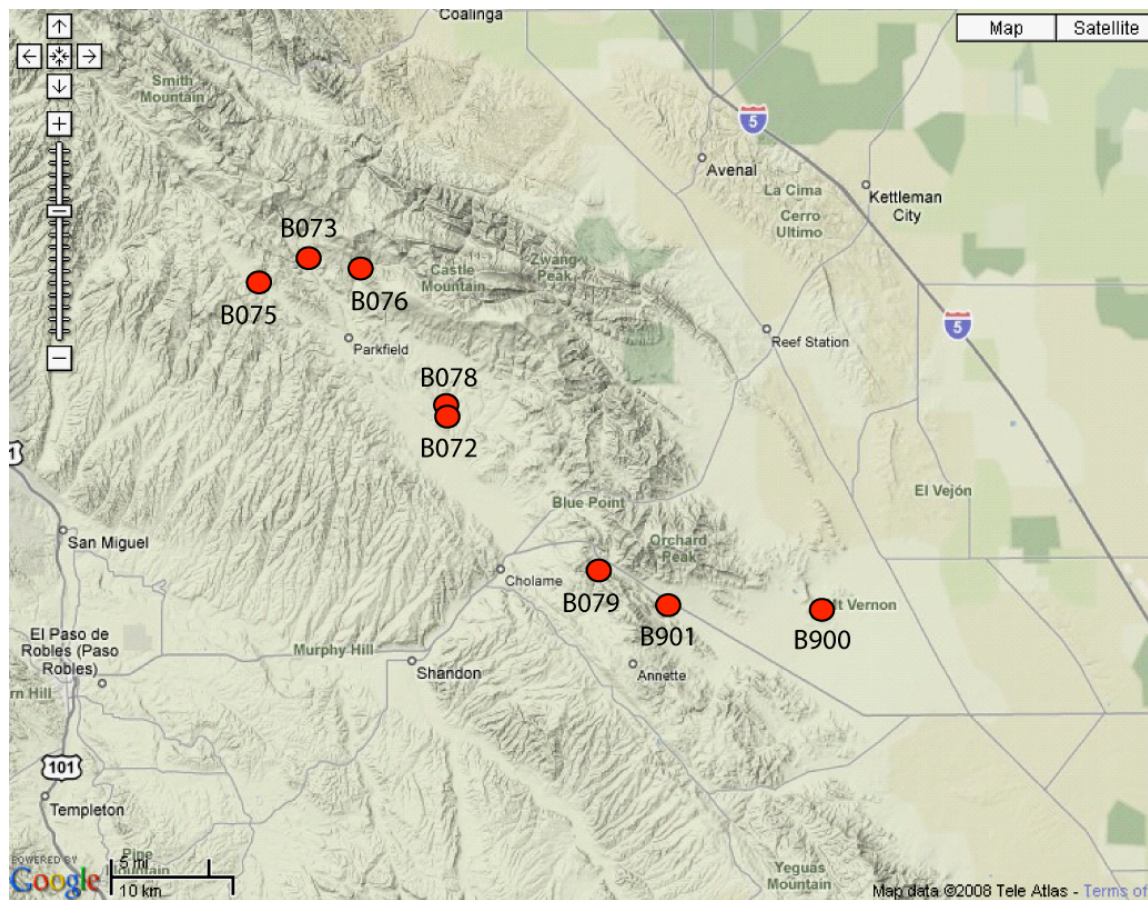


Station Notes for B073, varian073bcs2006

Latitude:	35.9467 (WGS 84)
Longitude:	-120.4717 (WGS 84)
Elevation:	535.3 m / 1756 ft
Install Depth:	241.4m / 794 ft
Orientations:	CH0=270.1, CH1=210.1, CH2=150.1, CH3=120.1
Install Date:	18 October 2006
GTSM Technologies #:	US26
Executive Process Software:	Version 1.14
Logger Software:	Version 2.02.2
Home Page:	www.unavco.org/instrumentation/networks/status/pbo/overview/B073
Notes Last Updated:	July 29, 2019

Install depth is from the top of the casing to the bottom of the strainmeter.

