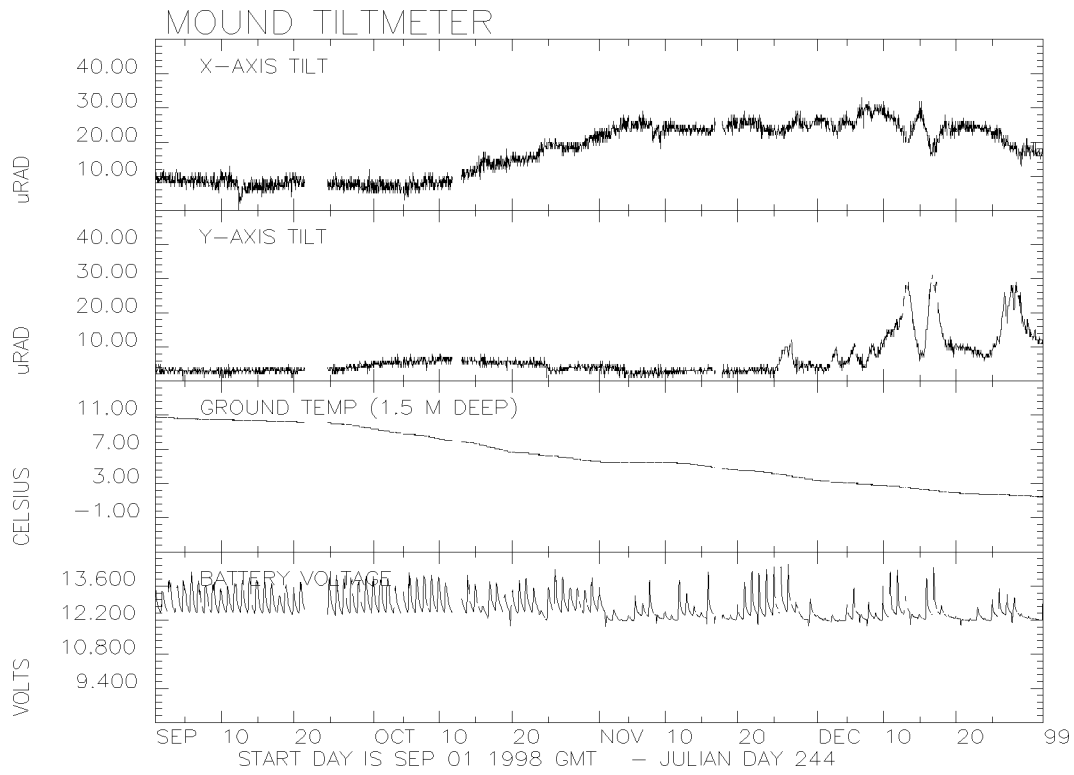


Figure 24: Mound tiltmeter plots. Quiet data overall, noisy Y-Axis is probably electronics.

