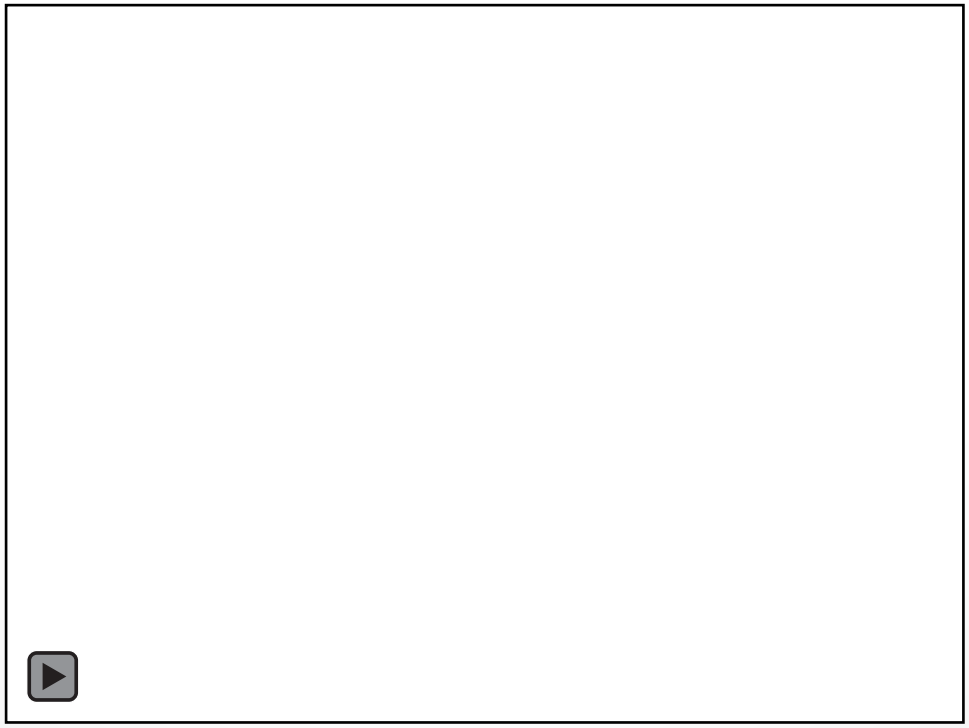
IRIS Data Tools and Other Resources

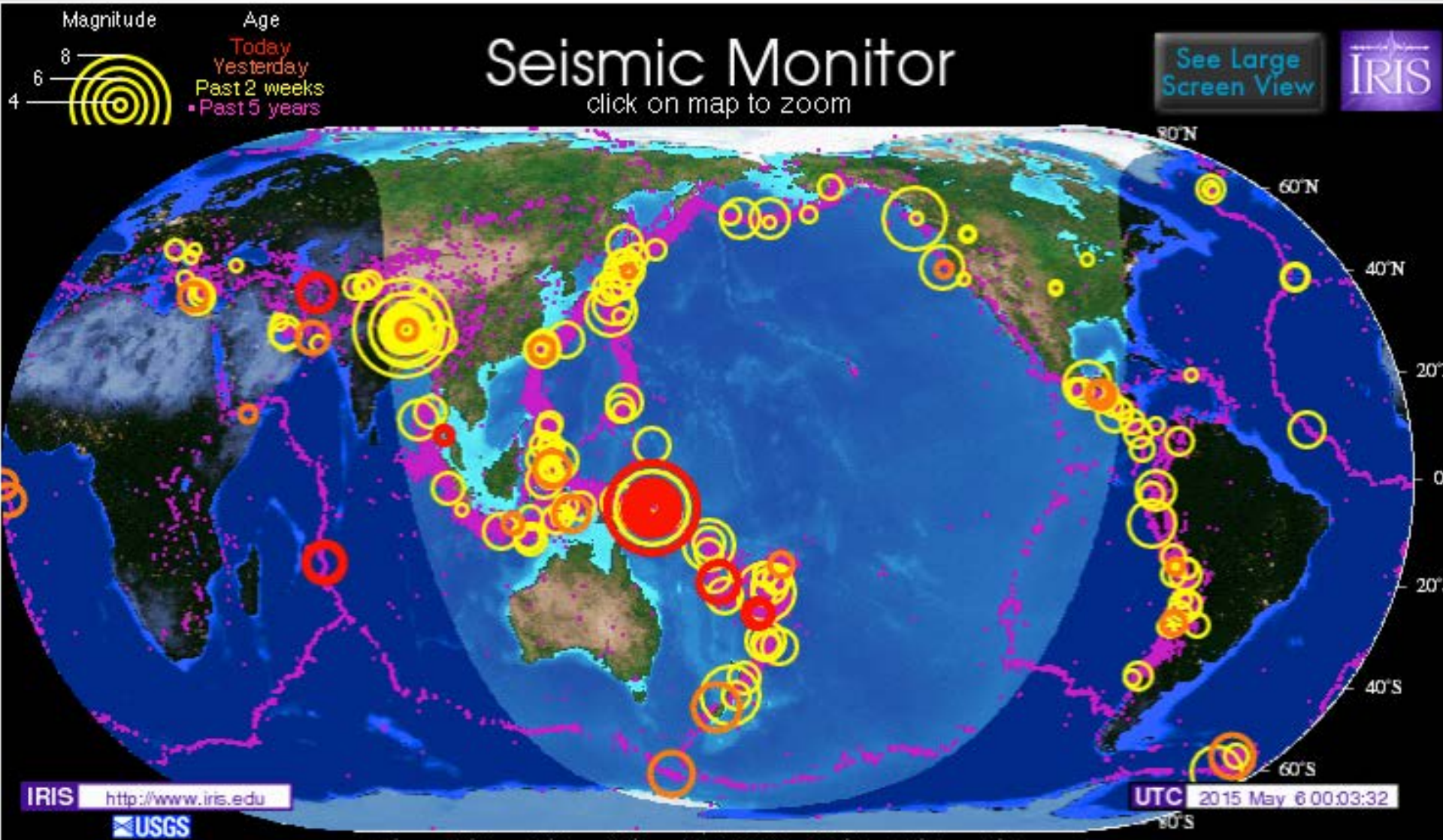
John Taber, IRIS

Overview

- How to engage students with real data and recent newsworthy earthquakes
- Tools for student activities and research
- Supporting resources



