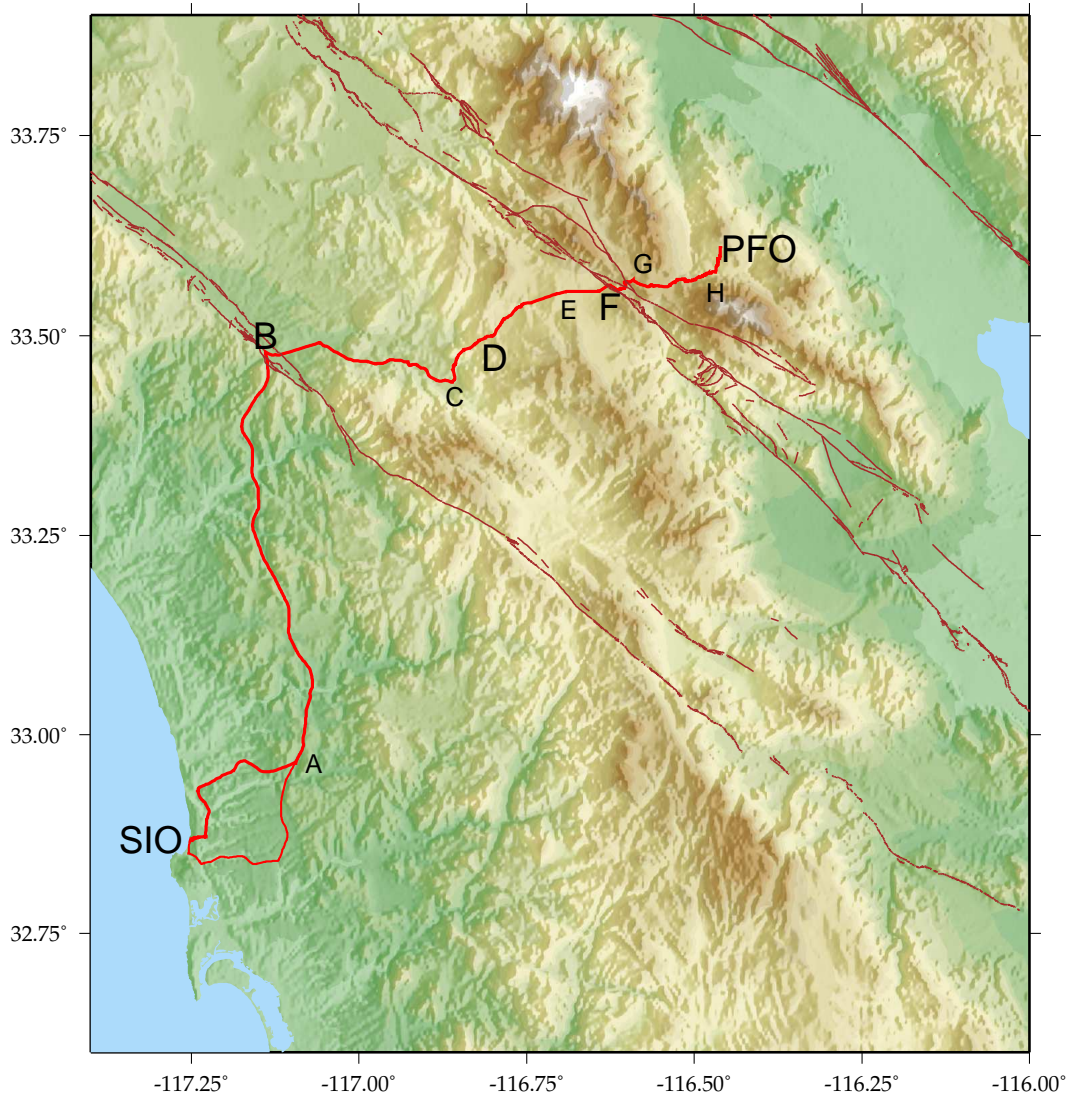


Piñon Flat Observatory Field Trip, November 2015



Road Log for Trip to PFO
(see map, above)

