

QUARTERLY NETWORK REPORT 2006-B

on

Seismicity of Washington and Oregon

April 1 through June 30, 2006

Pacific Northwest Seismograph Network

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This report is prepared as a preliminary description of the seismic activity in Washington State and Oregon. Information contained in this report should be considered preliminary and not cited for publication without checking directly with network staff. The views and conclusions contained in this document should not be interpreted as necessarily representing the official policies, either express or implied, of the U.S. Government.

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INTRODUCTION

This is the second quarterly report of 2006 from the Pacific Northwest Seismograph Network (PNSN), at the University of Washington Dept. of Earth and Space Sciences, covering seismicity of Washington and western Oregon. In these reports we provide information about network operations, our educational and outreach activities, and seismicity of the region including special coverage (figures, counts, listings, etc.) of earthquake swarms, aftershock sequences, or unusual events or findings.

This report is preliminary, and subject to revision. The PNSN routinely records signals from selected stations in adjoining networks. This improves our ability to locate earthquakes at the edges of our network. However, our earthquake locations may be revised if new data become available. Findings mentioned in these quarterly reports should not be cited for publication.

Prior to 2004, each quarterly included station tables and maps. Beginning in 2004, station tables and maps appear in the quarterly report only once a year. These tables were included in Appendix 1 of the 2005C Quarterly Report. Comprehensive quarterlies have been produced by the PNSN since the beginning of 1984. Prior to that, we published quarterly reports for western Washington in 1983 and for eastern Washington from 1975 to 1983. Annual technical reports covering seismicity in Washington since 1969 are available from the U.W. Dept. of Earth and Space Sciences. The complete PNSN earthquake catalog is available on-line, both through our web-site and through the ANSS earthquake catalog.

NETWORK OPERATIONS

Lists of currently operating stations are available on-line through web page <http://www.pnsn.org/OPS/stations.html>. We currently receive data from 289 stations in our network area. There are 214 stations in Washington and 64 in Oregon. These stations provide short-period data from 163 stations, strong motion data from 102 stations, and broadband data from 53 stations. The PNSN also receives data from 53 stations operated by other seismic networks.

Table 1 gives approximate periods of time when individual stations were inoperable. Data for Table 1 are compiled from weekly plots of network-wide teleseismic arrivals and automated and manual digital and analog signal checks, plus records of maintenance and repair visits.

Station	Outage Dates	Comment
ALCT	08/16/05-End	Removed for repair
BEVT	05/20/05-05/16/06	Removed for repair
BEVT	05/17/06-06/07/06	No communications
BKC	11/19/05-End	Dead
BPO	01/05/06-05/04/06	Noisy
BRO	04/07/06-04/19/06	Dead
COLT	06/23/05-05/04/06	Removed for repair
CPW	05/10/06	Replaced and moved seismometer
ELW	05/10/06-05/20/06	Intermittent communications
ELW	06/11/06-End	Intermittent communications
ERW	07/25/05-06/06/06	Intermittent communications
ERW	04/05/06-End	Broadband removed
EYES	04/13/06-05/11/06	No communications
GL2	10/21/04-06/22/06	Dead; replaced battery, VCO, seismometer and fixed transmitter
GLK	09/29/05-03/19/06	Intermittent
GNW	05/23/06-End	Broadband E-W channel has high counts
GRCC	05/04/06-05/18/06	No communications
GTWN	06/01/05-End	No communications; telemetry being moved for bldg. renovation
HOG	04/01/06-04/13/06	Dead
HUO	05/18/06-End	Dead
JBO	10/15/04-End	Noisy

TABLE 1 - Station outages and installations		
Station	Outage Dates	Comment
KEEL	03/24/06-End	Removed for repair
KICC	03/04/05-End	Bad timing
KICC	12/14/05-End	No communications
KIMR	03/20/06-04/17/06	No communications
KMO	12/29/05-06/24/06	Dead; repaired transmitter
KNEL	01/30/06-02/06/06	No communications
LON	01/30/06-03/19/06	Intermittent communications
LTY	09/07/05-End	Intermittent communications
LYNC	04/18/06-05/15/06	No communications
LYNC	05/17/06-06/21/06	Sensor has high offsets
LYNC	06/01/06-End	No communications
NCO	04/01/06-06/11/06	Dead
OBC	10/27/05-05/02/06	Dead; replaced battery
OBH	01/31/02-End	Temp. removed for logging
PCMD	02/02/06-04/13/06	Removed for repair due to a flooded vault
PCMD	05/02/06-05/16/06	No communications
RCS	02/23/06-04/20/06	Intermittent
RER	12/19/05-End	Noisy
SBES	05/18/05-End	Short period noisy
SEA.HH?	12/05/03-End	Disconnected for renovation
SFER	09/01/04-End	Short period dead; needs removal
SHW	04/01/06-05/10/06	Dead
SOPS	08/27/02-End	K2 flash-memory problem
SQM	06/01/06-06/16/06	No communications
SQM	06/17/06-End	Possible digitizer problem
TTW	12/01/05-End	Removed; strong motion sensor moved to USArray site for 2 years
UPS	05/11/06-End	Removed for building renovation
UWFH	05/01/05-End	Short period problems; needs removal
VCR	03/07/06-04/27/06	Noisy; seismometer replaced
VGB	09/23/04-04/19/06	Intermittent; usually very noisy
VIP	02/19/06-End	Dead
VLL	06/06/06-06/29/06	Dead; replaced VCO
VT2	01/04/06-03/26/06	Intermittent
VTH	02/06/06-04/28/06	Dead; repaired cables
WRW	02/01/06-03/09/06	Dead

Mt. St. Helens eruption, 2004-2006

The dome-building eruption of Mount St. Helens that began on September 23, 2004 continues. The procedure for selecting events at Mt. St. Helens to be located remains the same; triggering produces preliminary solutions for locatable events (which are manually processed), webicorders are reviewed to identify events to be manually retrieved from the continuous data stream, and the continuous data are fully reviewed only for one hour of every six.

