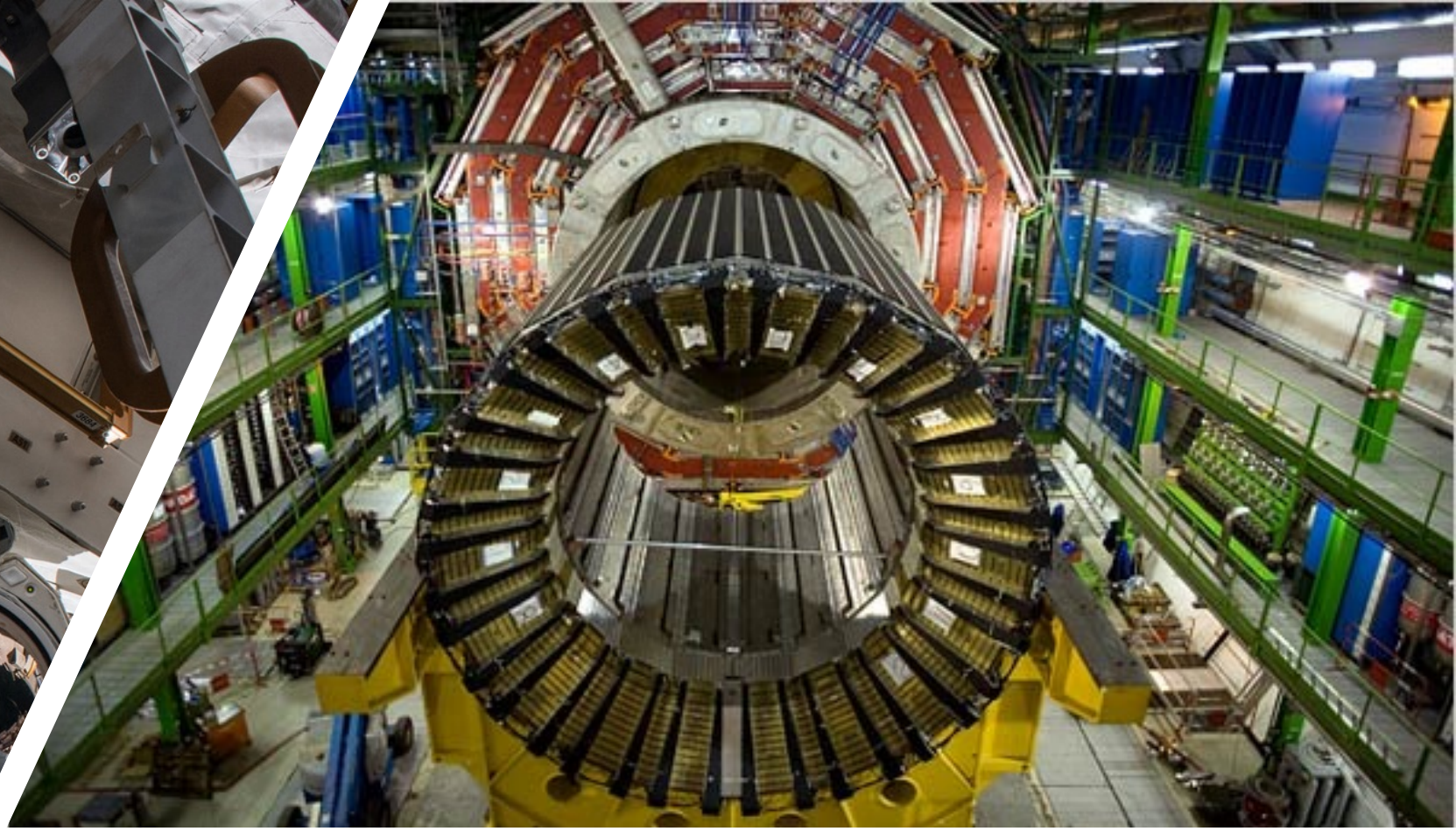


Celebrating EarthScope

Bill Easterling, Assistant Director

NSF Directorate for Geosciences

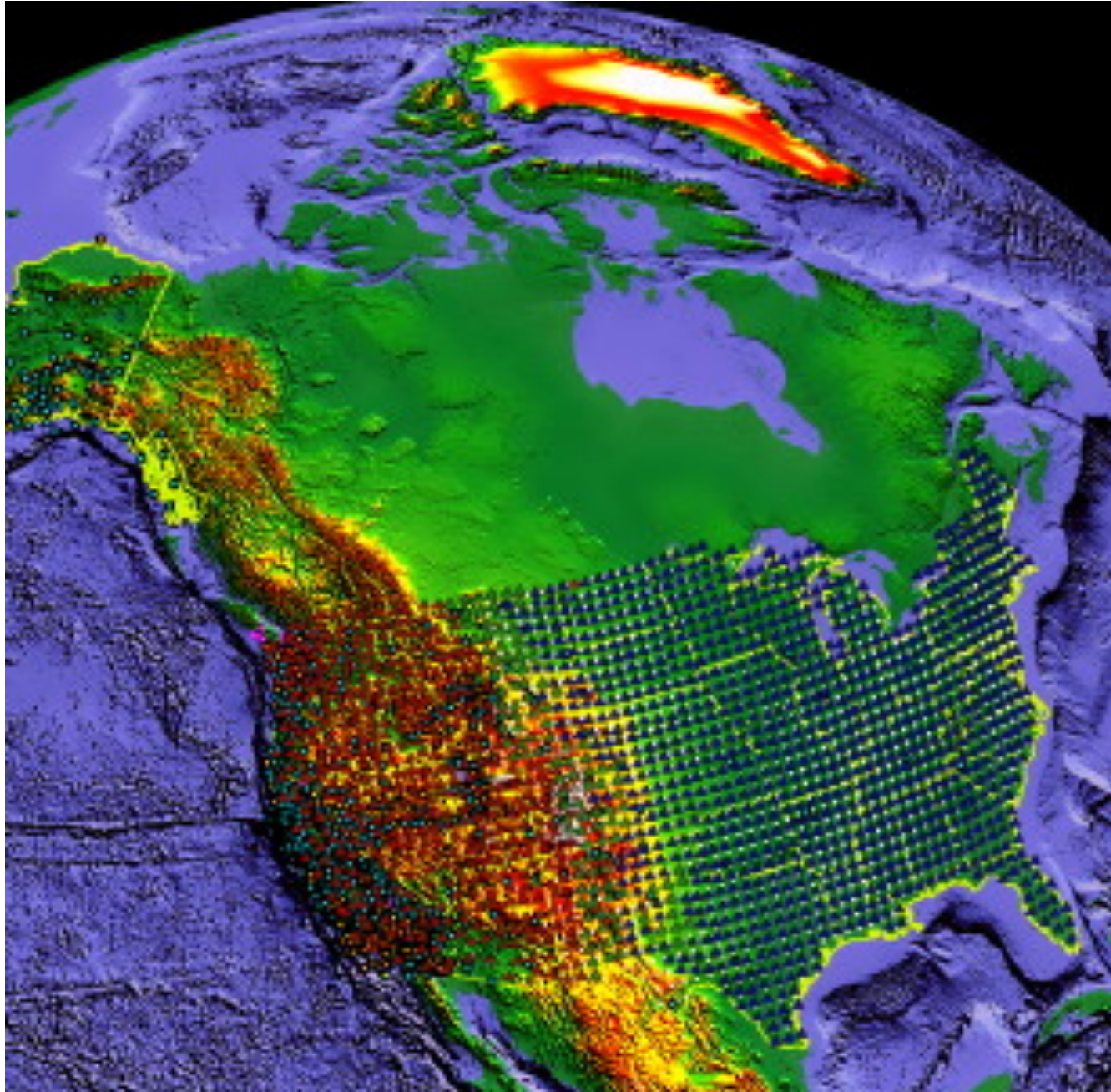


Big Science: The 10 Most Ambitious Experiments in the Universe Today

1: THE EARTHSCOPE

A telescope to peer deep into the heart of our planet

Designed to track North America's geological evolution, EarthScope is the largest science project on the planet. This earth-sciences observatory records data over 3.8 million square miles. Since 2003, its more than 4,000 instruments have amassed 67 terabytes of data – that's equivalent to more than a quarter of the data in the Library of Congress – and add another terabyte every six to eight weeks



earth
scope

www.earthscope.org





A
Map of
LEWIS AND CLARK'S TRACK,
Across the Western Portion of
(North America)
From the
MISSISSIPPI TO THE PACIFIC OCEAN;
By Order of the Executive
of the
UNITED STATES.
in 1804, 5 & 6.
Copied by Samuel Lewis from the
Original Drawing of W. C. Clark.
from H. B. Smith, 1811

