

LBNL SMAC Update May 9, 2016

- Operational update
- Initiative update
- A little bit of science
 - The 2014 Mag 6.0 EQ
- Funding update

Operational update

- Current Array (all operational after fire)
 - 34 permanent 3-c station
 - 5 Temp stations around EGS well (Prati 32/31)
- SE part of array augmented with former 500 ft. deep Alta Rock boreholes. All five now instrumented.
- Calpine working with USGS on strong motion data collection
- Web site access
- Adding US geothermal stations (5) on west edge of the production zone (Plant 15)

Current web site

Lawrence Berkeley National Laboratory » Earth Sciences Division

Questions & Comments | Privacy & Security Notice

U.S. DEPARTMENT OF ENERGY

Energy Efficiency & Renewable Energy

Induced Seismicity

Home

EGS

CO₂

Oil & Gas

EGS Earthquake Maps

- The Geysers
- Desert Peak
- Bradys Hot Springs
- New York Canyon
- Raft River
- Newberry Caldera

EGS Protocols

- Best Practices for EGS Induced Seismicity (pdf)
- New Protocol for Induced Seismicity (pdf)
- Primer on EGS Induced Seismicity (pdf)
- Seismic Risk Analysis: Deep Heat Mining Basel (pdf)

General EGS Information

- What is an Enhanced Geothermal System?
- What is the history and cause of seismicity in geothermal areas?
- Why do the operators of EGS activities want to avoid large Earthquakes?
- What is being done to understand and control the seismicity as well as interact with the local communities?

EGS 720


from LBNL Earth Sciences Division

EGS Enhanced Geothermal Systems


Geothermal wells are traditionally drilled in locations where hot rock is located near the surface of the earth, and permeable rock make it easy for underground liquid to heat up.

Some hot rock formations have the potential to produce energy, but lack either the necessary permeable rock or underground water to produce steam.

EGS makes it possible to create fissures in the rock and inject water underground. This process can transform many potential sites into working geothermal wells.



02:37



EGS 720 from LBNL Earth Sciences Division on Vimeo.

Related Sites

- U.S. DOE - geothermal homepage
- U.S. DOE - geothermal basics
- U.S. DOE - field demo projects
- IEA (International Energy Agency) Geothermal Site
- California Geothermal Maps and Information
- GEISER - Geothermal Engineering Integrating Mitigation of Induced Seismicity in Reservoirs

International EGS Sites

- Switzerland: Swiss seismological service Deep Heat Mining project in Basel

Industry Sites

- AltaRock
- Calpine Geysers
- Ormat Desert Peak

New web site

Operational on June 1,
will include all data from 2002
to present time.

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Obtaining Induced Seismicity Data for EGS

The type of data available through this site are event catalogs (which include location, magnitude, depth and date). After reviewing the *EGS Earthquake Maps* to determine which specific event data you would like to select, go to the Induced Seismicity Data Catalog webpage and enter the options.

Waveform and meta data are not available in real time; however they can be requested by contacting us by emailing Katie Freeman.

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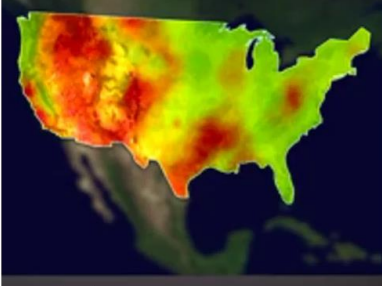
EGS 720 from LBNL Earth Sciences Division

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Induced Seismicity



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Welcome to the Induced Seismicity Data Catalog. Users can request access to data related to induced seismicity for specific networks which are currently being monitored by researchers from the Lawrence Berkeley National Laboratory, Energy Geosciences Division. More Information about these networks (earthquake maps and data) are found under the Enhanced Geothermal Systems (EGS) tab on the [Induced Seismicity website](#).

The form below will return a text file containing the earthquake catalog corresponding to the parameters entered in the form.

