PACIFIC NORTHWEST SEISMIC NETWORK OPERATIONS

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URL: **http://www.pnsn.org**
Key words: Seismology, Education-lay, Real-time earthquake information

Reporting Period: Oct. 1, 2005 - Sept. 30, 2006

Non-technical Summary

The Pacific Northwest Seismic Network (**PNSN**) operates seismograph stations in Washington and Oregon, and collects, analyzes, and distributes earthquake data and information. Between Oct. 1, 2005 and Sept. 30, 2006 the PNSN analyzed 4,494 events. Of these, 3,613 were earthquakes or blasts within the network (410 of which were too small to locate). Within the network area, 3,194 earthquakes were located west of 120.5 degrees west longitude (including 1,369 at Mount St. Helens, which began a magmatic eruption earthquake sequence on Sept. 23, 2004, and 295 east of 120.5 degrees west longitude. The remaining events were blasts within the network (387), regional earthquakes (267), teleseisms (614), low-frequency events (234 events, 11 locatable, including ice-quakes near the summit of Mt. Rainier, and a few events associated with the eruption of Mount St. Helens), and surficial events (8 events, 1 locatable, mostly rockfalls near the summits of Mt. St. Helens and Mt. Rainier).

West of the Cascades, 16 earthquakes were reported felt in Washington or Oregon, ranging in magnitude from 1.7 to 4.0. The largest event, magnitude 4.0, was located about 7 km east-northeast of Deming on November 23, 2005 (UTC), with depth of less than 1 km.

East of the Cascades, two earthquakes (magnitudes 2.4 and 3.1) were reported felt. The smaller one was at a very shallow depth (less than 1 km) about 27 km west-northwest of Spokane on December 15, 2005 The other event was about 3 km south-southeast of Entiat at approximately 7 km depth, and occurred on July 25, 2006.

No “Episodic Tremor and Slip” (ETS) was observed during this reporting period

Network Operations

The Pacific Northwest Seismic Network (**PNSN**) operates 185 short-period, broad-band, or strong-motion seismic stations west of 120 degrees west longitude under this agreement, and 16 additional stations in western Washington/Oregon under other support. . Some stations include up to 7 components. PNSN stations operated under this agreement include 53 ANSS strong-motion instruments and 15 CREST (Consolidated Reporting of EarthquakeS and Tsunamis) stations. Continuous data from ANSS and CREST stations are sent to the PNSN via Internet or lease-line modem, but the instruments can also trigger to record stronger events on-site. If continuous data transmission fails, data will still be available via dial-up retrieval or site

visit. PNSN stations in southern and central Oregon are maintained by the University of Oregon under Cooperative Agreement 04HQAG006. The PNSN exchanges real-time data with adjacent networks to improve our ability to locate earthquakes on the edge of our network. The PNSN exchanges real-time data with neighboring networks, records and assists with the maintenance of several short-period stations operated by the USGS, and receives real-time data from seven US National Network (USNSN) and seventy EarthScope (USArray or PBO) stations located in Washington and Oregon. All recorded stations are used in event location and analysis.

A PNSN seismologist is always available on-call, and our standard procedure is to respond to pager messages from our automatic earthquake detection process (initiated for any earthquake within our network of magnitude 2.9 or larger), or calls from Washington or Oregon emergency management agencies or the UW police. Information for well-located earthquakes is sent out automatically by the event detection process to select recipients including the national ANSS catalog. Emergency managers and other high-priority information users receive very rapid notification thorough the national QDDS and CISN systems, or through faxes, pages or e-mail. Simultaneously, an automatic Web-site is created for the event (see **http://www.pnsn.org/SEIS/EQ_Special/lasteq.html**). ShakeMaps are generated automatically for events of magnitude 3.0 or greater in the greater Puget Sound and Portland areas and magnitude 4.0 or greater elsewhere in the region.

Final details are provided as soon as the duty seismologist analyzes the earthquake information. Final locations and magnitudes for earthquakes of M>=2.9 are also disseminated through the NOAA emergency weather notification system.

For all earthquakes, updates of information are posted to Web-pages each time the analyst finalizes a group of locations and magnitudes. In addition to ordinary phone lines, the PNSN has access to a University of Washington emergency communications system that bypasses the regular phone provider, a radio link to the King County and City of Seattle Emergency Operations Centers, and an independent direct phone link to the Washington State Dept. of Emergency Services.

