New Opportunities with the Alaska and Cascadia Near-Trench Community Geodetic Experiment

By: Noel Bartlow[1], Ben Brooks[2], Donna Charlevoix[3], John DeSanto[4], Andrew Newman[5*], David Schmidt[4], Spahr Webb[6], Surui Xie[7], and Mark Zumberge[8]

1. University of Kansas; 2. US Geological Survey, 3. EarthScope Consortium, 4. University of Washington, 5*. Georgia Institute of Technology (presenter: anewman@gatech.edu), 6. Columbia University, 7. University of Houston, 8. University of California San Diego

We present initial work from the Alaska and Cascadia Near-Trench Community Geodetic Experiment; a 5-year open community experiment running through 2027 aimed to capture interseismic locking, transient, and slow-slip along large swaths of these two subduction zones. The experiment takes advantage of the nascent NSF-sponsored Seafloor Geodetic Instrument Pool (SGIP) including GNSS-Acoustic and Bottom Pressure Recorders, with semi-autonomous Wave Gliders making sea surface measurements..Twelve sites equally divided between Alaska and Cascadia were selected from community input during a planning workshop held in May 2022. These sites are planned to yield valuable deformation signals in zones poorly understood with land-based tools. Initial deployment began in Cascadia last summer, with further deployments planned there this July, and the first deployments in Alaska are planned in Summer 2024. The new sites will augment data collected by ongoing GNSS-Acoustic experiments, including those by the USGS and Ocean Networks Canada. The measurements provided by this community experiment will be critical for accurately modeling the interseismic strain accumulation and assessing slip potential for very large earthquakes and the tsunamis they generate, primarily in the near-trench region. Alaska has additional abilities to characterize near-trench coupling in a “tsunami earthquake” region, and recent post-seismic behavior offshore. Pressure sensors in both environments can help identify shallow slow slip not seen before.

The experiment supports deployment, data collection, processing, archiving, and dissemination using FAIR data standards, and will tie to efforts by the SZ4D initiative. To ensure data are well understood and equitably accessible for researchers, we will develop open-source software for GNSS-Acoustic data processing and operate short-courses for processing and interpreting these data. Especially early-career scientists will be enabled through short-courses focused on “Future-PI” training beginning in 2024. We are planning “Apply to Sail” opportunities for students and early-career scientists along field deployments at each locale.

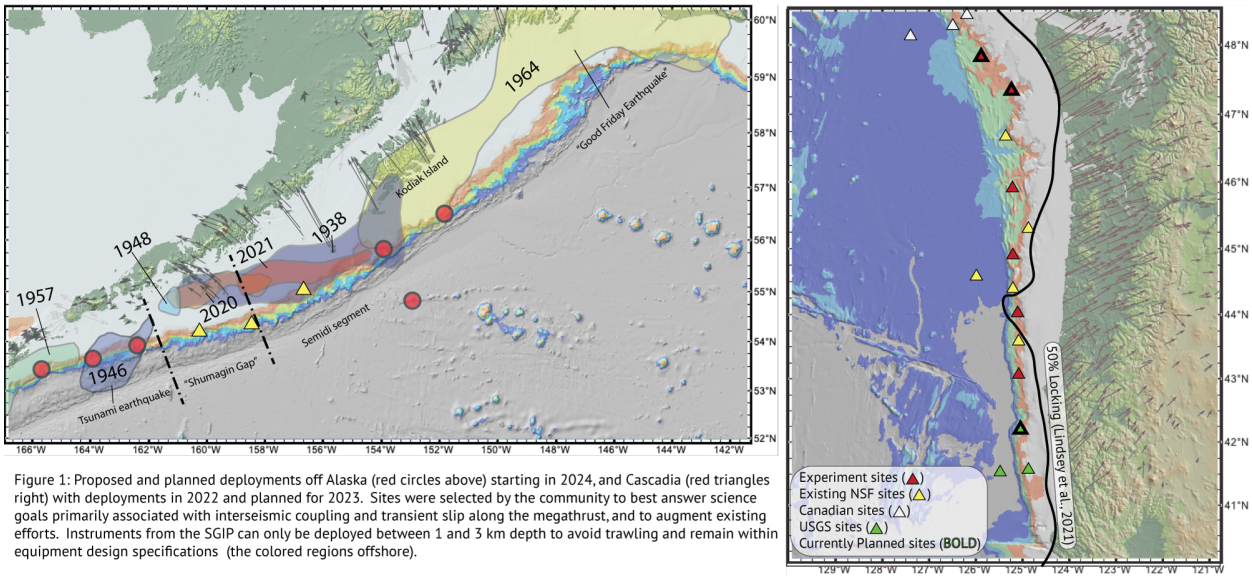

Figure 1: Proposed and planned deployments off Alaska (red circles above) starting in 2024, and Cascadia (red triangles right) with deployments in 2022 and planned for 2023. Sites were selected by the community to best answer science goals primarily associated with interseismic coupling and transient slip along the megathrust, and to augment existing efforts. Instruments from the SGIP can only be deployed between 1 and 3 km depth to avoid trawling and remain within equipment design specifications (the colored regions offshore).