Select Network:	<input type="text" value="Bradys"/>		
Dates (MMDDYY): Start:	<input type="text"/>	End:	<input type="text"/>
Decimal Latitude: Bottom:	<input type="text"/>	Top:	<input type="text"/>
Decimal Longitude: Left:	<input type="text"/>	Right:	<input type="text"/>
Magnitude: Minimum:	<input type="text"/>	Maximum:	<input type="text"/>
<input type="button" value="Submit"/>			

Note: Search options are optional. If no options are entered, all earthquakes will be returned. This is not recommended for the Geysers due to the large number of earthquakes in the catalog.

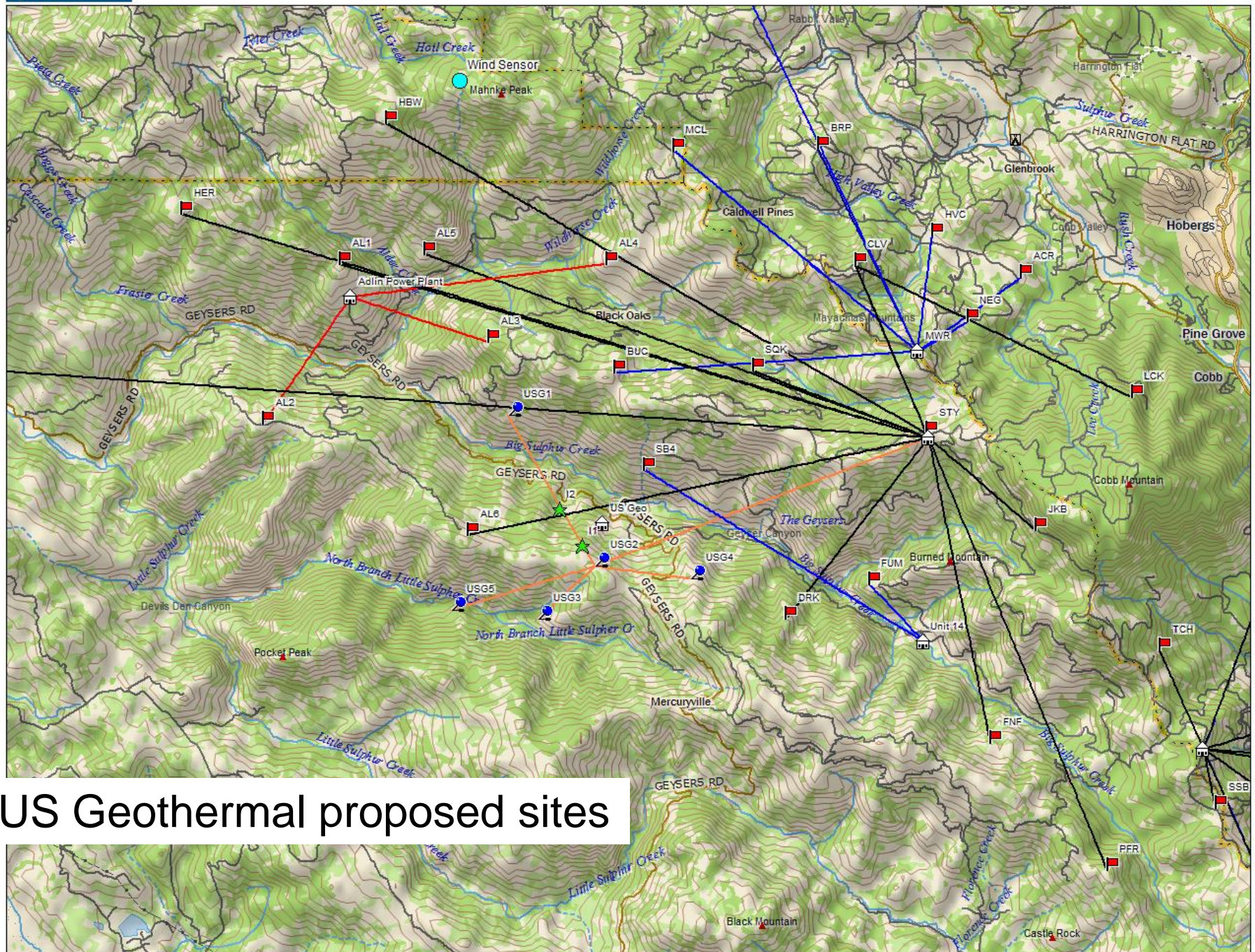
[Return to Induced Seismicity Web Site](#)

Please use this statement in your publication acknowledgments:

This material is based upon work supported by the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy (EERE), Office of Renewable Power, Geothermal Technologies Office, by Lawrence Berkeley National Laboratory under Award Number DE-AC02-05CH11231.