The PNSN provides "Recent Earthquakes" web pages using the national "Quake Data Delivery System", "ShakeMap" pages (showing instrumental intensity, PGA, and PGV), and links to the USGS CIIM (Community Internet Intensity Maps) site, which collects, compiles, and interprets web-based felt reports from the public.

- ***Data Availability*:** Continuous telemetry data streams from all PNSN broadband stations and the higher-quality short-period stations are recorded at the UW, and all broad-band and short-period data are provided to IRIS in near real-time via the IRIS BUD system. Complete unedited trace-data for all network triggers are saved on DVD. Edited, quality-controlled event trace-data are archived at the UW on hard disk and DVD. Edited event trace-data are also archived at the IRIS Data Management Center (DMC) in SEED format, where they can be retrieved by any investigator via the standard IRIS data request mechanisms.

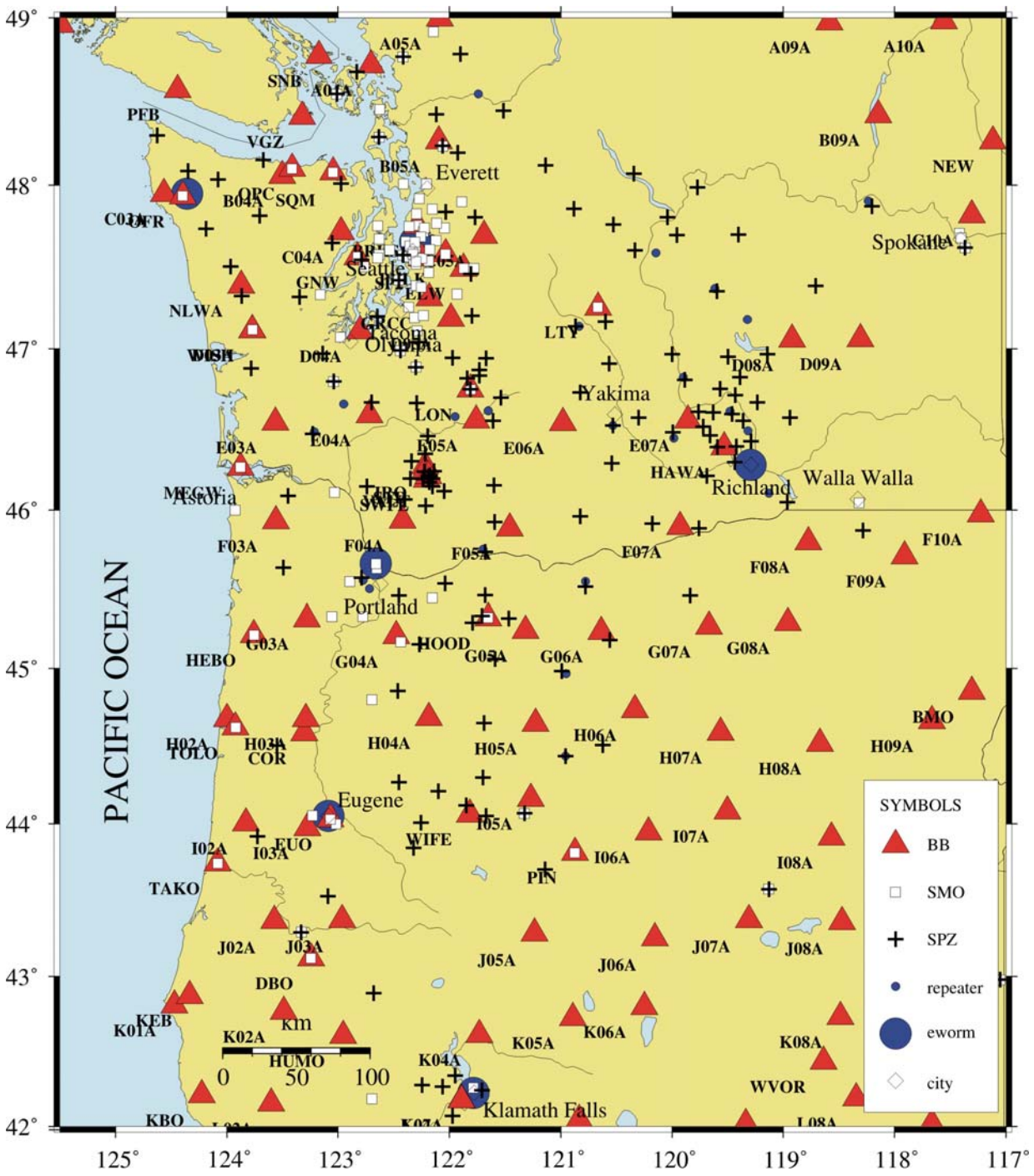

Figure 1a. Seismograph stations operated by, or recorded at, the PNSN at the end of September 2006. Black crosses indicate the locations of short-period seismometers, Red triangles represent the locations of three-component broad-band seismometer installations, and white squares show the locations of strong-motion stations.

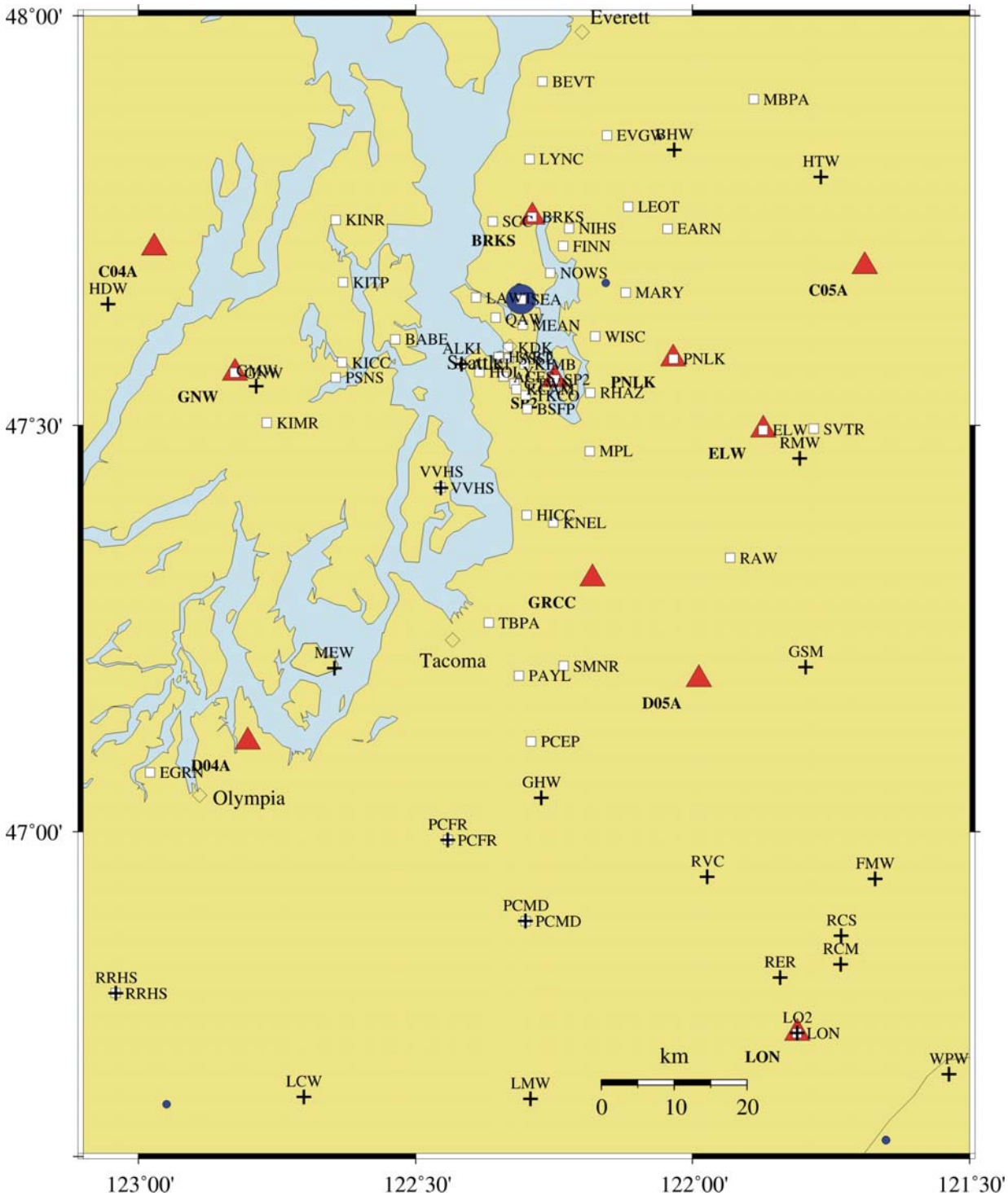

Figure 1b. Detail of Fig. 1a. Puget Sound Seismograph stations operated by or recorded at the PNSN at the end of September 2006. Symbols as in Fig. 1a.

