Conference: SAGE/GAGE 2022
Title: Fiber in the ocean – Update on the impact and diversification of subsea fiber sensing
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Following three initial seafloor cable DAS experiments in 2018 – 2019 (Lindsey et al, 2019, Sladen et al., 2019, Williams et al., 2019), the field of subsea optical fiber sensing has rapidly branched out to study various types of seismic waves, ocean waves, currents, tides, storms, ships, ocean thermometry, and marine life. The focus has largely been on signal exploration from these powerful distributed arrays in the fiber span from shore to first repeater (<200 km offshore).

In parallel, non-DAS fiber sensing experiments – pioneered by the early work on ultra-stable laser phase measurements with subsea cables by Marra et al., 2018 – have begun to utilize not only the existing optical fiber glass but also the existing coherent transponders and repeaters for geoscience applications (Zhan et al., 2021).

Many community-scale questions exist today: How do optical fibers modulate pressure, temperature, ground motion across timescales? How does this sensitivity compare with traditional instruments? How do subsea fiber sensing technologies compare with one another in terms of sensitivity, range, density, cost, ease of adoption?

In the first part of this talk, I will survey the advantages and limitations of the subsea fiber technologies on the market and in development today with a focus on their relevance to solve important and interesting scientific problems.

In the second part of this talk, I will focus on a particularly important and hazardous scientific problem– tsunami – and the actionable steps the scientific community can take to develop fiber-based tsunami and earthquake early warning tools this decade.