Investigating an earthquake



As a story

IRIS Teachable Moments

Magnitude 7.1 PUEBLA, MEXICO
Tuesday, September 19, 2017 at 18:14:39 UTC

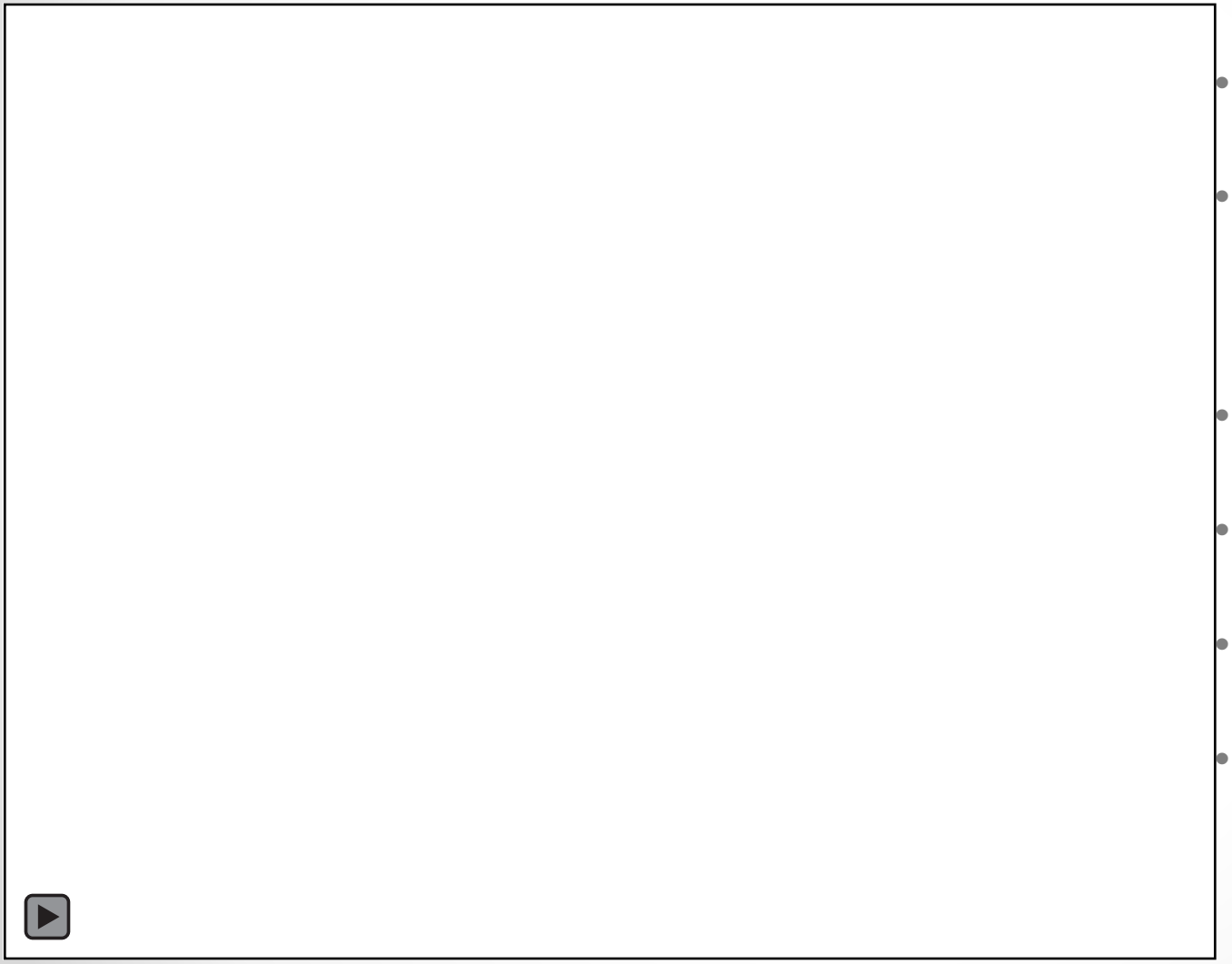
A magnitude 7.1 earthquake has occurred 120 km SE of Mexico City collapsing buildings, homes, and bridges across hundreds of miles. Nearly 140 people had been reported killed across the country, but that figure was expected to climb as rescue and recovery proceeds.

This earthquake occurred on the 32nd anniversary of the devastating 1985 M8.0 Michoacan earthquake, which caused extensive damage to Mexico City and the surrounding region.

A car sits crushed, engulfed in a pile of rubble from a building felled by a 7.1 earthquake, in Jojutla, Morelos state, Mexico. The earthquake stunned central Mexico, killing at least 139 people as buildings collapsed in plumes of dust. (AP Photo/Carlos Rodriguez)

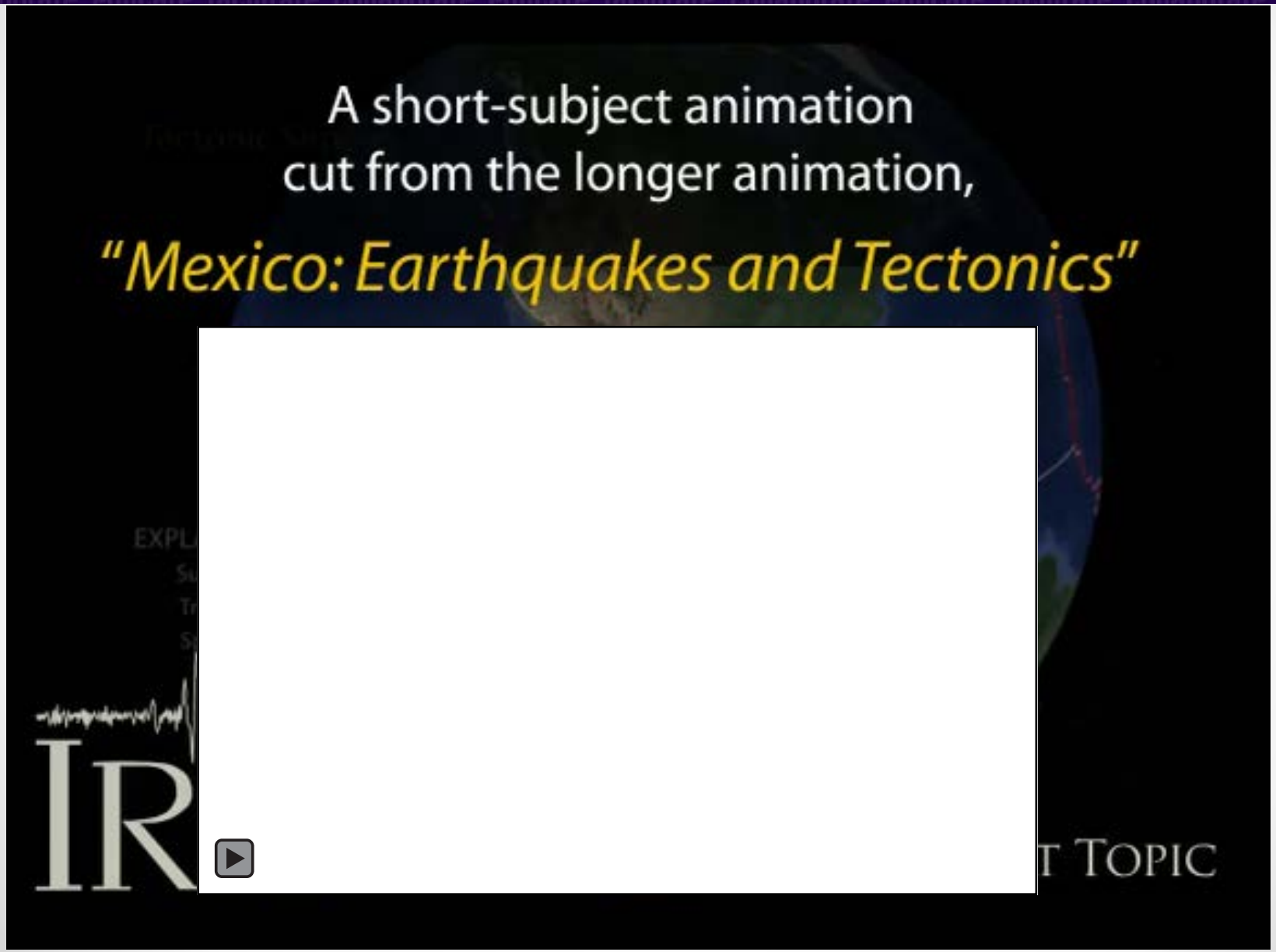
- Recent Earthquake Teachable Moments slide sets produced within 1 day
- Jointly produced with Univ. of Portland
- Collaborative content from USGS, UNAVCO and others