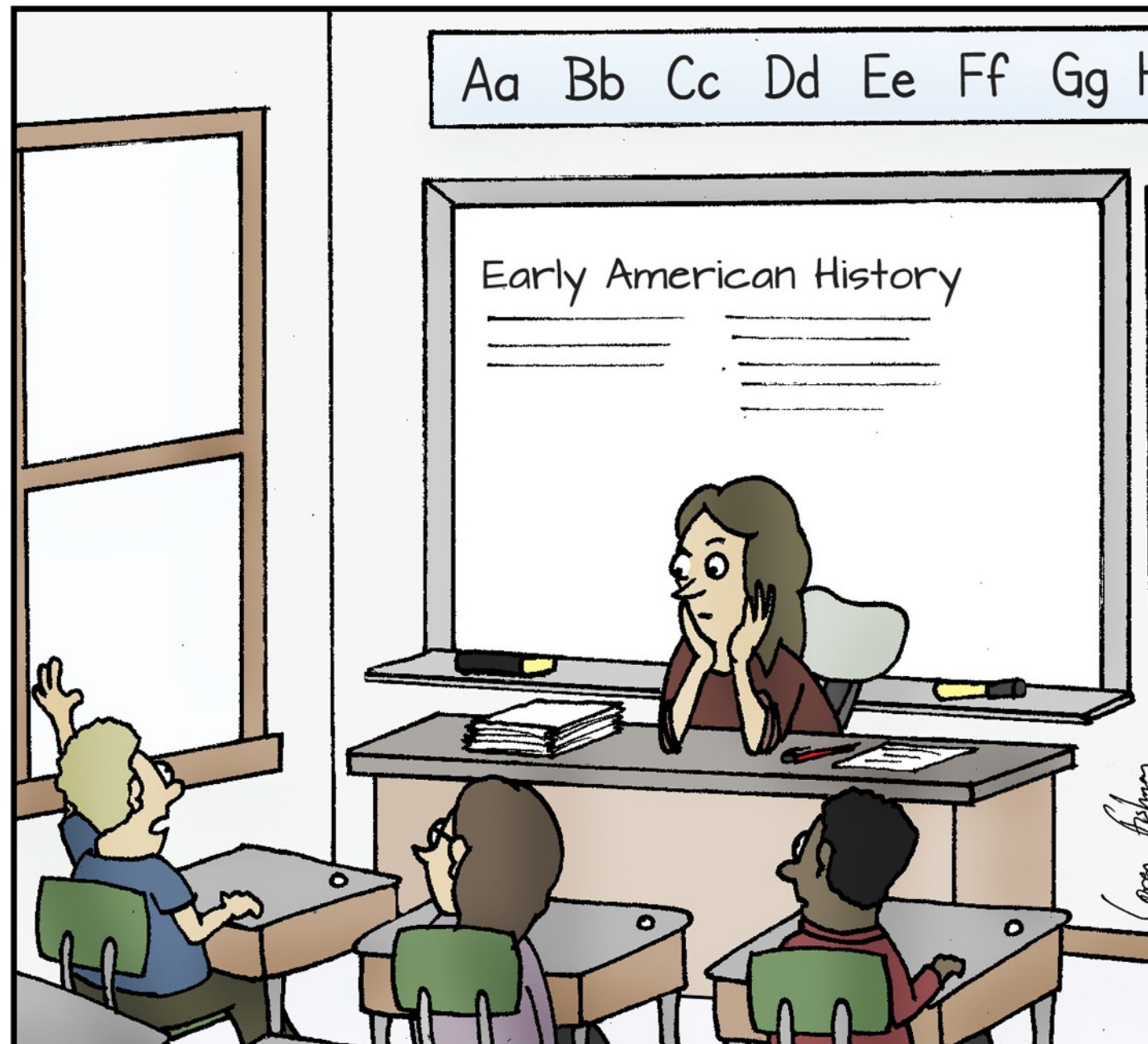
71-692907

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Force Map Coll

Division of Maps
Library of Congress



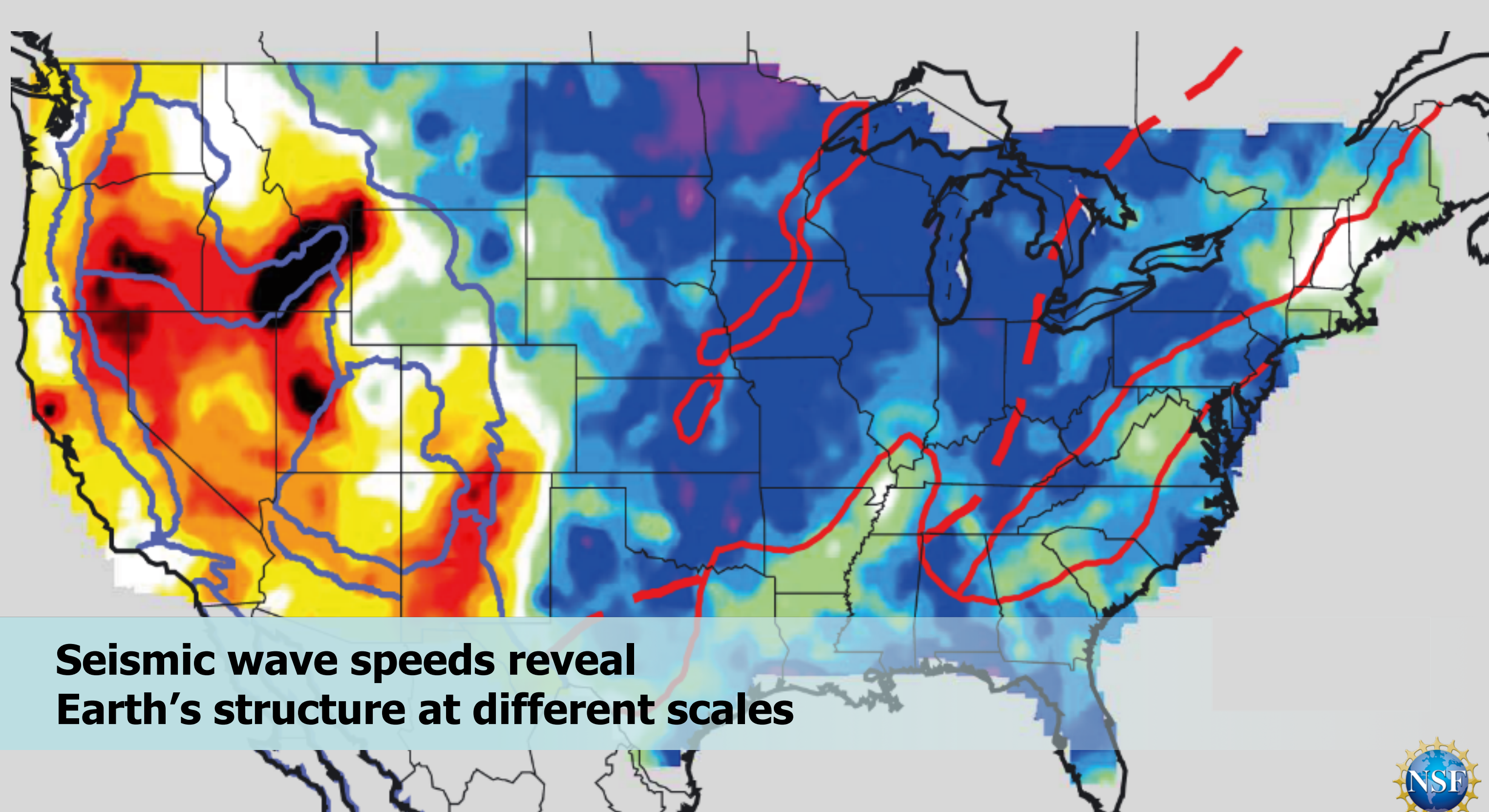


“Why didn’t Lewis and Clark just use GPS?”

