VINCENT VARAMO

M.S. PLAN A THESIS PRESENTATION & DEFENSE
TUESDAY, MAY 16, 2017
HOLMES 400 (seating limited)
10:30 AM

Reliable Acoustic Path Tomography at the ALOHA Cabled Observatory

Abstract:

Using a mobile ship platform (*R/V Kilo Moana*) with an acoustic source transmitting to a fixed bottom hydrophone at the ALOHA Cabled Observatory (ACO), we are investigating the feasibility of Reliable Acoustic Path (RAP) Tomography. This will allow the spatial mapping of a path integrated sound speed (temperature) over a 60 km diameter "teacup" volume of the ocean. This can be considered an extension of an inverted echosounder (from a vertical to near horizontal path) combined with the precise positioning and timing of seafloor geodesy, where their noise (sound speed variation) is our signal. As a first step in this pilot project, transmissions were sent using an array of transducers at 3.5 kHz. Receptions at the hydrophone were recorded as the vessel approached and departed from ACO. Actual travel times were compared with estimated travel times that were calculated using CTD measurements. The next test employed user-generated (LFM sweeps and M-sequences) signals and an improved experimental setup to ensure a precise and accurate time of transmission. This experiment provided a more consistent travel time that agreed well with estimated times, when compared to the earlier pilot test. For an upcoming cruise with dedicated ship time, this setup will be used again. The vessel will traverse circular and radial paths around the hydrophone to obtain multiple different acoustic paths in the volume. Subsequent analysis of the data is expected to resolve the tidal cycle at ACO, increase positioning accuracy of the bottom mounted hydrophone, and perform RAP Tomography.