As recorded in the US

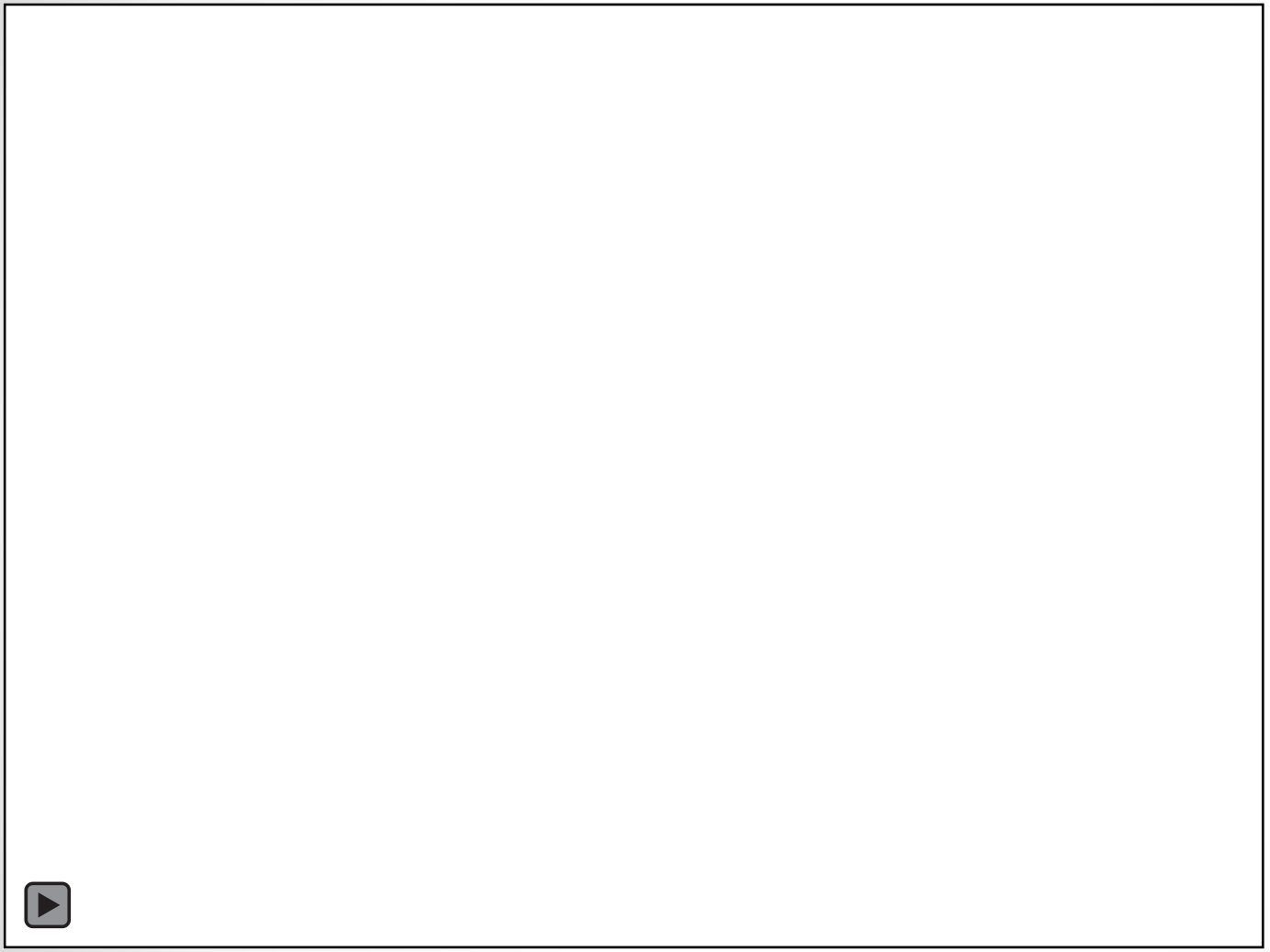


- **Ground motion visualization (GMV)**
- Automatically produced by the IRIS DMC for all earthquakes M5.5+
- Ready after several hours
- Each dot is a seismic station
- Red means up and blue means down
- Scale on the bottom

Tectonics animation

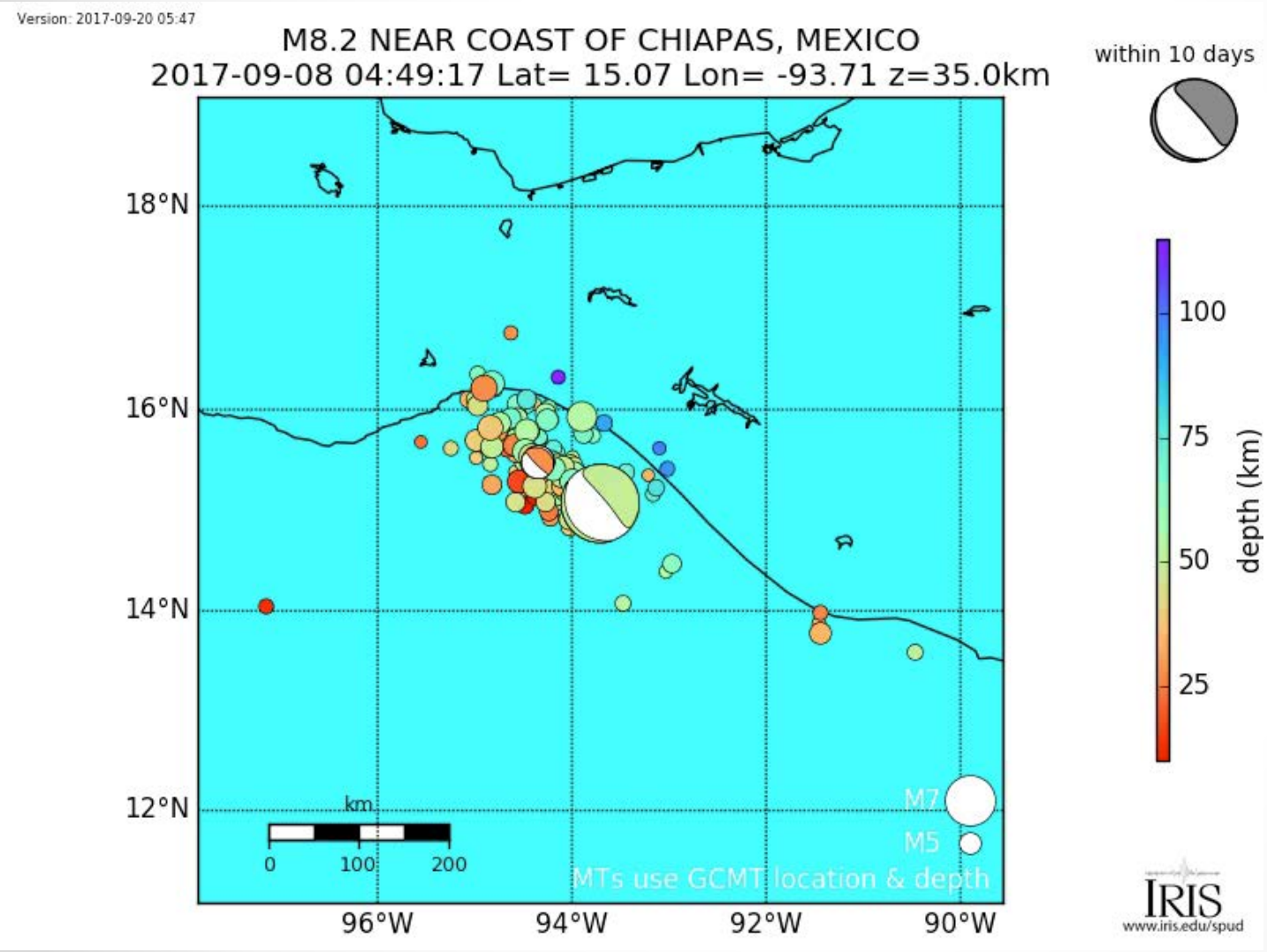


Aftershock sequence and focal mechanisms



Automatically produced by IRIS Data Services

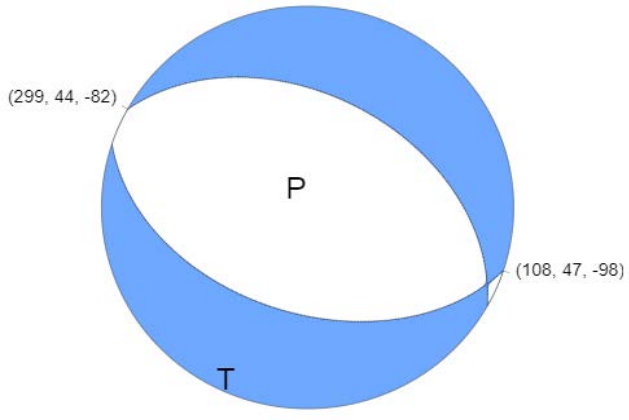
Aftershock sequence and focal mechanisms



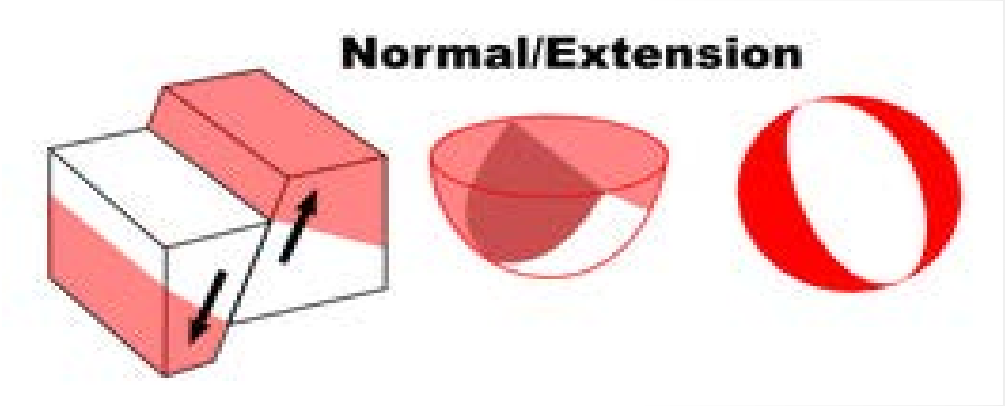
Automatically produced by IRIS Data Services

Mechanism and regional stresses

The focal mechanism is how seismologists plot the 3-D stress orientations of an earthquake and determine the direction of faulting.