To request waveform data, or for additional information, contact [Steve Jarpe](#).

New page on website



US Geothermal proposed sites

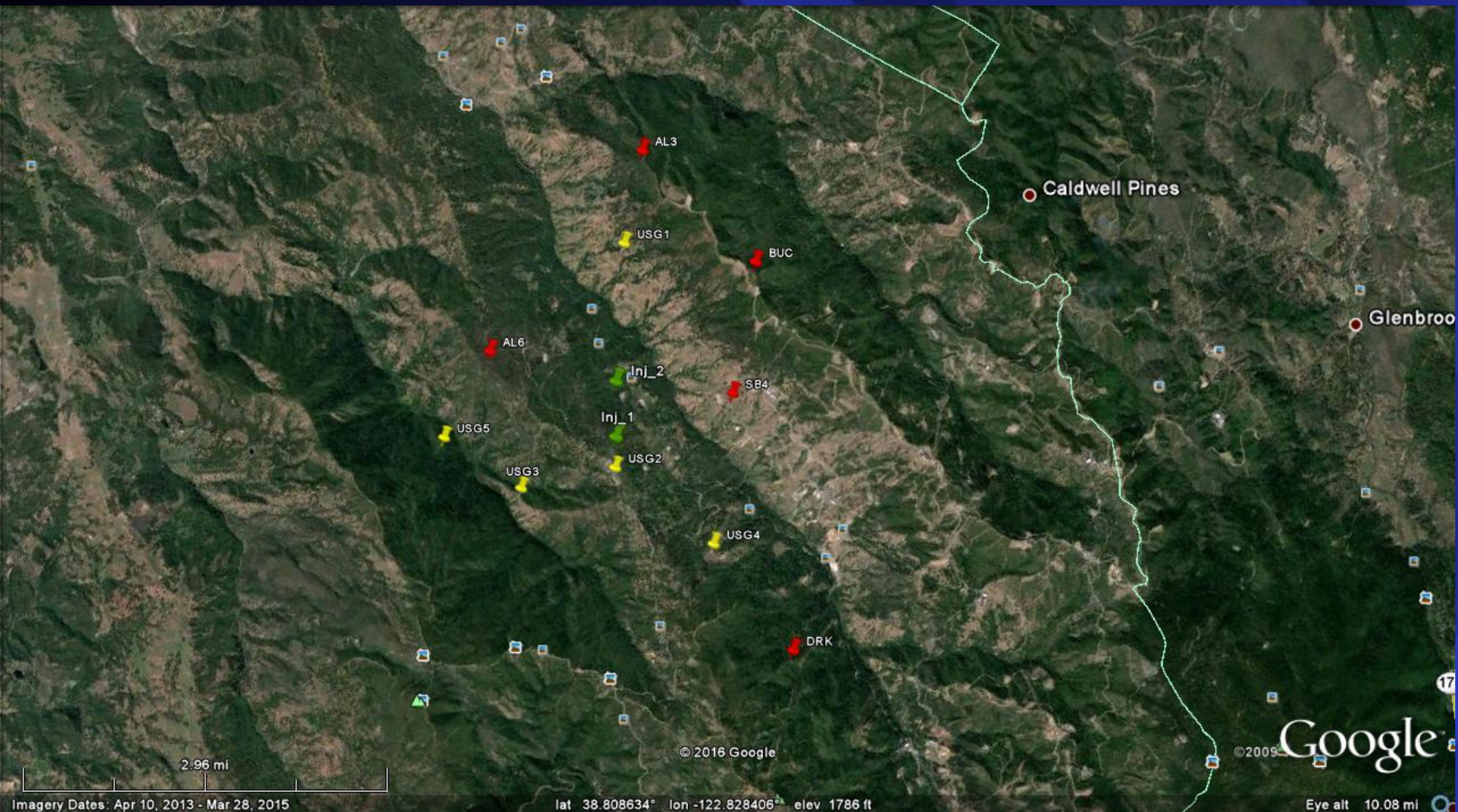
Data use subject to license.

