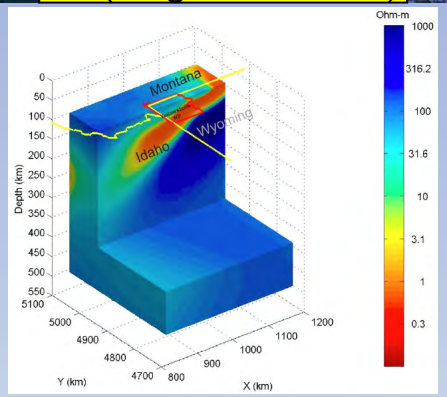
The EarthScope USArray in Eastern North America

Oct 28, 2011
Lehigh University

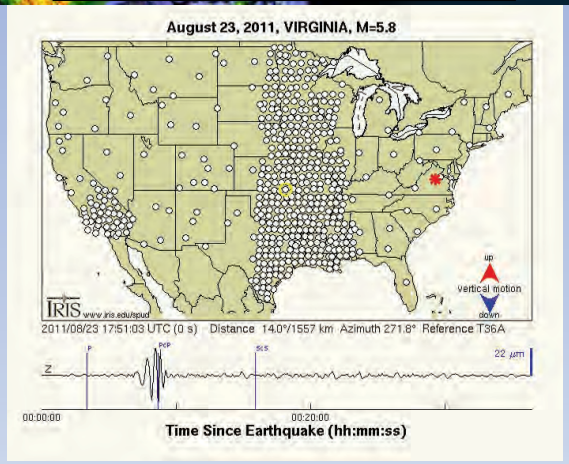
Science Results

TA (Magnetotellurics)



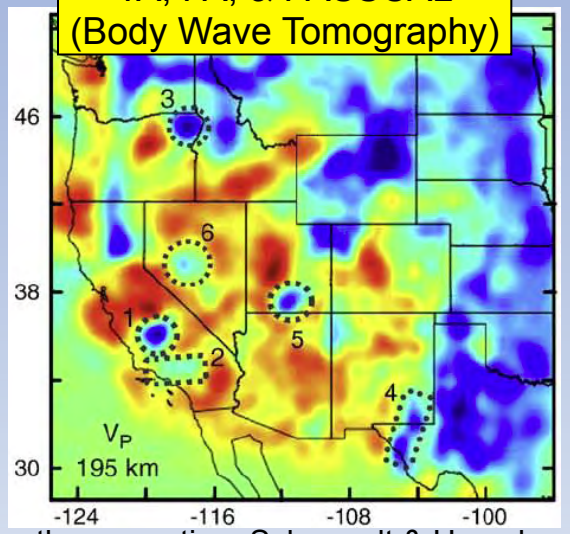
Plumes : Zhdanov et al.

TA (Array Processing)



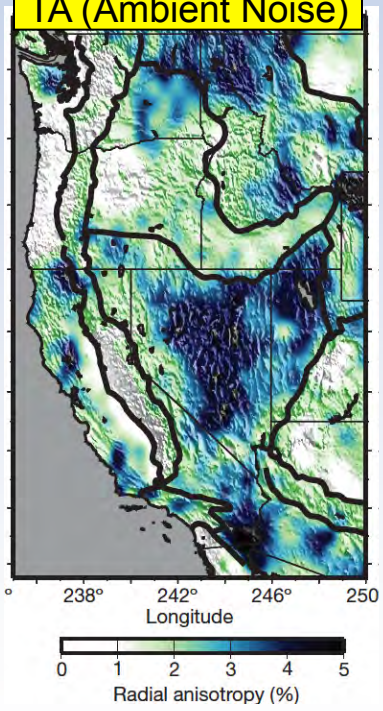
Visualizing earthquakes: IRIS DMC

TA, FA, & PASSCAL (Body Wave Tomography)



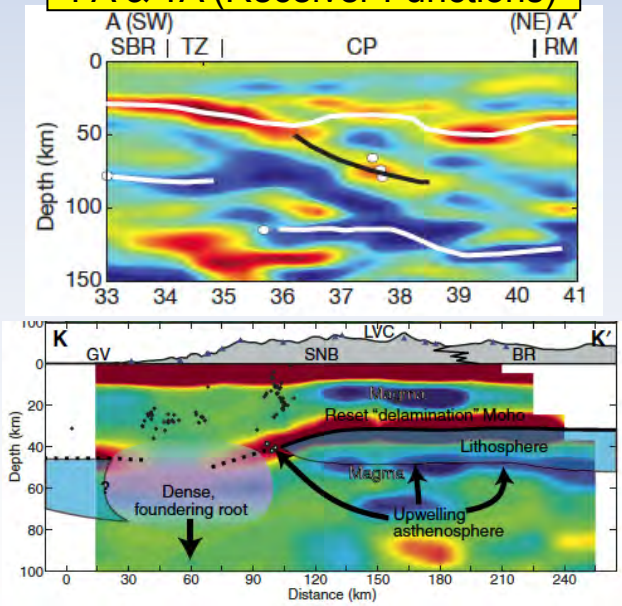
Mantle convection: Schmandt & Humphreys

TA (Ambient Noise)



Crustal anisotropy:
Moschetti et al.