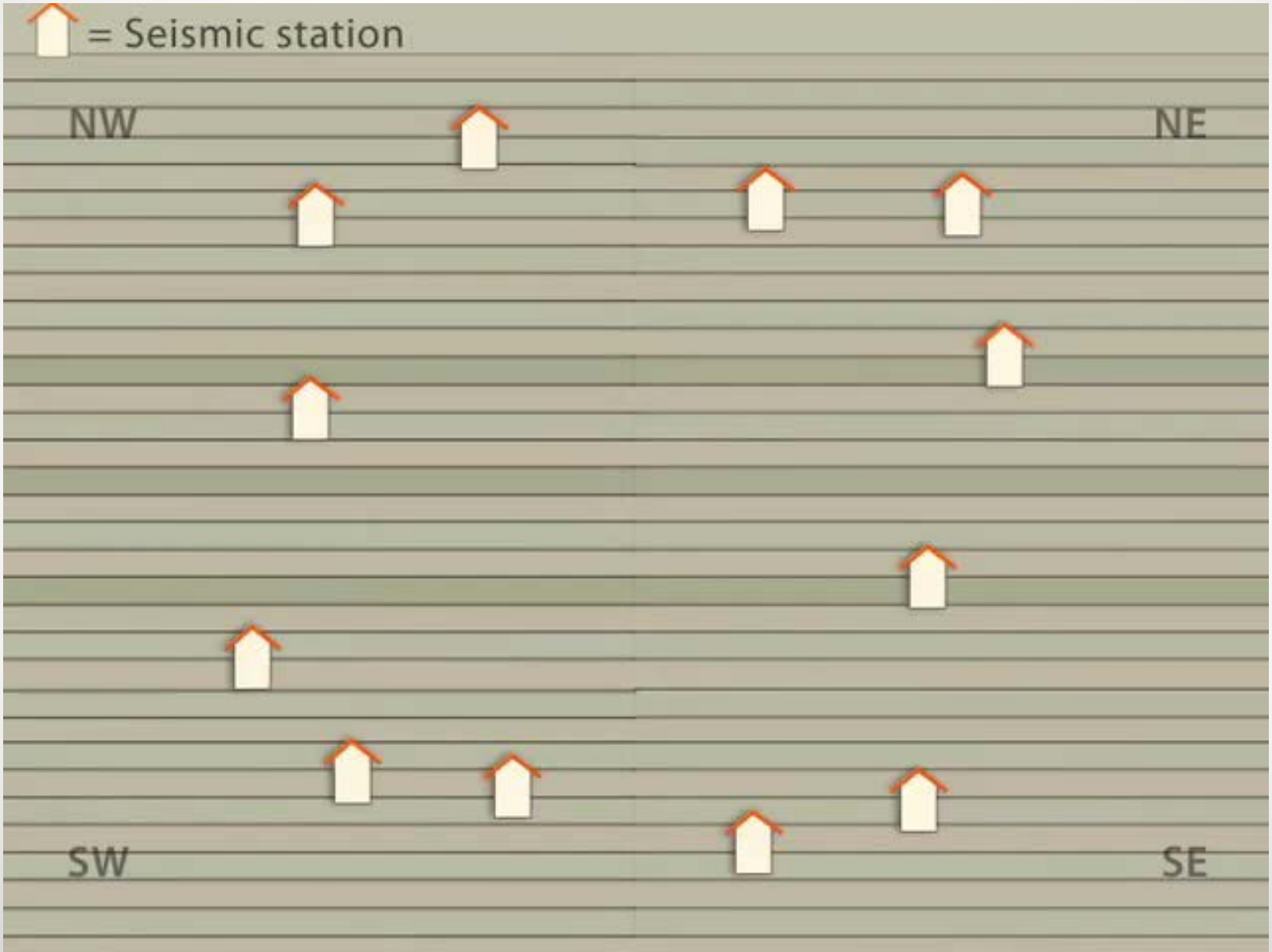
USGS W-phase Moment Tensor Solution



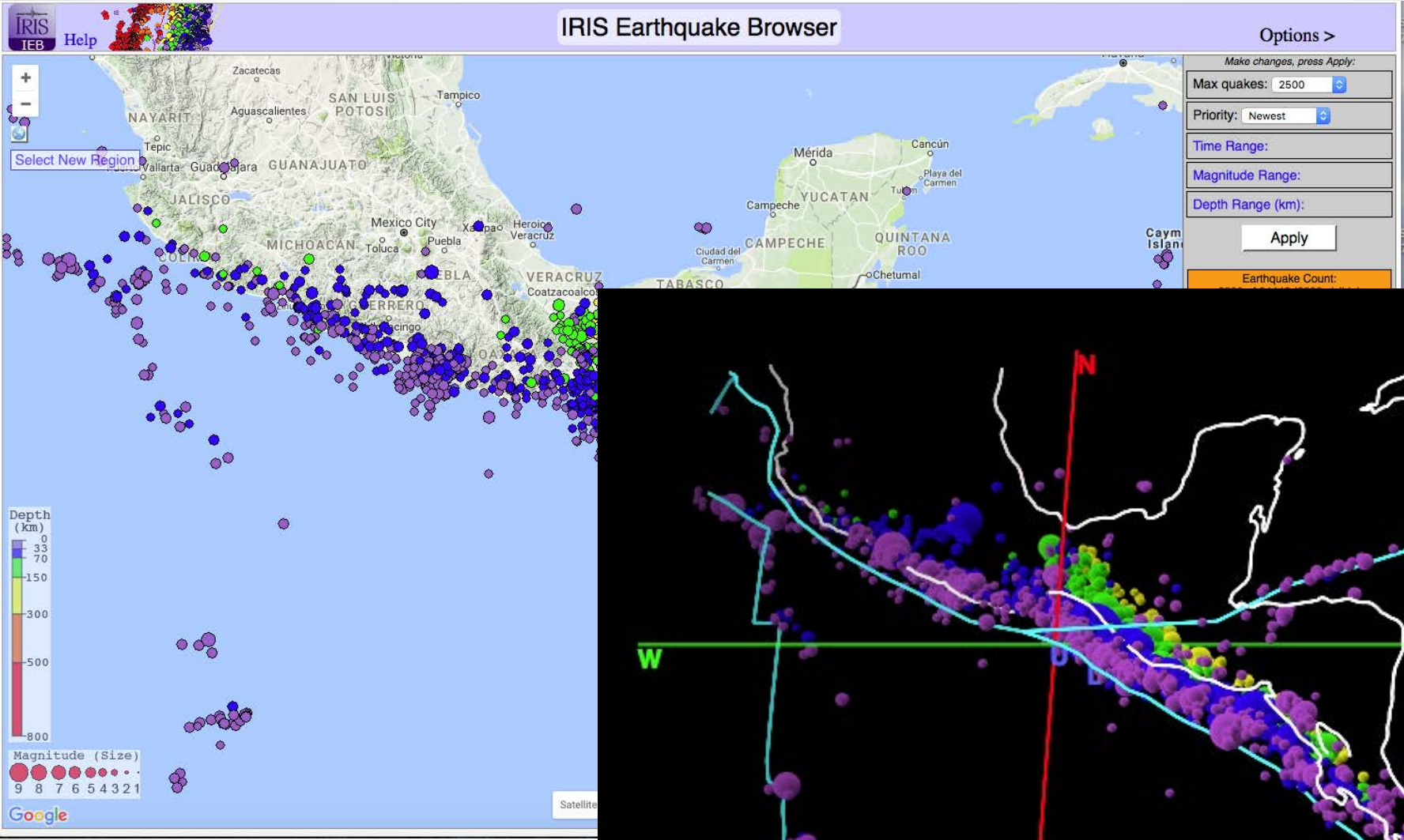
The tension axis (T) reflects the minimum compressive stress direction. The pressure axis (P) reflects the maximum compressive stress direction.

In this case, the focal mechanism indicates this earthquake occurred as the result of normal faulting.