Map Point	Distance (miles)	Description
SIO	0	Start at IGPP.
A	17	On I-15 going north, past CA-56 (perhaps reached via CA-52, or via CA-56).
B	55	Exit I-15 at Temecula to get on CA-79. At this point we are also crossing the Elsinore fault zone, one of the three parallel strike-slip faults in southern California, though much less active than the other two.
C	74	Turn left onto CA-371, heading up towards Anza.
D	79	Top of grade, with view to the right of the Anza Valley, with Thomas Mountain behind it. The San Jacinto fault runs along the foot of that mountain.
E	87	Entering the town of Anza, a center for this small region of agriculture (and rural homes). Formerly Terwilliger, renamed Anza after UCB Professor Harold Bolton determined that the 1774/5 Anza expedition had passed this way.
F	91	At this point, just as we enter a canyon, we are crossing the main trace of the San Jacinto fault. The fault here has not ruptured in at least the past 200 years, (the “Anza slip gap”), although we know from a 4000-year record at Hog Lake that the average recurrence time is 250 years; the 30-year probability of a large earthquake is about 20%. This is also the location of a seismicity gap, with few earthquakes compared to regions to the northwest or southeast (Figure 2).
G	94	Turn onto CA-74, the Pines to Palms highway. The pass just before this is the highest point of the route (about 4800' – PFO is about 600' lower).
H	102	Pass Palm Canyon Drive, a part of the Pinyon Flat development laid out in the 1960's. The road was named in the hope (never fulfilled) that it would end up reaching Palm Springs by going down Palm Canyon. Actually turn at Pinon Dr. about 1.8 miles further; this passes the campground, turns back West, and meets Jeraboa, on which you turn right (North).

PFO 105 Turn on Matterhorn Way; Entrance to the Cecil and Ida Green
Piñon Flat Observatory.

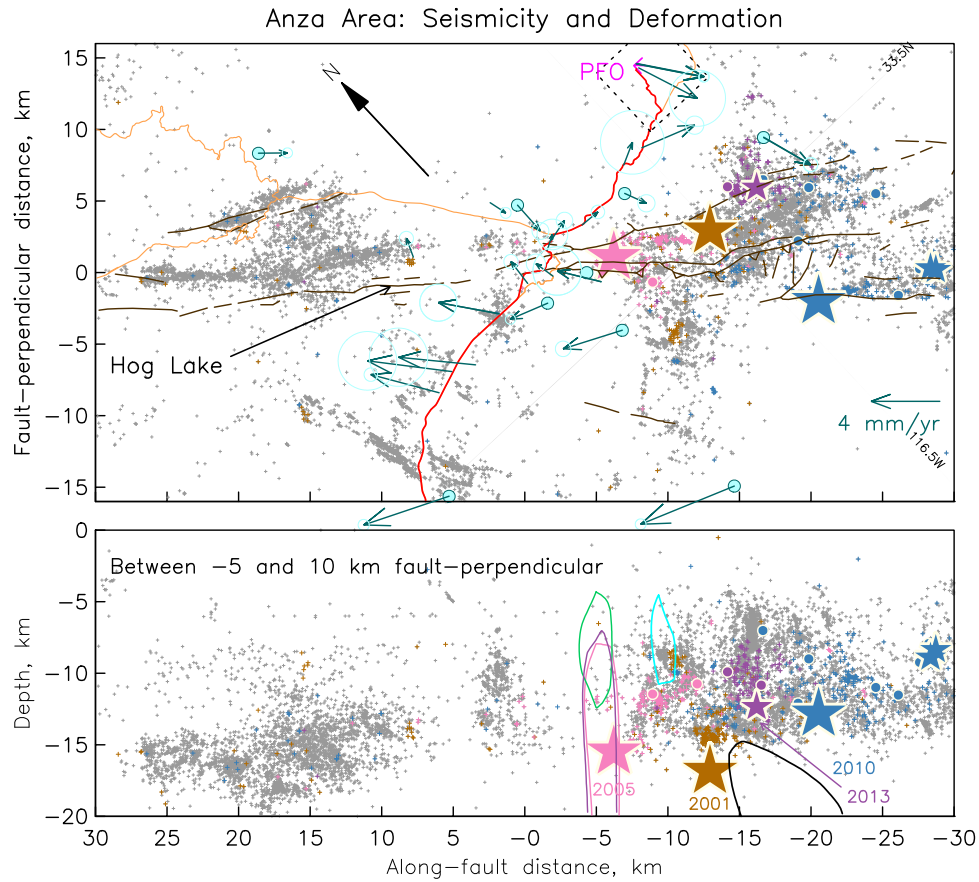


Figure 2: Seismicity (mag 1.4 and above, 1981-2015) along the Anza part of the San Jacinto fault, in map view and profile, using relocated hypocenters, with particular sequences in color. The map also shows locations of PBO borehole strainmeters (green); velocities of GPS points relative to an average value (red). and the PFO LSM's (purple, shown to scale.) The cross-section (bottom frame) shows the same seismicity, along with possible regions of postseismic and aseismic slip: a green irregular polygon for the EMC postseismic signal, pink and purple for those from the 2005 and 2013 earthquakes,