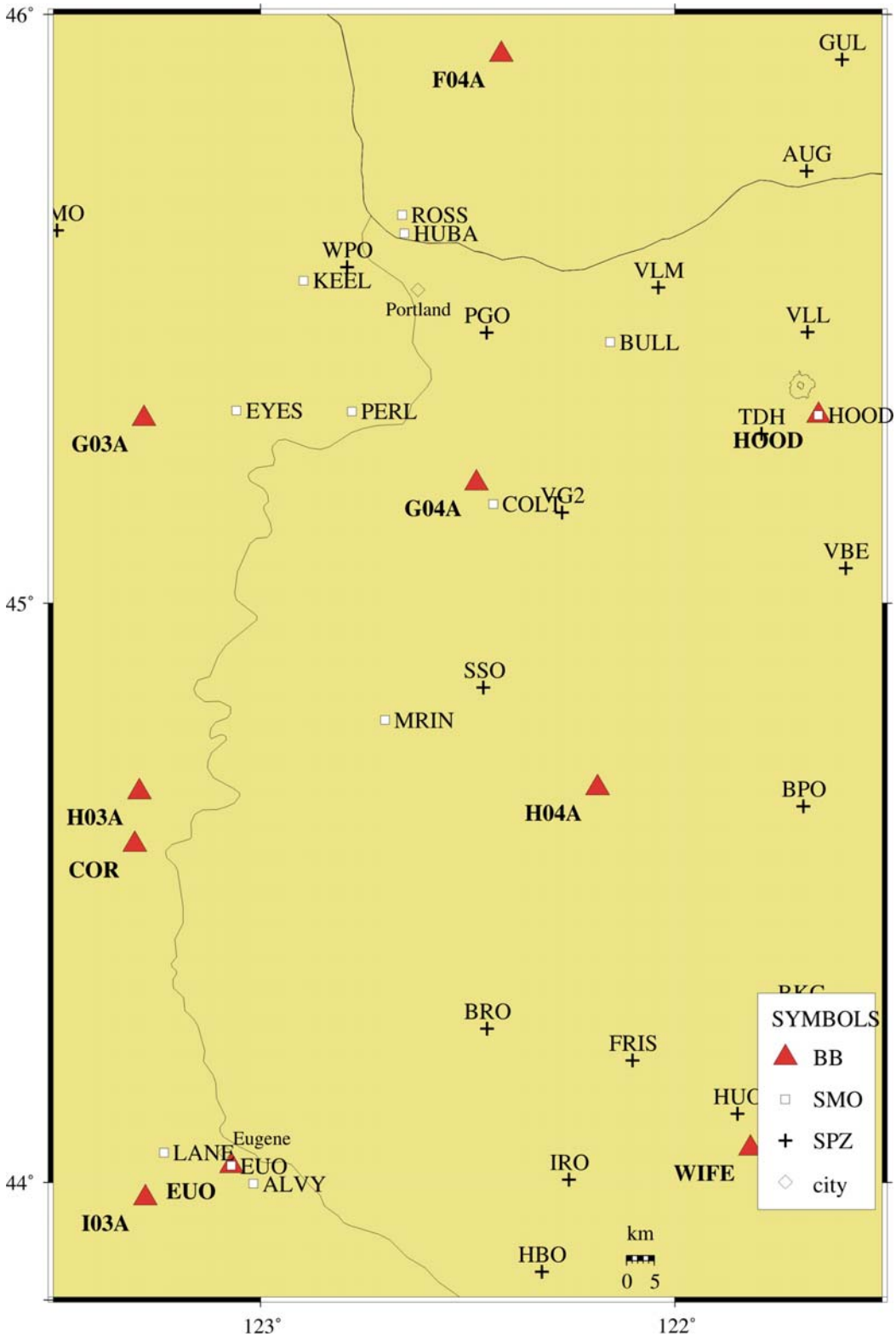

Figure 1c. Detail of Fig. 1a. Willamette Valley Seismograph stations operated by or recorded at the PNSN at the end of September 2006. Symbols as in Fig. 1a.