- **MSH Equipment**

On June 5, 2006, the batteries were swapped out at YEL. Repairs were also made to connectors from one of the solar panels. On June 20, 2006, the antennas and batteries were replaced at stations RAFT and NED. The SUG seismometer was reburied and the gain was increased. The JRO broadband transmit radio was also replaced.

Strong Motion & CREST Instrumentation Update

There were no new strong motion or CREST installations this quarter

Computer Hardware Update

Scossa continues to be our “master” real-time data processing computer. *Tremito* acts as a live backup for *scossa*, provides additional computational power for manual processing of earthquake data and acts as a fileserver for all the other networked computers in the group. Data acquisition is done by four dedicated computers; *pigia* handles digitization of analog data, while *verme*, *milli*, and *verli* acquire digital data.

Use of PNSN Data through the IRIS DMC

The IRIS Data Management Center reports 1,420 requests for PNSN trace-data this quarter. Almost 20,000,000 traces were requested. The number of traces requested remains at an elevated level compared to a “typical” quarter prior to the current eruption of Mount St. Helens.

PNSN PERSONNEL CHANGES

Dr. Paul Bodin accepted a position as PNSN network manager to oversee day-to-day network operations including field work, data-acquisition hardware and software, data analysis, and response to significant events. Dr. Bodin and Dr. John Vidale, the new director of the PNSN, are scheduled to start work at the end of August. The PNSN’s retiring director, Dr. Stephen Malone, will be going half time at the end of September.

In anticipation of additional funding from the state of Washington starting July 1, 2006, the PNSN began the process of hiring additional staff. Job announcements were published for a Senior Computer Specialist and for an Electronics Technician. We hope to have these positions filled by early in the next quarter

EARTHQUAKE DATA – 2006-B

Between April 1 and June 30, 2006, 1,134 events were digitally recorded and processed at the University of Washington. Thousands of additional unlocated events occurred at Mount St. Helens associated with the dome-building eruption which began in late September 2004. Of the processed events, locations in Washington, Oregon, or southernmost British Columbia were determined for 759 of these events; 644 were classified as earthquakes and 115 as known or suspected blasts. The remaining processed events include teleseisms (173 events), regional events outside the PNSN (84), and unlocated events within the PNSN, mostly at Mt. St. Helens. Due to large number of events associated with the ongoing eruption of Mt. St. Helens, only a representative sample of Mt. St. Helens seismicity was located. Other unlocated events within the PNSN normally include surficial events on Mt. St. Helens and Mt. Rainier, very small earthquakes, and blasts. Frequent mining blasts occur near Centralia, Washington and we routinely locate a sample of them.

Table 2 lists earthquakes reported to have been felt during this quarter. Events with ShakeMaps or Community Internet Intensity Maps (CIIM) are indicated. No event this quarter was large enough to generate a ShakeMap. Two events this quarter produced “CIIM” maps (<http://pasadena.wr.usgs.gov/shake/pnw/>), which convert “felt” reports sent by the general public (via Internet) into numeric intensity values. CIIM maps show the average intensity by zip code.

Table 3 is this quarter's catalog of earthquakes M 2.0 or greater, located within the network - between 42-49.5 degrees north latitude and 117-125.3 degrees west longitude.

Figure 1. Earthquakes with magnitude greater than or equal to 0.0 ($M_c \geq 0$).

Figure 2. Blasts and probable blasts ($M_c \geq 0$).

Figure 3. Earthquakes located near Mt. St. Helens ($M_c \geq 0$).

Figure 4. Earthquakes located near Mt. Rainier ($M_c \geq 0$).

TABLE 2 - Felt Earthquakes during the 2nd Quarter of 2006

DATE-(UTC)-TIME	LAT(N)	LON(W)	DEP	MAG	COMMENTS	CIIM	CIIM - # of felt reports	Shake Map
yy/mm/dd hh:mm:ss	deg.	deg.	km	MI				
06/04/26 14:24:06	45.01	122.56	20.0	3.0	27.1 km ESE of Woodburn, OR	✓	65	

OREGON

During the second quarter of 2006, 29 earthquakes were located in Oregon between 42.0 degrees and 45.5 degrees north latitude, and between 117 degrees and 125 degrees west longitude. Only one earthquake magnitude 3.0 or larger was recorded in Oregon this quarter. The M 3.0 earthquake on April 26 occurred at approximately 20 km depth, and was located about 27 km east-southeast of Woodburn, OR. This was the only felt earthquake this quarter within the PNSN region, and was reported felt through CIIM by 65 individuals.

WESTERN WASHINGTON SEISMICITY

During the second quarter of 2006, 555 earthquakes were located between 45.5 degrees and 49.5 degrees north latitude and between 121.0 degrees and 125.3 degrees west longitude. Most western Washington seismicity this quarter was in the Mount St. Helens area, see discussion below. No felt earthquakes were located this quarter in western Washington.

The six largest earthquakes felt in western Washington this quarter were all shallow earthquakes associated with the eruption of Mt. St. Helens. They were located within the crater and ranged in magnitude from 3.0 to 3.3.

WASHINGTON CASCADE VOLCANOES

Mount St. Helens

Mount St. Helens seismicity and dome building eruption continued through this quarter. During the second quarter of 2006; seismicity decreased. Figure 3 shows located volcano-tectonic earthquakes near Mount St. Helens. Low frequency (L) and avalanche or rockfall events (S) are not shown. The PNSN catalog lists only a small subset of events selected for manual processing. See the operations section for details on how events are selected for processing, and instrumentation changes, if any.

