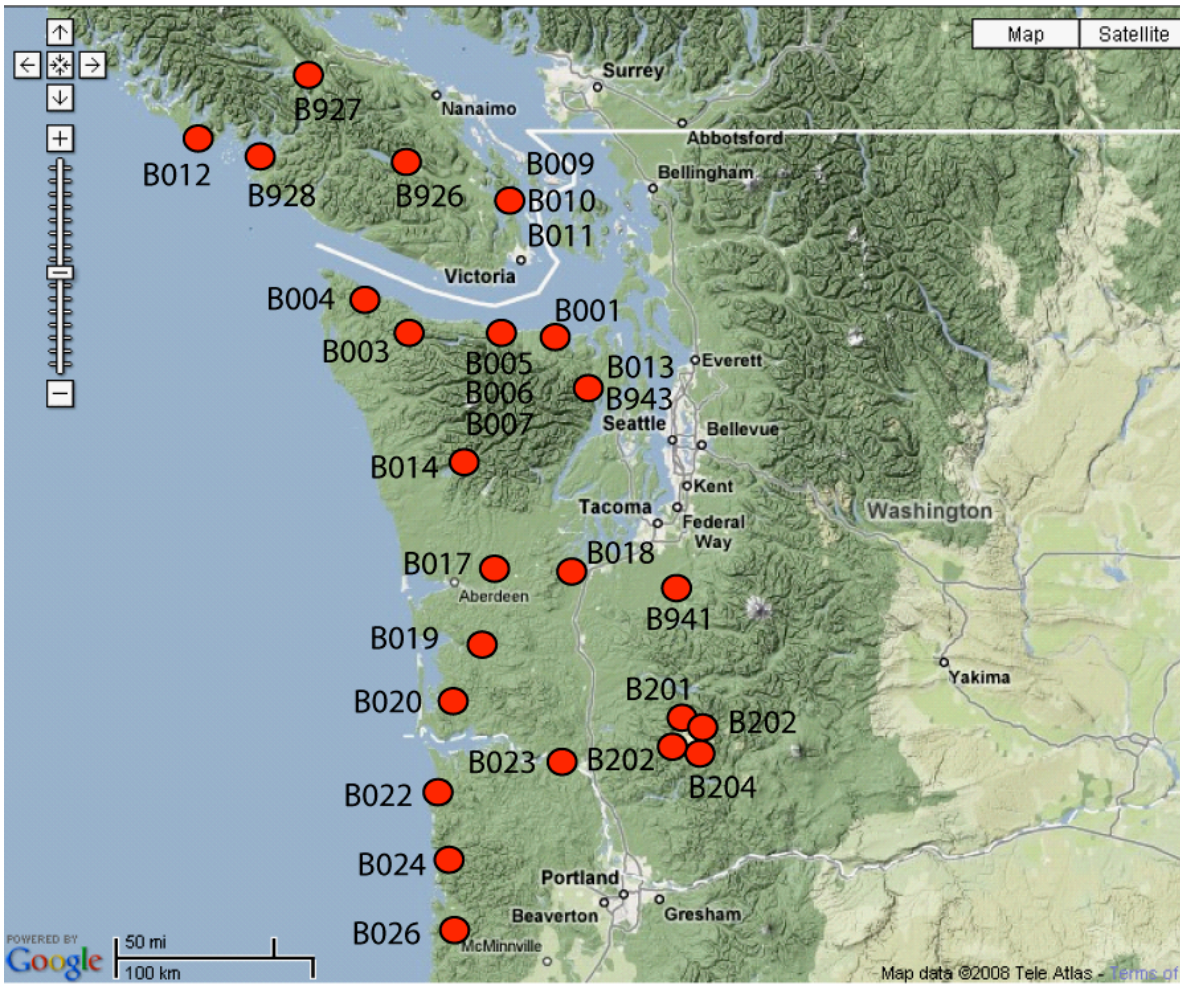
Station Notes for B005 shoresnw1bwa2005

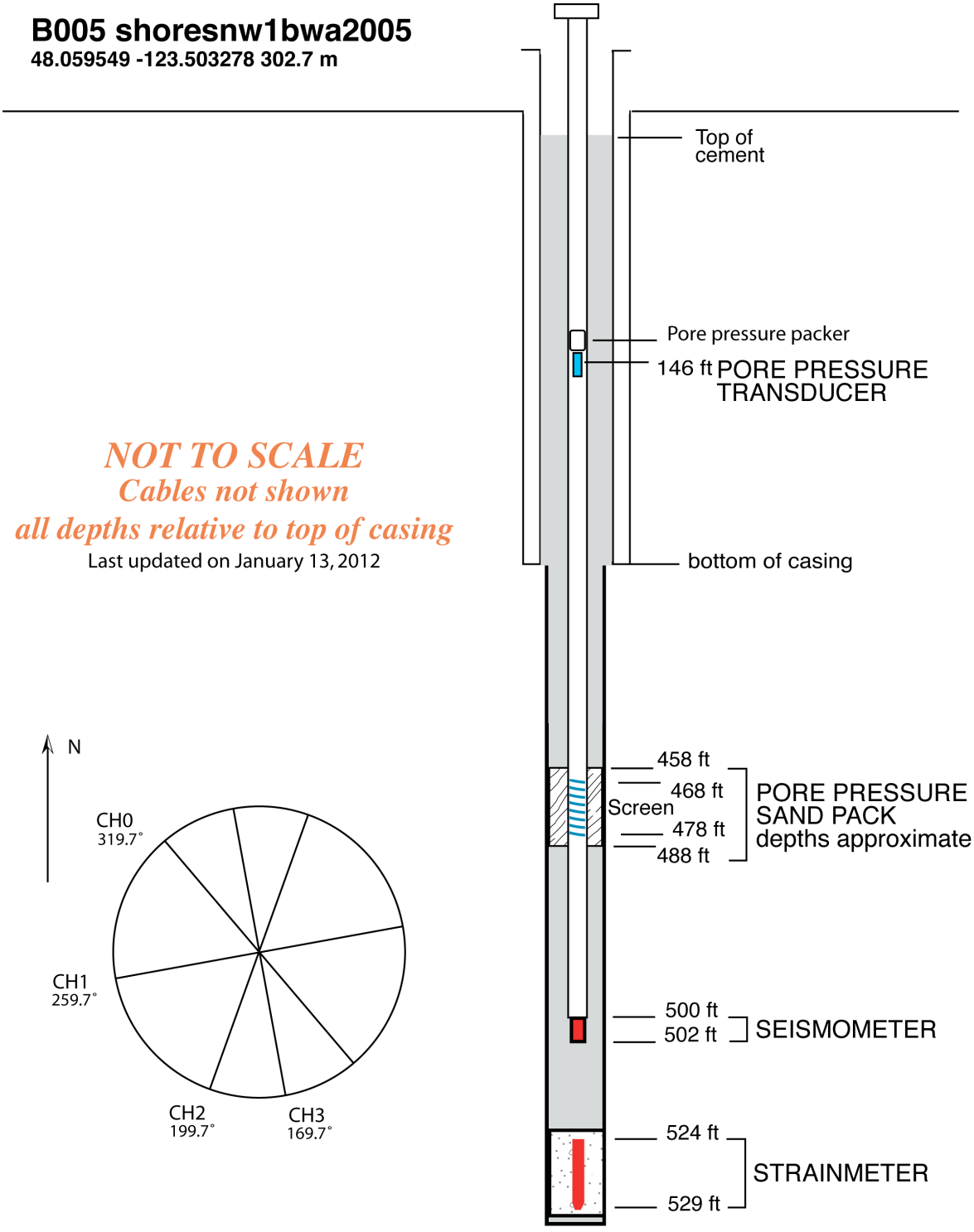
Latitude:	48.059549 (WGS 84)
Longitude:	-123.503278 (WGS 84)
Elevation:	302.7 m / 993 ft
Install Depth:[1]	161.2 m / 529 ft
Orientations:[2]	CH0= 319.7, CH1= 259.7, CH2= 199.7, CH3= 169.7
Install Date:	2005-07-19
GTSM Technologies #:	US01
Executive Process Software:	Version 1.14
Logger Software:	Version 2.02.2
Home Page:	www.unavco.org/instrumentation/networks/status/pbo/overview/B005
Notes Last Updated:	October 17, 2018

[1]Install depth is from the top of the casing to the bottom of the strainmeter.
[2]Orientations are in degrees East of North.