FA & TA (Receiver Functions)

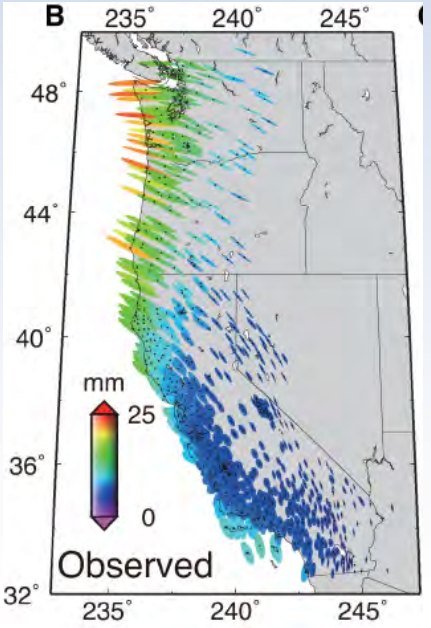


Lithospheric foundering:
Levander et al., Frassetto et al.

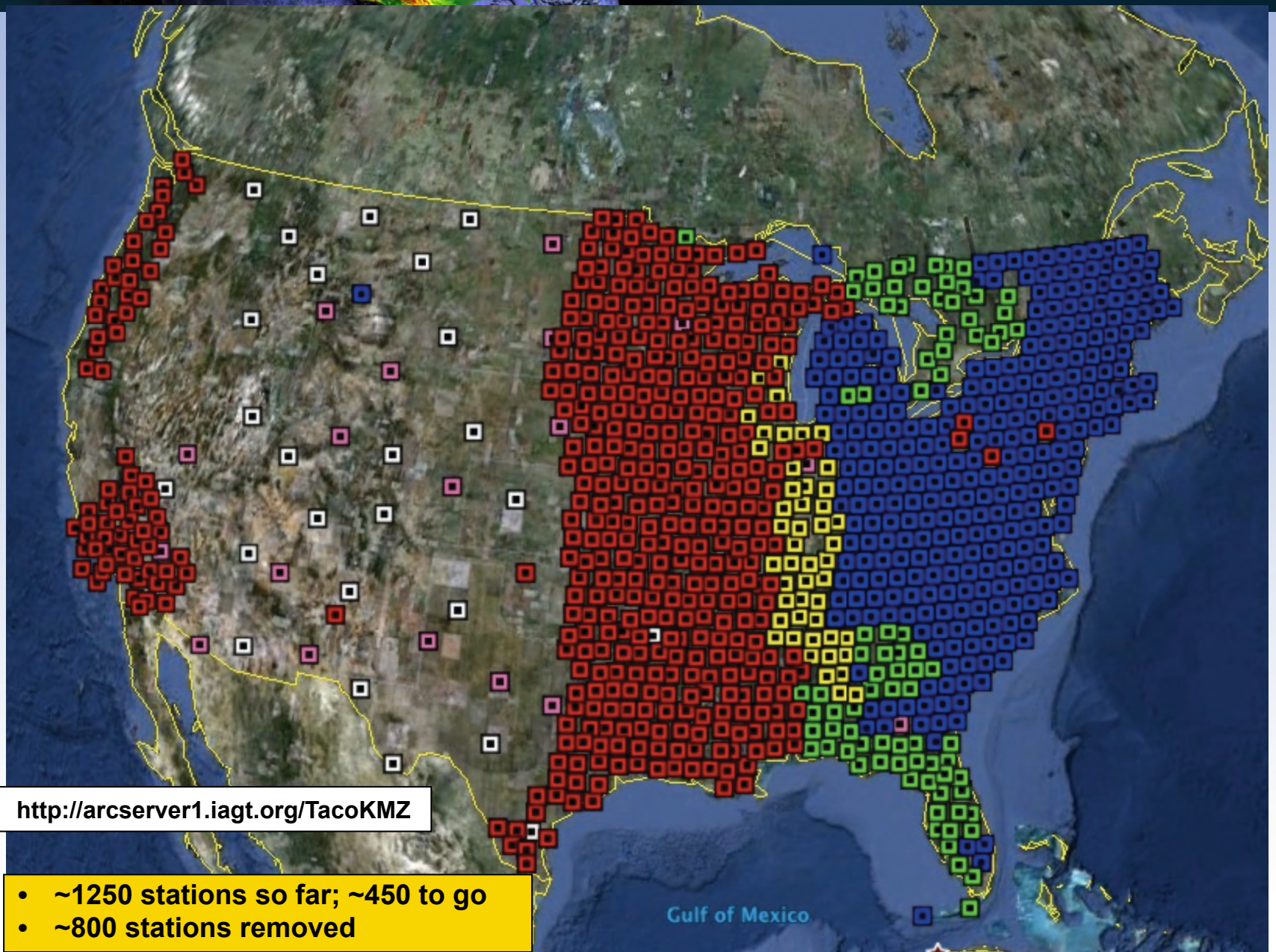
PBO (GPS)