This quarter, 291 earthquakes were located in the area shown in Fig. 3 using conventional manual processing procedures (including 275 earthquakes between magnitude 1.0 and 2.9, and 6 slightly larger events with magnitudes between 3.0 and 3.3). All locatable earthquakes in the 2004/2006 sequence are relatively shallow. Only a few events have been located deeper than 2 km. Seismicity this quarter continued to be located on the boundary between the old and new domes near the vent that appeared in early October, 2004.

Seth Moran of CVO has provided counts of seismic events during the current eruptive sequence. These numbers represent automated counts at HSR. Towards the middle of March the earthquakes decreased in magnitude, and their amplitudes at HSR became small enough to be missed by the picker, so additional very small earthquakes may not be included in the count.

Mount St. Helens 2004-2006 Quarterly earthquake counts at HSR; provided by CVO.		
Year	Quarter	HSR event count
2004	4th	292,352
2005	1st	123,502
	2nd	49,811
	3rd	12,085
	4th	30,315
2006	1st	30,617
	2nd	*13,236
* - Count is an estimate, review is incomplete		

Mount Rainier

The number of events in close proximity to the cone of Mt. Rainier varies over the course of the year, since the source of much of the shallow activity is presumably ice movement or avalanching at the surface, which is seasonal in nature. Events with very low frequency signals (1-3 Hz) believed to be icequakes are assigned type "L" in the catalog. Emergent, very long duration signals, probably due to rockfalls or avalanches, are assigned type "S" (see Key to Earthquake Catalog). One event flagged "L" or "S" was located at Mount Rainier this quarter and 83 "L" or "S" events were recorded, but were too small or too emergent to locate reliably. Type L and S events are not shown in Fig. 4.

A total of 46 tectonic events (17 of these were smaller than magnitude 0.0, and thus are not shown in Fig. 4) were located within the region shown in Fig. 4. The largest tectonic earthquake located near Mt. Rainier this quarter was a magnitude 2.4 event on April 10 (UTC), located about 21 km northwest of the summit of Mt. Rainier at about 17 km depth. This quarter, 25 tectonic earthquakes (7 of them smaller than magnitude 0.0 and thus not shown in Fig. 4) were located in the "Western Rainier Seismic Zone" (WRSZ), a north-south trending lineation of seismicity approximately 15 km west of the summit of Mt. Rainier (for counting purposes, the western zone is defined as 46.6-47.0 degrees north latitude and 121.83-122 west longitude). Within 5 km of the summit, there were 15 (8 of them smaller than magnitude 0.0 and thus not shown in Fig. 4) higher-frequency tectonic-style earthquakes, and the remaining events were scattered around the cone of Rainier as shown in Fig. 4.

EASTERN WASHINGTON SEISMICITY

During the second quarter of 2006, 59 earthquakes were located in eastern Washington in the area between 45.5 - 49.5 degrees north latitude and 117 - 121 degrees west longitude. The largest earthquake recorded in eastern Washington this quarter was a magnitude 2.8 event on April 8 (UTC), located about 8 km east-northeast of Entiat at less than 1 km depth.

OTHER SOURCES OF EARTHQUAKE INFORMATION

We provide automatic computer-generated alert messages about significant Washington and Oregon earthquakes by e-mail, FAX or via the pager-based RACE system to institutions needing such information, and we regularly exchange phase data via e-mail with other regional seismograph network operators.

Other regional agencies provide earthquake information. These include the Geological Survey of Canada (Pacific Geoscience Centre), Sidney, B.C. <http://www.pgc.nrcan.gc.ca/seismo/table.htm> and other regional networks in the United States <http://earthquake.usgs.gov/regional/> The US Geological Survey coordinates earthquake information nationally; <http://earthquake.usgs.gov>.

Complete catalog listings are available on-line through <http://www.pnsn.org/CATDAT/catalog.html> Key to earthquake catalog can be found in the last quarterly report of each year, or at: http://www.pnsn.org/INFO_GENERAL/PNSN_QUARTERLY_EQ_CATALOG_KEY.htm