Pacific Northwest PBO strainmeter network, April, 2008

B005 shoresnw1bwa2005
48.059549 -123.503278 302.7 m



NOT TO SCALE
Cables not shown
all depths relative to top of casing
Last updated on January 13, 2012

Instrumentation at Strainmeter

Instrument	Units	Bottle/ASCII Scale Factor	SEED Scale Factor
Pore Pressure	Hecto Pascals	1.0	N/A
GTSM Barometer	Kilopascals	1.0	0.0001
Rain Gauge	Millimeters/hour	1.0	0.252
Down hole Temperature Sensor	Degrees Celsius	1.0	0.0001
Logger Temperature Sensor	Degrees Celsius	1.0	0.0001
Setra Barometer	Hecto Pascals	1.0	1.42908E-4

1. General Information

- B005 is part of the Shores cluster of strainmeters. Strainmeters B006 and B007 are within a few 100 meters of B005.
- CH3 malfunctioned from time of installment to September 12, 2005. All data from CH3 are flagged as bad quality in the XML files until 14 September 2005.
- Record amounts of rain fell on the Olympic Peninsula between the 1st and 9th November 2006.
- Quarry blast on September 5, 2007 at 18:43 UTC. The blast caused offsets on all channels of B005, B006 and B007.
- Quarry blast on July 16, 2008. The blast caused offsets on all channels of B005, B006 and B007.
- Sensitivities of all EH channels were corrected in the dataless on March 4, 2010. The blast caused offsets on all channels of B005, B006 and B007.
- Quarry blast on May 24, 2012 at 22:44 UTC. The blast caused offsets on all channels of B005, B006 and B007.
- Quarry blast on May 7, 2013 at 21:07:03 UTC (confirmed by the USGS http://earthquake.usgs.gov/earthquakes/eventpage/uw60526356#summary). The blast caused offsets on all channels of B005, B006 and B007.
- The pore pressure sensor is installed at 146 feet with the packer inflated directly above the sensor.

2. Strainmeter Maintenance

- July 26, 2005
  Tue Jul 26 15:36:03 -15:36:08 2005. Environmental door opened.

- July 28, 2005
  Thu Jul 28 15:04:22 - 15:04:31 2005. Environmental door opened.

- August 17, 2005
  Mike Hasting and his team installed a Netrs. Tested pore pressure monitor, installed rain gauge.

- August 31, 2005
  Wed Aug 31 01:03:53 2005 Logger restarted, no one at site.

- September 12-13, 2005
  Mike Hasting worked on the GPS timing and the problem on CH3. An uphole problem with CH3 caused it to record in the G1 mode. After moving a few of the boards around it wnet

back to reading G3, normal mode. The GPS timing chip in the power box was swapped and the strainmeter data cable was moved around to relieve some of the stress on the cable connectors. It was noticed that the power supply for the seismic and communications had failed. A new power supply was installed. A GPS monument as attached to the top of the well head.

- October 12, 2005
  Wed Oct 12 08:01:30 - 08:03:24 2005. Logger restarted twice, no one at site.

- October 27, 2005
  Thu Oct 27 02:33:44 - 02:36:14 2005. Logger restarted, no one at site.

- December 12, 2005
  Mick Gladwin visited the strainmeter. The RT firmware was upgraded to version 1.16 and lightning protection diodes were added.

- December 16, 2005
  Fri Dec 16 22:17:43 - 22:35:35 2005. Environmental door opened, logger shut down.

- December 18-19 2005
  Sun Dec 18 23:54:00 - Mon Dec 19 21:52:16 2005. Logger restarted several times by engineers at the site.

- January 5 – 6 , 2006
  Thu Jan 5 21:29:15 - Fri Jan 6 18:16:56 2006. Logger restarted several times. No one was at the site.

- February 7, 2006
  Tue Feb 7 23:39:38 2006. Logger restarted, no one at site.

- February 9-10, 2006
  Thu Feb 9 01:58:19 - Fri Feb 10 19:34:28 2006. Logger restarted several times. No one was at the site.