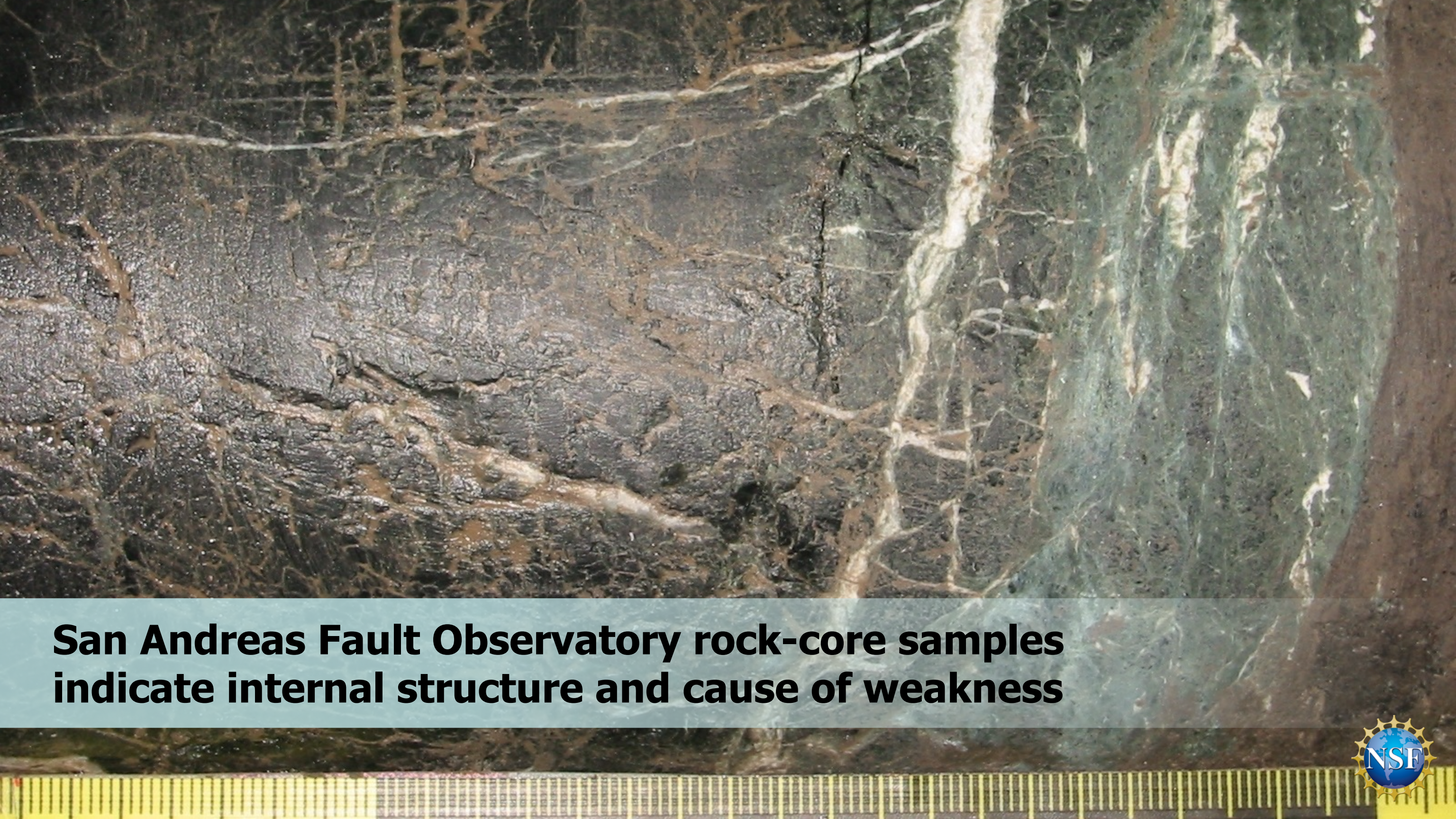


**Built nearly 2,000 Transportable Array stations
and 1,200 Plate Boundary observatories**



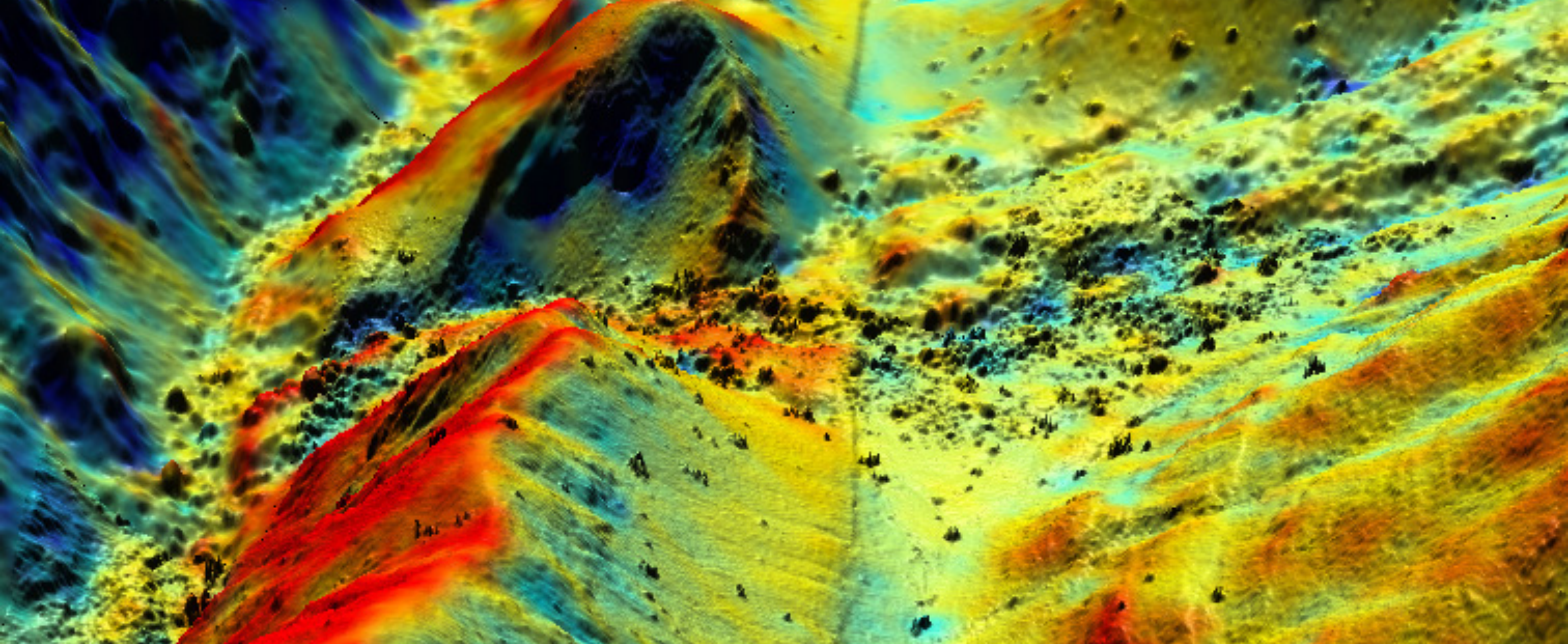


**Seismic wave speeds reveal
Earth's structure at different scales**



San Andreas Fault Observatory rock-core samples indicate internal structure and cause of weakness





**Post-earthquake topography shows Mexico's
Pescadores Fault cutting along a ridge**



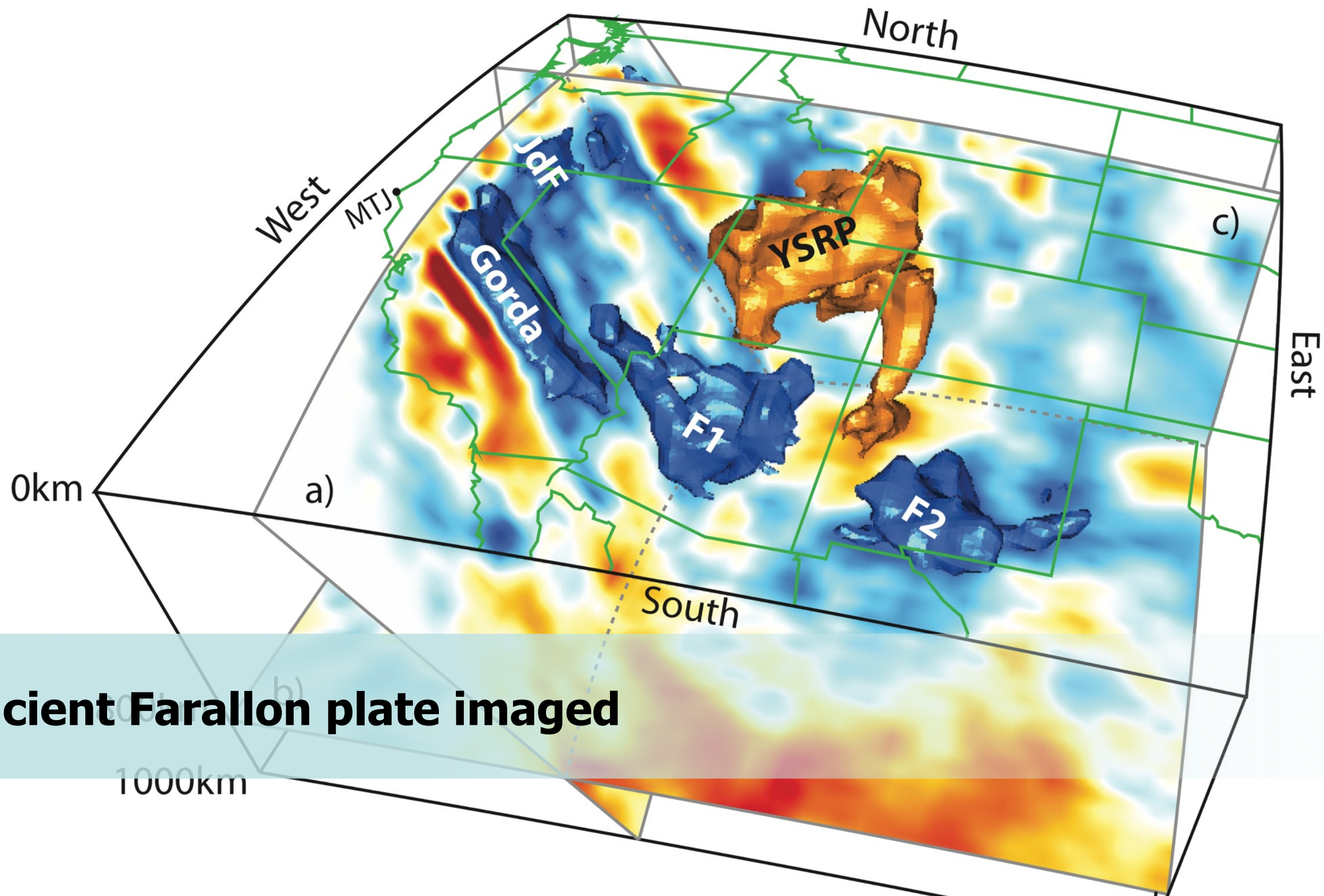
**Tectonics and surface load changes
deform North American continent**