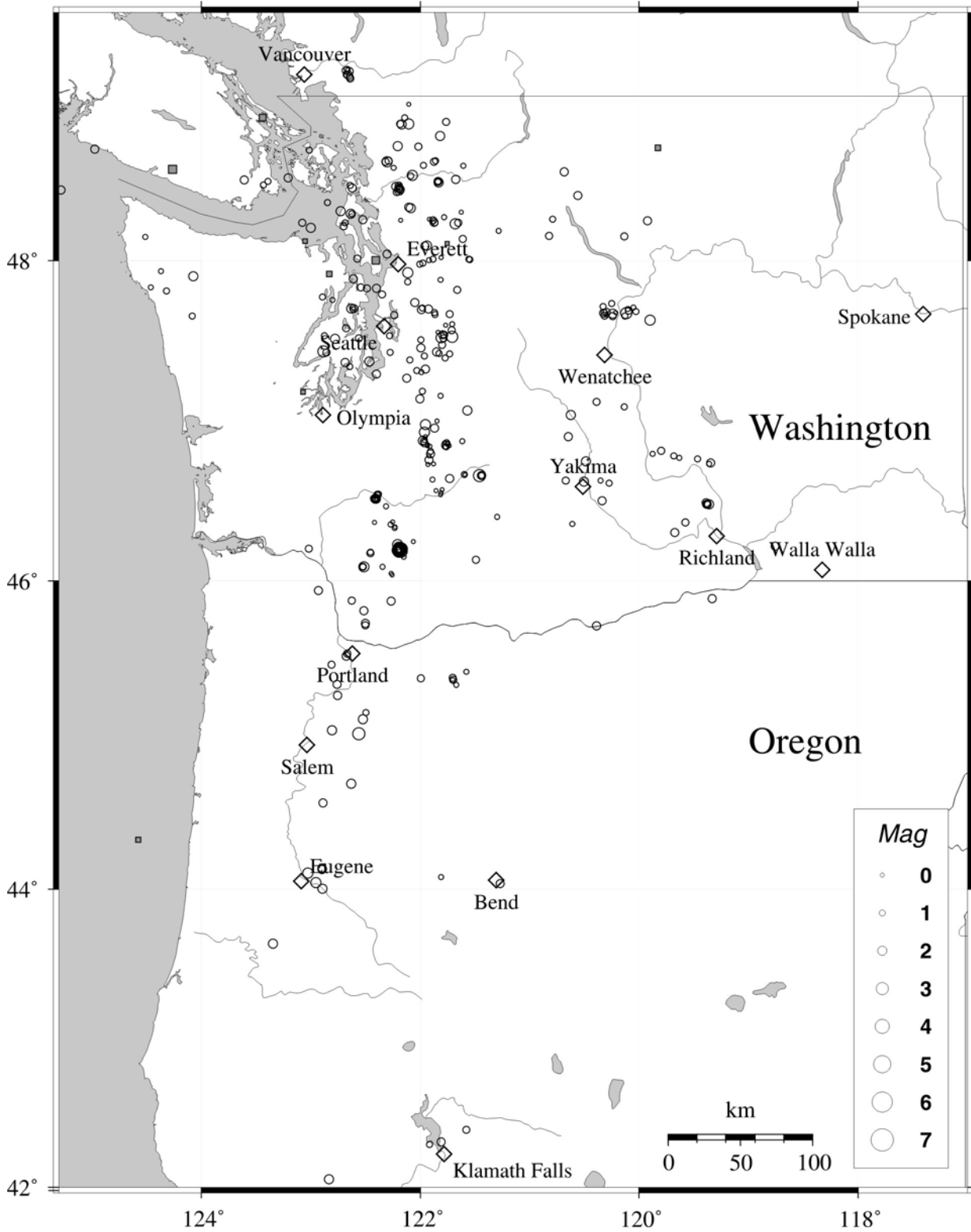


Figure 1 Earthquakes with magnitude greater than or equal to 0.0 ($M_c \geq 0.0$).

Unfilled diamonds represent cities. Quakes shallower than 30 km are indicated by circles, and deeper quakes by filled squares.

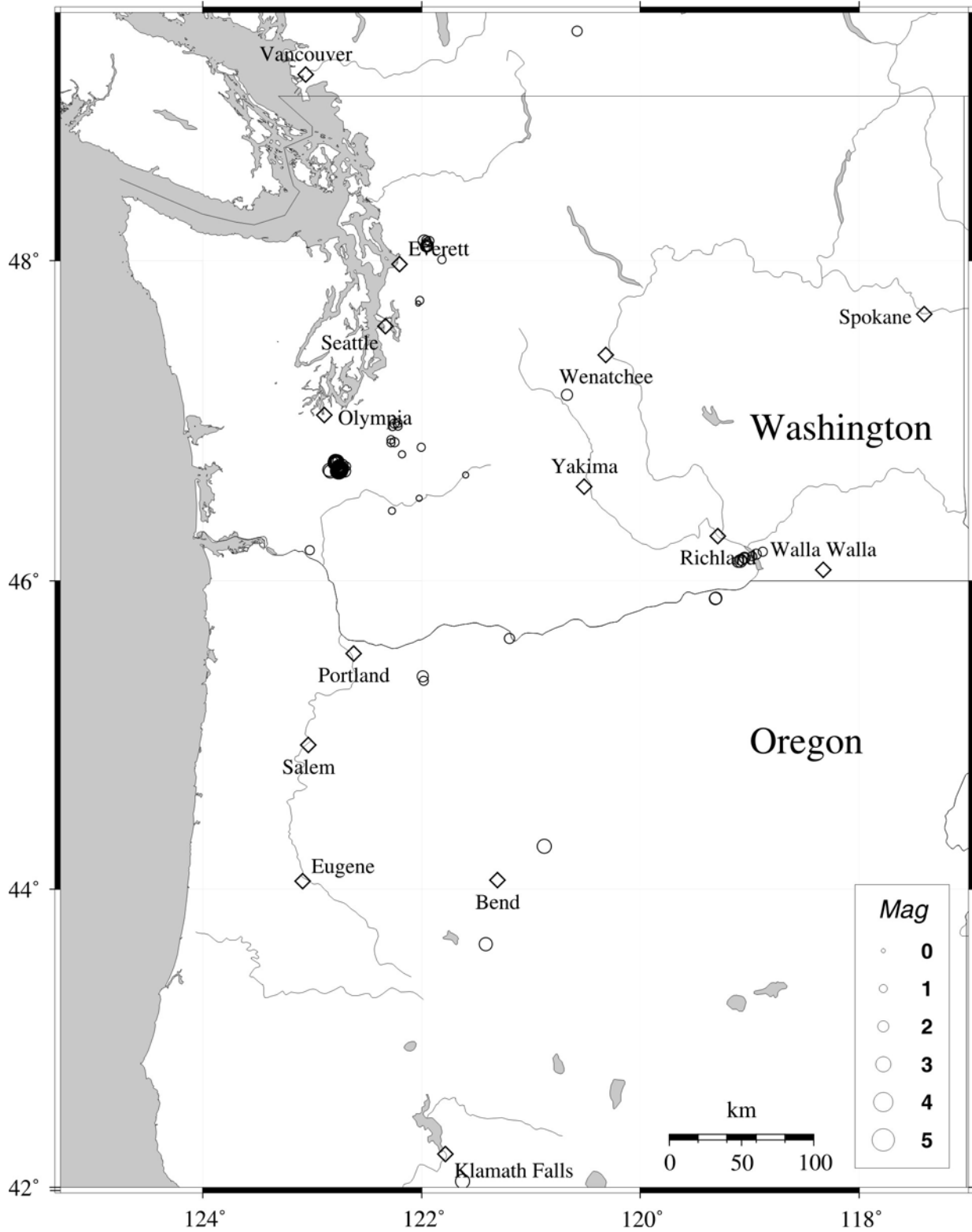


Figure 2. Blasts and probable blasts. Unfilled diamonds represent cities.