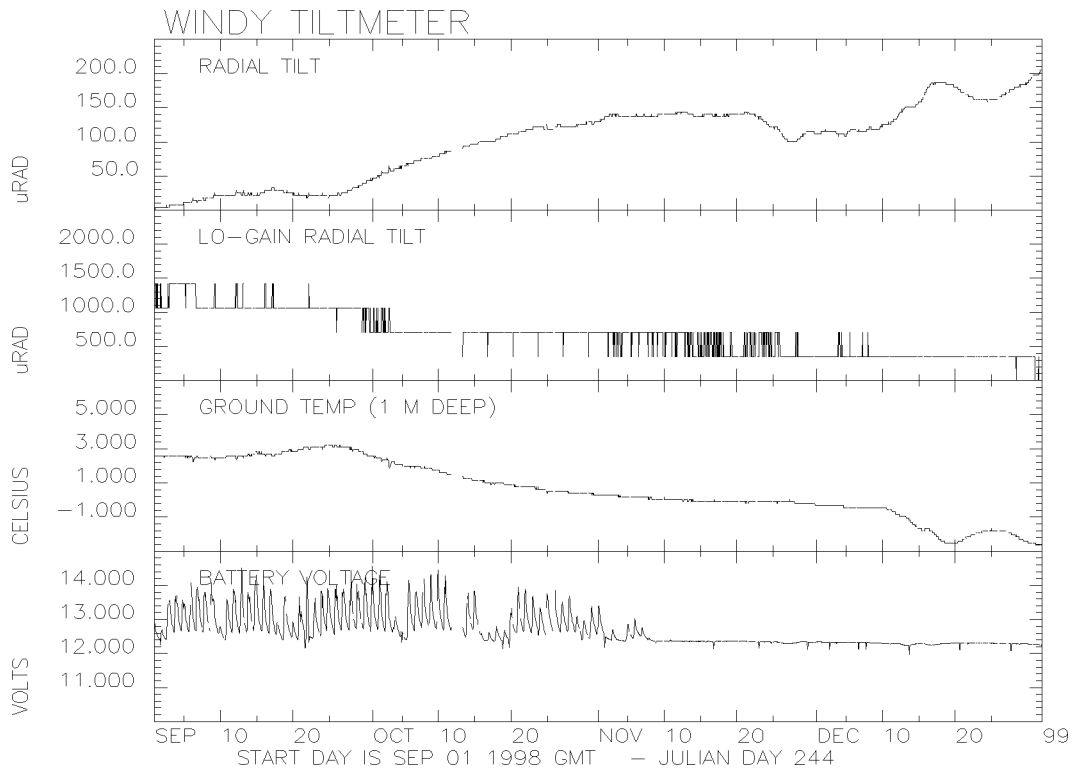


Figure 25: Windy tiltmeter plots. The radial tilt trend is seen every year at this time.