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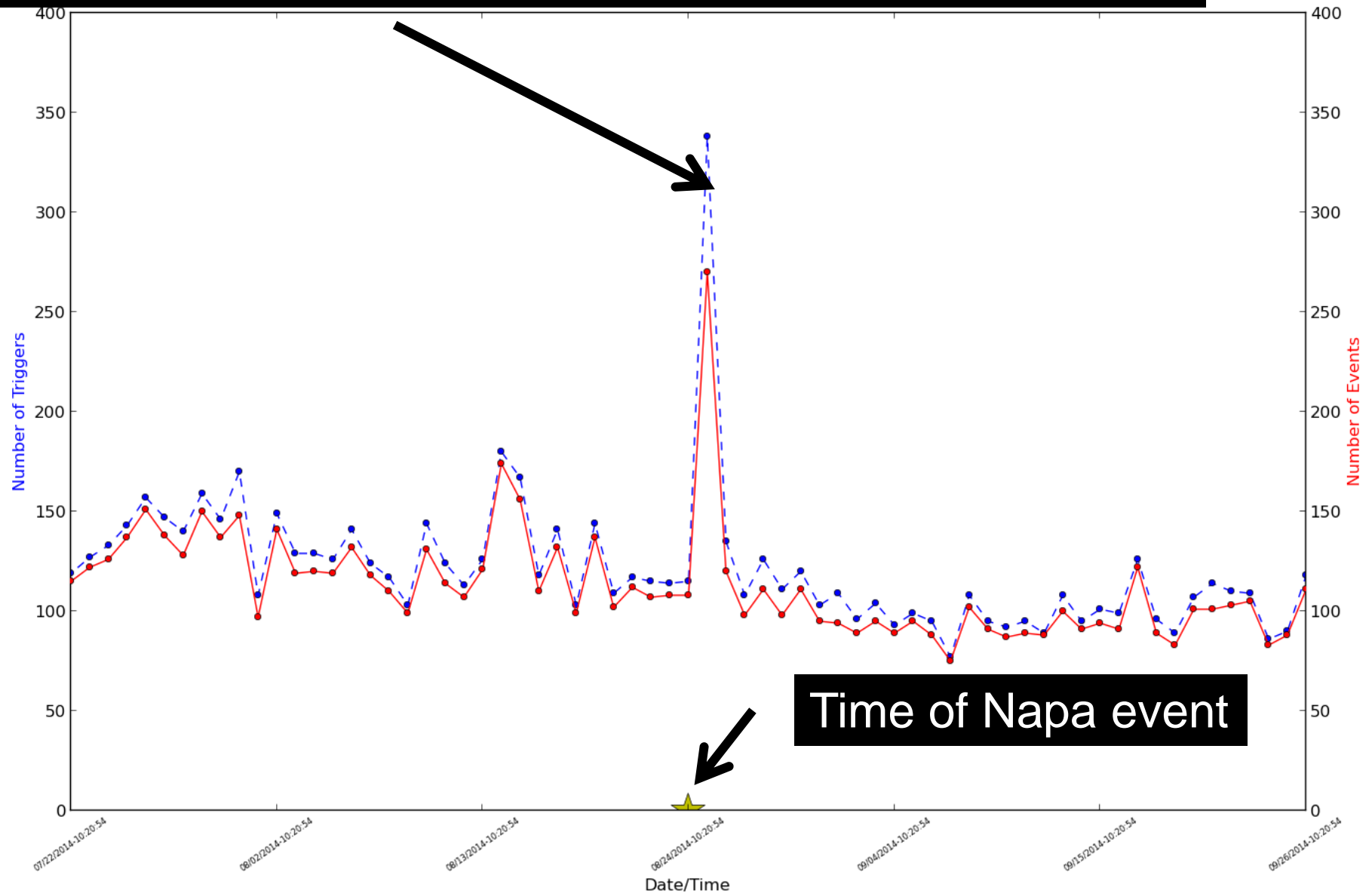