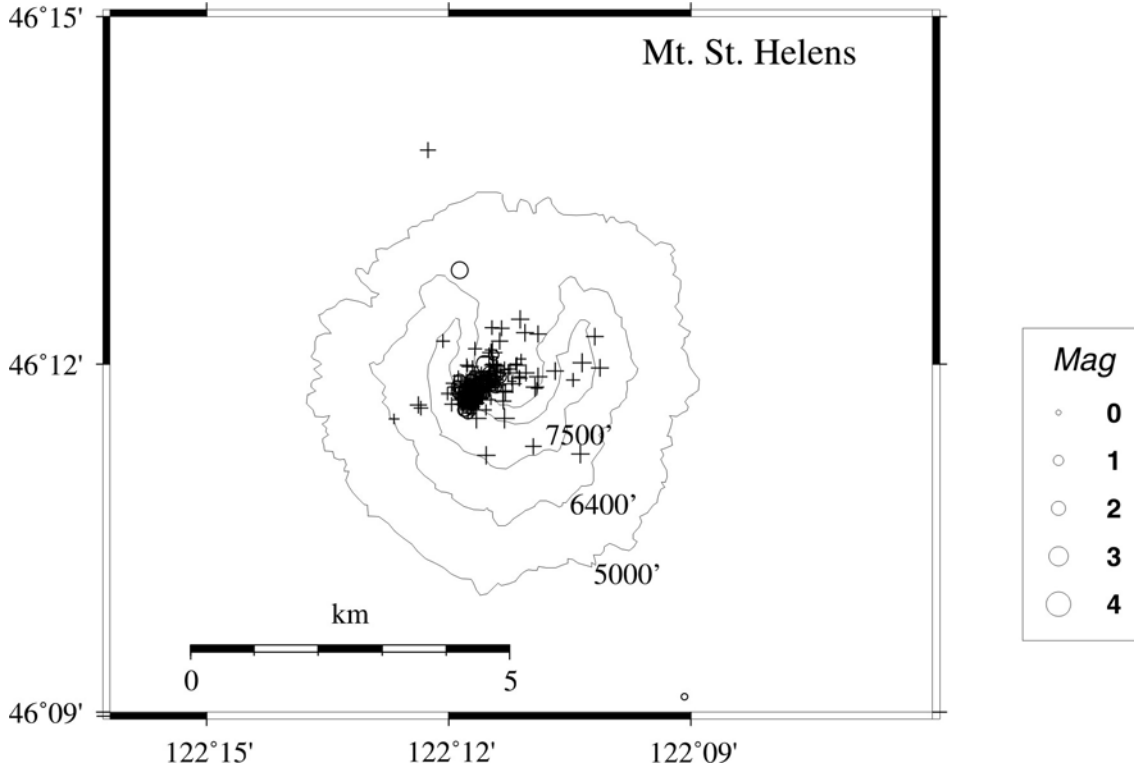


Figure 3. Selected Earthquake at Mt. St. Helens; ($M_c \geq 0.0$)

Events elected by the analyst for location are small fraction of the number of events recorded during the quarter.

Plus symbols indicate depth less than 1 km. Circles indicate depth greater than 1 km. Elevation contours shown in feet.

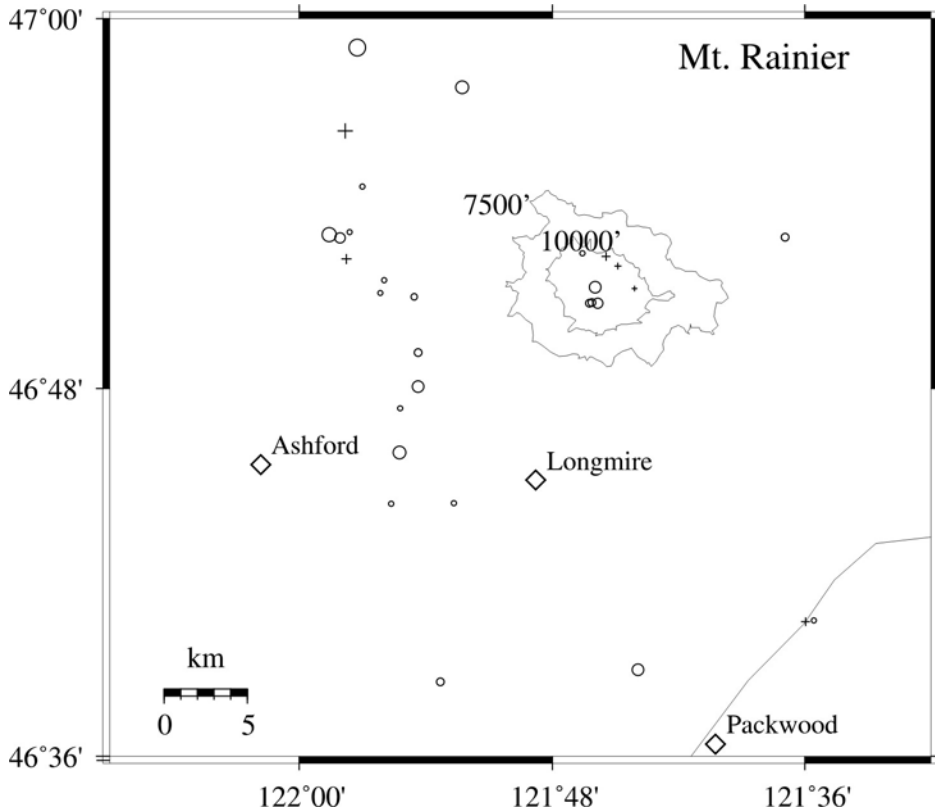


Figure 4. Earthquakes at Mt. Rainier; ($M_c \geq 0.0$)