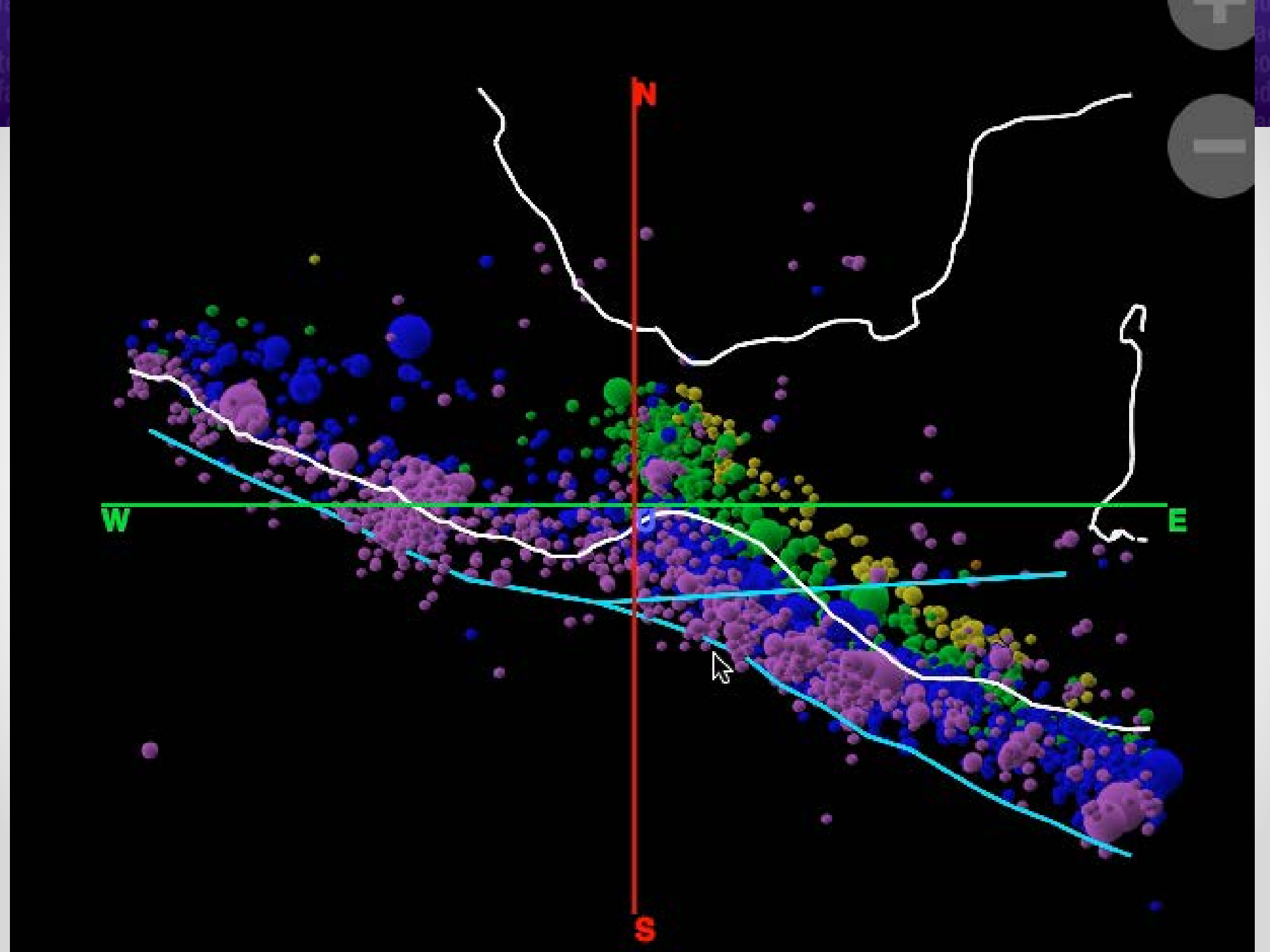
Focal mechanism animation



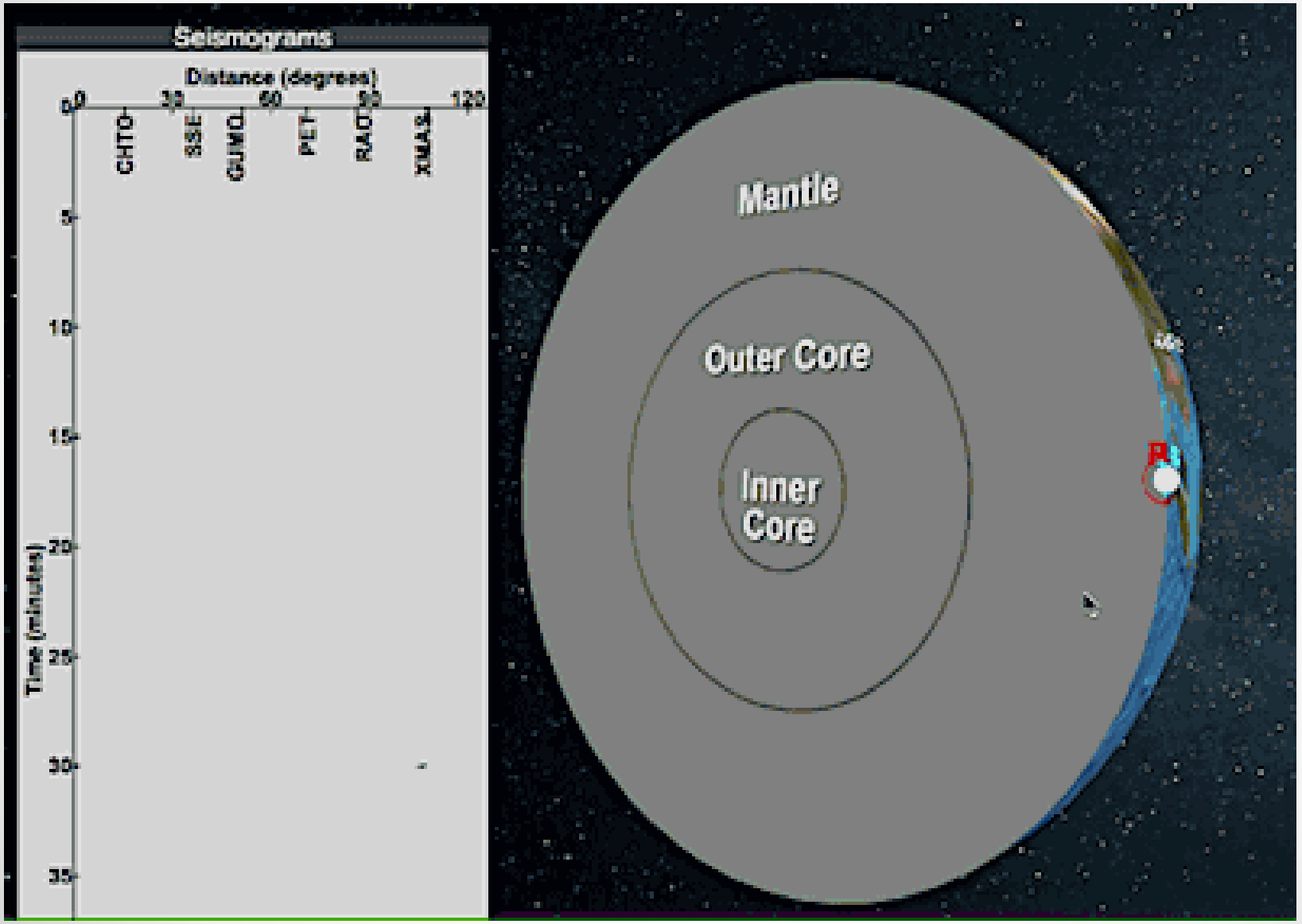
Explore the regional seismicity



http://ds.iris.edu/ieb/


N
W
E
S

Explore waves traveling through Earth

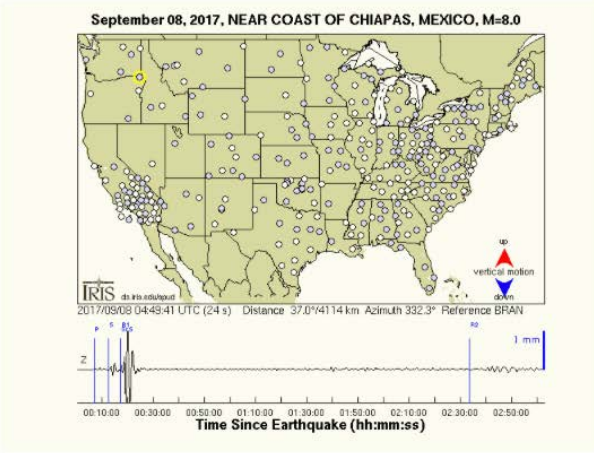


Web app

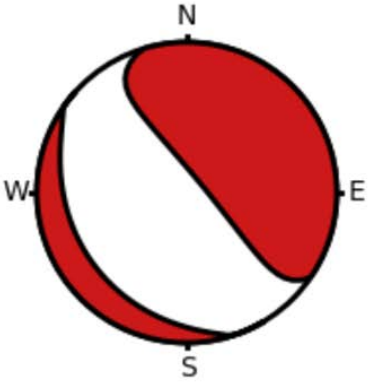
http://ds.iris.edu/seismon/swaves/

Explore Event Data Products

USArray GMV



Moment Tensor



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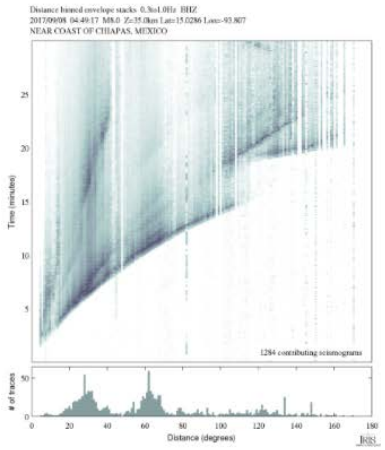
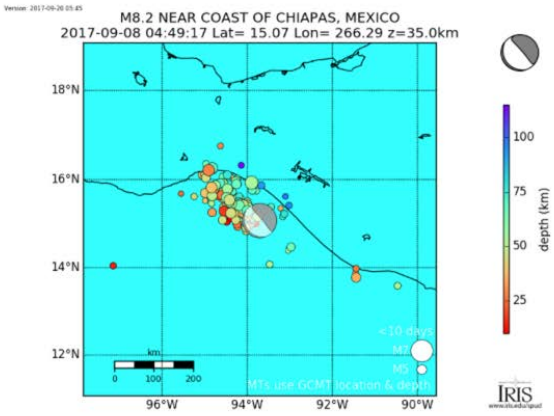
Event Plots