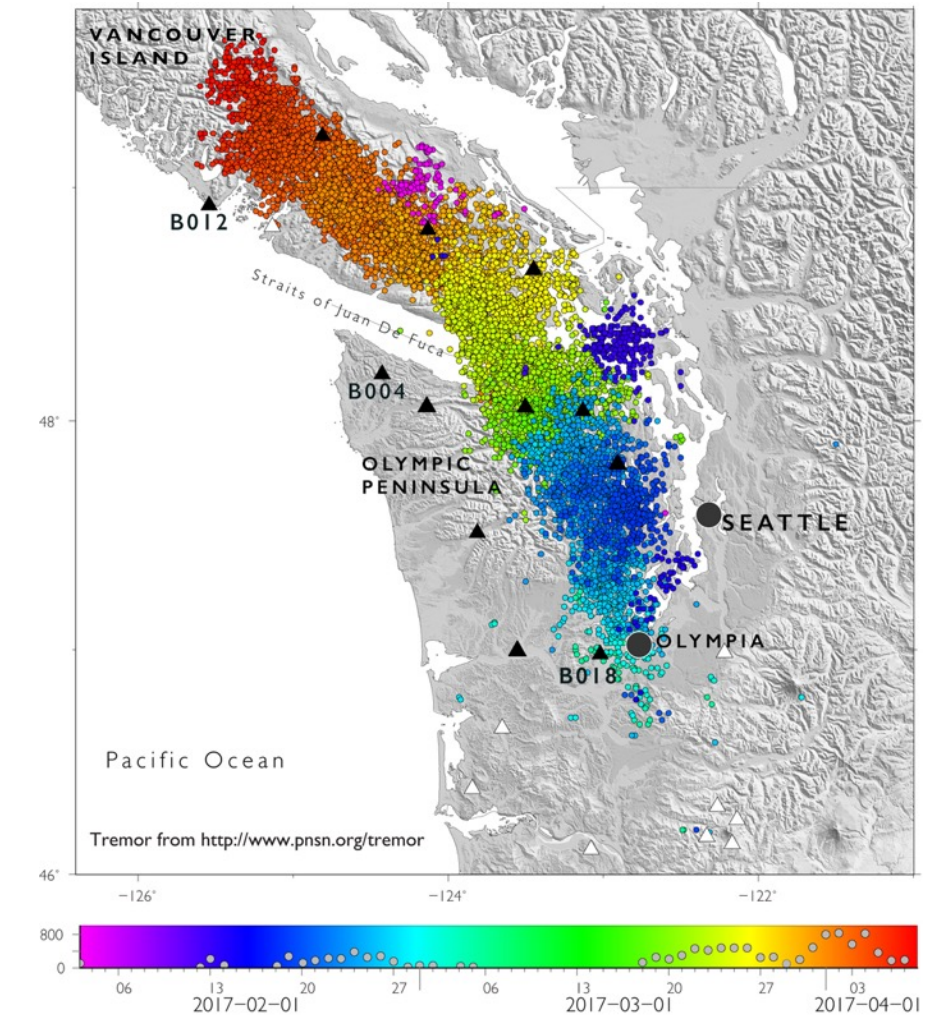
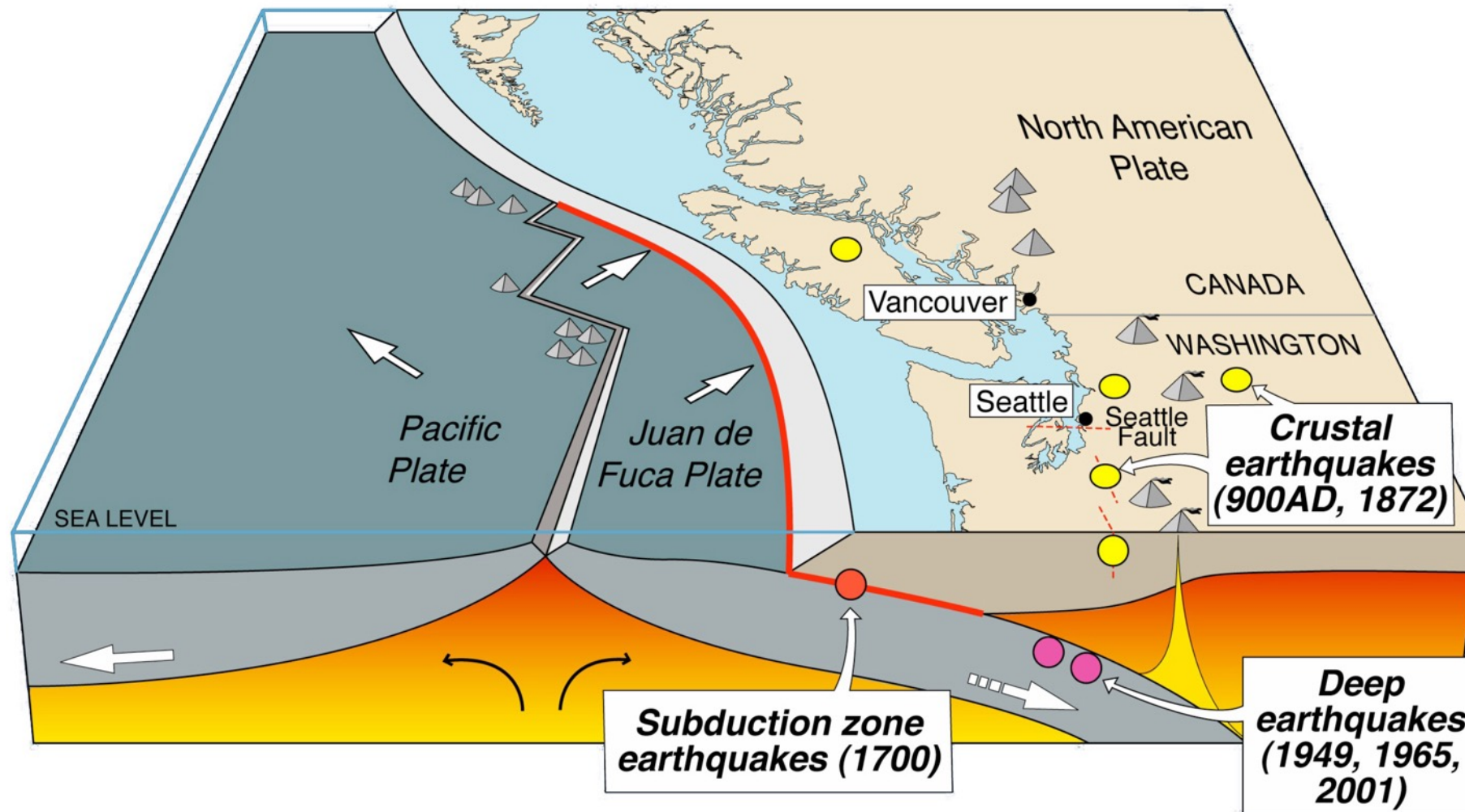


Large, open data sets and data products help educate the next generation of scientists





Ancient Farallon plate imaged



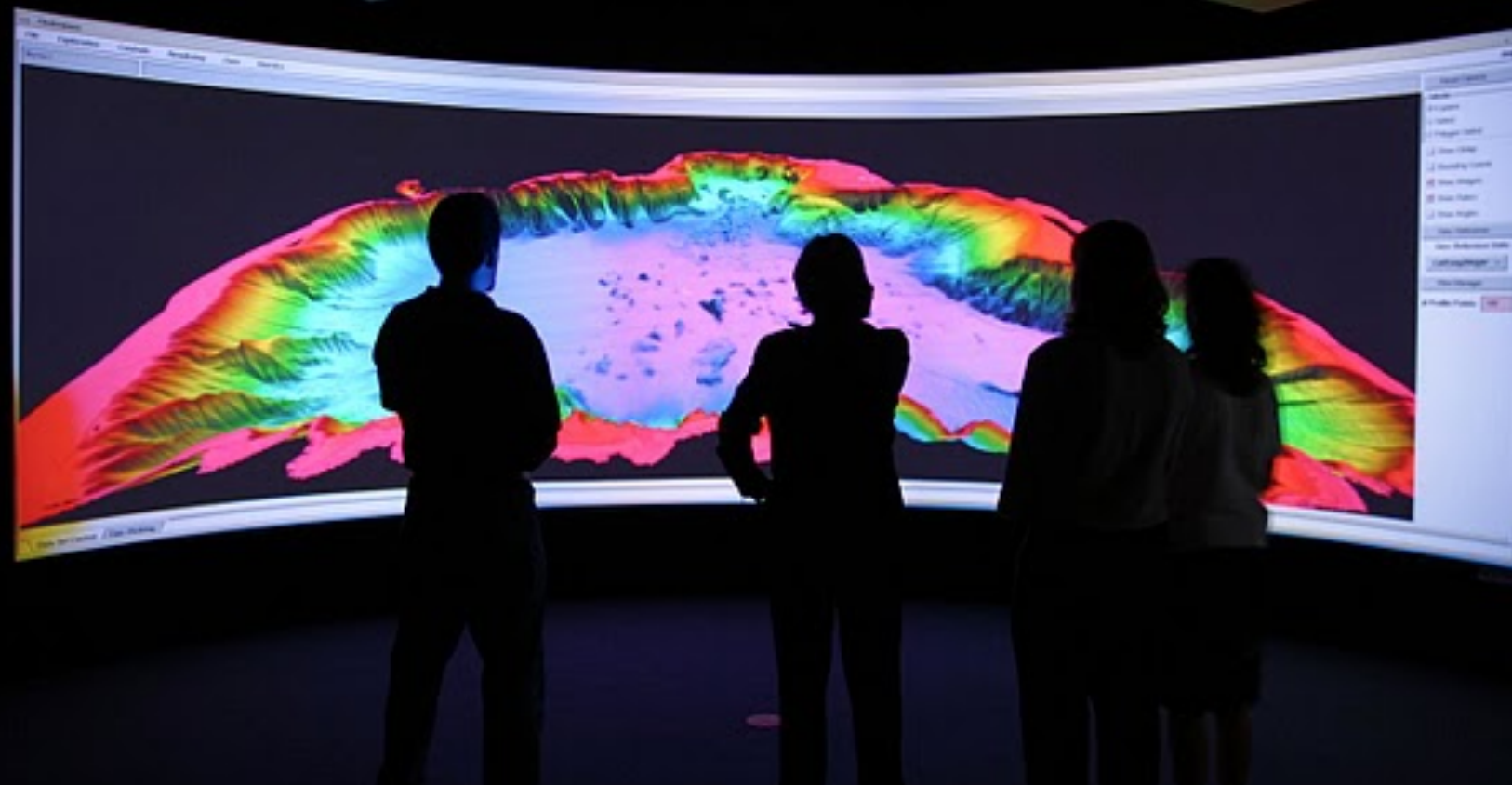
Cascadia subduction zone tracked, clarifying picture of episodic tremor and regional slow slip

A photograph showing a geophysical sensor, possibly a GPS or GNSS receiver, mounted on a tripod on a rocky mountain ridge. The sensor has a white dome-shaped antenna. In the background, a large lake is visible, surrounded by rugged, forested mountains under a clear blue sky. The foreground shows the rocky terrain of the ridge.