Pinyon Flat Region

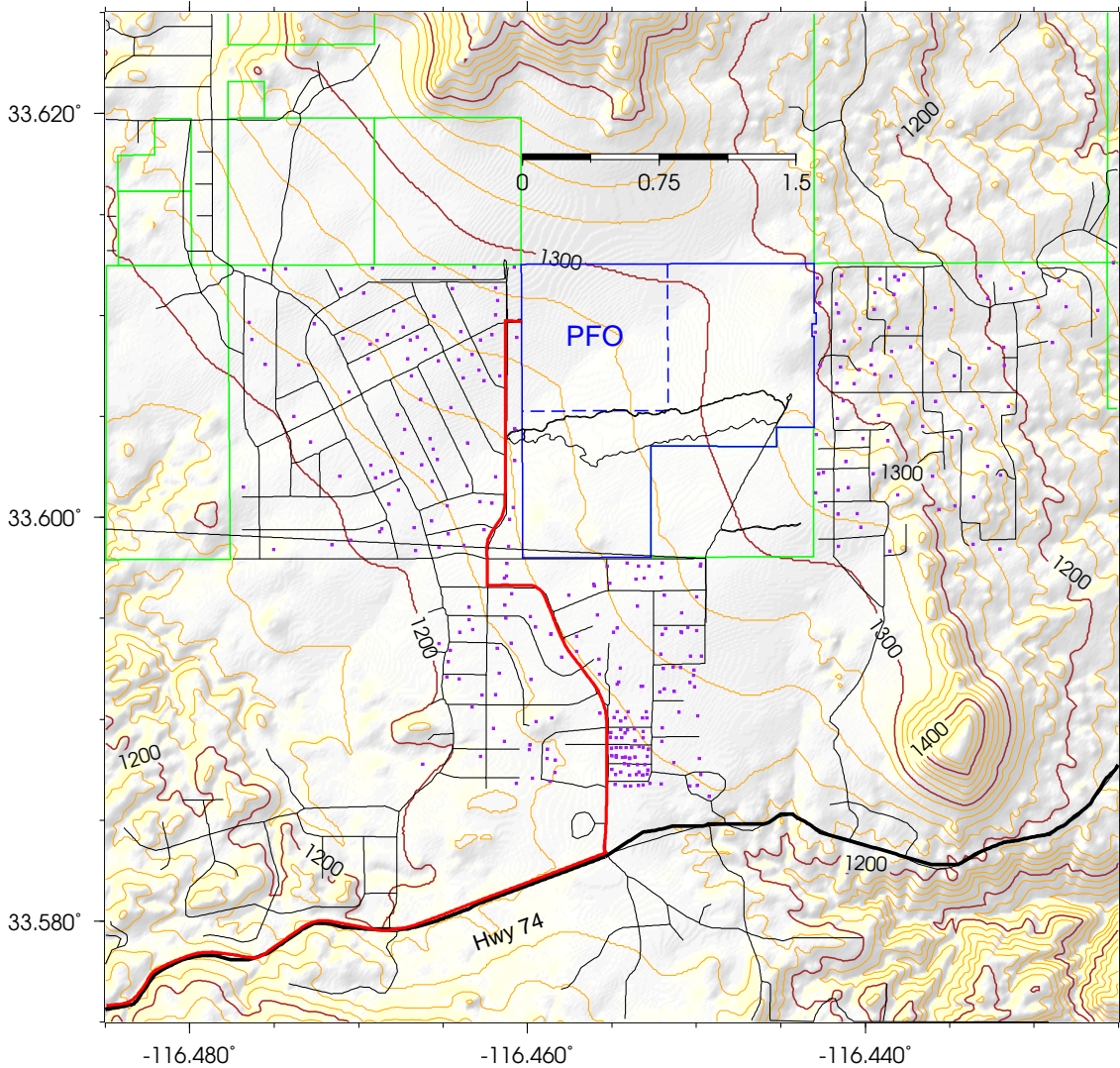


Figure 3: Map of the region immediately around PFO. Purple squares are houses, sparsely scattered through several development areas, all begun about 1970 and slowly filling up over the last four decades. The blue polygon shows land owned by the University of California, acquired from the US Forest Service in 1978 with funds provided by Cecil and Ida Green. Green polygons show public lands administered by the U.S. Forest Service. The dashed line shows the part of University land used for PFO; the rest is part of the Deep Canyon Natural Reserve. The section to the north of the University land was recently acquired by the Friends of the Desert Mountains for conservation.