EARTHQUAKE CATALOG, 2006-B

This quarter's catalog lists earthquakes of magnitude 2.0 or larger. Complete catalog listings are available on-line through <http://www.pnsn.org/CATDAT/catalog.html> Key to earthquake catalog can be found in the last quarterly report of each year, or at: http://www.pnsn.org/INFO_GENERAL/PNSN_QUARTERLY_EQ_CATALOG_KEY.htm

Table 3											
Earthquakes Second Quarter 2006											
Apr-06											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
2	20:03	46 11.94	122 11.48	0.11*	2.7	11/011	83	0.17	BA	S4	
3	1:51	47 42.39	122 37.68	22.18	2.0	56/058	43	0.29	BA	P3	
3	15:13	46 12.00	122 10.35	0.03*	3.0	11/011	113	0.49	CB	S4	
5	23:06	46 11.75	122 11.29	0.04*	2.3	10/011	84	0.18	BA	S4	
6	15:49	46 31.14	122 24.58	18.95	2.0	44/049	26	0.18	BA	C3	
6	17:34	47 40.48	120 14.43	0.55	2.0	14/014	73	0.24	BC	N3	
6	19:50	47 38.13	119 53.89	0.44	2.2	6/006	119	0.55	DC	N3	
7	6:45	46 11.98	122 11.45	0.04*	2.7	11/012	83	0.14	AA	S4	
8	0:41	45 02.27	122 48.24	4.92	2.0	8/008	266	0.13	CD	O0	
8	3:49	47 40.71	120 07.10	0.49	2.8	26/026	45	0.23	BC	N3	
8	11:07	46 11.91	122 11.03	0.04*	2.6	7/007	149	0.11	AC	S4	
8	18:48	47 04.50	121 34.29	9.14	2.0	20/023	72	0.16	BB	C3	
8	19:35	46 12.32	122 11.46	0.03#	2.1	7/007	138	0.96	DC	S4	
10	4:45	46 11.80	122 10.93	0.02#	2.9	9/009	68	0.35	CA	S4	
10	21:06	46 59.05	121 57.25	17.28	2.4	51/052	33	0.15	BA	C3	
12	2:41	46 11.94	122 11.48	0.51	2.7	9/009	130	0.17	BB	S4	
12	16:09	48 52.31	123 26.29	36.89	2.0	18/020	194	0.41	CD	P3	
14	18:17	46 12.30	122 11.34	0.02#	2.3	11/011	95	0.40	CB	S4	
16	1:56	46 11.98	122 11.15	0.03#	2.4	11/012	59	0.23	BA	S4	
17	2:54	42 03.21	122 50.01	6.43\$	2.1	14/014	86	0.40	CC	K3	
17	5:51	46 11.91	122 11.49	0.03#	2.7	11/011	83	0.34	CA	S4	
17	19:05	46 29.01	119 21.75	0.31	2.0	12/012	64	0.05	AB	E3	
18	16:35	46 11.72	122 11.67	0.67	2.1	9/009	179	0.09	AC	S4	
19	2:45	46 12.13	122 11.67	0.05*	2.0	9/009	82	0.26	BA	S4	
19	5:36	46 11.85	122 10.45	0.04*	2.0	7/007	78	0.25	BB	S4	
20	19:28	46 11.78	122 11.60	0.03#	2.7	12/012	111	0.29	BB	S4	
24	6:03	46 11.94	122 10.68	0.04*	2.7	8/008	125	0.16	BB	S4	
25	6:31	46 11.54	122 11.65	0.02#	3.3	15/015	58	1.02	DA	S4	
26	14:24	45 00.97	122 33.65	20.04	3.0	61/062	46	0.32	CA	O0	F
28	21:12	46 11.91	122 11.26	0.04*	2.8	10/010	82	0.28	BA	S4	
29	21:06	47 55.55	122 06.88	25.56	2.2	61/063	36	0.46	CA	P3	

May-06											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
1	5:32	46 11.23	122 10.37	0.02*	2.9	13/013	105	0.37	CB	S4	
2	12:08	46 12.00	122 11.54	1.03	2.4	9/009	83	0.06	AA	S4	
5	9:01	46 11.90	122 11.42	0.03#	2.7	12/012	75	0.14	AA	S4	
5	10:06	46 05.22	122 30.93	14.23	2.3	47/048	69	0.17	BA	C3	
8	6:23	46 53.00	121 58.56	7.91	2.0	37/039	48	0.13	AC	C3	
11	0:51	48 33.60	124 15.71	42.90	2.9	29/031	157	0.17	BC	P3	
11	16:24	46 11.62	122 12.33	0.04*	2.1	10/010	127	0.31	CB	S4	
12	13:24	47 31.92	121 42.51	15.97#	2.5	47/050	51	0.32	CA	P3	
16	21:14	46 11.65	122 11.96	0.02*	2.1	11/011	84	0.10	AA	S4	
19	11:17	46 11.84	122 11.92	0.02*	2.7	10/010	110	0.09	AB	S4	
20	15:51	46 11.85	122 11.73	0.02*	2.9	12/012	77	0.31	CA	S4	
21	18:39	46 39.97	121 27.53	5.75	2.9	55/056	66	0.17	BB	C3	
22	6:58	46 12.20	122 12.06	0.05#	2.0	8/008	159	0.44	CC	S4	
24	3:57	47 31.60	121 48.45	13.43	2.2	38/041	47	0.20	BA	P3	
25	3:09	46 11.65	122 12.37	0.05*	2.6	7/007	126	0.32	CB	S4	
25	14:17	46 12.26	122 11.04	0.03*	2.7	13/013	116	0.19	BB	S4	
26	3:48	46 11.77	122 11.32	0.27	2.9	26/026	46	0.17	BA	S4	
26	22:23	46 11.85	122 11.41	0.84*	2.3	10/010	98	0.05	AB	S4	
29	16:08	46 11.77	122 11.67	0.04#	3.1	16/016	80	0.47	CA	S4	
30	16:56	47 02.67	120 37.50	21.15*	2.0	7/007	155	0.24	BC	N3	