- February 13-14, 2006
  Mon Feb 13 20:00:29 - Tue Feb 14 06:10:17 2006. Logger restarted several times. No one was at the site.

- February 24-25, 2006
  Fri Feb 24 20:22:29 - Sat Feb 25 11:57:16 2006. Logger restarted several times. No one was at the site.

- March 14-22, 2006
  Tue Mar 14 19:00:10 - Wed Mar 22 03:46:52 2006. Logger restarted several times. No one was at the site.

- April 11, 2006
  Tue Apr 11 21:35:04 - 21:49:45 2006. Environmental door opened, logger restarted.
  B005 is put on VSAT system. Wade Johnson at site.

- April 26, 2005
  Wed Apr 26 13:10:04 - 14:01:07 2006. Logger restarted several times, no one at site.

- May 25, 2006
  Thu May 25 05:16:09 - 05:22:56 2006. Logger restarted, no one at site.

- August 9, 2006
  Wed Aug 9 22:54:28 - 23:21:20 2006. Mike Hasting upgraded the RT firmware, logger restarted.

- August 15, 2006
  Tue Aug 15 05:16:12 - 05:19:17 2006. Logger restarted, no one at site.

- November 28, 2006
  Mike Hasting visited the site to work on B005. He found that there was 2 feet of snow at the site and the VSAT was covered in snow. The fiber optic modem cable, which had failed and caused the devices on the switch to be out of contact, was fixed.

- November 1, 2007 UTC
  This station went down weeks ago, and we had just lost B006 on 10/30, so Steve decided to have a peek. It ended up being two more capacitors dying on the F/O switches on the GTSM side. He also did the normal maintenance type things.
  17:06 - Onsite.
  18:19 - Had two spare caps, and installed those in the least ugly F/O switches.
  Replaced F/O switch in B005, unit is back online.
  18:45 - Off-site.

- December 19, 2007 UTC – Wade Johnson and Liz Von Boskirk.visited the site to get it back online.
  16:45 - Onsite. There was no power. The interior of the site was wet, and there was concern over equipment shorting out. They replaced the Cisco, and the power supply was so wet it was tripping the GFI. Two new batteries were used to replace three enclosure batteries that registered as having 3 volts.
  17:30 - Offsite.
  17:35 - Return and replace the modem. The new one they had just put in the enclosure was bad.
  17:45- Offsite.

- February 27, 2008 UTC – Sarah Venator visited the site.
  16:55 - Check rain gage- pour water in, and it tips normally
  17:00 - Open enclosure doors. Unplug old marmot and plug in new marmot. Look at GPS NetRS for PNW office, no satellite communications. Reboot GPS NetRS, but it still doesn't work.
  17:45 - Try again to test rain gage, but the water added doesn't register on the computer. The site will need a new rain gage.
  17:52 - Close enclosure doors.

- March 7, 2008 UTC – Wade Johnson and crew visited the site.
  17:00 - On site.

17:30 - Shut down main power and replace power system with a standard back panel.
Ken A and Sarah D find a bad GPS antenna and a NetRS with substandard flash memory, replace both. Upgrade GPS cabling.
19:00 - Replace Rain gauge. No resister in rain gauge wiring which explains why it doesn't work. New rain gauge has longer wire so is better for the distance of pull. Wade did not have a resister with him (only needed for early strainmeter sites). Left wiring in a state that should make it really easy to hook rain gauge up.
20:00 - Leave site.

- July 8, 2008 – Mike Gottlieb visited the site to take inventory. The site needs 5 more batteries, new style enclosure, electronics rack, new fiber optic modems, and trip-lite.

- 28 July 2008 PST
  16:00 - On site, enclosure open.
  16:20 - Power down site except for GTSM.
  16:45 - Add Tripp-Lite and change out fiber optic modem.
  17:30 - Install a total of 4 batteries; 2 to strainmeter bank, 2 to battery bank.
  17:40 - Cycle power to Marmot..
  17:45 - Enclosure closed, off site.

- 29 July 2008 PST
  13:20 - Return to site to cycle power on Marmot at the request of C. Kurnik. The day before it was possible to ping the Marmot, but not possible to get it to respond.
  13:25 - Enclosure open inspect comms and Marmot. Cycle power again, now not able to ping. Check new fiber optic modem, ping GTSM and Q330 and get responses from both. Change ether net ports around, again ping, GTSM and Q330 respond, Marmot does not. Call C. Kurnik and have new Marmot, ethernet, and power cords FedEx'd out.
  14:15 - Enclosure closed, off site.