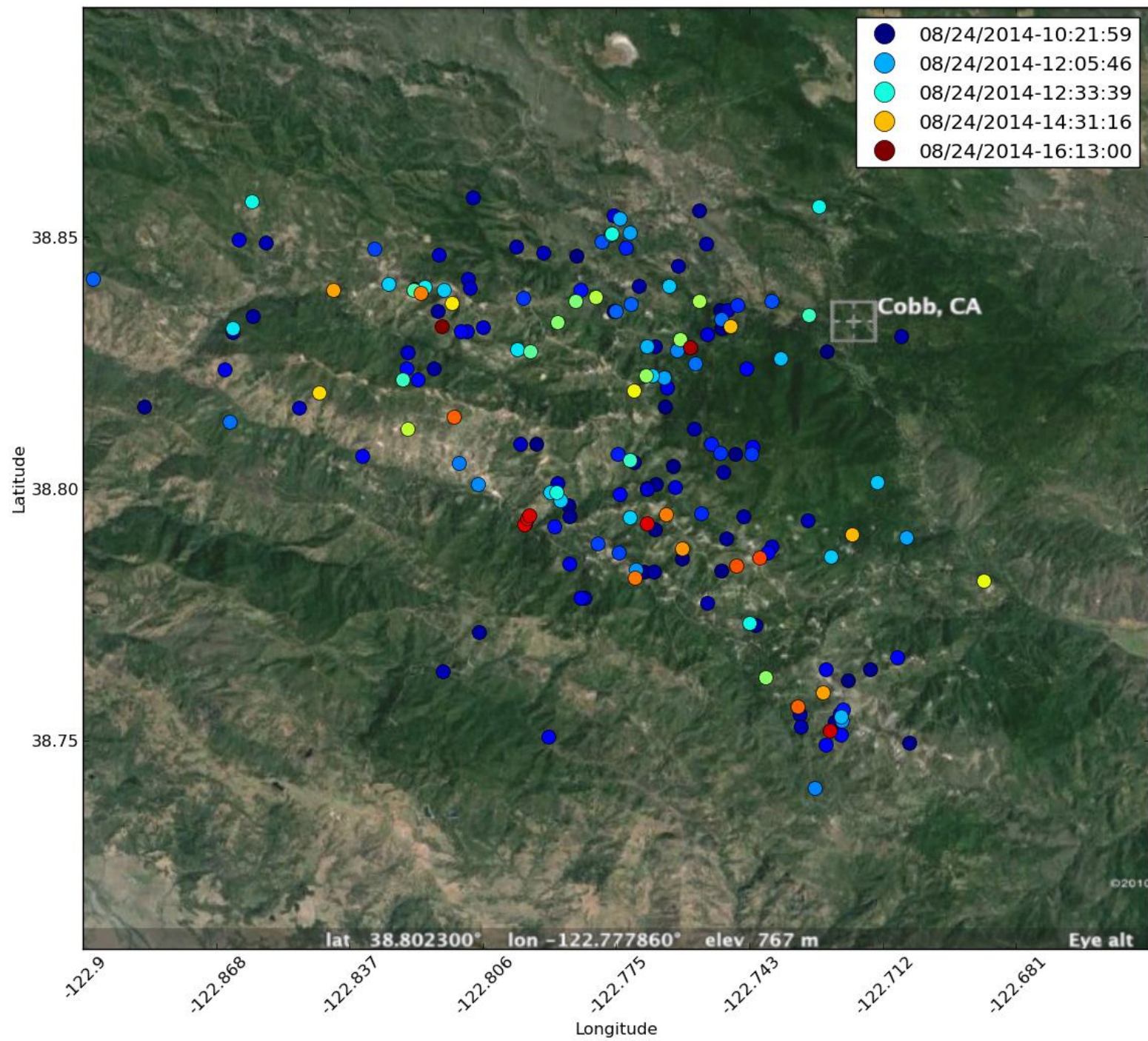
- Two new initiatives in DOE that will have Induced seismicity as one of the main focus areas
 - FORGE(Frontier Observatory for Research in Geothermal Energy) (10 year effort)
 - Dedicated field site for understanding EGS
 - LBNL and USGS involved in two potential sites (Fallon Nevada and Coso, California)
 - SubTER (Grand challenges in subsurface engineering)
 - Proposal by Array Information Technology (with Calpine, USGS, LBNL) to DOE for application of Fiber Optic sensors to measure Deformation with MEQ and strain at The Geysers, Submitted on May 5,2016