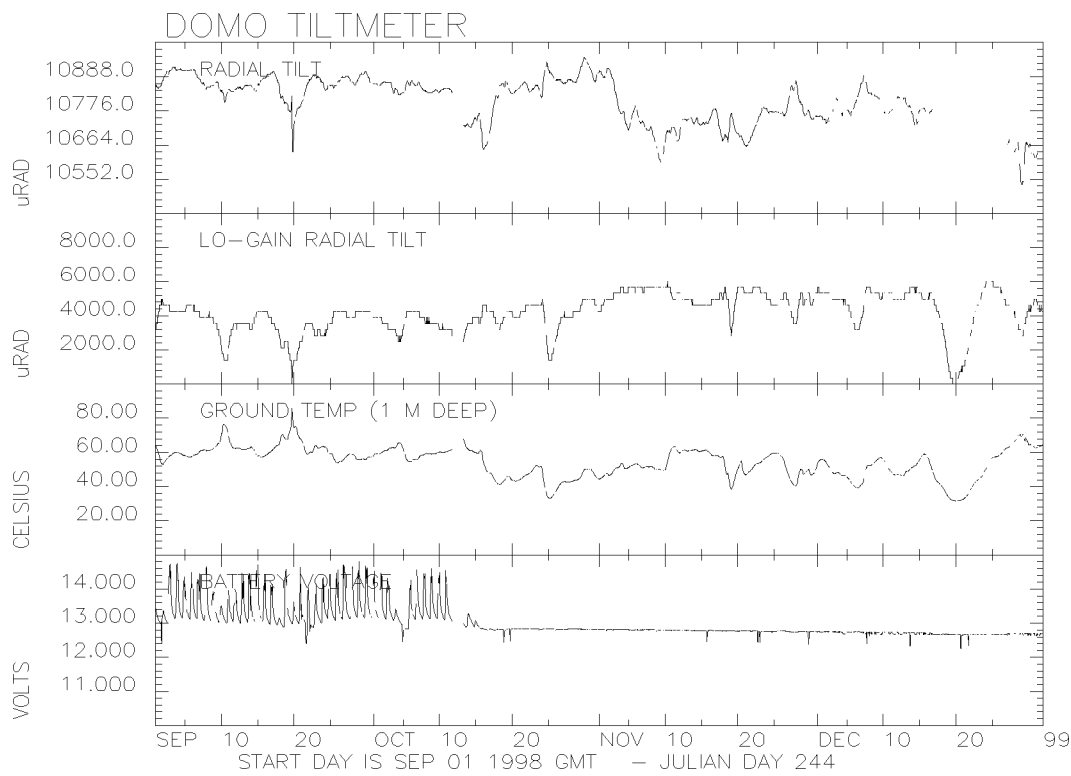


Figure 26: Domo tiltmeter plots. Large gap in data during December is noisy electronics.

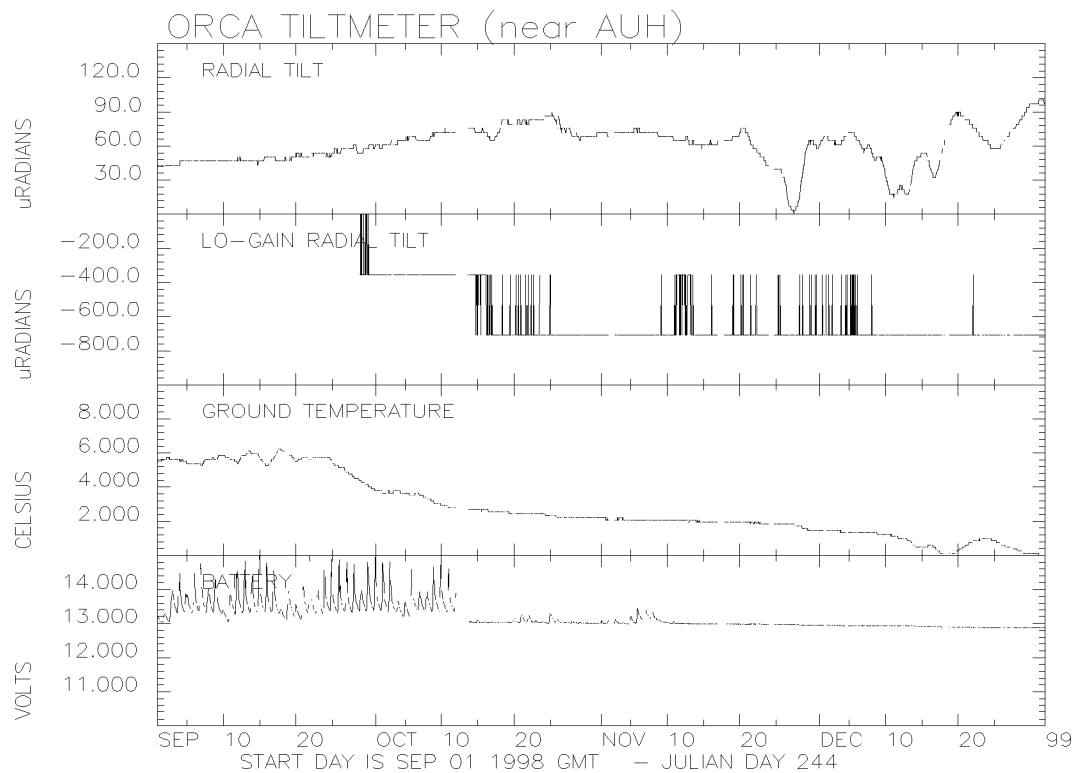


Figure 27: Orca tiltmeter plots. No significant tilt changes can be seen.