Modeling mantle rheology: Ito & Simons

150+ papers in 2010-2011



Transportable Array

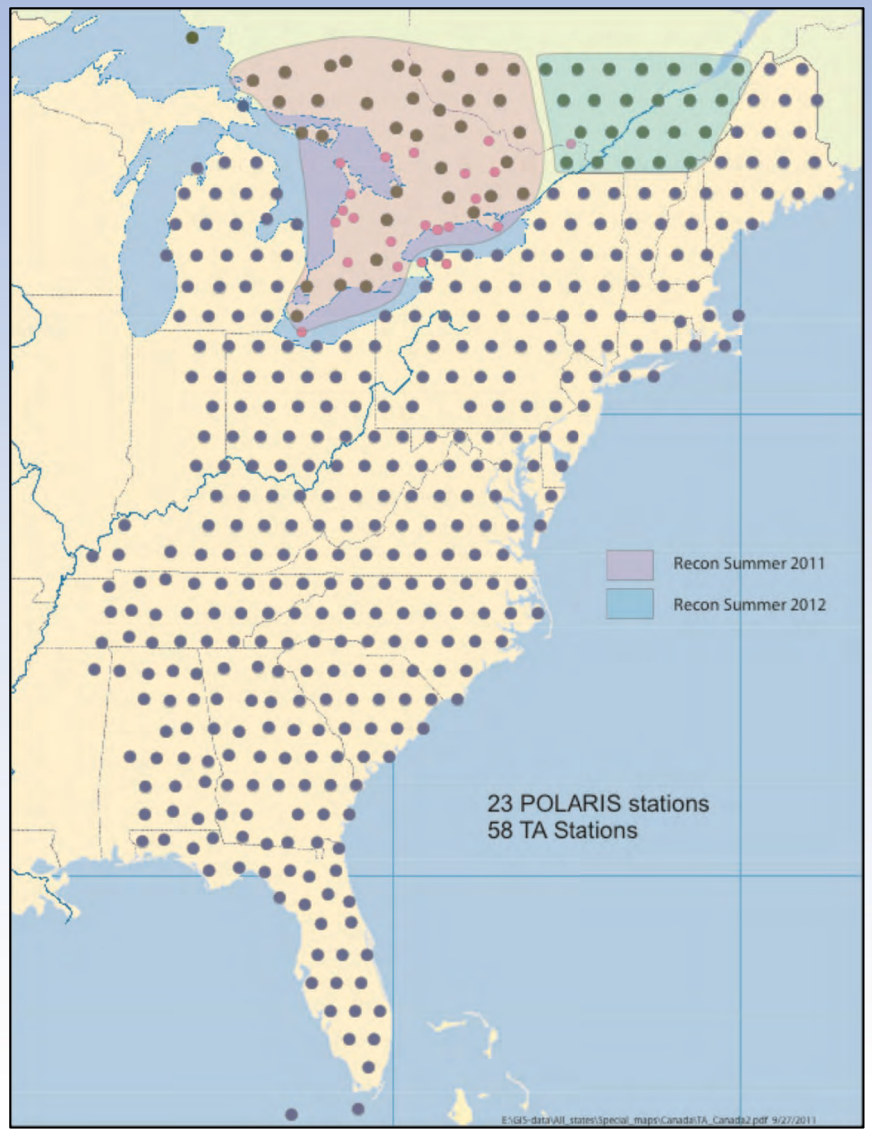


http://arcserver1.iagt.org/TacoKMZ

- ~1250 stations so far; ~450 to go
- ~800 stations removed

Approximate Final Footprint