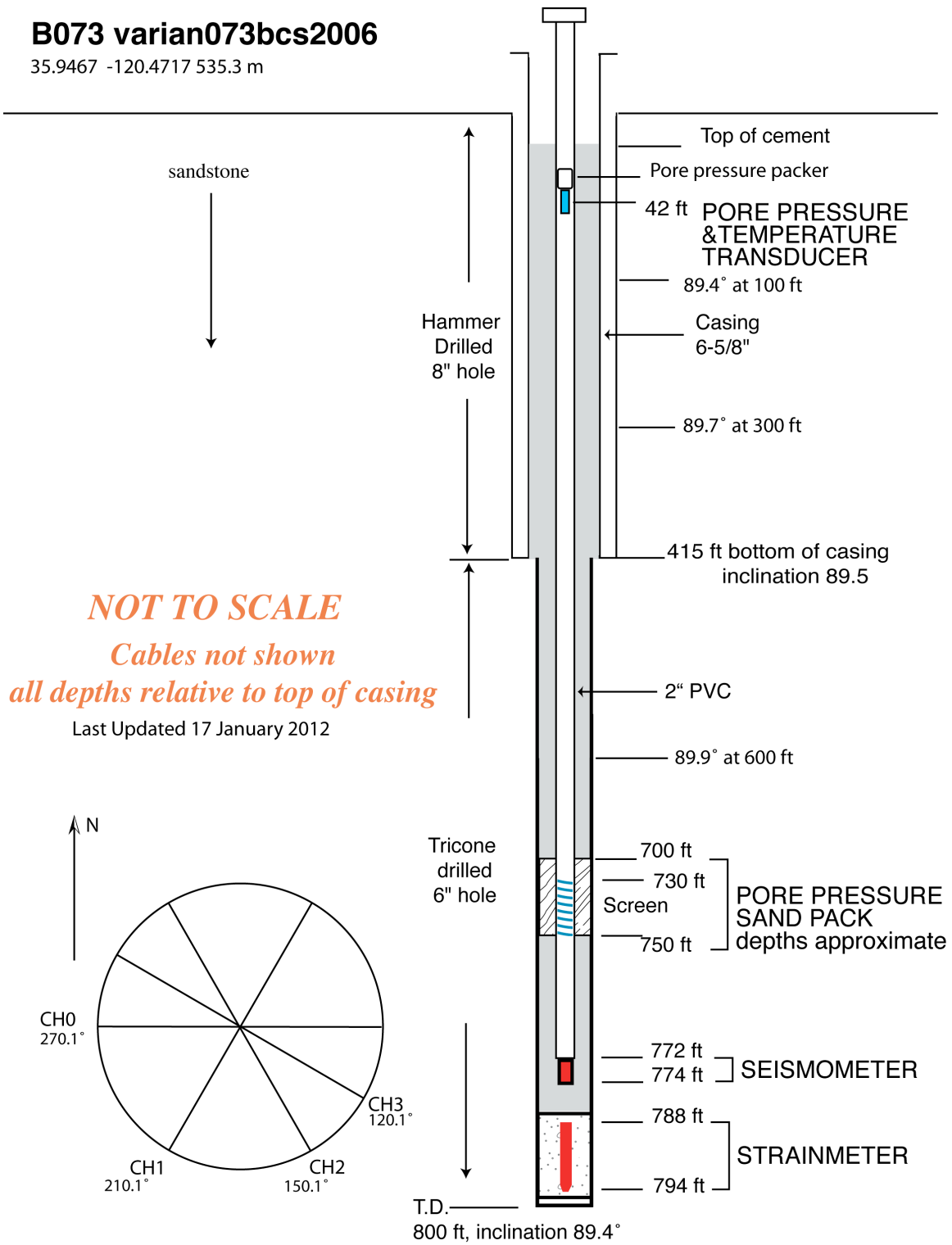
Orientations are in degrees East of North.



