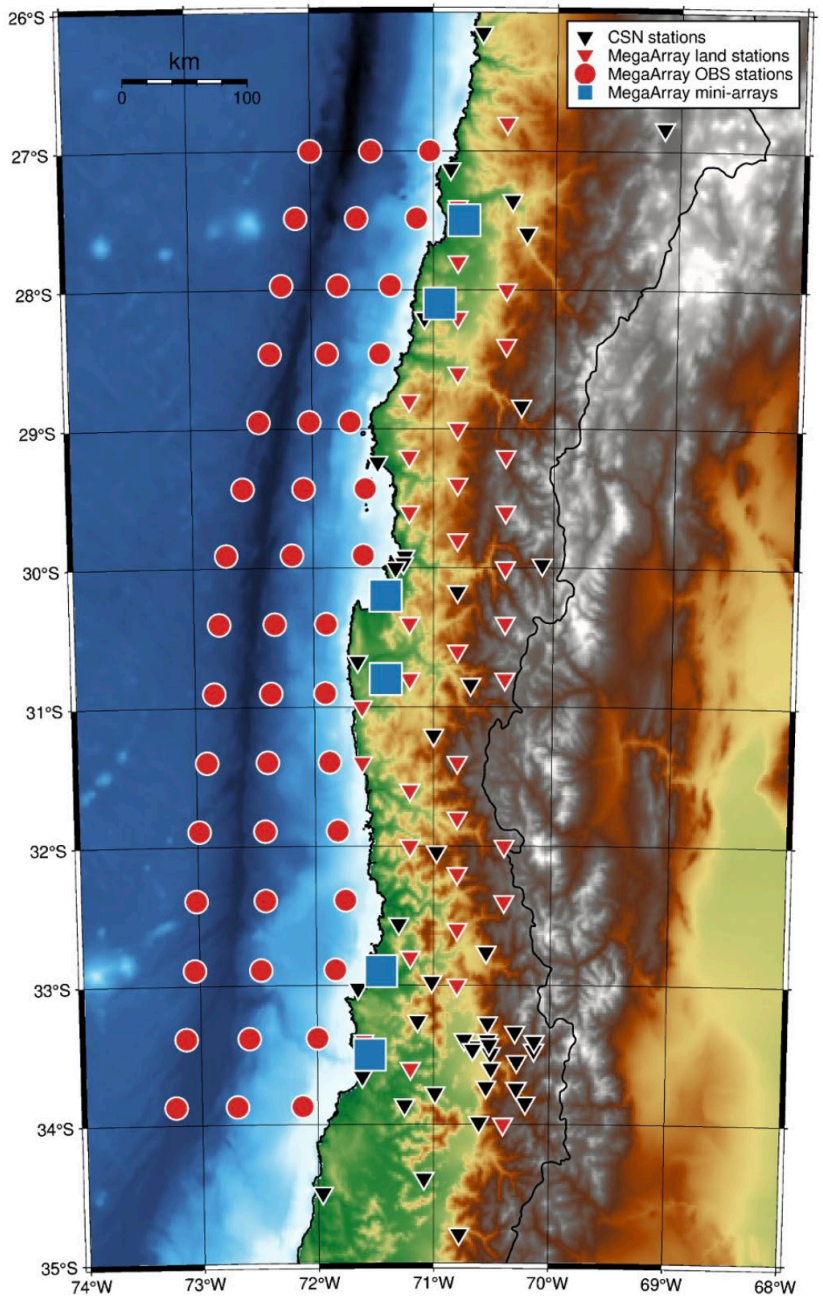
Key Ocean Science Components of SZ4D: Ocean Bottom Seismology

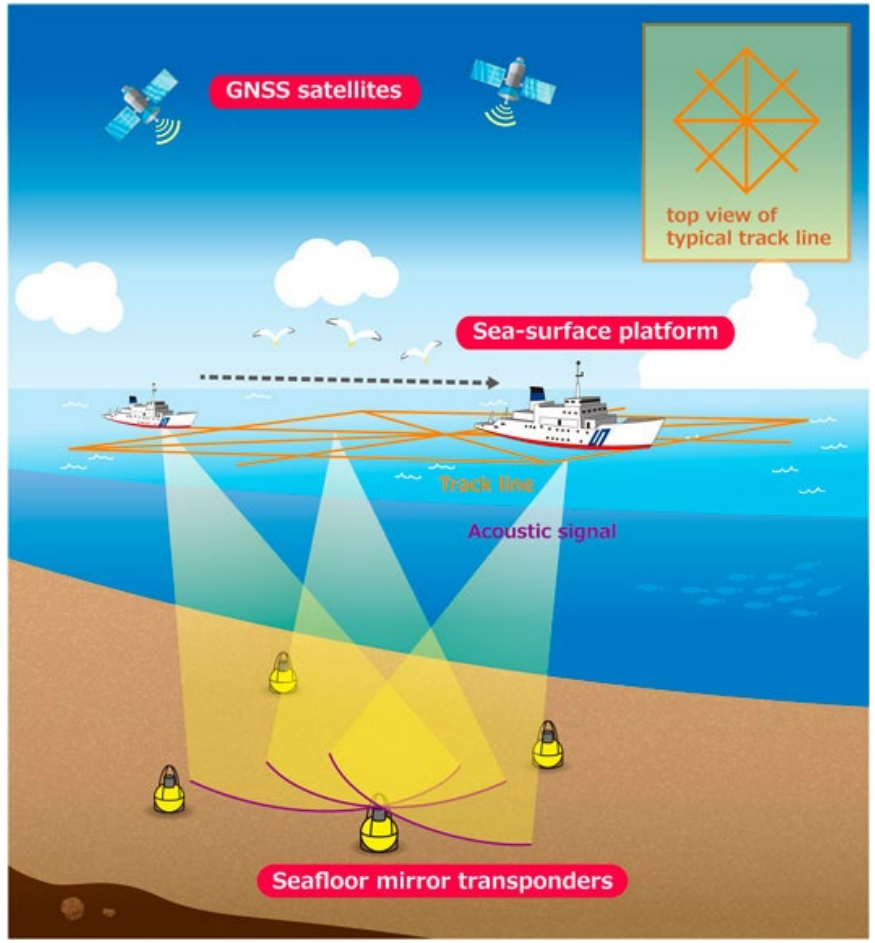
- Required to determine the seismic characteristics of the near-trench region; understand the physics of rupture-to-trench
- Seismicity will provide constraints on precursory behavior
- Initial plans are for 5-year deployment of ~ 50 next generation ocean bottom seismographs in Chile
- Long-range plans involve seafloor fiberoptic cables and associated sensors