Jun-06											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
3	11:30	46 11.97	122 10.12	0.03*	2.7	9/009	75	0.50	DA	S4	
4	23:39	48 00.15	122 24.39	57.11	2.5	35/037	39	0.22	BA	P3	
6	11:23	46 11.96	122 11.30	0.03#	2.2	5/005	155	0.67	DD	S4	
7	11:45	48 31.31	122 04.42	0.03*	2.3	29/031	77	0.23	BC	P3	
7	22:14	46 37.65	120 30.16	0.02*	2.1	22/022	43	0.25	BC	E3	
8	22:51	44 02.54	122 57.16	9.51	2.2	4/004	166	0.15	CD	O0	
9	18:34	44 06.37	123 01.51	0.02*	2.4	8/009	112	0.18	BB	O0	
10	4:04	46 11.54	122 11.30	0.02#	3.2	14/014	47	1.10	DA	S4	
11	2:26	48 13.59	121 40.87	8.65	2.4	25/029	80	0.40	CC	C3	
11	7:35	48 49.73	122 10.23	0.02*	2.0	14/014	106	0.38	CC	P3	
11	22:19	46 12.26	122 10.89	0.03*	2.6	7/007	150	0.09	AC	S4	
14	0:59	46 11.82	122 11.21	0.04*	2.9	11/011	77	0.48	CA	S4	
14	3:04	48 17.34	122 38.21	23.96	2.1	28/033	49	0.23	BA	P3	
15	23:46	46 12.20	122 11.36	0.02*	2.6	7/007	99	0.38	CB	S4	
17	8:30	46 11.98	122 11.41	0.03*	2.4	9/010	73	0.43	CA	S4	
17	22:39	46 12.81	122 11.86	1.73	2.4	7/007	154	0.13	AC	S4	
18	3:02	47 26.56	122 53.07	26.69	2.8	79/080	55	0.38	CA	P3	
18	18:47	46 12.39	122 11.10	0.02*	2.9	10/010	152	0.40	CC	S4	
19	9:26	46 12.10	122 11.46	0.62	3.2	16/016	58	0.10	AA	S4	
20	4:15	46 13.85	122 12.25	0.04#	2.3	8/008	281	0.64	DD	S4	
20	15:46	48 50.05	122 06.17	15.61#	2.2	12/014	106	0.32	CB	P3	
21	13:45	46 12.23	122 10.18	0.04*	2.8	10/010	93	0.66	DB	S4	
22	3:05	46 11.88	122 11.13	0.04#	2.4	7/007	91	0.35	CB	S4	

Jun-06											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
23	3:26	46 11.91	122 11.47	0.04#	2.5	16/016	75	0.18	BA	S4	
23	12:06	46 11.22	122 11.53	0.03#	2.9	15/015	89	0.75	DA	S4	
24	12:36	46 11.68	122 11.32	0.04*	2.5	7/007	102	0.23	BB	S4	
25	3:57	46 11.81	122 11.39	0.05*	2.4	9/009	99	0.38	CB	S4	
25	21:45	48 12.20	122 59.89	22.00	2.0	17/019	62	0.16	BA	P3	
25	23:58	46 11.88	122 10.89	0.03*	2.9	11/011	59	0.22	BA	S4	
26	22:57	46 12.06	122 11.49	0.04*	3.0	13/013	71	0.20	BA	S4	
28	3:12	46 11.29	122 10.95	0.02*	2.4	9/010	90	0.59	DA	S4	
29	17:31	47 54.23	124 04.27	28.58	2.1	22/024	72	0.28	BA	P3	
29	17:48	46 12.00	122 11.45	0.04*	2.4	11/012	93	0.10	AB	S4	
29	20:47	46 11.62	122 11.72	0.03#	2.1	8/008	142	0.43	CC	S4	
30	7:27	48 36.29	122 18.30	7.45\$	2.3	25/026	84	0.24	BC	P3	

OUTREACH ACTIVITIES

PNSN staff and faculty participate in an educational outreach program designed to better inform the public, educators, businesses, policy makers, government agencies, engineers, and the emergency management community about earthquake, volcano and related hazards. Our program offers lectures, classes, lab tours, workshops, consultations, and electronic and printed information products. Special attention is paid to the information needs of the media. We provide information directly to the public through information sheets, an audio library, email, and via the Internet at <http://www.pnsn.org>. The following is a partial list of activities this quarter.

Audio Library, Phone

The Seismology Lab responded to ~100 calls from the general public, Emergency Managers and government agencies, and another 25 calls from the media. In addition, the PNSN audio library system received 150 calls this quarter. The audio library offers recordings describing seismic hazards in Washington and Oregon and earthquake prediction. Callers to the audio library have the option of being transferred to the Seismology Lab for additional information.