Parkfield PBO strainmeter network, July, 2008

B073 varian073bcs2006

35.9467 -120.4717 535.3 m



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	Not installed at this time	

1. Installation notes

B073 is located about 5 miles north of Parkfield, CA, on the Parkfield Coalinga road. The site is about 1 mile east of the San Andreas Fault. The first install attempt failed when the set grout failed to dump. The dump balor opened up just as we got it to the surface. Only a little bit fell into the hole. We installed using new set grout. The instrument hit bottom about 6 feet earlier. The top of the set grout was at 779'.

2. General Information

- Instrument installed with Executive Process Software Version 1.13 and Logger Software Version 1.15.
- Environmental door opened almost every day Oct. 18 - Nov. 17, 2006. Logger restarted most of these days as well.
- Between installation and 17 November the battery voltages dipping below 12.5 volts for several hours every day.
- One gauge was in extension and three in compression five weeks after installation.
- Very small amount of strain accumulated on CH0 five weeks after installation.
- This strainmeter lost GPS time from March 10, 2007 to March 30, 2007 due to a broken power box.
- This station is co-located with the GPS station P789
- Sensitivities of all EH channels corrected on March 4, 2010
- The pore pressure sensor is installed at 42 feet with the packer inflated directly above the sensor.
- EH1 and EH2 recorded very similar traces during a nearby M4.5 earthquake on August 6, 2012. The counts were not identical, but such similar waveforms from two sensors at 90 degrees to each other indicates a problem.

3. Strainmeter Maintenance

- 9 November 2006
Environmental door is opened and logger restarted.
Thu Nov 9 04:59:03 2006 Entering Standby
Thu Nov 9 18:55:36 2006 Logger Started
Thu Nov 9 18:55:36 2006 Environmental door is closed
Thu Nov 9 18:56:15 2006 Environmental door opened
Thu Nov 9 18:56:22 2006 Environmental door closed
- 17 November 2006
Wade Johnson and Alan visited the site they “retrofitted the GTSM charging system with Flex chargers and also tested the wiring of the seismometers.”
- December 5, 2006
Mike Gottlieb visited the site at 12:00 PST.

- 17 December 2006 - Michael Hasting visited the site to test and check the power system.
- 18 December 2006 - Michael Hasting updated the RT firmware to 1.17 and the GPS to 135_309.s3 at B073 Varian 1. I am able to connect to the GPS but as of this email it has yet to get a fix.
- 12 January 2007 – Michael Hasting adjusted the downhole temperature setting, and moved one of the Seismic/Communications solar panels to the GTSM21 charging system. Now has 4 solar panels on the strainmeter and 5 solar panels for the seismic/communications system.
- 13 January 2007 - Michael Hasting Checked rain gauge wiring as it has not been recording. Everything is normal and he can record the tipping with his voltmeter so he put in a 10Kohm resistor but this did not fix the problem. It appears there is a problem with the power box and will need to be fixed at some point.
- 12 March 2007 – Michael Hasting tried a reboot and a GPS_ColdStart command on the B073 site. Neither worked for getting the GPS back. As such this will require a site visit to look into unless Mick has any tricks up his sleeves. He plan on being at the Parkfield sites around the 25th and 26th of March to replace the power systems and will fix this problem at that time.
- 25 March 2007 – Tim and Michael Hasting upgraded the power system at B073 and hooked the GTSM21 power box to the DC/DC converter. They also upgraded the RT Controller Boards firmware from Version 1.17 to 1.18. While at the site they tried to get the GPS up and running but could not. As of now it has completely failed. After the ES meeting Michael Hasting will replace the power box with one from storage in San Juan Bautista.
- 30 March 2007 – Michael Hasting replaced US26PB with “US SPARE 2” power box. GPS is now working tracking 10 satellites.
- October 2 & 5, 2007 – Warren Gallaher visited the site to perform some maintenance. The site was cleaned up and reorganized for better access. The power box was adjusted for proper charge voltage. Also the quadrature and delay were set. A Marmot was also installed. The solar regulator was found to be causing radiated noise on the GTSM system. As a temporary solution one set of solar panels was hooked directly to the GTSM power box and the wires were re-routed to provide physical separation.
- July 17, 2008 – New firmware has been installed on the Q330. The Q330 has also been configured to record pore pressure with temperature. The netrs has been removed.
- August 28, 2008 – GPS station P789 was installed.
- September 19, 2008 - Warren Gallaher upgraded the GTSM logger software from version 1.15 to 2.02.2. The site was offline from about 22:00 until about 22:30 UTC.
- December 7, 2008 – Warren Gallaher visited the site to get it back online. He replaced both fiber modems with new B&B modems. He also repaired rain gage wire by removing and splicing it were it had been chewed apart. The rain gauge was tested at about 20:30 UTC.
- March 19, 2009 – Logger software was upgraded from 2.02.2 to the correct version of 2.02.2 that matches the compact flash size.
- August 2, 2009 - All Rt Boards were upgraded to Firmware 1.20, and the quadratures were adjusted. After observing the seismometer wiring into the panel, the wires from the seismometer were in the wrong order. The wire going out of the panel to the equipment no longer has the Chan. labels on the wires. To note the wiring, which was corrected, they went