Effect of Aug 2014 “Napa” Mag 6.0 (Katie Freeman)

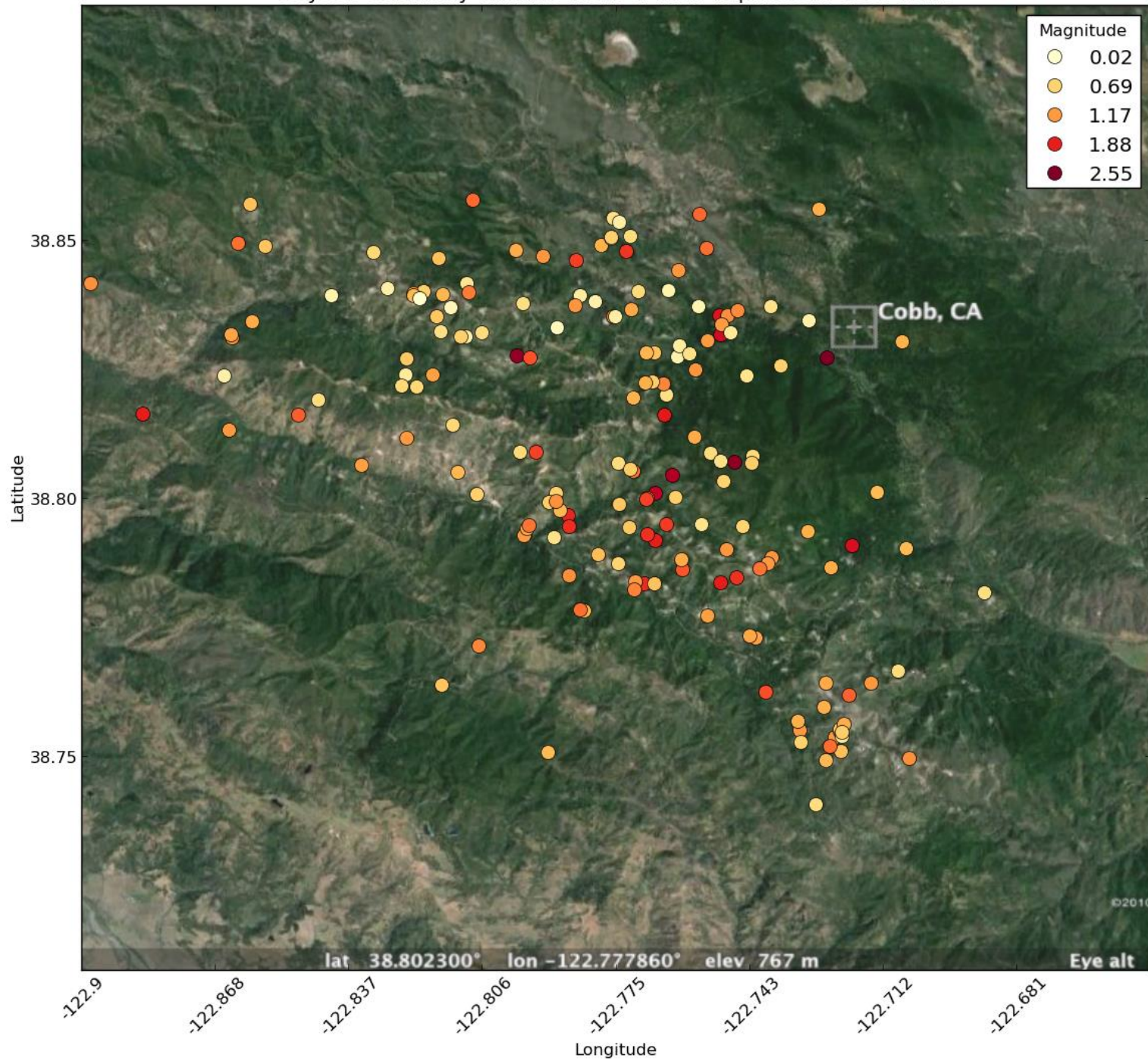
- There have been observations of large distant events triggering smaller events (not just at The Geysers)
- The Japan Mag 9 did not trigger any events at The Geysers (when the energy from the Mag 9 event went by)
- We investigated if the Napa vent did “trigger” local events