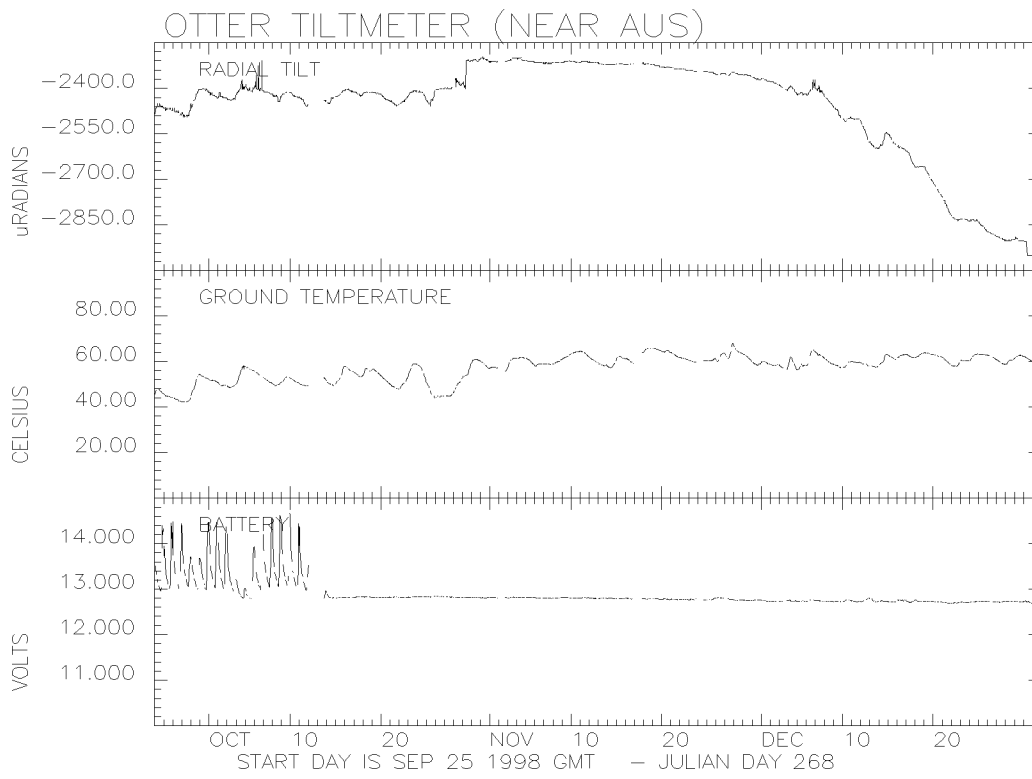


Figure 28: Otter tiltmeter plots. Plot starts September 25, after Tom Murray fixed the station.