black, clear, ground, blue, clear, white, clear. If this does not work then the other wires out of the panel to the equipment will need to be replaced to ensure they match.

- December 10, 2009 - The seismometer cable (from panel to Q330) was replaced with a labeled cable (channels 1, 2, 3). The site was offline prior to visit. The comms were down with the battery bank reading 12.6 Volts (GTSM batteries were >14 V). Liz turned the comms off and on before leaving, however it was cloudy and will most likely shut off. The quadrature was adjusted for all GTSM channels. All quadratures were off by roughly 1/3.
- March 15, 2010 – Liz VanBoskirk visited the site to test the rain gauge. First Voltage was taken at the rain gauge. With the bucket tipped it reads 4.99V, connection good. The power box was opened. While the gauge was tipped the voltage was taken on the circuit board of the power box. Here it read 4.96 V. The connection for taking the rain gauge reading may be bad elsewhere in the power box. From this test the signal from the rain gauge to the Power Box is good. While observing the seismic data through the Q330, Liz noticed that channel 2 and channel 3 were crossed.
- June 15, 2010 from 15:00 to 16:30 PT - After arriving on-site an extender board was added onto the logger board. The Scopemeter was connected to pin 5 and 17 on the extender board to observe voltage changes when the rain gauge was tipped. The rain gauge was tipped but there was no reading change in voltage on the extender card. All connections were double checked with the same test result. Warren was then called to guide Liz through a series of tests to pinpoint where the signal was lost. They checked the voltage and ohms from the extender board to the pins on and in the power box. They then check the pin on the cable attachment on the side of the environmental box. It was determined the signal is lost on the back board in the environmental box.
- July 17, 2010 – Warren Gallaher and Liz Van Boskirk visited the site to get seismic metadata using a birdog. The also looked at the rain gauge. The resistivity of the rain gauge was checked on the extender card, points on the rain gauge, the power box, and the cable that goes between the power box and the environmental box. The rain gauge splice wiring was checked and all corroded wire was removed. The new splice was tested and the signal enters the power box. The gauge was tipped twice after the repair, but there is still no data coming in from the rain gauge.
- October 22, 2010 – The power system was reviewed using the current meter and voltmeter. The solar panels and GTSM battery bank were fine. The main bank of 8, which is composed of two smaller banks of four, tested ok, with the exception of the last battery on each bank. There was no current flow at the last battery. Each bank of 4 was rewired so that the red and black wires coming into each bank had a positive (red) on one end of the bank and negative (black) on the other end of the bank.
- October 30, 2010 – A broadband seismometer, marmot and Q330 were temporarily deployed at the site. The seismometer will be used to orient the borehole seismometer.
- November 17, 2010 – The main battery bank of eight was replaced. Both the main bank and GTSM batteries were rewired so that each bank (of four) has the negative (black wire) attach on one end of the bank and the positive (red wire) feeds to the other end of the bank. The seismometer was wired back into the panel.
- December 13, 2010 – A broadband seismometer, marmot and Q330 were temporarily deployed at the site. The seismometer will be used to orient the borehole seismometer.
- June 23, 2011 – Replaced the rain gauge. The old gauge was not soldered. New gauge was soldered to existing wiring harness, and reconnected to strainmeter power box.