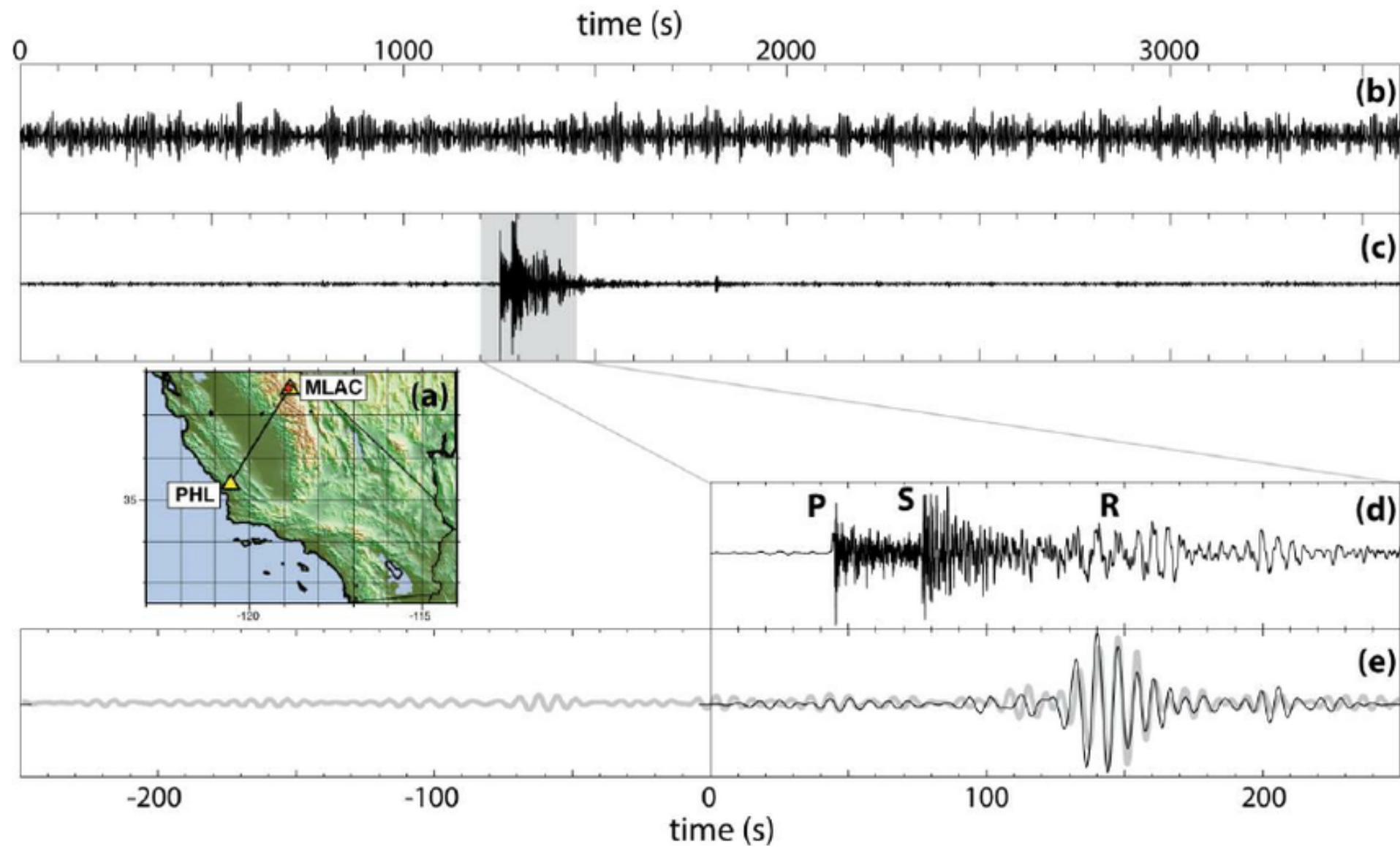
Groundwater changes detected in shallow subsurface

EarthScope's Transportable Array spans Alaska, on time and under budget





**Researchers study large data sets at
EarthScope-supported Visualization Center**

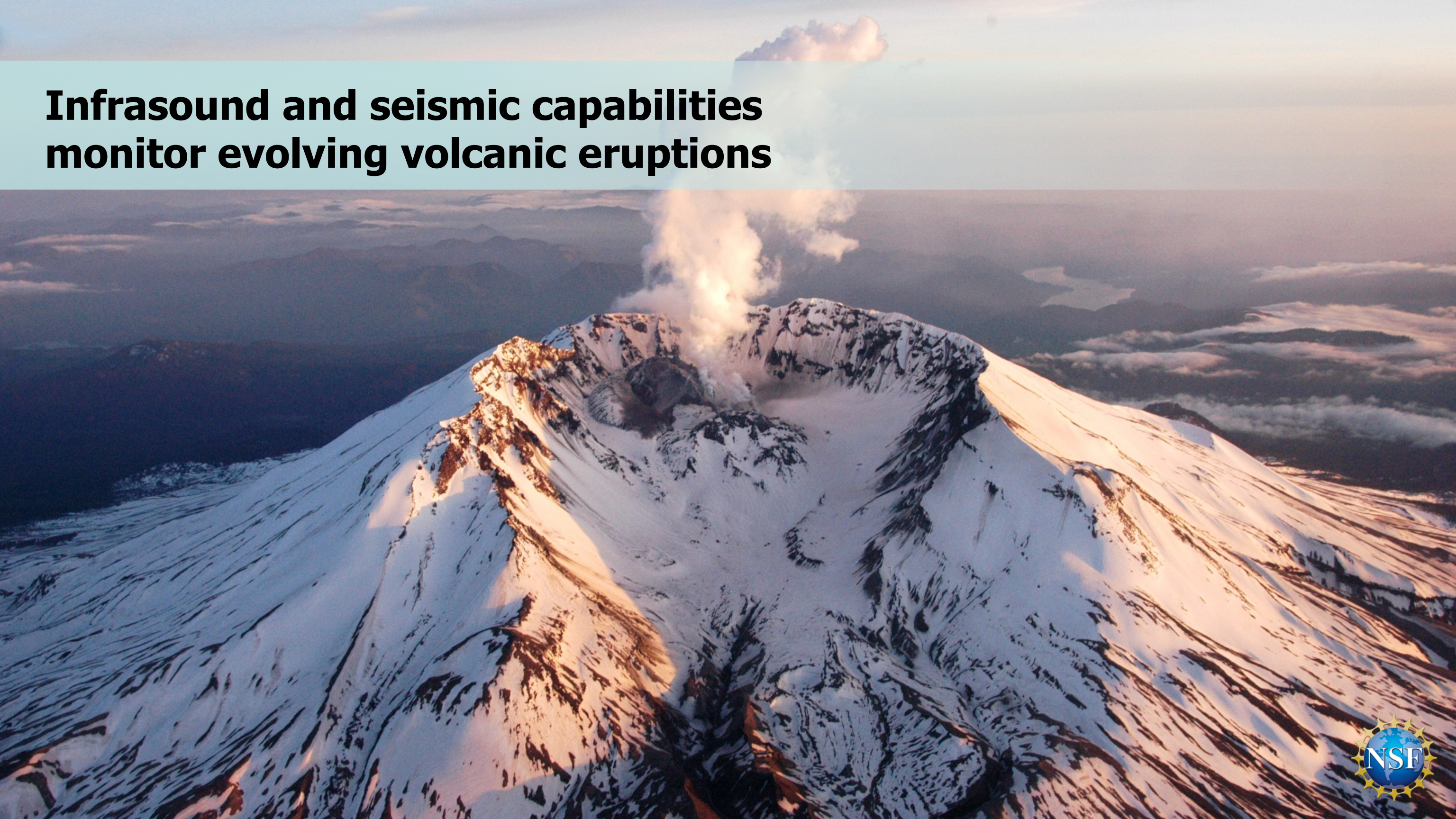


Ambient-noise wavefields used for seismic imaging

EarthScope's National Office staff teach park rangers and museum educators about geoscience