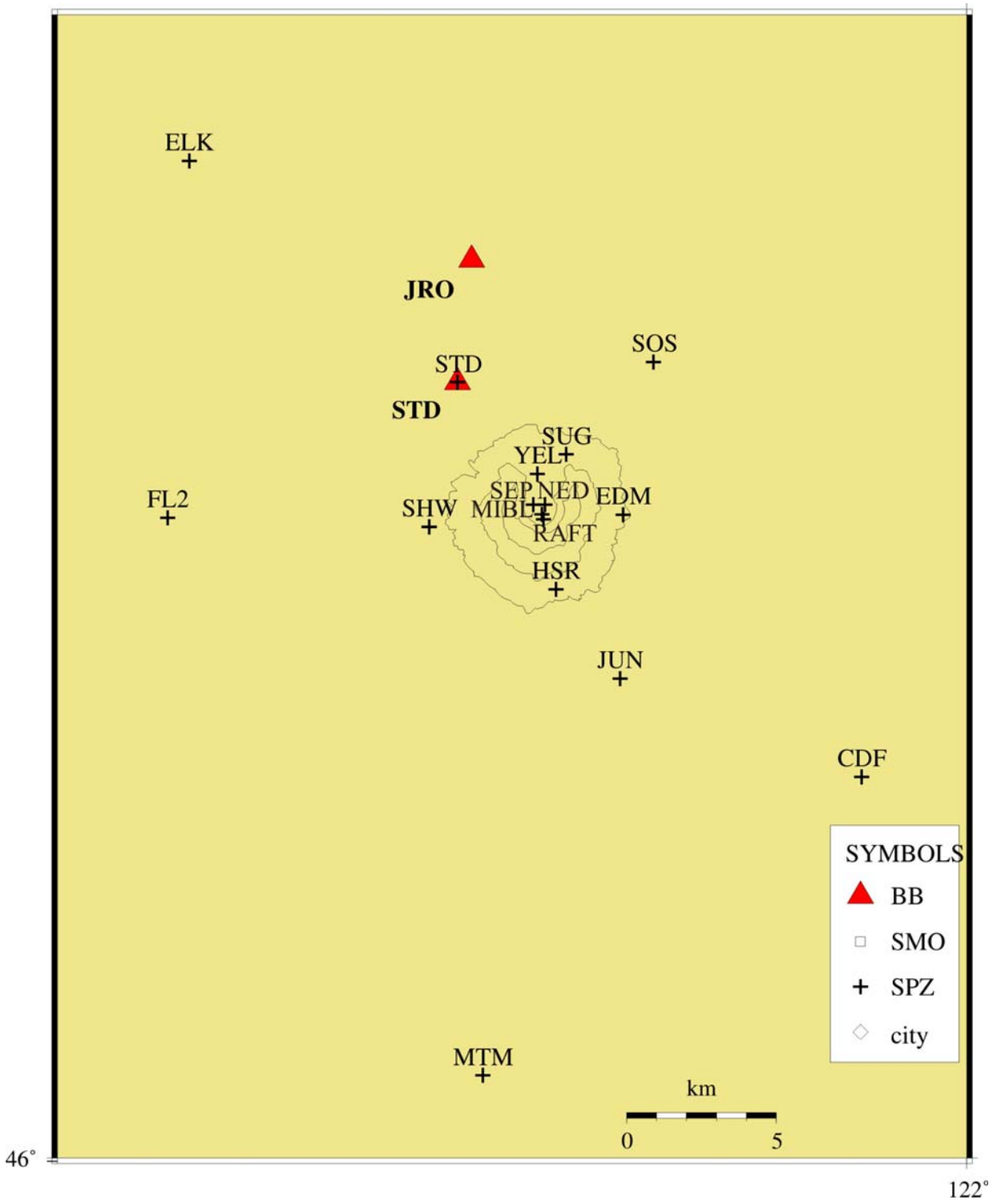

Figure 1d. Detail of Fig. 1a. Mount St. Helens Seismograph stations operated by or recorded at the PNSN at the end of September 2006. Symbols as in Fig. 1a. Contours shown are at 5,000, 6,400, and 7,500 feet.