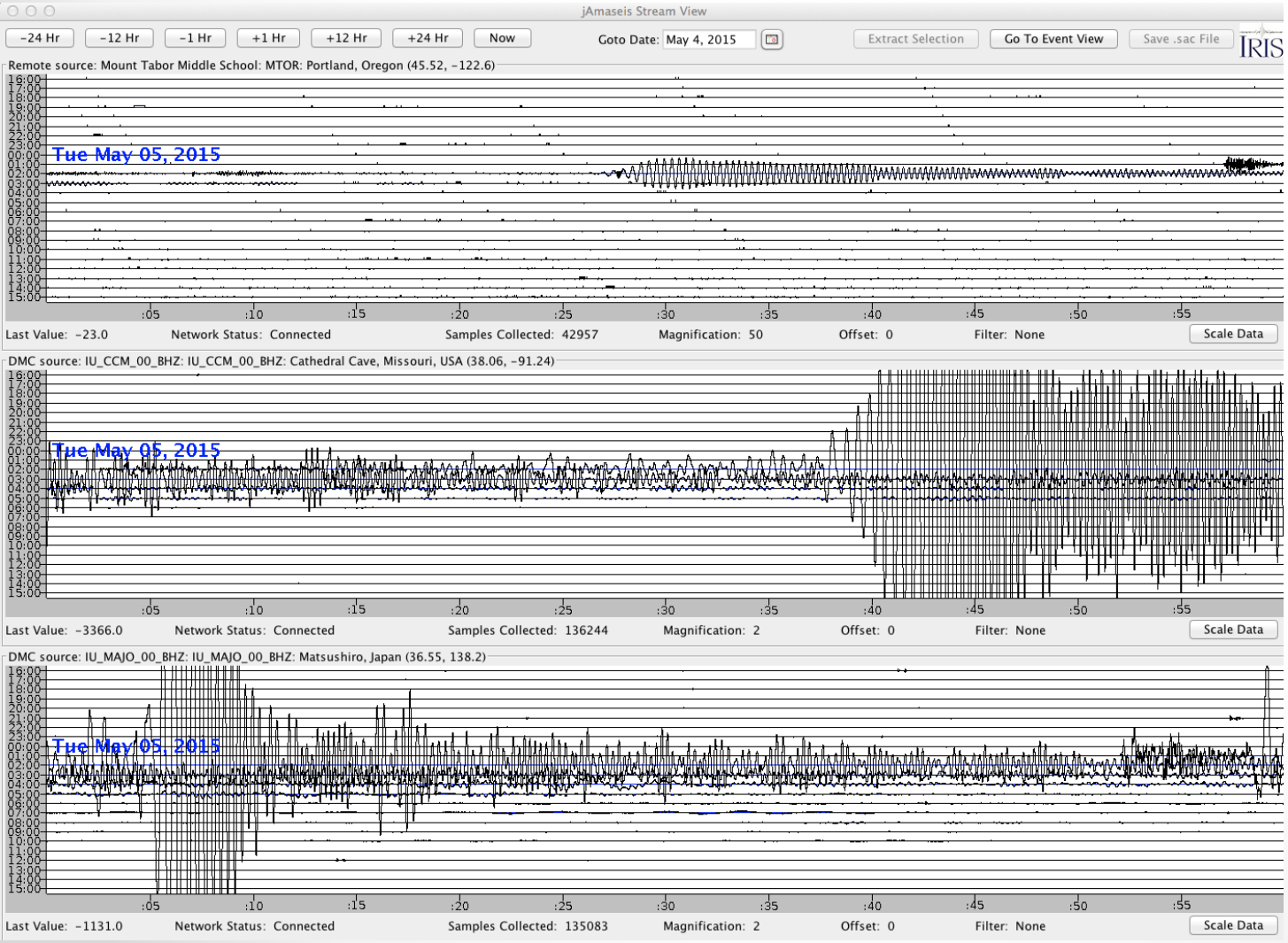
Aftershocks



http://ds.iris.edu/spud/

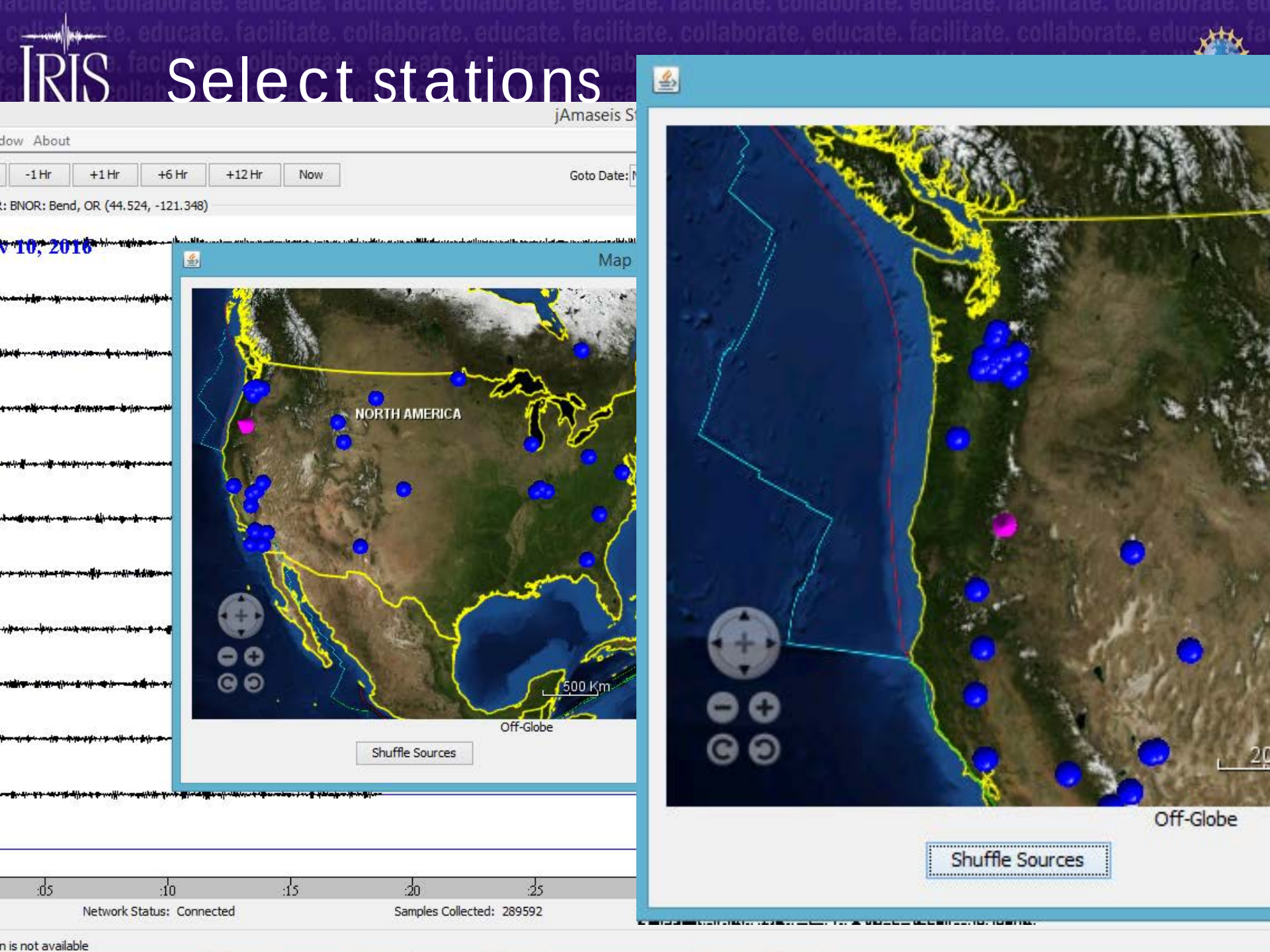
Stream data into the classroom

jAmaSeis

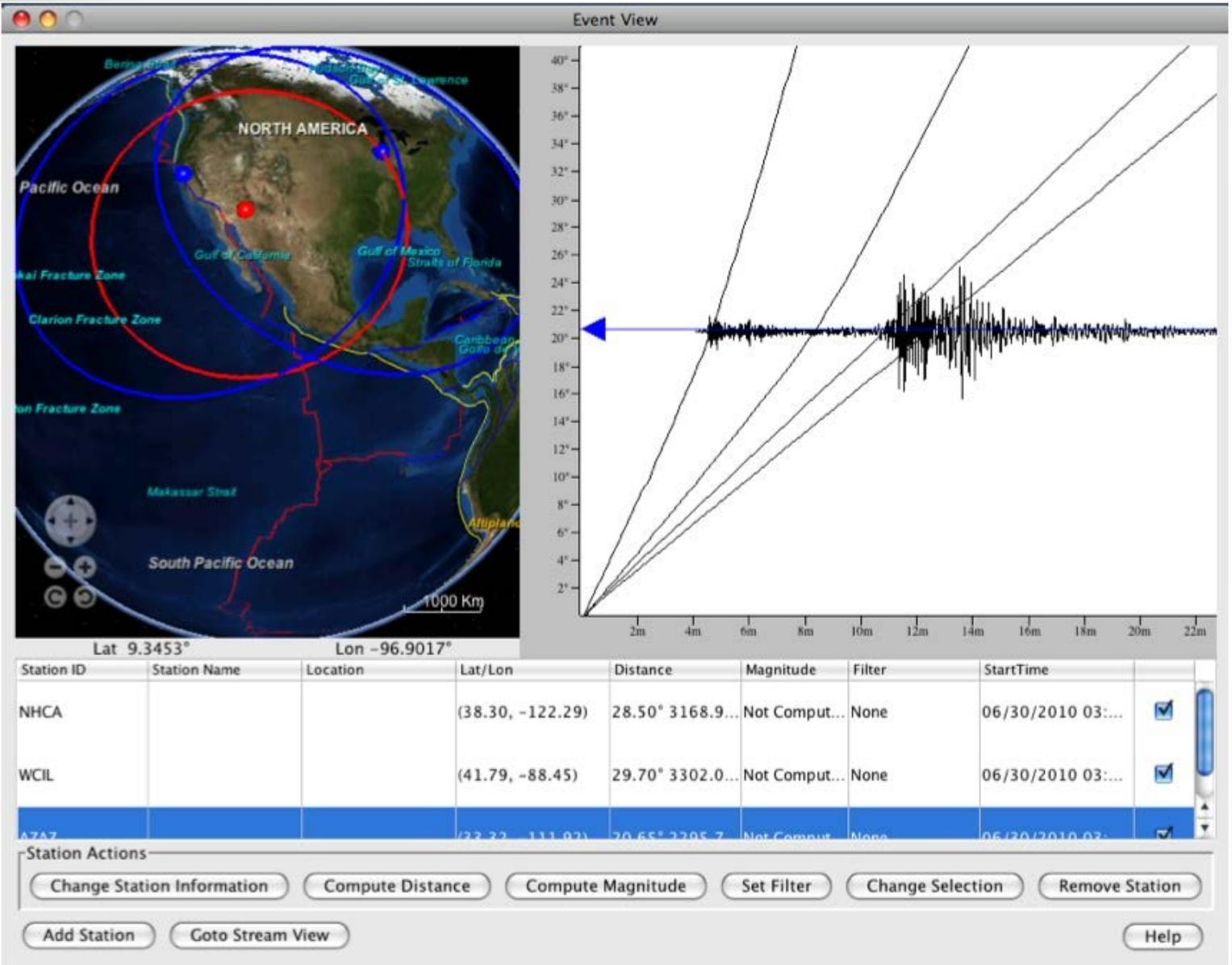


- Cross-platform software
- Can run with/without an educational seismometer
- Watch earthquakes arrive in real-time
- Analysis tools for students

Select stations