Infrasound and seismic capabilities monitor evolving volcanic eruptions

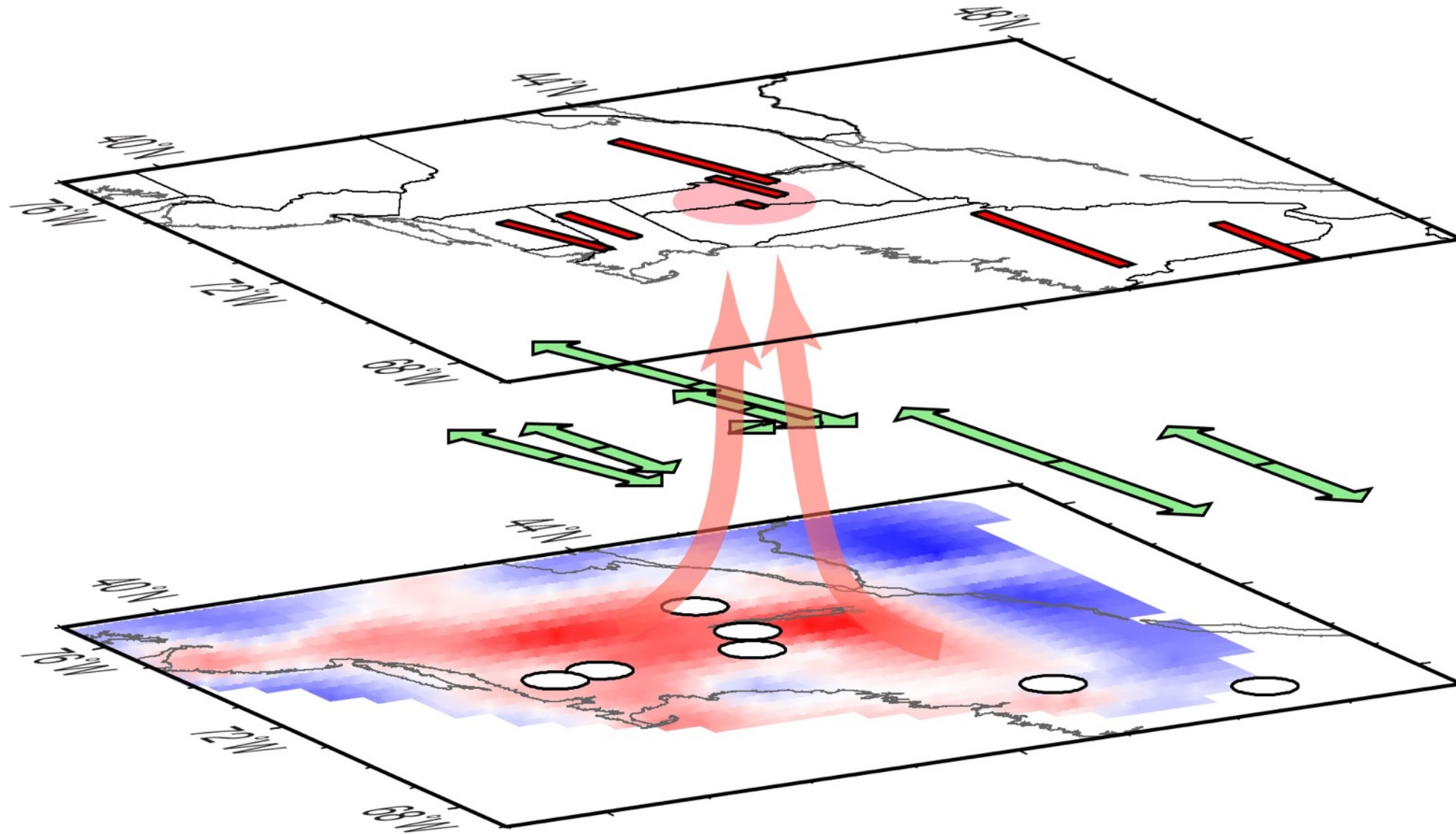


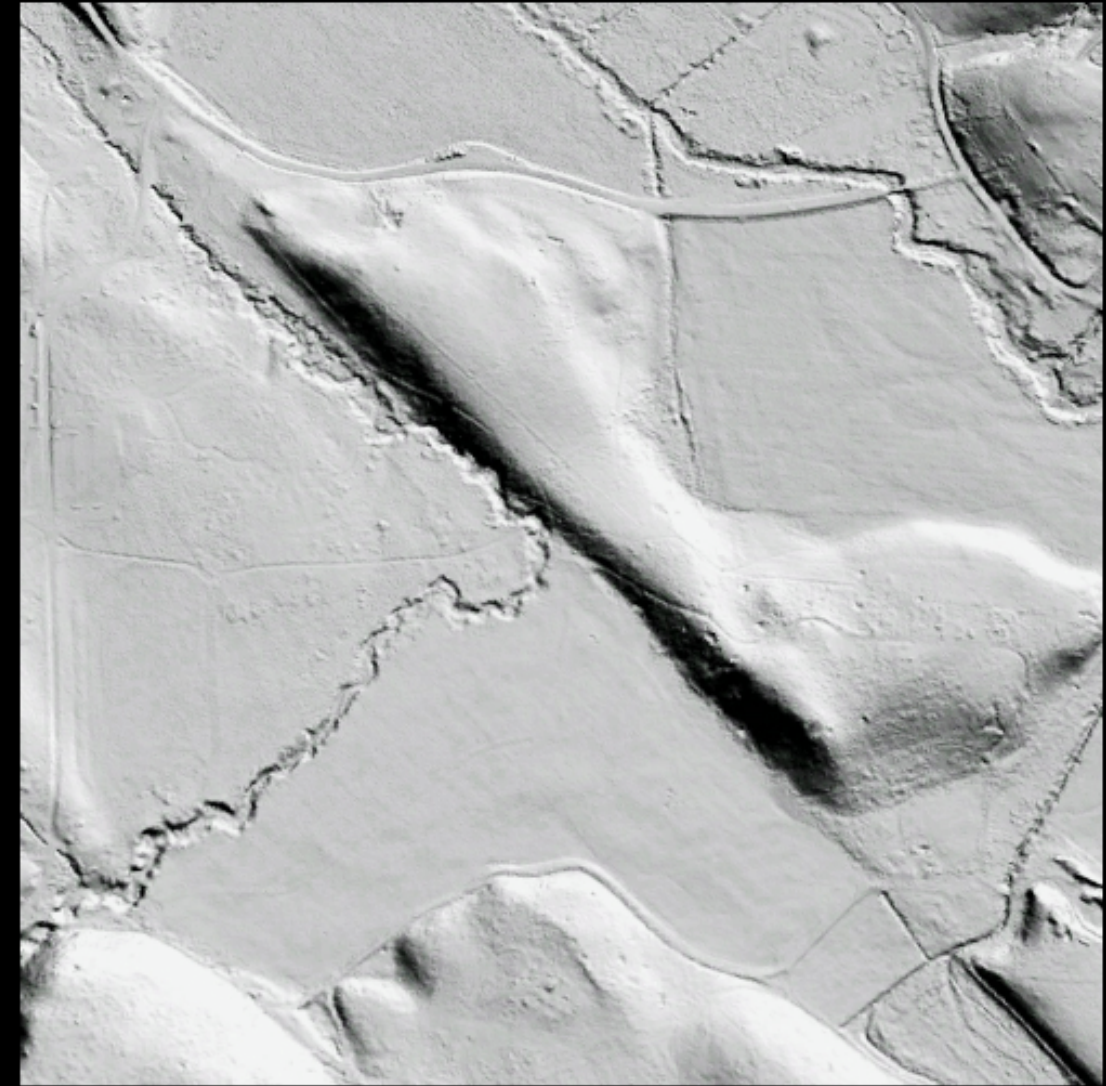
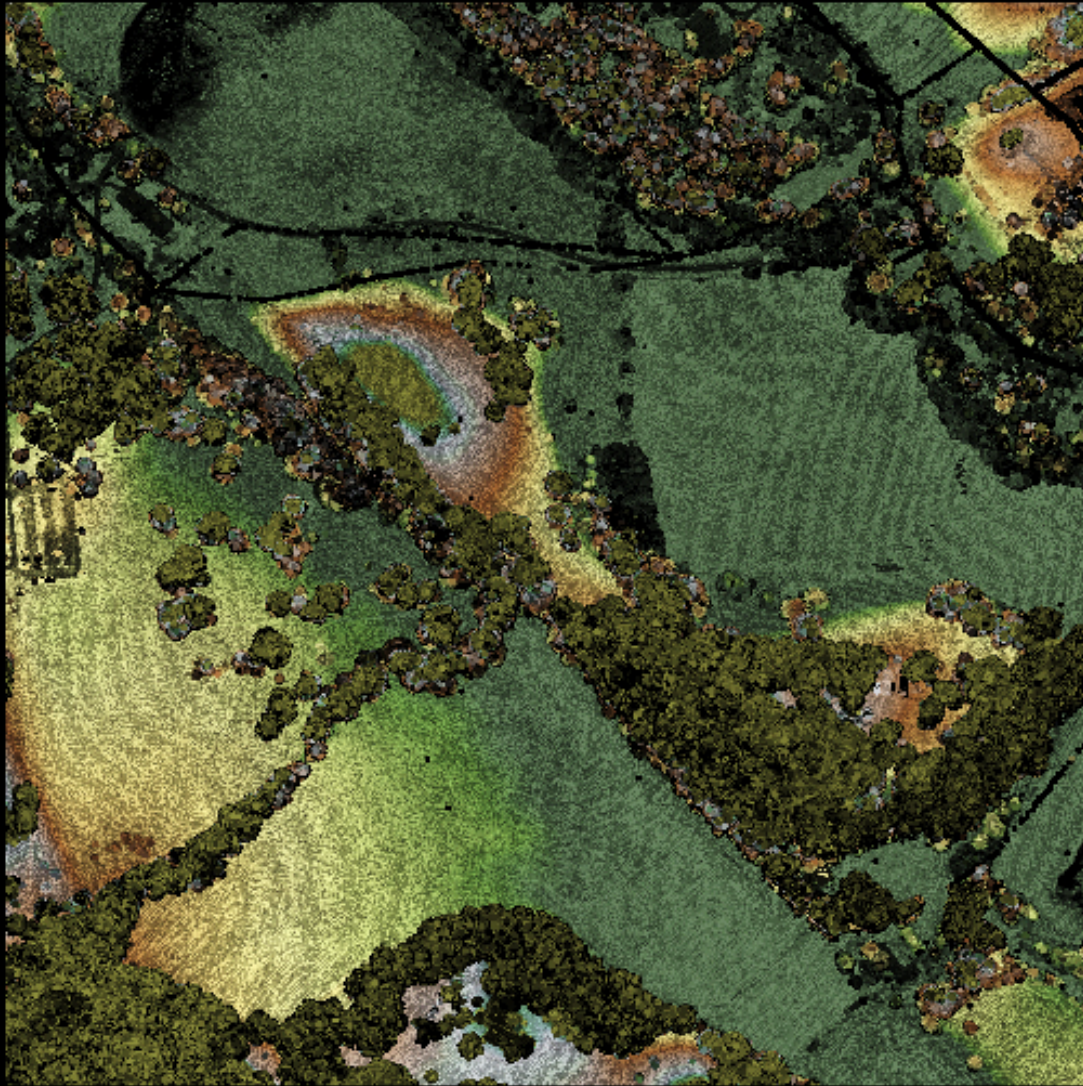