Approximate Final Footprint – September 2013

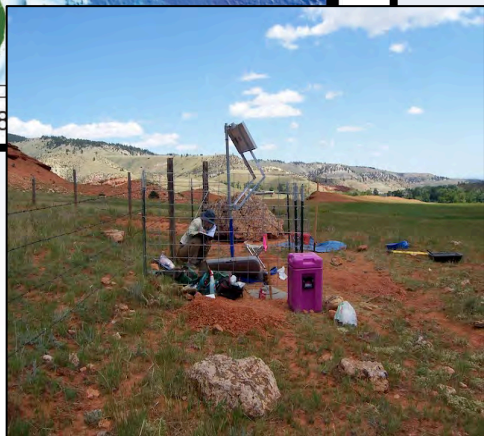


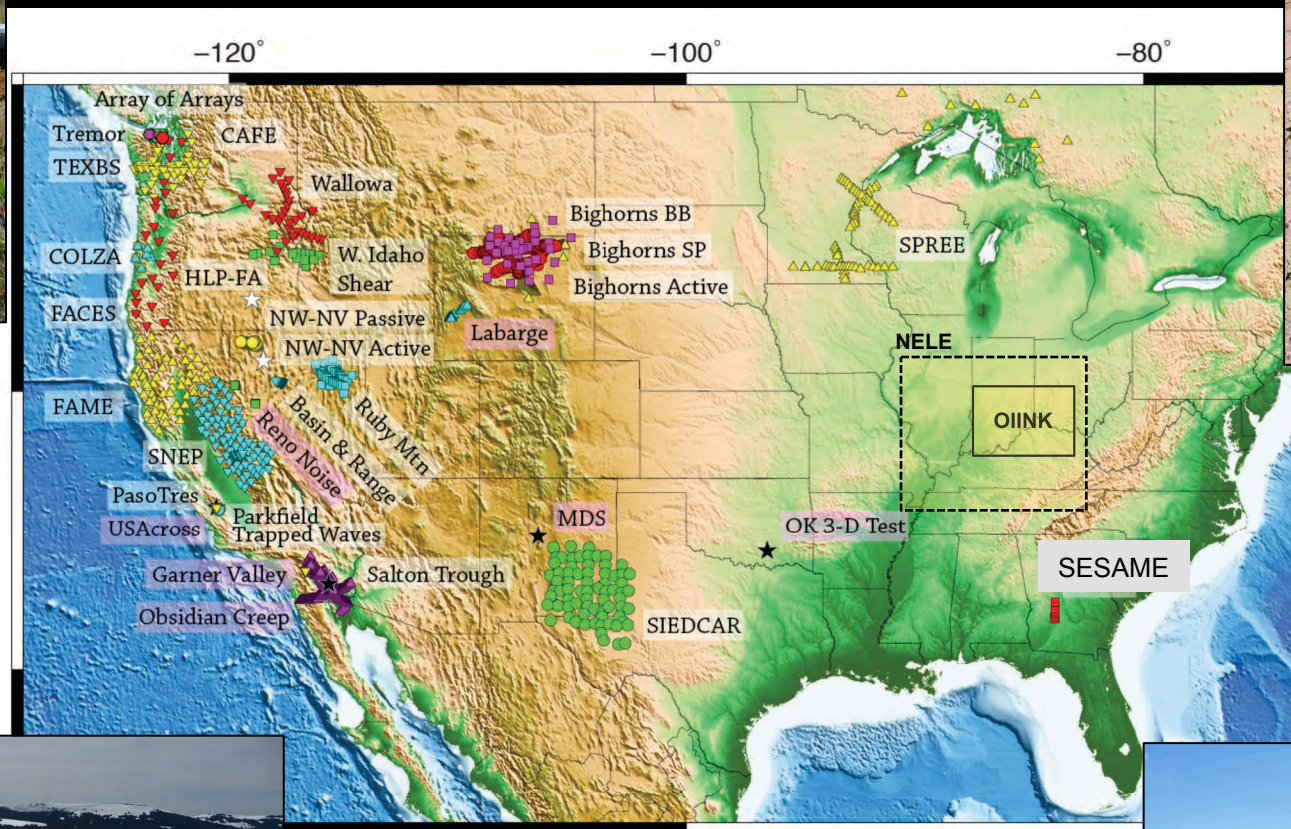
Alaska 2013-2018

272 sites

85 km grid

Flexible Array

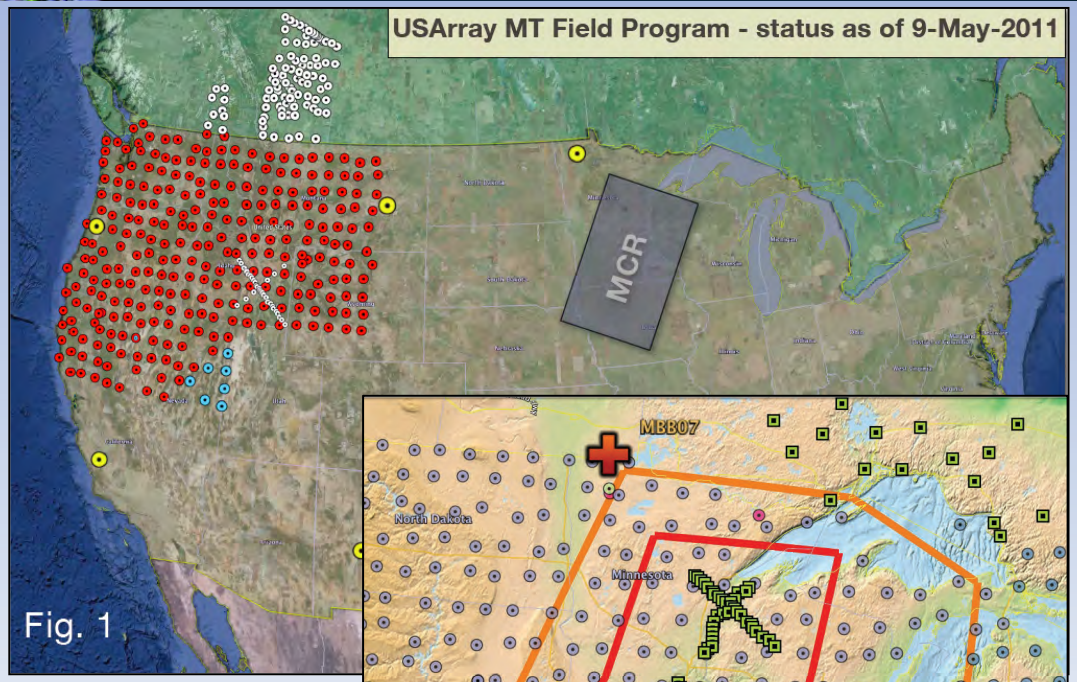


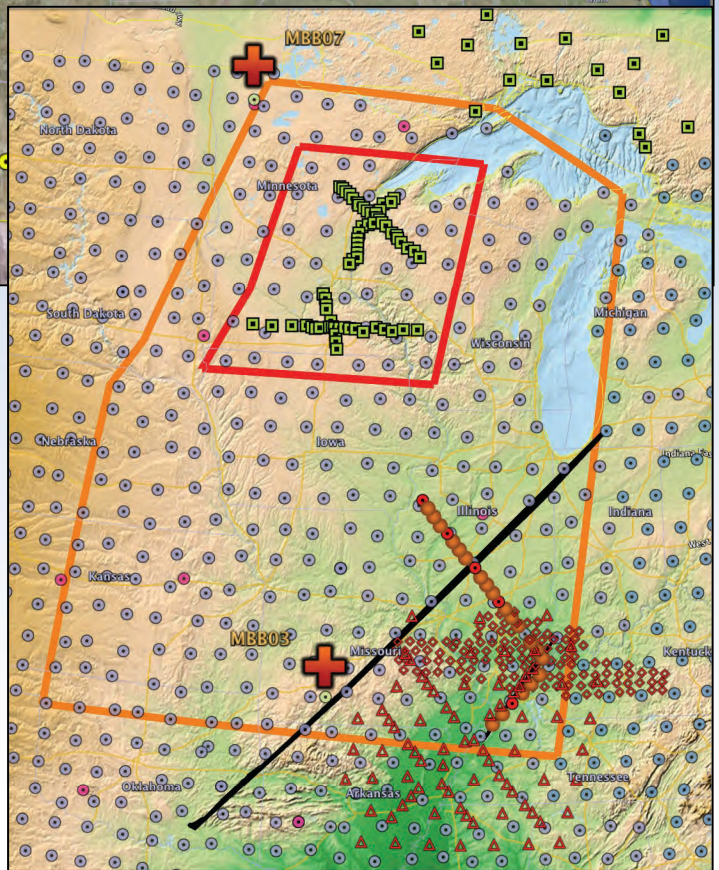