- ***Education and Outreach:*** Staff from the PNSN provide an educational outreach program to better inform the public, policy makers, and emergency managers about seismicity and natural hazards. Most of the PNSN strong-motion instruments are located at public schools. We provide information sheets, lab tours, workshops, and media interviews, and have an audio library with several recorded messages. Current seismic activity and other information are available via Internet on the World-Wide-Web (WWW): **http://www.pnsn.org**

- ***Special Events:*** PNSN staff participated in meetings with numerous groups, including hosting meetings of the **ANSS PNW Region Advisory Committee** (see **www.pnsn.org/SEIS/ANSS/welcome.html**), Cascadia Regional Earthquake Workgroup (CREW), and Contingency Planners and Recovery Manager (CPARM). and making presentations in other meetings, such as **ANSS, IRIS and Earthscope committees**, as well as numerous presentations for the general public. PNSN faculty, staff, and students authored s number of abstracts and articles.

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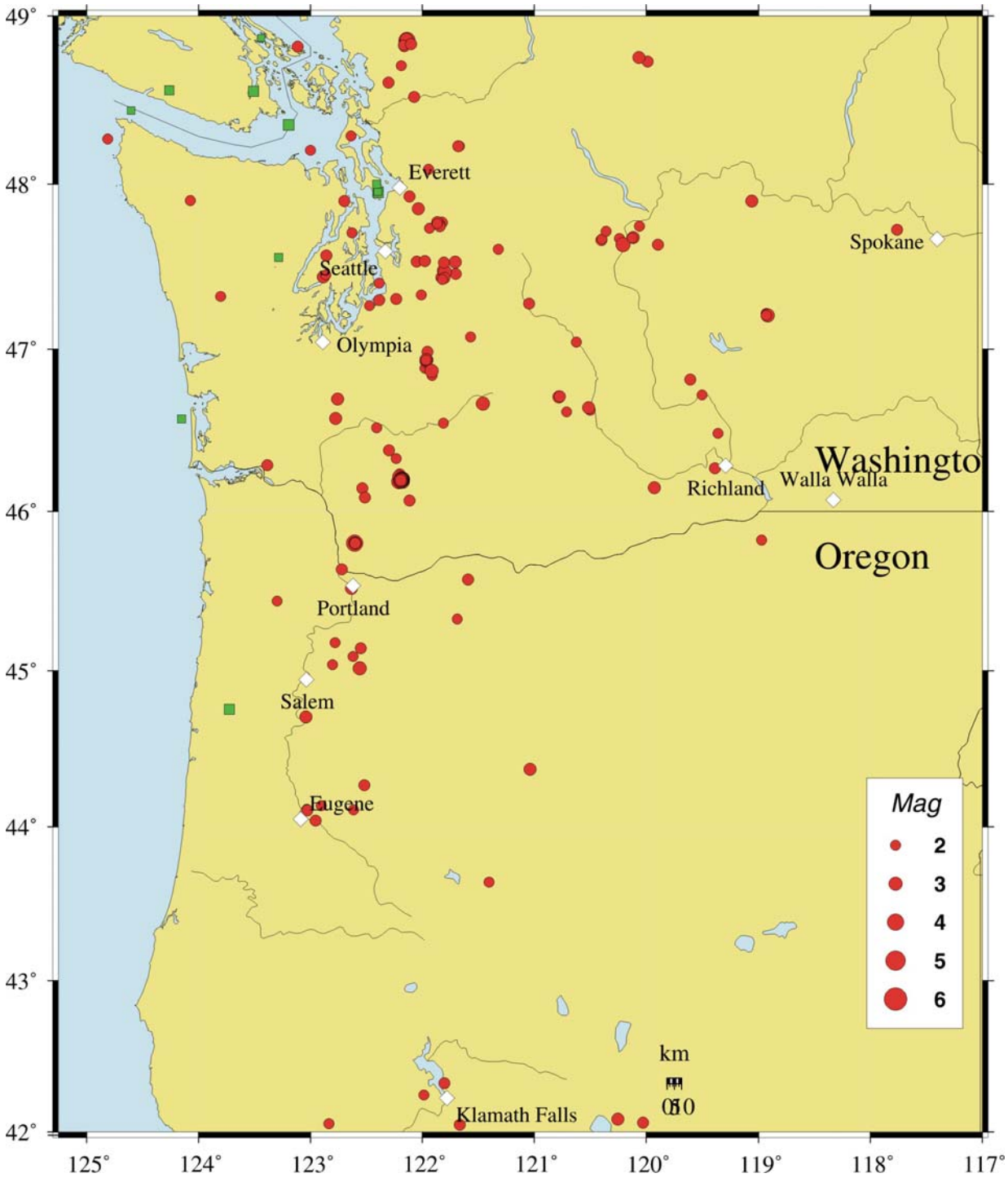
TABLE 1-- FELT EARTHQUAKES Oct. 1, 2005 - Sept. 30, 2006