Given these patterns of land ownership, and the fact that this whole region (private inholdings aside) is now part of the Santa Rosa and San Jacinto Mountains National Monument, we see that on three sides PFO is well buffered by land that will never be developed.

Piñon Flat Observatory

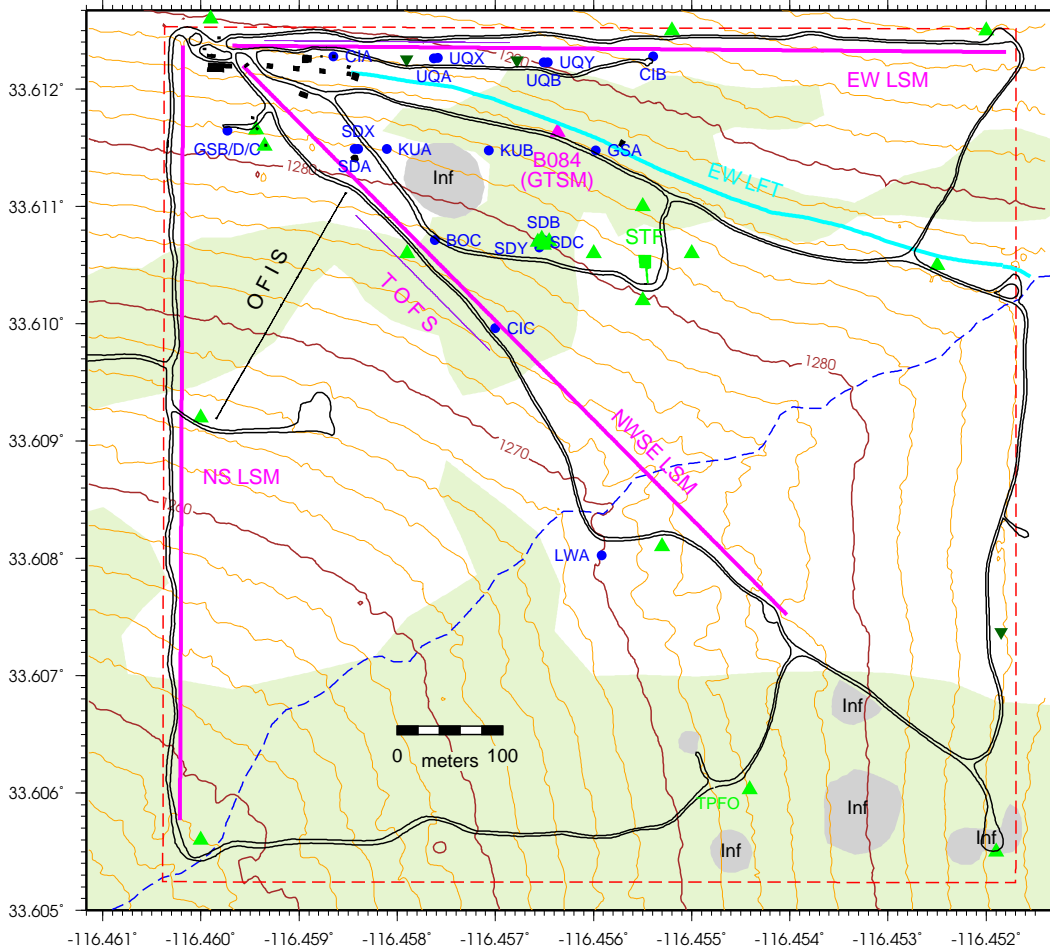


Figure 4: Map of PFO. The green areas are those not burnt by the brushfire in 1995. The strainmeters (old and the new TOFS optical fiber system) are in purple and the EW Long Fluid Tiltmeter in light blue. Gray areas are infrasound arrays, green circles (and the outline of the Seismic Test Facility) are the locations of seismometers – some, like the IDA vault, no longer used. Blue triangles are boreholes; dark green upside-down triangles are InSAR reflectors.