- **~16 experiments**
- **326 broadband**
- **120 short period**
- **1700 active source**

MT - TA

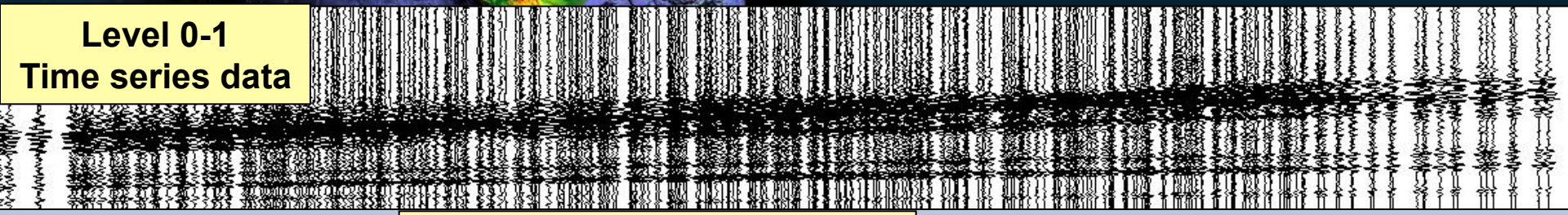
- Over 300 stations during 2006-2011
- 2012 and 2013 will focus on the mid-continent rift
- Data available at IRIS DMC