Chile seismograph deployment scenario



Key Ocean Science Components of SZ4D: Seafloor Geodesy

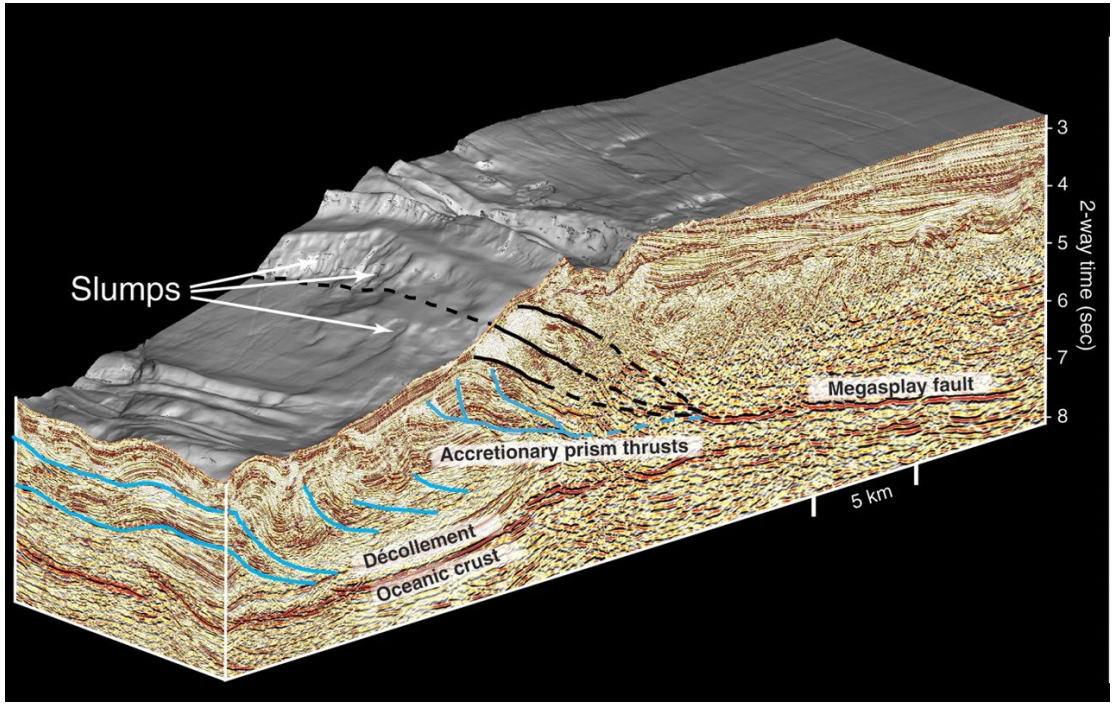
- Required to determine the locking and creep behavior of the megathrust fault
- Will identify locked regions where future earthquakes will nucleate
- Involves the installation and operation of GNSS-A transponders and seafloor pressure gauges in the near-trench regions of Chile and Cascadia
- Operation requires periodic resurveys using wavegliders deployed and recovered from ships.



Watanabe et al [2020]

Key Ocean Science Components of SZ4D
Marine Geophysics

- Marine geophysical studies of the Chile, Cascadia, and Alaska subduction zones
- Active-source seismic imaging of the trench region
- Megathrust characterization, identification of major splay faults
- Collection of high-resolution bathymetry



Moore et al [2007]
Nankai subduction zone

NSF-OCE investments that would benefit SZ4D science

- Adequate ship time on global and ocean/intermediate class vessels.
- Mechanism for funding ship time on less-expensive international ships for equipment maintenance
- Continued support and enhancement of the ocean bottom seismograph facility
- Support for a seafloor geodetic facility and associated equipment
- Continued support for an active source seismic ship or similar capabilities (currently R/V Langseth).
- Mechanisms for funding joint OCE-EAR research in shoreline-crossing science