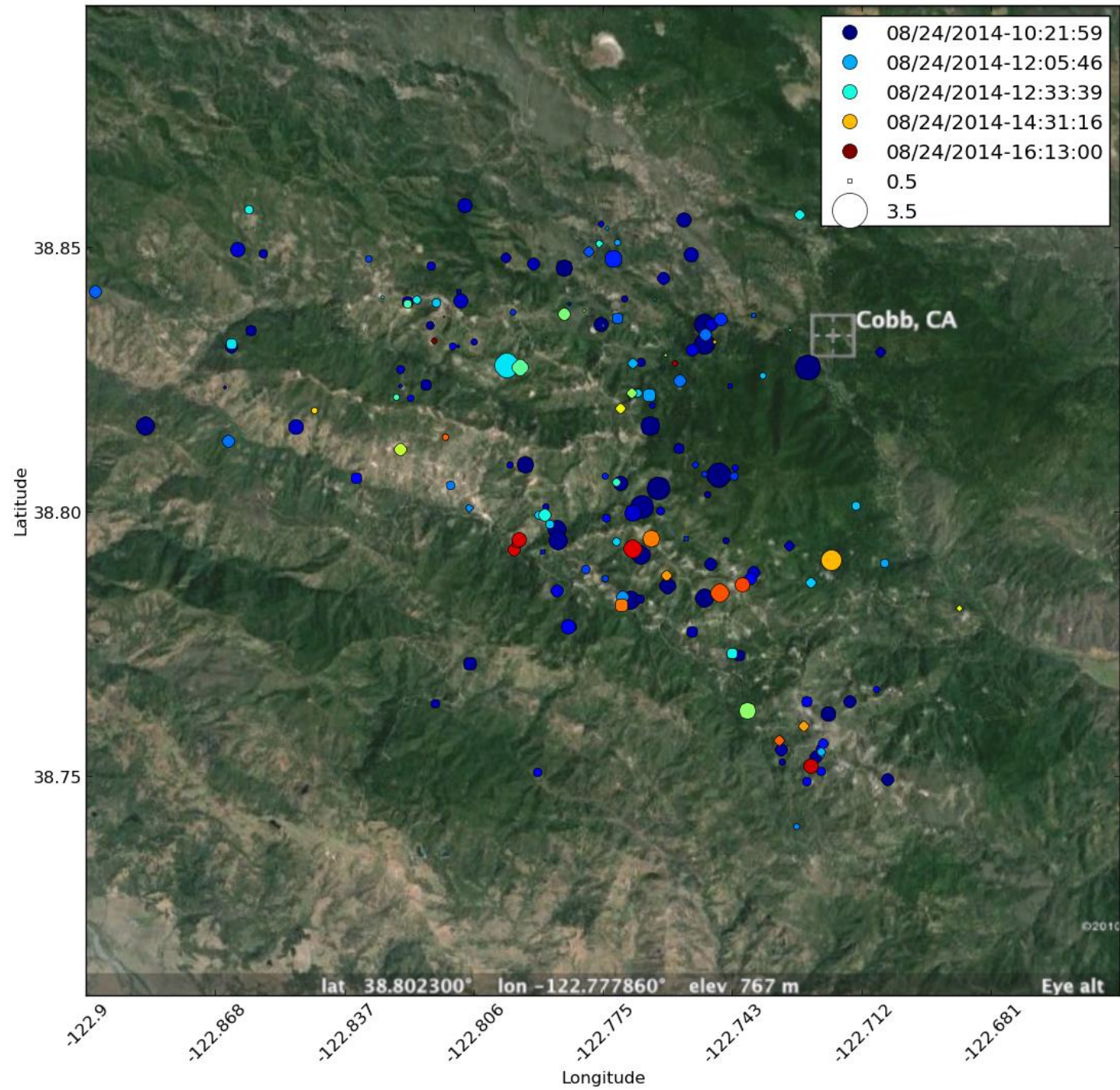
Notice large spike in events directly after the Napa event