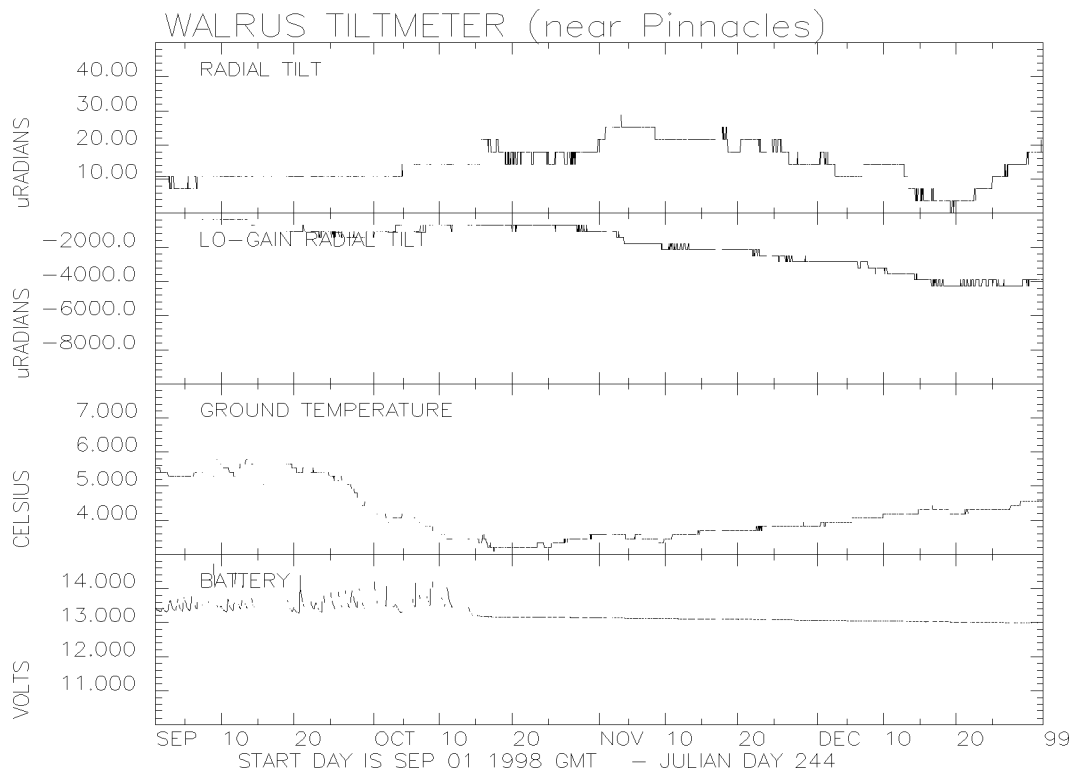


Figure 29: Walrus tiltmeter plots. Very quiet tilt signal at the Pinnacles.

Operations

1998 Field Summary: Seismic station installation and maintenance

AVO field operations expanded again in 1998. One network was installed around Westdahl volcano. Telemetry considerations made it convenient to include Isanotski as well. The Katmai area was supplemented by five new single component and one three component station. These new stations required the addition of two new leased telephone circuits and the reconfiguration of two existing ones. Since no additional circuits were available at Akutan the digital broad band instrument was converted to analog and multiplexed with stations from the southern part of Westdahl.

Efforts have continued to upgrade and harden sites, to improve reliability, reduce maintenance trips and standardize equipment. In the Aniakchak network 4ft extensions were added to the antenna masts in an attempt to elevate the antenna above the snow pack. Radome-enclosed antennae were also added.

Improvements in communication technology allowed us to disconnect the 56kb/s leased digital circuit which we installed in 1996. It was replaced by an intranet connected "Earthworm" digitizer in Anchorage. The data is now time-tagged in Anchorage and recorded in Fairbanks by this means.

The addition of the "Earthworm" digitizer in Anchorage made discriminator rack space available in Fairbanks to integrate all of the seismic station recording into a common distribution system.

The Augustine broad-band digital telemetered station that was installed in 1996 was upgraded to a Guralp digitizer and Freewave telemetry system. A failed wind generator that

was installed in 1997 was replaced twice, the second time with a newer style, and down sized blades.

The seismic operations web is being integrated into the AVO internal pages. These include summarized and detailed field notes from 1990 through present. In addition to field notes, network diagrams, station files, photographs, calibration data, recordings and spectra of telemetry, battery voltage plots, and many other types of related information continue to be accumulated on these Web pages. Because much of the information contained in the site is preliminary, much of it has not been reviewed. It is secured in the AVO internal pages. The location is http://www.avo.alaska.edu/internal/estes_ops/AVO_ops.html

Below is a summary of the 109 field site visits during 1998 based on contributions I have received from the field crews. Detailed notes are available on the Web pages. Those involved (alphabetically) were: Estes, Hammerich, Hammond, Jolly, Lawson, Lockhart, Mann, Moran, Paskievitch, Power, Tytgat.