- August 17, 2011 – Replaced existing 10AWG battery jumpers with 4AWG jumpers to upgrade the power system in advance of winter.
- December 21, 2011 – Upgraded power system. Added Tristar MPPT solar controller.
- September 14, 2012 – A Metpack was installed. Installed a VAISALA WXT520 weather transmitter at the site to address the lack of rainfall data. Ran a birdog test to explore why the two horizontal seismic channels look so similar, no problems were found. Wiring was checked and is correct.
- March 28, 2013 – The rain gauge and VSAT cables had been chewed on by animals. Chad repaired the rain gauge and VSAT cables, and ran conduit for the metpack, raingauge and comms cables. The new rain gauge wire was faulty (bad wiring at the tipper bucket, similar to B058), so he fixed that and verified that he could see voltage changes at the power box connection. Resistance was measured between each seismometer channel, with infinite resistance between each.
- April 16, 2013 – It appeared as though the seismic data from channel 2 and channel 3 were identical at this site. The engineers have been trying to determine if it's an instrument or electronics issue. Chad did some additional testing today. First, the Q330 pigtail was swapped. The data was still similar. He then ran the birdog on channel 2 while observing the other channels in quick view (Willard). No discernible change was noticed in the other channels while the test was performed. He ran the birdog on channel 3 while observing the other channels, with similar results. He re-tested channel 2, with no change in results. Finally, when re-attaching the channel 2 wires, he noticed a signal change on channel 1 and channel 3. He removed and re-attached the wires for channel 3, and again noticed a response on the other channels. He moved the seismic wire terminal block from the up-hole electronics DIN rail to the GTSM isolation block DIN rail, and again checked whether the individual wire removal caused a signal change. Each channel (2 and 3) showed up on the other channels.
- April 17, 2013 – Chad replaced the Q330 after discussions with Wade. He cloned the old config and uploaded it to the new unit.
- January 8, 2014 – VSAT IDU power supply was replaced.
- August 6, 2014 – Adjusted LVD settings.
- March 30, 2016 – Swapped batteries due to loss of GPS observations. Performed GTSM testing. Measured resistance and capacitance on all 4 channels.
- April 10, 2018 – CH1 was in G2 starting May 2017, needed to address. Data was still good but noisier on CH2.
- April 12, 2018 – VSAT IDU removed when cell modem was installed. Cisco router removed during cell modem install. Verizon RV50 and switch added during comms upgrade.
- January 3, 2019 – Adjusted chops and quads, got Ch2 from G2 to G3. No pore data for several months. Willard showed Paroscientific but no data. Digiquartz found sensor baud 9600 but could not communicate with it. Kermit received no response to *9900P3, gave "???" on reboot. Power cycles did not help. Will need to replace sensor, could be tricky with inflated packer (20 psi) and borehole mount GPS.
- July 16, 2019 – Mike and Wade tried to remove failed pore pressure. They released the pressure from the packer, but instrument was quite stuck. Steel cable was rusted and broken.

Pulled on copper tube but couldn't get sensor to move. Set up pulley and ratchet strap and left for 30 minutes, sensor still would not budge. GPS borehole mount made this difficult. They were able to pull the pore pressure at B078 and B079 by using the truck winch, but the site layout makes that difficult here. Would probably need to remove GPS monument, so decided they can't replace sensor at this time.