New training approaches for seismology



Hot, bubbling magma discovered under New England states





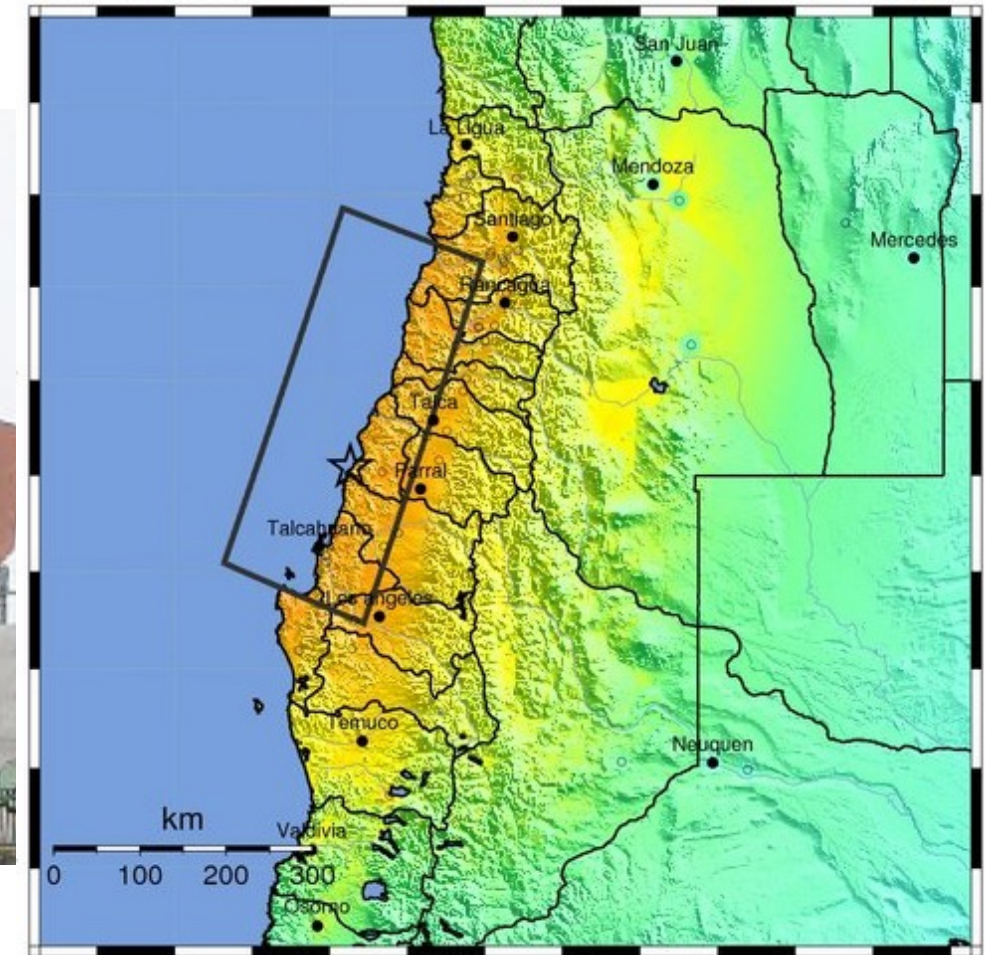
LIDAR – Laser Vision sees earthquake damage

California Central Valley groundwater depletion raises Sierra Nevada mountains

PBO Network

Permanent GPS
Campaign GPS
Borehole Strainmeter
Long Baseline Laser





Source of global breakups backtracked



Tsunami warnings using GPS realized

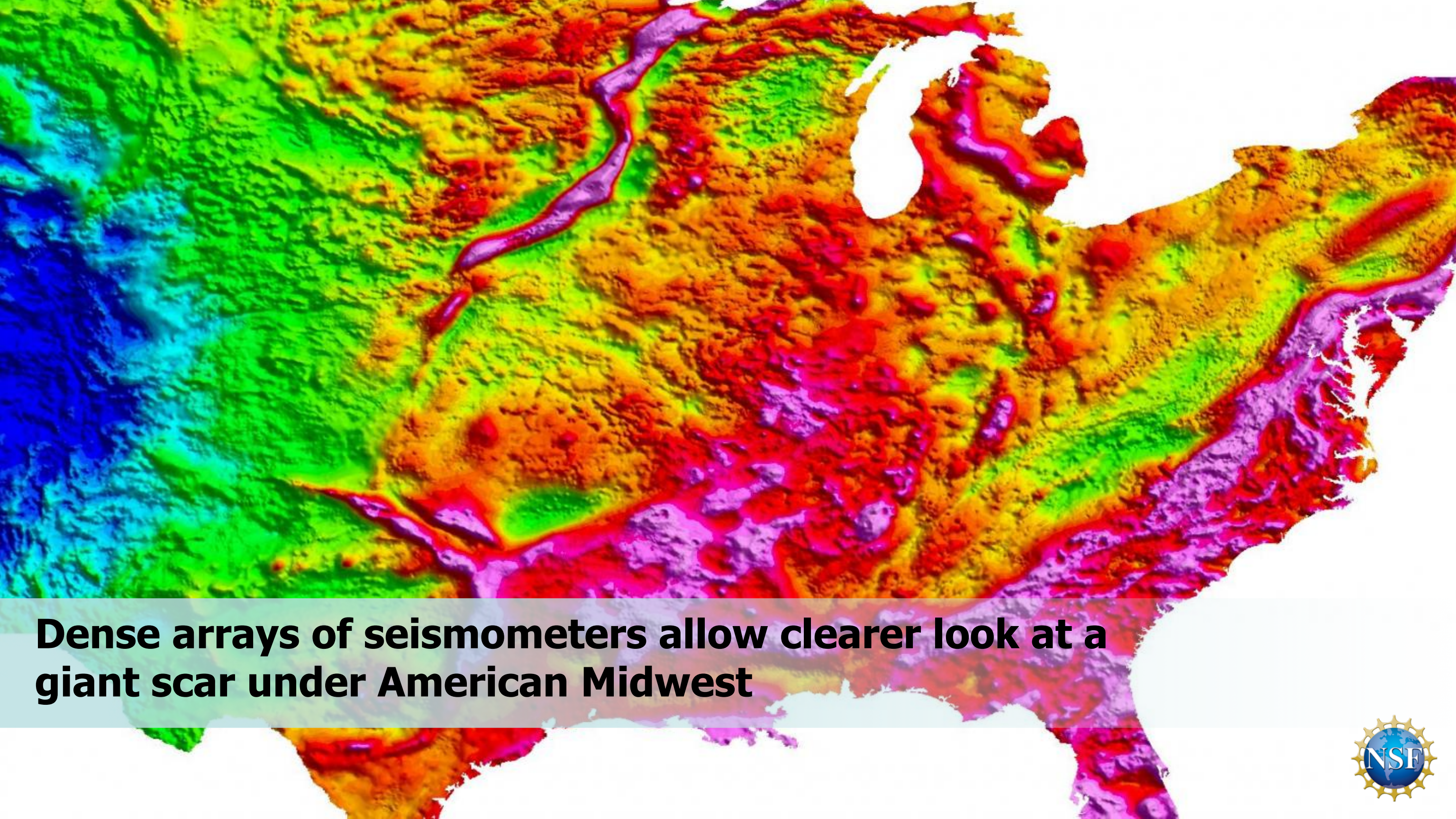
Pacific Northwest has a slow lane



An aerial photograph of a lush green mountain valley. The mountains are covered in dense forest. In the center of the valley, there is a small farmstead with several buildings, including a large barn and a house, surrounded by open fields and scattered trees. The sky is blue with some white clouds.