Piñon Flat Observatory - NW Corner

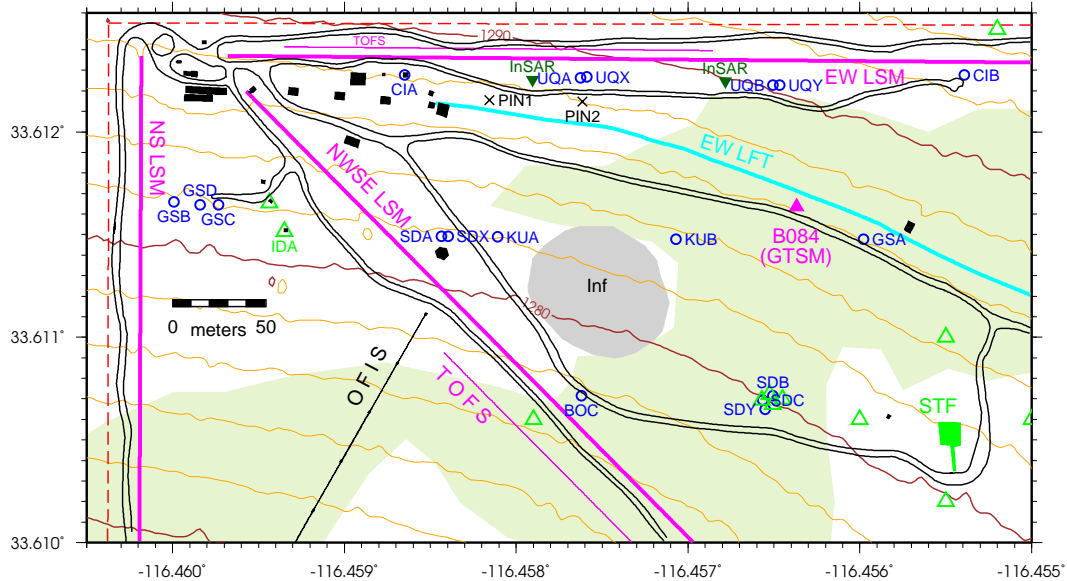


Figure 5: Map of PFO, showing more details in the NW corner.

A [Selective] PFO Chronology

Date	What
May 1970	Site chosen: flat, granitic, and with power.
August 1970	Forest Service signs 5-yr MOU with ESSA to make area available for UCSD earthquake studies.
April 1971	NS laser strain meter (LSM) began operating.
January 1972	EW LSM began operating; Payson LaCoste Gravimeter installed
March 1973	NW-SE LSM began operating.
April 1976	Project IDA gravimeter began operating.
April 1979	Short Fluid Tiltmeter began operating (ran through 1981).
July 1980	After more than three years of work, title transferred to University of California from USFS.
January 1981	EW Long Fluid Tiltmeter began operating.
October 1982	PFO station of the Anza Seismic Network began operating.

March 1983	Three Carnegie borehole strainmeters began operating (ran through 1990).
September 1984	VBB Seismometers began operating in IDA vault.
July 1986	VLBI measurements began at PFO; ended 1993 (replaced by GPS).
September 1989	Two deep-drilled braced monuments installed for continuous GPS
March 1990	Continuous GPS began operating, though only intermittently at first.
October 1990	Digital recording of strong ground motion began as Terrascope installed sensors at PFO.
July 1994	The “Palm” fire came through the observatory; almost all structures were saved, but the LSM vacuum pipes and much wiring was lost.
September 1994	NWSE LSM restored to operation. Rebuilding from the fire took place over the next two years.
June 2000	Infrasound arrays began operating.
July 2001	Rebuild of EW laser strainmeter began; completed December 2003.
January 2004	Construction of Seismic Test Facility begun by excavating large pit; completed March 2006.
April 2014	Installation of local (PY) seismic network.

.....and no doubt many things have been left out.