DATE-TIME is in Universal Time (UTC) which is PST + 8 hours.
Magnitudes are reported as local magnitude (Ml).

TABLE 1 - Felt Earthquakes Oct. 1, 2005 - Sept. 30, 2006

DATE-(UTC)-TIME yy/mm/dd hh:mm:ss	LAT(N) deg.	LON(W) deg.	DEP km	MAG Ml	COMMENTS	CIIM	CIIM - # of felt reports	Shake Map
05/11/23 20:53:15	48.85	122.13	0.0	4.0	6.6 km ENE of Deming, WA	✔	112	✔
05/12/15 10:26:02	47.72	117.76	0.1	2.4	27.0 km WNW of Spokane, WA (Mission & N Division)			
05/12/27 05:46:07	47.76	121.82	12.4	2.3	12.4 km ENE of Duvall, WA	✔	26	
06/01/12 18:15:58	46.57	124.14	36.5	2.4	49.4 km NNW of Astoria, OR	✔	40	
06/01/15 12:29:46	48.55	123.50	40.8	3.3	18.8 km NW of Victoria, BC	✔	31	✔
06/01/26 03:53:18	48.82	122.16	0.4	2.4	4.0 km E of Deming, WA	✔	42	
06/01/26 21:43:31	48.83	122.15	1.9	1.8	4.7 km ENE of Deming, WA			
06/01/26 21:54:57	48.80	122.21	19.6	1.7	2.5 km S of Deming, WA			
06/01/29 02:00:53	45.51	122.63	15.4	2.8	2.1 km SSW of Portland, OR	✔	2261	✔
06/02/03 01:47:46	47.95	122.39	33	3.3	14.9 km WSW of Everett, WA	✔	900	✔
06/02/09 19:26:26	47.47	121.80	8.4	2.9	2.6 km SW of North Bend, WA	✔	105	✔
06/02/11 11:47:56	47.47	121.79	7.6	2.9	2.8 km SSW of North Bend, WA			
06/03/04 17:38:47	44.75	123.72	43.5	3.3	29.0 km ENE of Newport, OR	✔	141	
06/04/26 14:24:06	45.01	122.56	20.0	3.0	27.1 km ESE of Woodburn, OR	✔	65	
06/07/04 20:37:02	48.35	123.19	45.7	3.6	13.7 km SE of Victoria, BC	✔	260	✔
06/07/25 06:13:37	47.63	120.20	6.7	3.1	3.0 km SSE of Entiat, WA	✔	18	
06/08/03 08:39:18	45.80	122.60	14.6	3.8	29.7 km N of Portland, OR	✔	3748	✔
06/08/09 14:32:16	45.80	122.60	12.7	2.3	29.7 km N of Portland, OR	✔	13	
06/09/13 17:56:07	46.19	122.19	0	3.2	0.4 km SSW of Mt St Helens, WA	✔	11	



- **Figure 2.** Earthquakes magnitude 2.0 or larger between Oct. 1, 2005 and Sept. 30, 2006. Locations of a few cities are shown as white-filled diamonds. Earthquakes are indicated by red circles or green squares; red circles represent earthquakes at depths shallower than 30 km, and green squares represent earthquakes at 30 km or deeper.

Publications

Quarterly bulletins from the PNSN (**http://www.pnsn.org/REPTS/quarterly.html**) provide operational details and descriptions of seismic activity in Washington and Oregon. These are available from 1984 through the third quarter of 2004. Final published catalogs are available from 1970, when the network began operation, though 1989.

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