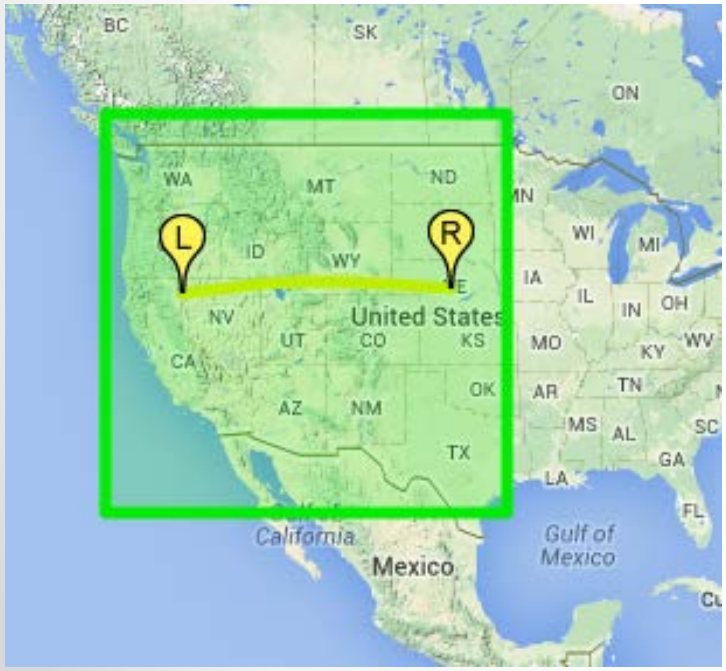
Record and analyze seismic data

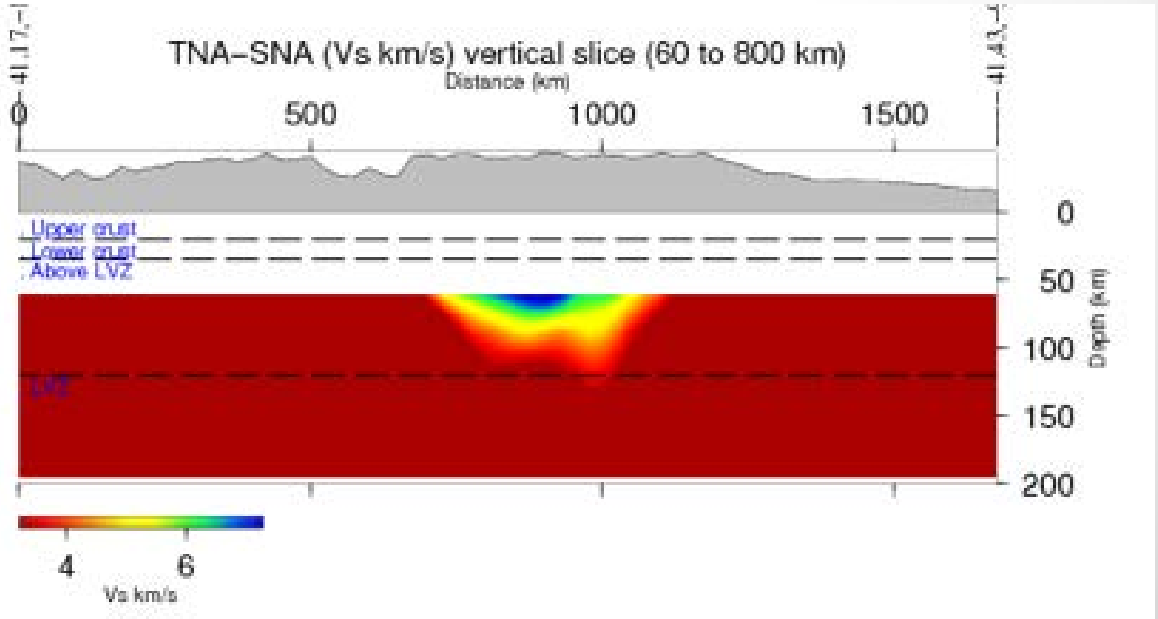


- Simple filtering, arrival picking, locations, magnitudes

Investigate Earth structure: tomographic models

- Select a region and a submitted velocity model and generate a cross section
- Fate of slabs
- Crustal and upper mantle thickness under mountain ranges