Appalachian tectonics measured far from plate boundary action





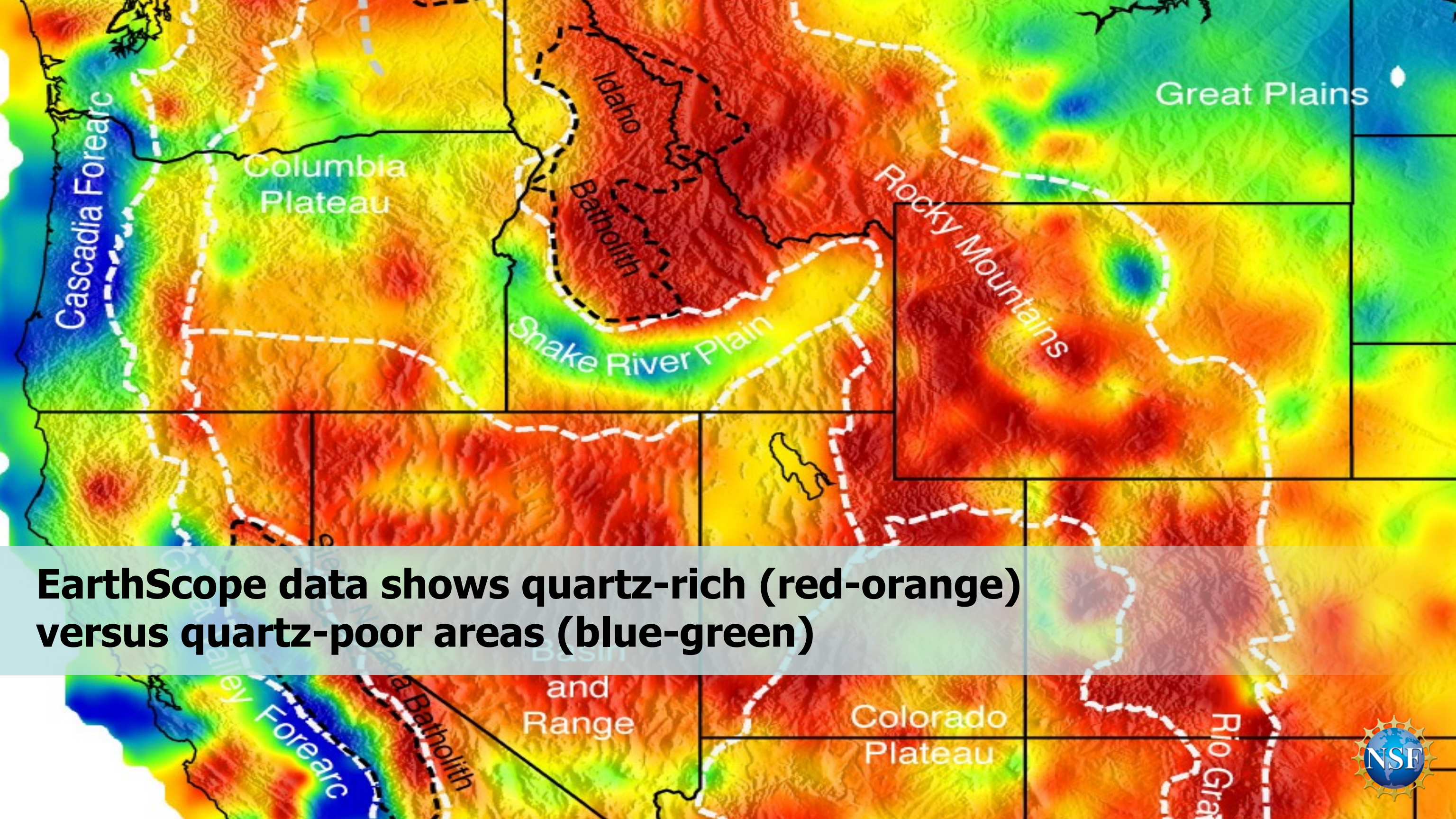
Dense arrays of seismometers allow clearer look at a giant scar under American Midwest



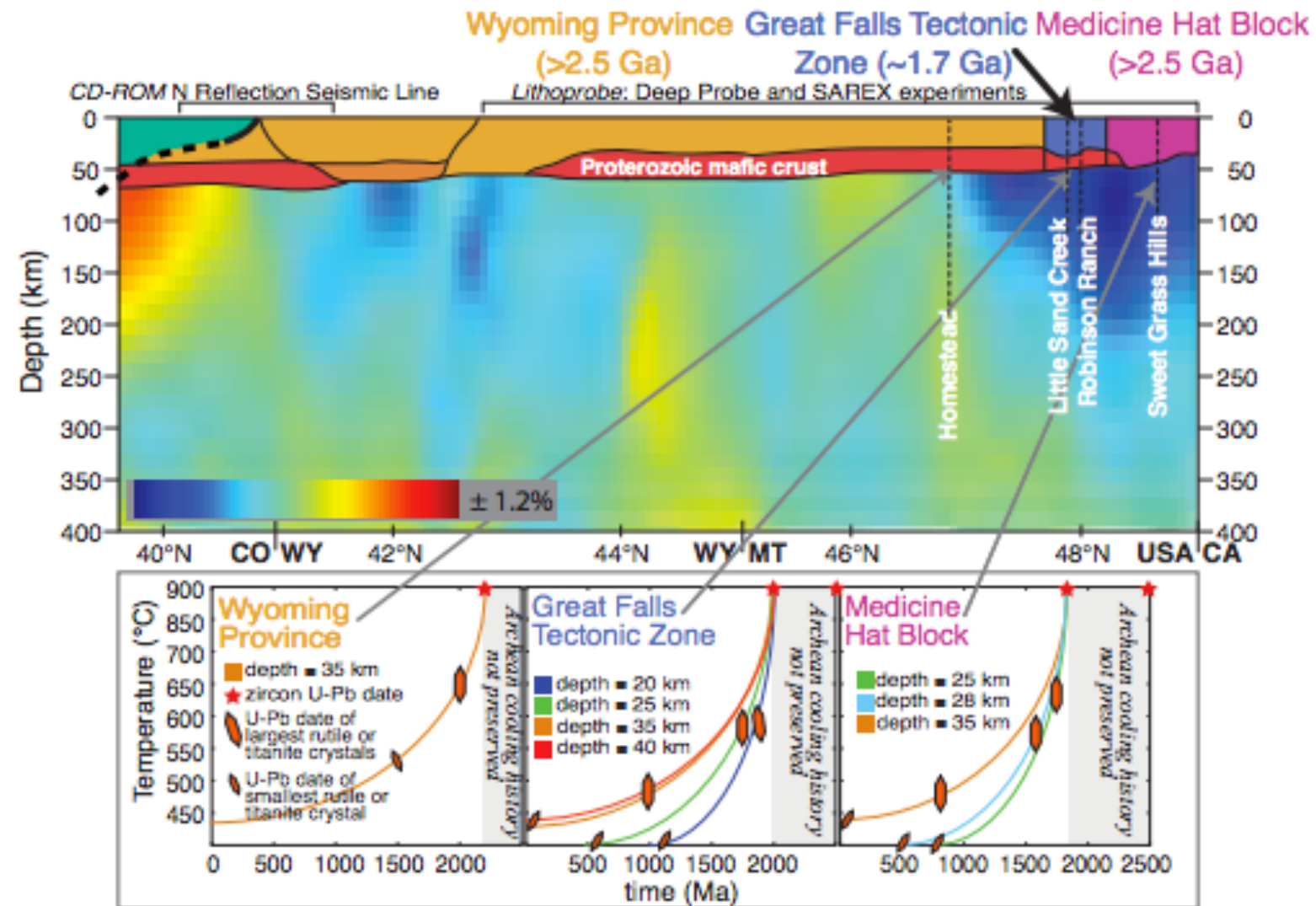
**Earth's crust expands and contracts
in localized pattern. Linkage to aquifers?**

Alaska earthquakes offer new insight into improving hazard assessment





EarthScope data shows quartz-rich (red-orange) versus quartz-poor areas (blue-green)



Four-dimensional changes of North American continent driven from below



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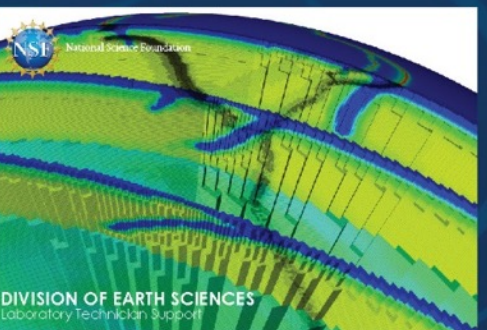
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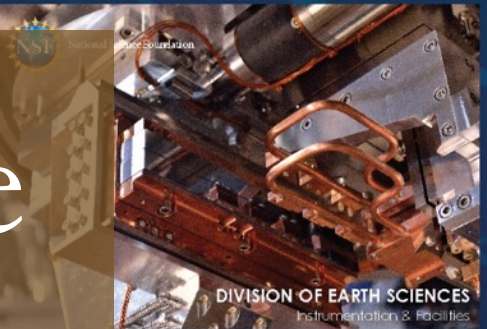
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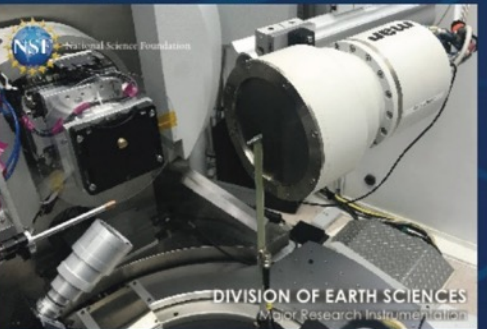
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DIVISION OF ADVANCED CYBERINFRASTRUCTURE



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Geobiology and Low-Temperature Geochemistry



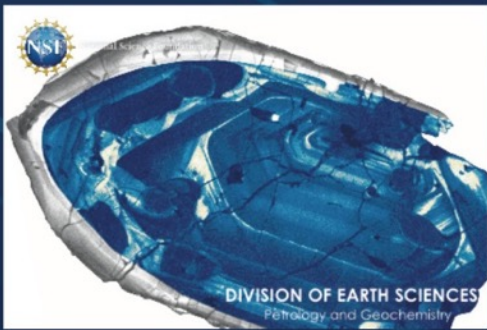
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Where Discoveries Begin