- 30 July 2008 PST
  11:10 On site, enclosure open.
  11:15 Change out Marmot and ethernet cable, ping and get no response. Call C. Kurnik and M. Gottlieb for trouble shooting advice, still not able to get the Marmot to respond.
  11:20 Check fiber optic modem, ports, and power again. Ping again, able to reach GTSM and Q330 but still unable to get Marmot to respond.
  * While Steve Alm was on the phone with C. Kurnik, he was trying to ping the Marmot. Steve Alm could see the data indicator light flash orange indicating he was pinging the site, although he did not get any response.
  11:40 Enclosure closed, off site.

- March 25, 2009 – Logger software was upgraded to 2.02.2

- April 18, 2009 – Ken Austin powered down the BSM at 18:39 UTC and replaced power box. He repaired the rain gauge cable, tested gauge, and checked BSM and GPS P435 with Wade. GPS had antenna replaced.

- November 30, 2009 – Wade Johnson moved the pore pressure logging from the NetRS to the Q330.

- May 28 ,2010 – Replaced the fiber optic data ports. Powercycled the cisco and marmot.

- October 21, 2010 – Chad repaired the damaged VSAT mount, and the Shores network was back online. A new marmot was also installed.

- November 8, 2010 – Station had gone offline due to a power failure. Power was restored and the site is back online.

- March 21, 2011 – Power supply for Cisco router failed. After it was replaced the comms came back up.

- September 22 – 23, 2011 – Pad was extended. Full size hut was installed, added belkin equipment rack, and swapped 2 (gtsm) batteries. In order to upgrade the hut, the ray dome and antenna were removed from the borehole mount. They were replaced over the new hut. Antenna was off from 08:40 to 10:30 local time.

- June 19, 2012 – The battery main bank, which consisted of two banks of four, was replaced. The quadrature on the GTSM was adjusted and site was photographed.

- April 16, 2015 – Secured all site equipment and adjusted chops and quads.

- Oct 6, 2015 – Adjusted quads.

- December 10, 2015 – CH0 had been recording garbage data for several weeks, then turned to Fatal Error. The RT0 board would not calibrate on restart, it bounced around a huge range of RT numbers for a while then settled in to Fatal Error Too Many Errors. Replacing the RT board had no effect. Replacing the Oscillator also had no effect. Mike tested to see if the problem was downhole by turning off the GTSM, disconnecting the signal cable, and restarting the oscillator and the RT0 board. With no connection to the downhole instrument the board calibrated normally, settling in at 5000000, which was a bad sign. He tried changing the flex jumper cable, and when he disconnected it he noticed that water had gotten into one of the ends, to the point that he actually poured some out. That end was also kinked at a tight angle, based on the geometry of the cable and environmental box. He replaced the cable with a longer one and re-routed it so that it would no longer touch the side of the enclosure, where he is guessing water was able to drain into it. He took apart the old cable and saw both moisture and evidence of dirt/insects living in the connector. The new flex jumper seemed to be working better. CH0 calibrated normally, settling into 5009xxxx and G3. Tap step still looked good. He was also able to adjust the quadrature (it responded normally). He replaced the original boards (both RT and OSC) and saw the same results, so he left the original boards in place. The only change was a new, longer, drier, flex jumper. The data from CH0 has returned to normal.

- September 27, 2016 – CH0 was noisy. Station was losing random hours of data. Reseated the oscillator board, CH0, and logger board. Disconnected and checked all connectors for moisture/corrosion. Swapped out the flex jumper to the down hole instrument. Liz felt moisture, but did not see droplets or water. Did not fix noise on CH0, may need to swap boards. Documented resistance and capacitance of downhole instrument. CH0 noise returned days later. Will need to make a trip before mid-January (ETS) to swap out RT board.

- July 7, 2017 – Adjusted chops and quads.

- October 4, 2018 – Upgraded CDMA to RV50. Swapped out second 4-port FODP with Ethernet switch. Swapped out 10 batteries with replace them with 8.