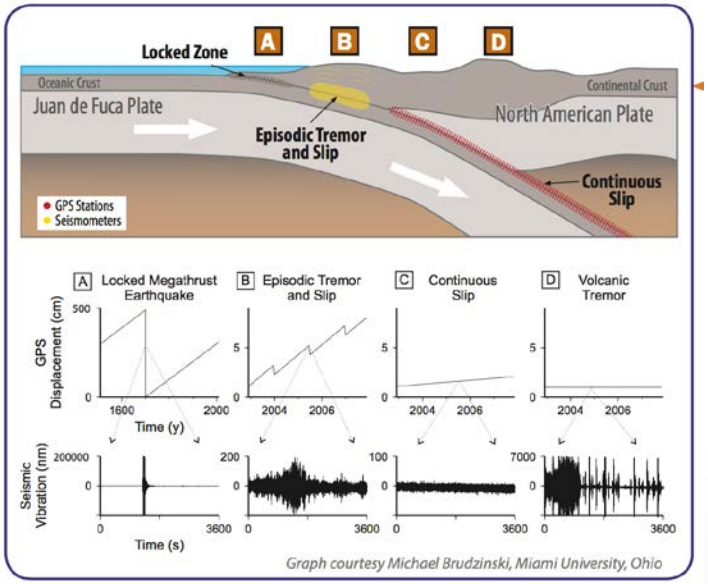


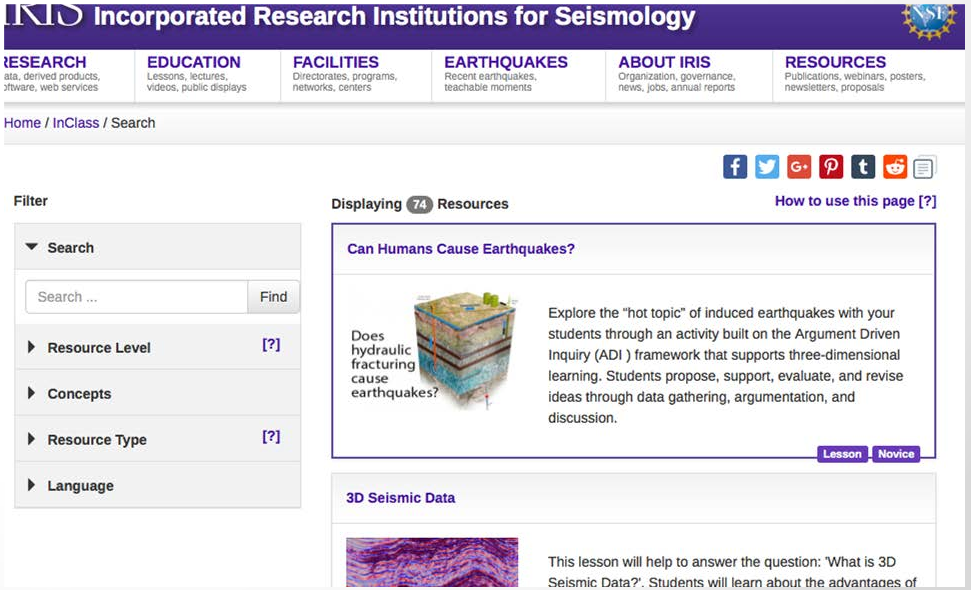
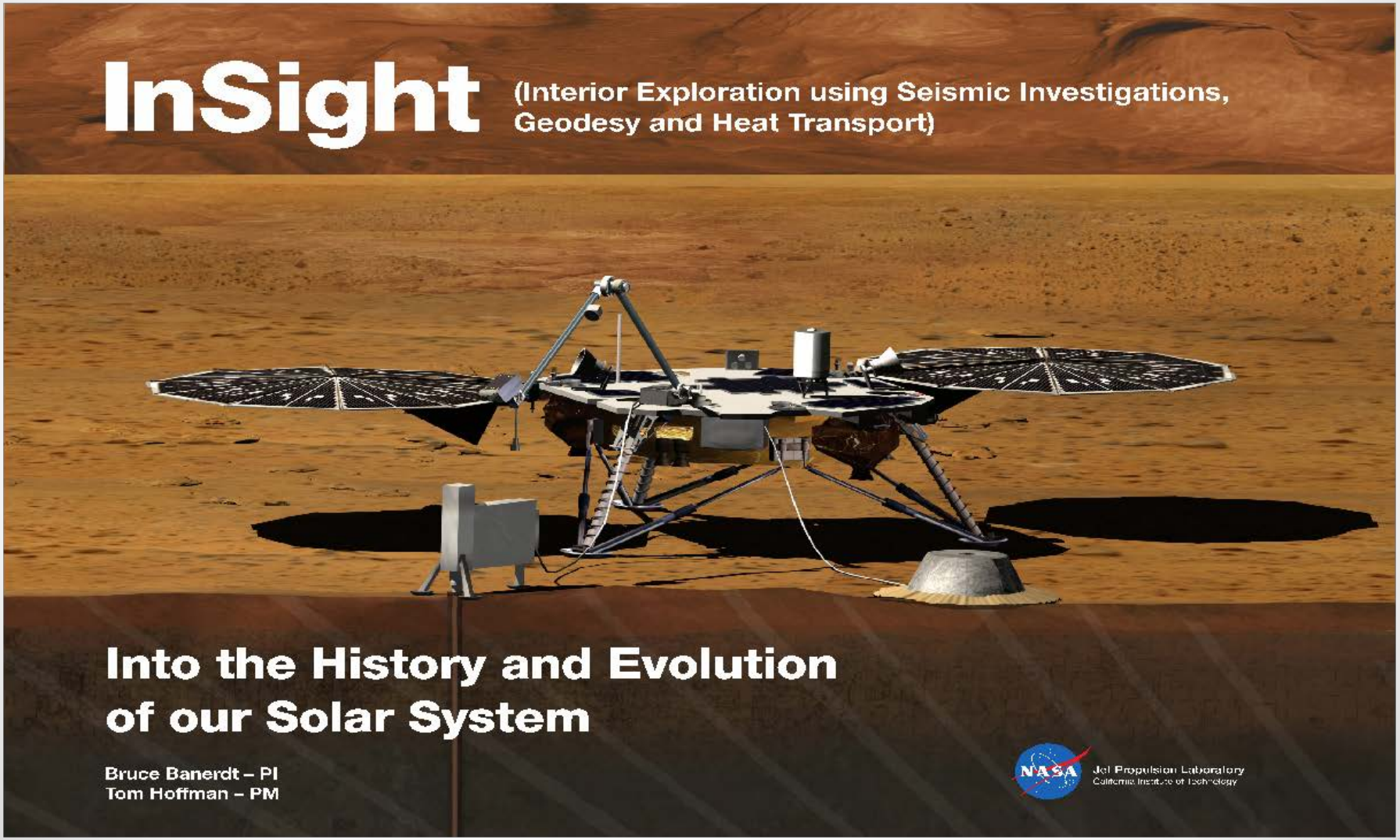


http://ds.iris.edu/ds/products/emc/

Curriculum and Online resources

- Undergraduate seismology labs
  - A collection of inquiry-based classroom activities
  - Episode tremor and slip, glacial earthquakes, induced seismicity, earthquake hazards, earth structure
  - Utilize authentic data to modernize seismological instruction
  - 100- and 200-level undergraduate courses
- Searchable online database of over 300 EPO resources provides links to related resources to expand impact





Looking to the Future (2018)