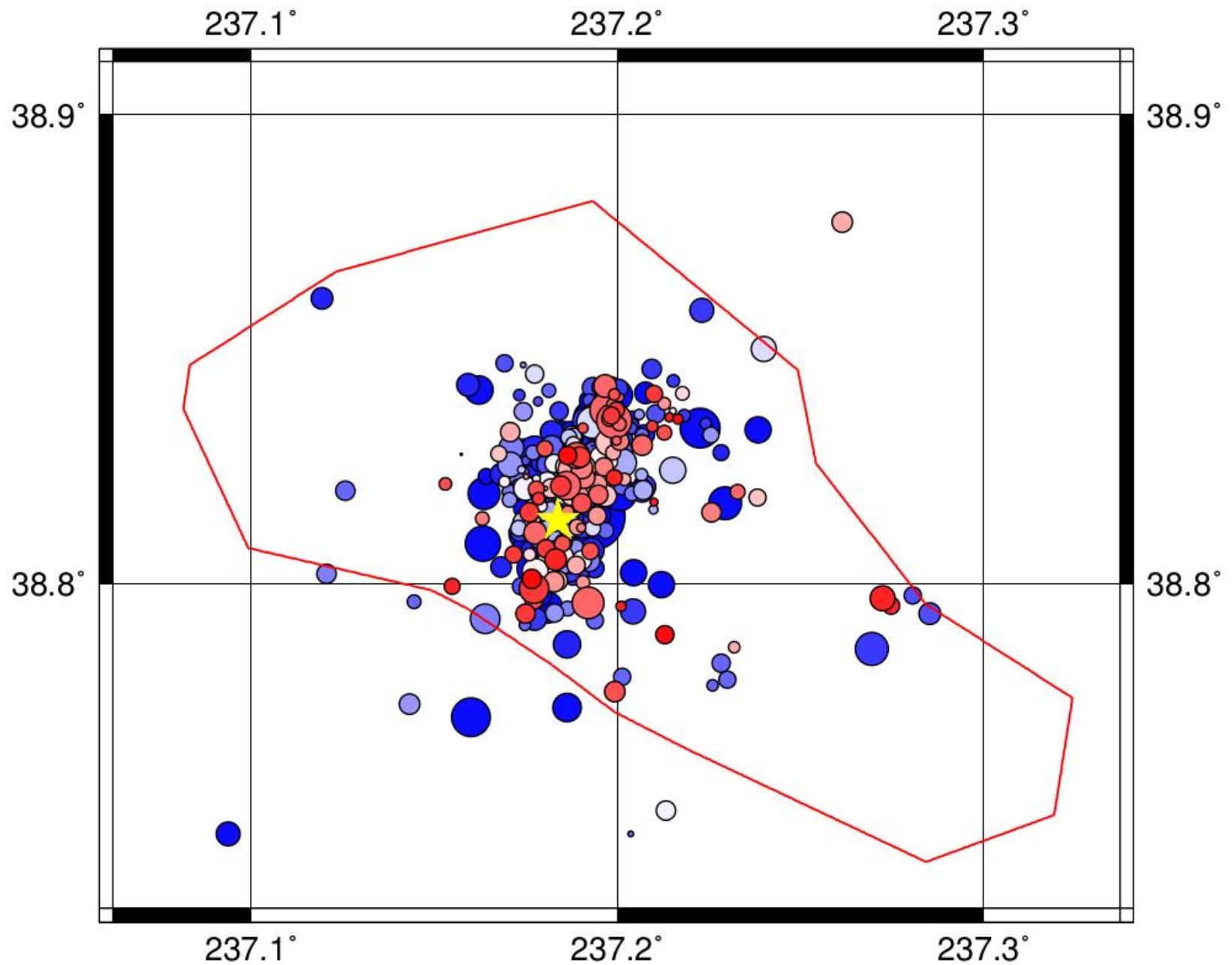




Geysers Seismicity Within 6 Hours of M6+ Napa Event: 180 Events







Funding Update

- DOE extended the Lake County Project to Dec 31 2016
- DOE did not extend the data archival effort at the NCEDC
- We have requested FY17 funding to continue data collection after the Lake county project funds are used up (early 2017)