CRESCENT Kickoff
October 23-25, 2023
Offshore Observations Breakout

Wish List

Geodesy

- Expand GNSS-A on Gorda/JdF plates to constrain convergence rates and the accretionary prism. Evans et a. (2022, https://doi.org/10.1093/gji/ggab360) discusses optimal design.
- Seafloor pressure geodesy for slow slip including improved approaches for removing oceanographic signals from pressure time series.
- Fiber optic strainmeters for slow slip – build on the Jackson/Zumberge experiment in progress.
- CORKED boreholes are the most sensitive slow-slip detector. One off Vancouver island shows no slow-slip over 8 years. Work to make a priority in the next iteration of IODP.

Earthquake Monitoring & Early Warning

- Microearthquakes using both temporary OBS and permanent networks.
- Fiber sensing (DAS) and SMART repeaters on commercial telecom cables. Work to develop relationships with owners/operators.
- DAS for scientific research and research into its use for early warning.
- Shallow 5-10 m deployment of seismometers (on cabled observatories) and other sensors following JAMSTEC approach. Rock drill in Victoria, BC.
- Expand cables observatories potentially using cheaper in-line sensor systems.
- Additional DART buoys or alternate approaches such as SMART cables that can incorporate seismic observations.

Subsurface Imaging

- Langseth MCS on the California margin not only to get the wedge structures, but also for the velocity structure. Can CRESCENT community help with permitting?
- Improved mapping of offshore faults (partner with PGE off California).

Seafloor characterization and sampling

- Multibeam mapping at the appropriate resolution on the shelf and margin. Much of the shelf still unmapped. Are other communities (e.g., biologists) interested in this?
- AUV mapping in key areas. Can we expand beyond the use of the MBARI system by adopting their technology?
- Geotechnical experiments of shallow sediment strength (e.g., cone penetrator, compliance).
- Reanalysis of existing cores.

- Coring and use of the Victoria BC rock drill.

- **How can CRESCENT help?**

- Develop a prioritized list with realistic budgets.

- Develop a comprehensive list of activities that might be supported with enhanced post-disaster funding. The list above is a start.

- Help strategically to build support for key observations.
    - Can CRESCENT community help with permitting MCS off California? The R/V Langseth may not be available post 2026 (i.e., proposals are due in CY2024).

- Identify offshore needs of CRESCENT working groups (text below from the 1st year solicitation)

- Early career engagement / training.
    - Build upon existing training efforts (e.g., GNSS-A training, MCS training cruises, OBSIC training).
    - Incorporate into 2026 workshop.
    - Cores2code to training cruise?

- Strengthen existing academic partnerships
    - USGS
    - Ocean Networks Canada / Geological Survey of Canada

- Develop new partnerships:
    - Offshore telecom cable companies.
    - PGE
    - Offshore wind development (Humboldt) – BOEM and commercial developers
    - Offshore aquaculture
    - Wave energy

- Explore uses of coastal infrastructure including fiber installations along the coast.

- Small grant opportunities (text below from the 1st year solicitation)
    - *Quantitative studies to design offshore observational networks that go beyond what might reasonably be done without support in preparation for an NSF proposal to make those observations. For example, sensitivity tests to evaluate the number and distribution of offshore stations/observations that are needed or studies to understand how different types of observations can complement each other (e.g., strain, gravity and seafloor pressure for slow slip event detection).*
    - *Studies that explore novel approaches for mitigating oceanic noise sources in seafloor geophysical observations. For example, correcting water column signals in GNSS- acoustic observations or seafloor pressure, or correcting seafloor seismometer data for ocean current generated noise.*

- o *Studies that explore novel technologies that cross shorelines that are presently not in the crosshairs of either the terrestrial or ocean communities. Examples might include mapping topography/bathymetry across the coastline and sensing tsunamis from the coast (e.g., radar or infrasound).*

- Provide a forum for SZ4D Cascadia observations planning. Nominally 20% of the observational budget although some will be onshore.