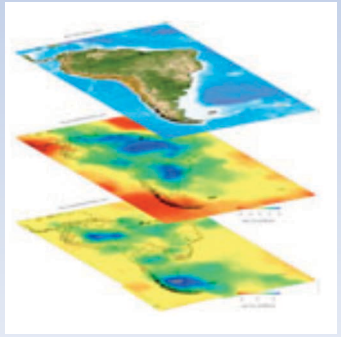
Data & Products

Level 0-1
Time series data

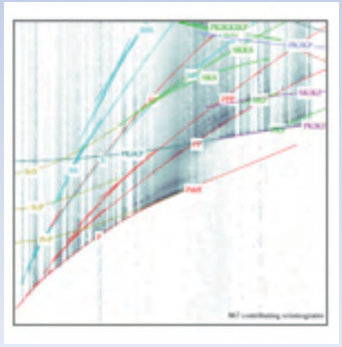


Level 2-3 Products

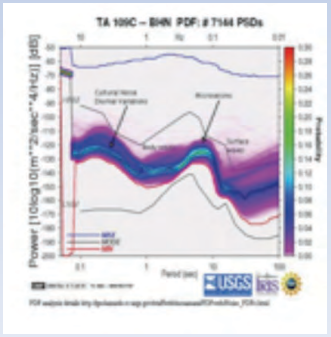
Earth Model Collaboration



Event Plots

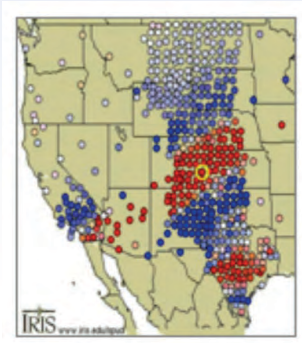


PDF/PSD Bulk Data Delivery

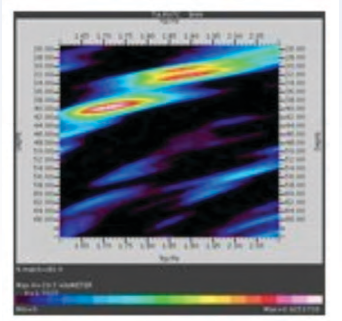


MT Transfer Functions

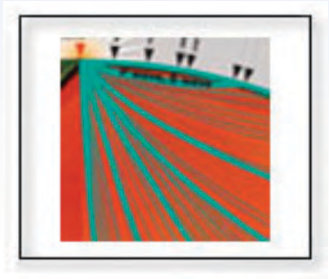
Ground Motion Visualizations



EARS Receiver Functions



Event Bulletins



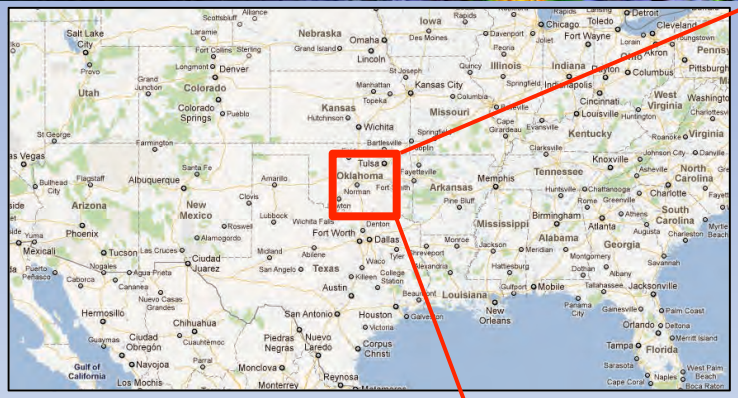
TA Station Digests

Film Chips

GSN Calibrations

Global CMTs

Mapping Low-level Seismicity



Events detection / location:

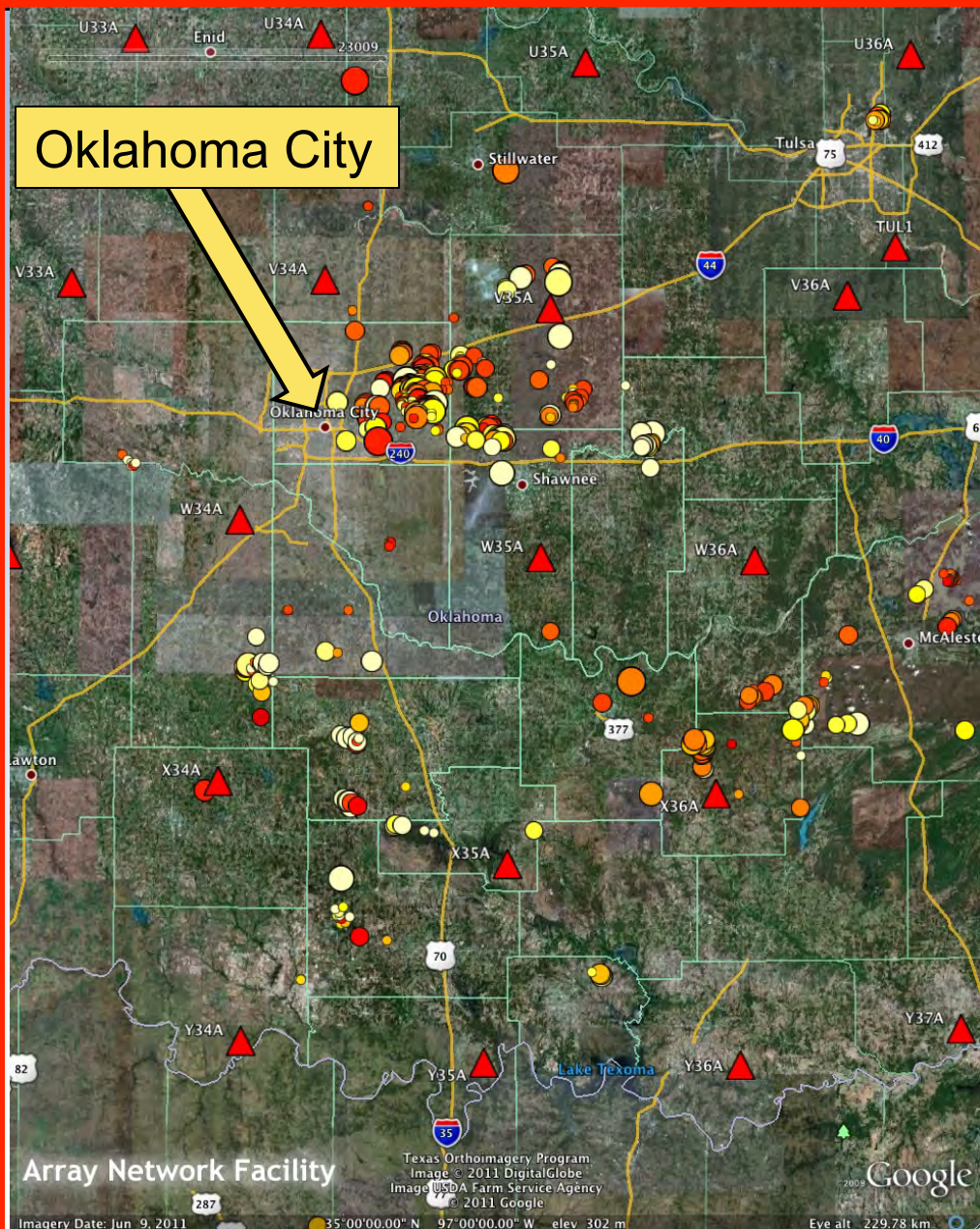
USGS QED	62
CERI	2
USArray ANF	614

Catalog produced by USArray ANF from TA waveforms to-date

60,139 events

4,488,465 arrivals

See WWW.IRIS.DMC/SPUD



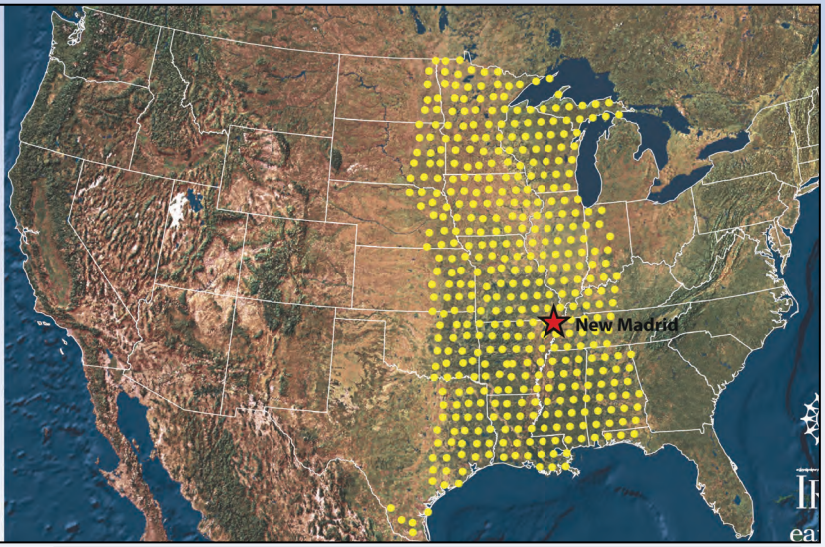
Station Adoption

As of August 2011
45 Complete Stations Adopted
29 Vaults Adopted

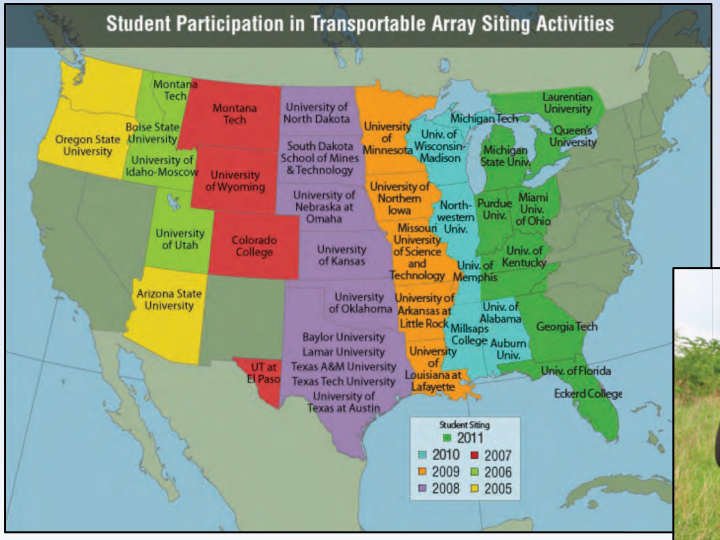
~$40K to adopt a station
~$6K/yr to operate

Opportunities for Broader Impacts

- Active Earth Kiosks - simple free-standing displays designed for visitor centers, small museum
- Transportable Array and the New Madrid bicentennial
- Student participation in TA site reconnaissance



TA footprint at New Madrid Bicentennial



Summary

- Opportunities:
  - Data, data products, instruments
  - Station Adoption
  - Outreach and broader Impacts

- Opportunities for input
  - IRIS membership meeting and reception - Monday evening @ AGU
  - UNAVCO membership meeting and reception - Tuesday evening @ AGU
