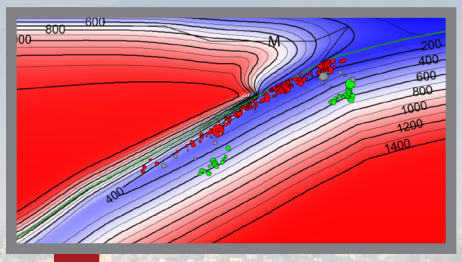
The SZ4D Initiative

Understanding the Processes that Underlie Subduction Zone Hazards in 4D

https://www.iris.edu/hq/workshops/2016/09/szo_16



The tectonic process of subduction generates the largest earthquakes, volcanic eruptions, and tsunamis on the planet. Most of these devastating events are poorly forecast, or occur with no apparent warning at all. However, all of them are caused by the slow sinking of oceanic plates into the mantle.

Anchorage, Alaska, 1964

Tsunami damage is extensive in the aftermath of the second largest earthquake ever recorded.

Portland, Oregon, Today

Mt. Hood, a volcano that last erupted 150 years ago, looms over Portland, Oregon.

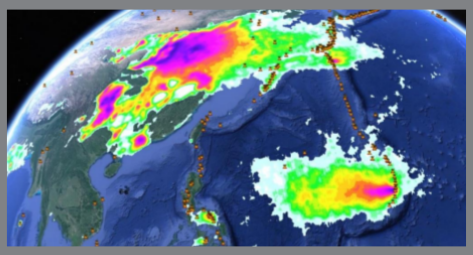
Oso, Washington, 2014

The Pacific Northwest experiences landslides regularly. This landslide cost over $60 million in damages.

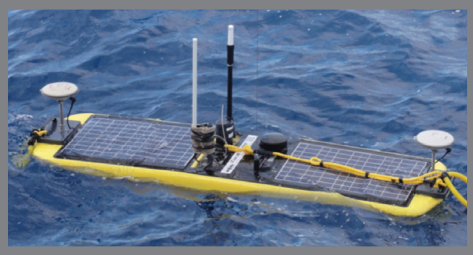
SZ4D at the Frontier

The ***SZ4D Initiative*** aims to increase our predictive understanding of eruptions, tsunamis, earthquakes, and landslides by:

- Capturing and modeling emergent phenomena
- Collecting time series data sets in real time and through geological time

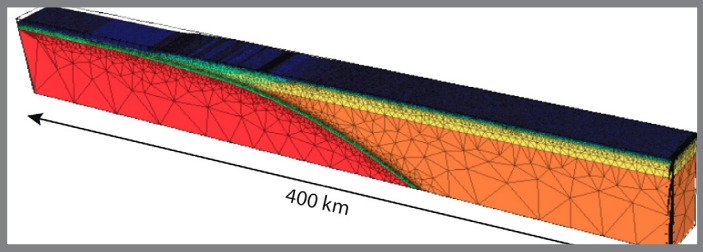


Measuring volcanic gases from space



Measuring motions of the seafloor

Squeezing rocks in the laboratory



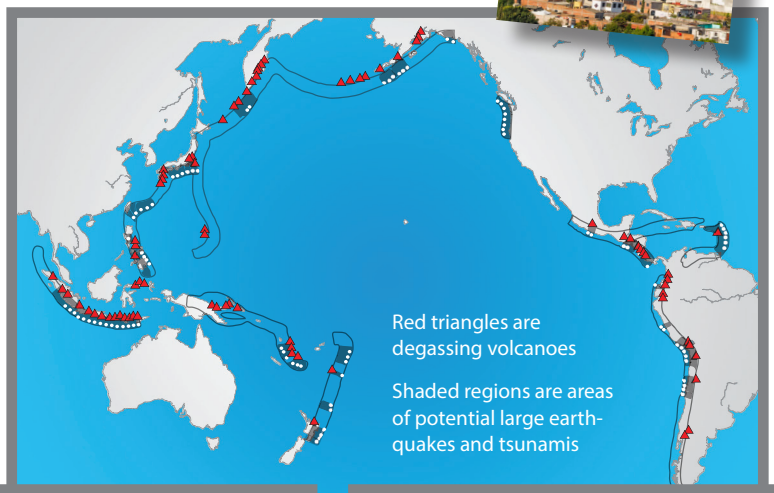
Developing dynamic models

Analyzing rocks from the subduction zone

SZ4D Science Questions

- When and where do large earthquakes happen?
- How is magma production connected through the crust to volcanoes?
- How do spatial variations in subduction inputs affect seismicity and magmatism?
- How do surfaces processes link to subduction?