Steve Estes

1998 FIELD WORK SUMMARY

Date	Code	Station Name	What Was Done
980711		Akutan Repeater	Installed repeater; Tytgat, Hammond & Lockhart
980711		Akutan Village	Rx Installed Rx site; Tytgat, Hammond & Lockhart
9807??	ANCK	Martin	Replaced solar regulator; Paskievitch
980914	ANC_R	Anchor River receiver	Measured and adjusted levels; Lawson & Tytgat
981125	ANC_R	Anchor River receiver	Trouble shoot and fix 457.175 rx, measure signal levels; Lawson
98062?	ANIA	Aniakchak	Replace 3 ants w/radomes, mast 4' higher, add filter bridge; Lockhart & Hammond
98062?	ANNE	Aniakchak NorthEast	Replace ant w/radome, mast 4' higher; Lockhart & Hammond
98062?	ANNW	Aniakchak NorthWest	Check site, Okay; Lockhart & Hammond
98062?	ANPB	Aniakchak Plenty Bear	Replace ant w/radome, mast 4' higher; Lockhart & Hammond
98062?	ANPK	Aniakchak Peak	Replace ant w/radome; Lockhart & Hammond
98062?	ANSL	Aniakchak Surprise Lk	Bear damage, new ant & coax, add in/out temp probe; Lockhart & Hammond
980912	AUC	Augustine Crater	Replaced VCO; Lawson & Tytgat
980911	AUH	Augustine Dome H	Replaced aircells; Lawson & Tytgat
980913	AUI	Augustine Island	Installed hut, added 3 batteries, replaced guy wires; Lawson & Tytgat
980304	AUL/B	Augustine Broad Band	Installed new batteries; Lawson
980911	AUL/B	Augustine Broad Band	Put BB on aircells + replaced wind generator; Lawson & Tytgat
980912	AUL/B	Augustine Broad Band	Replaced DST (digital seismic transmitter); Lawson & Tytgat
981106	AUL/B	Augustine Broad Band	Installed Guralp + replaced wind generator; Lawson & Tytgat
980911	AUP	Augustine Pinnacle	Replaced aircells; Lawson & Tytgat
980911	AUR	Augustine Rim	Replaced A1VCO with McVCO s/n 97-185; Lawson & Tytgat
980911	AUS	Augustine Summit	Installed new power regulator, now using both solar panels; Lawson & Tytgat
980912	AUS	Augustine Summit	Added two batteries, now two banks of four batteries; Lawson & Tytgat
980518	BIBL	Bible Camp	Becharof temp 3 comp station; Larsen (see AVO BiMo May-Aug '98)
980811	BKG	Blockade Glacier	Replaced cables and aircells following bear damage; Paskievitch
981015	BLDY	Mt Baldy	Inspection: station in great shape; Tytgat
981015		Mt Baldy repeater 2	Inspection: station in great shape. Replaced filter card; Tytgat