  - UNAVCO Workshop 2/28 – 3/1, 2012
  - IRIS Workshop, 6/13 – 6/15, 2012

On the Web

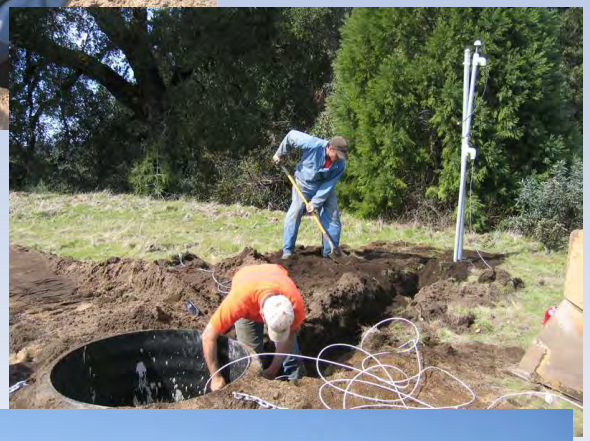
- EarthScope
  www.earthscope.org
- USArray
  www.usarray.org
- PBO
  pboweb.unavco.org
- National Science Foundation
  www.nsf.gov

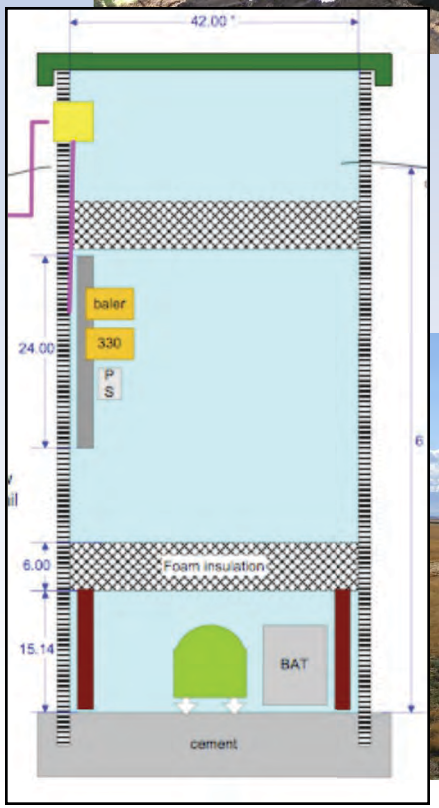
EarthScope is funded by the National Science Foundation.

EarthScope is operated, and maintained as a collaborative effort with UNAVCO, and IRIS, with contributions from the US Geological Survey, NASA and several other national and international organizations.

Transportable Array

- 400 broadband seismic stations
  - ~70 km spacing
  - ~2 year deployments at each site
  - 10 years and 1623 sites to roll across the country
- Progress to-date
  - ~1,250 installations
  - ~800 removals
- All data are collected in realtime
  - 24x7 data collection
  - Mostly via cell modems
  - Data are openly distributed via IRIS Data Management Center





Construction

Installation