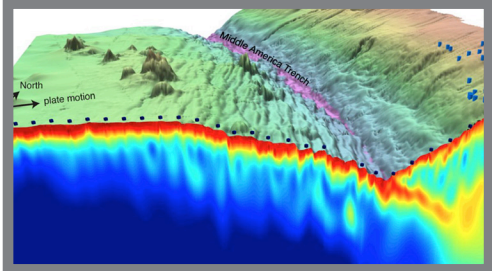
More information can be found at **https://www.iris.edu/hq/workshops/2016/09/szo_16**



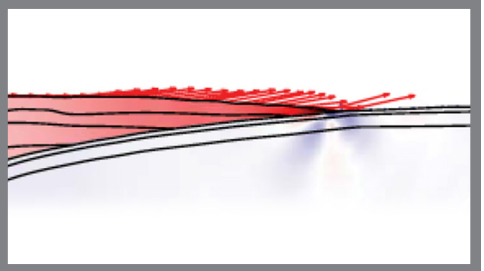
Subduction Zone Hazards

Subduction zone hazards are a global problem. Many promising sites exist for a new generation of frontier observations aimed at capturing, for instance:

» The gases that emanate prior to eruptions



» The inputs of fluids into the fault and magmatic systems

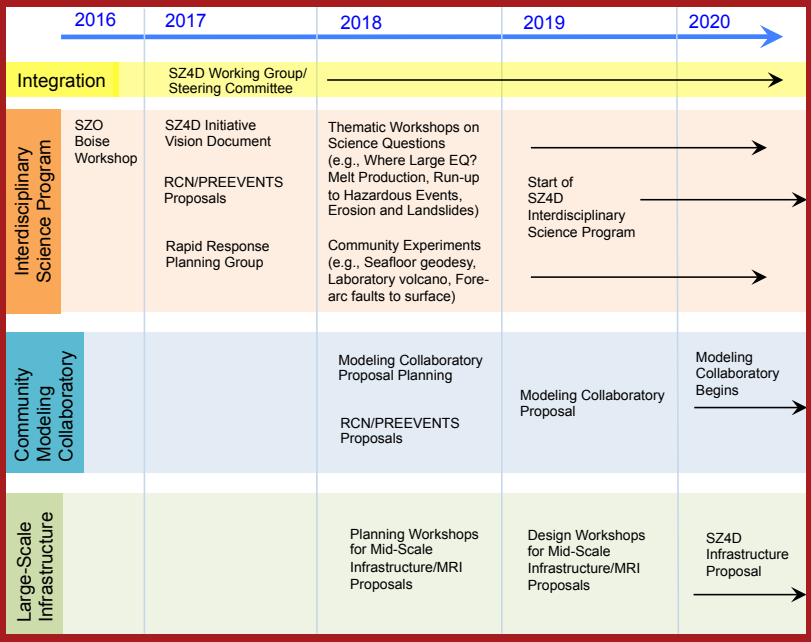


» The deformation before, during, and after large earthquakes and tsunamis

SZ4D Components and Planning

The ***SZ4D Initiative*** seeks to move subduction science from describing static snapshots to fully capturing and modeling key phenomena as they evolve both in real time and through geological time. ***SZ4D*** will enable frontier activities that are impossible or difficult to do now. The ***SZ4D Initiative*** will present a new opportunity to coordinate efforts across agencies and with international partners. Three key components—a modeling collaboratory, an interdisciplinary science program, and a community infrastructure program—in combination over 10 years would lead to a new understanding of subduction phenomena and in so doing, advance our ability to forecast earthquakes, tsunamis, landslides, and volcanic eruptions.

SZ4D has ambitious goals to improve the coordination of international efforts in subduction zone research, to communicate the current scientific understanding to the general public and to policymakers, and to train the next generation of scientists. The global importance of subduction zones demands partnerships that transfer skills, data, technology, and expertise between countries.



A potential ***SZ4D*** timeline.