980713		Mt Baldy repeater 3	Installed repeater; Tytgat
980716	BRPK	Brown Peak	Inspection: station in great shape; Tytgat & Mann
980509	CAHL	Cahill	Fly by; Paskievitch
980715		Cold Bay receivers	Installed Rx site; Tytgat, Hammond & Lockhart
981015		Cold Bay receivers	Connected North Westdahl circuit to Alascom circuit; Tytgat
980811	CGL	Capps Glacier	Replaced batteries; Paskievitch
980819	CKT	Bend	Hardened site, buried cables; Paskievitch
9807??	CNTC	Main	Added 2 MSX-40 solar panels, new gelcells & aircells; Paskievitch
980819	CP2	Crater Peak 2	Replaced avalanche-destroyed antenna; Paskievitch
980812	CRP	Crater Peak	Replaced summing amplifier; Paskievitch
980819	CRP	Crater Peak	Installed new 3-component station; Paskievitch
980818	DFR	Drift River	New A1VCO-ID = 9E gain remains the same; filter bridge, geophone and cable. Replaced batteries; Paskievitch
980304	DMR_R	Diamond Ridge	Measured signal levels, bad modem card; Lawson
980914	DMR_R	Diamond Ridge	Measured and adjusted signal levels; Lawson & Tytgat
980906	DMR_R	Diamond Ridge	Install FreeWave, antenna, coax, modem for AUL broad band; Lawson & Tytgat
981125	DMR_R	Diamond Ridge	Trouble shoot AUL BB, measure sig lvl, fix AUR rx; Lawson
980719		Deer Island repeater 1	Inspection: station in great shape, reduced deviation a little; Tytgat
980719		Deer Island repeater 2	Inspection: station in great shape; Tytgat
980719	DRR3	Deer Island 3	Inspection: station in great shape; Tytgat
980715	DT1	Dutton One	Removed solar reg. (full of water). Replaced geophone and SP4; Tytgat, Hammond & Lockhart
981015	DT1	Dutton One	Installed solar reg. Replaced VCO & Tx (water damage); Tytgat
980518	GASR	Gas Rocks	Becharof temp station; Larsen (see AVO BiMo May-Aug '98)
980120	GOU	Gould Hall	Took picture; Estes
980310	GOU	Gould Hall	Repaired cross talk, calibrated discriminators; Estes
980329	GOU	Gould Hall	Install inverters for PC digitizer; Estes
980605	GOU	Gould Hall	Install rx & disc for VOGL & BLGA; Estes & Larsen
980816	GOU	Gould Hall	Check telemetry, found disk crash, pick up supplies; Estes
980304	HOM	Homer	Measured received signals; Lawson
9805??	HOM	Homer	Replaced power supply on filter bridge 1; Lawson & Hammerich
981125	HOM	Homer	Installed new McVCO; Lawson
981125	HOM	Homer	Reduced McVCO gain, replace RED receiver; Lawson
980912	ILI	Iliamna Volcano	Inspection: station in excellent shape; Lawson & Tytgat.
980912	ILS	Iliamna Low South	Inspection: station in great shape. Left a set of aircells; Lawson & Tytgat
980912	ILW	Iliamna Northwest	Too much snow, could not replace aircells; Lawson & Tytgat
980912	INE	Iliamna Northeast	Fly by: looks good, lots of snow and ice; Lawson & Tytgat
980704	ISNN	Isanotski North	Inspection: station in good shape. 1 side of solar reg. dead; Tytgat, Hammond, Lockhart & Mann
980713	ISNN	Isanotski North	Replaced solar regulator; Tytgat & Lockhart
980704	ISTK	Isanotski Volcano	Fly by: station buried in snow, broken solar panels; Tytgat, Hammond, Lockhart & Mann
980713	ISTK	Isanotski Volcano	Started replacing solar panels, bad WX kicked us out; Tytgat & Lockhart
980719	ISTK	Isanotski Volcano	Finished solar panel installation; Tytgat
980912	IVE	Iliamna Volcano East	Replaced all 3 VCOs with newer generation; Lawson & Tytgat
980912	IVS	Iliamna Volcano South	Fly by: looks good, antenna elements bent a little; Lawson & Tytgat
9807??	KABR	Barrier Ridge	Installed new single component station; Moran, Jolly & Paskievitch
980720		King Cove receiver	Adjusted levels, removed 2720 card and replaced 1020 card on circ. 63; Tytgat
9807??	KAHC	Hardscrabble Creek	Installed new single component station/repeater; Moran, Jolly & Paskievitch
9807??	KAHG	Hook Glacier	Installed new single component station; Moran, Jolly & Paskievitch
9807??	KAIC	Ikagluik Creek	Installed new single component station; Moran, Jolly & Paskievitch
9807??	KAPH	Pasha	Installed new three component station; Moran, Jolly & Paskievitch
9807??	KARR	Rainbow River	Installed new single component station/repeater; Moran, Jolly & Paskievitch
9807??	KAWH	Katmai What	Installed new single component station/repeater; Moran, Jolly & Paskievitch
9807??	KBM	Katmai	Added repeater, this now links KABR with KVT; Paskievitch
9807??	KEL	Katmai	Station check, good voltage/solar, some minor damage to KCG rx ant; Paskievitch
981216	KEL	Katmai	Tx only putting out 30 mw, replaced it; Paskievitch