Internet outreach

PNSN staff replied to ~200 e-mail messages from the public seeking information on a variety of topics via the seis_info@ess.washington.edu email address. Ruth Ludwin managed this service this quarter, typically responding to routine questions within a day. Complex or sensitive questions are routed to the appropriate staff person for a more in-depth response. Requests may include complex scientific inquiries, assistance with hazard assessments and legal issues, consultations with government agencies, and support for engineering issues related to strong motion data. Bill Steele and other staff members also respond to numerous requests for information via their own email accounts.

Information Products

CISN display servers are receiving and displaying PNSN recent earthquake data and now provide links to the PNSN ShakeMaps, which are automatically generated following significant earthquakes. The CISN display version 1 was released in December 2004 and distributed to 35 select users including lifeline operators, emergency managers, and large businesses. This product has replaced the CUBE based RACE (Rapid Alert for Cascadia Earthquakes) systems which have largely been removed. After initial registration and configuration, the administrative duties for maintaining these accounts have been light.

One CIIM map was generated for a felt event this quarter. A 3.0 event near Woodburn Oregon on 04/26/06 generated 65 felt reports. No ShakeMaps were created this quarter.

Emergency Management

Bill Steele assisted in the development of the third "Blue Cascades" exercise, which was held in March, 2006. The Blue

Cascades exercises are infrastructure-interdependencies tabletop exercises to prepare emergency managers for the impacts of a Cascadia mega thrust earthquake. Each year has focused on a distinct aspect, and this year's theme was economic impacts to the urban corridor. Bill opened the two-day exercise with an overview of effects expected from a M 9 Cascadia event and served as a science advisor for the duration of the conference. The Blue Cascades exercises have been developed and conducted by regional public and private sector organizations, and over 350 managers participated this year. This quarter, Bill Steele attended a Blue Cascades "After Action" meeting.

Bill Steele represented the PNSN at the "Crisis Communications" and "Partners in Preparedness" conferences, hosted a CPARM (Contingency Planners and Recovery Managers) meeting, and hosted or chaired two meetings of the National Volcano Early Warning System (NVEWS) sub-committee. Steve Malone represented the PNSN at a meeting of the Consortium of U.S. Volcano Observatories (CUSVO) in Menlo Park in which progress on the National Volcano Early Warning System (NVEWS) was a prime topic.

K-20 Education Outreach

PNSN staff gave 8 Seismology Lab tours and presentations for K-12 students and teachers, serving about 160 students this quarter. PNSN faculty and staff provided tours and lectures for several University of Washington functions, including "Washington Day" and the reopening of the newly remodeled Johnson Hall (home of the Dept. of Earth and Space Sciences). Steve Malone created an animated presentation for the Lobby big screen display.

Steve Malone lectured at Stanford University on the current eruption of Mount St. Helens. Ruth Ludwin provided lectures for graduate and undergraduate students in the UW Institute for Hazards Mitigation Planning & Research and the Dept. of Earth and Space Sciences "Rocks and Stars" course, and led a field trip to core for tsunami deposits with students from the Northwest Indian College

Science Meetings

PNSN faculty, staff, and UW Seismology students made presentations at the 2006 Meeting of the Seismological Society of America in San Francisco including:

- BARBEROPOULOU, A., T. PRATT, and V. TITOV, **Investigating the damage potential of seismic seiches in the Puget Lowland;**
- LUDWIN, R., and A. COLORADO, **Tsunami Whirlpools - observed in 2004 and remembered in First Nations art and myth**
- SMITS, G. and R. LUDWIN, **Evolution of the Catfish (namazu) as an earthquake symbol in Japan;**
- THELEN, W., S. MALONE, A. QAMAR, and S. PULLAMMANAPPALLIL, **Improvements to Absolute Locations from an Updated Velocity Model at Mount St. Helens, Washington;**

Media Relations

The PNSN staff frequently provide interviews, research support, and referrals to radio, television, film, and print media. The PNSN organizes press conferences, contributes to TV and radio news programs and talk shows, and provides field opportunities linking reporters with working scientists. Staff members also assist news organizations, authors, television producers, and independent documentary makers to design accurate and informative stories and programs related to earthquake and volcano hazards. PNSN staff work to link reporters and producers developing stories with the appropriate research institutions, agencies, and scientists working in the areas to be covered by the piece. The PNSN coordinates the release of information and media relations with the USGS Western Region, the Cascades Volcano Observatory, and the Oregon Department of Geology and Mineral Industries (DOGAMI)

The ongoing eruption of Mount St. Helens (MSH) continued to stimulate occasional media inquiries. Throughout the quarter, PNSN scientists participated in morning science conferences with CVO once a week to share data and interpretations, plan field activities and develop "talking points" for use in interviews when needed.

Other Meetings, Presentations and Visitors

- Ruth Ludwin traveled to Portland to address the Oregon Continuity Planners Association.
- Ruth Ludwin and Agelikki Barberopoulous attended a USGS Tsunami Sources Workshop in Menlo Park, CA
- Bill Steele gave talks on regional earthquake hazards to the Washington state Geographic Information Council (via Teleconference), the Puget Sound Energy Management Forum; the King County Emergency Management ECC Support Team, and the Rainer Yacht Club. Bill also provided two workshops for managers of PEMCO Insurance Company.
- Shaun Williams, Scientific Officer, and Section Head, Geophysics and Meteorology Division Ministry of Agriculture in Samoa, visited the PNSN to discuss of tsunami, earthquake and volcanic hazard education, mitigation, and warning;
- Steve Malone and Bill Steele attended a Mt Rainer Park Service permitting meeting with Parks Service and CVO representatives.
- Bill Steele filmed a public service announcement sponsored by King County Emergency Management and was the guest of a half hour Trinity Broadcasting (TV) Public Affairs Program.