9807??	KMC_R	Katmai North Repeater	Installed new repeater; Moran, Jolly & Paskievitch
980912	MMN	McNeil River	Station in bad shape (bear damage). Took electronics back to fix; Lawson & Tytgat
981106	MMN	McNeil River	Helicopter could not reach site due to weather; Lawson & Tytgat
980818	NCT	North Crescent	Replaced batteries, removed RDW receiver; Paskievitch
980912	OPT	Oil Point	Replaced coax on AUH Rx antenna. Tightened tower guy wires; Lawson & Tytgat
98062?	PHD_R	Port Heiden Receivers	Install filter bridge; Lockhart & Hammond
980818	RDN	Redoubt North	Replaced batteries; Paskievitch
980818	RDT	Redoubt	Site visited (no details).
980818	RED	Redoubt	Site visited, Transmit power 85 ma; Paskievitch
980818	REF	Redoubt Flank	Helicopter could not land safely due to snow; Paskievitch
980818	RSO	Redoubt South	New McVCO ID=11A, Gain is 78, L4-C and changed to a hybrid power system; Paskievitch
980811	SPU	Spurr	Replaced all station components, new L4-C+McVCO:ID is 117; Gain is 66; Hybrid power; Paskievitch
980704	SSLN	Shishaldin North	Inspection: Bear tracks but no damage, excellent shape. Tytgat, Hammond, Lockhart & Mann
980704	SSLS	Shishaldin South	Inspection: Water damage on batteries, broken mast inside hut; Tytgat, Hammond, Lockhart & Mann
980719	SSLS	Shishaldin South	Sprayed battery terminals; removed Rx, Rx antenna, filter card & aircells; Tytgat
980704	SSLW	Shishaldin West	Inspection: bad regulator; Tytgat, Hammond, Lockhart & Mann
980709	SSLW	Shishaldin West	Replaced solar regulator; Tytgat & Mann
980712	SSLW	Shishaldin West	Rotated antenna toward WTUG, changed VCO freq; Tytgat & Mann
980715	SSLW	Shishaldin West	Replaced Tx; Tytgat & Mann
980812	STLK	Strandline Lake	Replaced VCO, hardened site; Paskievitch
9806	STR/R	Sterling	Adjust receiver levels; Lawson & Hammerich
980709	WESE	Westdahl East	Installed station; Hammond & Lockhart
980716	WESE	Westdahl East	Sprayed liquid galvanize on outside hut hardware; Tytgat & Mann
980708	WESN	Westdahl North	Installed station; Hammond & Lockhart
980716	WESN	Westdahl North	Sprayed liquid galvanize on outside hut hardware; Tytgat & Mann
980705	WESS	Westdahl South	Installed station; Tytgat & Mann
980705	WFAR	Farris Peak	Installed station; Tytgat & Mann
980717	WFAR	Farris Peak	Checked antenna orientation (good visibility); Tytgat & Mann
980705	WPOG	Pogromni Volcano	Installed station; Hammond & Lockhart
980712	WTUG	Tugamak Mt	Installed station/repeater; Hammond, Lockhart, Tytgat & Mann

Some of the sites not visited during summer 1998:

ACH, AKS, AKT, AKV, AUE, AUW, BGL, BGM, BGR, BLHA, BRLK, CAHL, CDA, CKL, CKN, CNP, DOL, DTN, HAG, HSB, KCE, KCG, KJL, KVT, LVA, MCIR, MGLS, MGOD, MSW, MTBL, NCG, NNL, PDB, PN7A, PS1A, PS4A, PVV, PV6, RDW (abandoned), SKN, SLK, SYI, XLV, ZRO

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AVO seismic data archive

AVO seismic data from January of 1996 to December of 1998 has been archived on 9 CDs. The annual CDs contains AH files and phase data for all detected events of interest.

Beginning in December of 1997, monthly CDs of AVO seismic data have been produced which contain AH files for all detected events of interest, conversion software for the AH format,

phase data, a summary file of earthquake locations, RSAM data, SSAM data, and relational database files.

Duplicate copies of all AVO archived data on CD reside at AVO offices in Fairbanks and Anchorage and are easily readable with a PC or UNIX machine.

The amount of data archived during this time period reflects the increase in AVO monitoring efforts at Katmai and Aleutian volcanoes and

the operation of three 64-channel recording systems:

1996	1.511 GB
1997	877 MB
1998	1.219 GB (1998 monthly CD total is 3.692 GB)

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