Contribution ID: **24** Type: **Instrumentation/Hardware**

Calibrating an Ocean-Floor Observatory: Conquering Currents at the Pacific Ocean Neutrino Experiment

Monday 15 August 2022 11:50 (12 minutes)

The Pacific Ocean Neutrino Experiment (P-ONE) is a multi-cubic kilometre neutrino observatory in development off of British Columbia's west coast, 2600 metres below sea level. P-ONE detects Cherenkov radiation from secondary particles of neutrino interactions in ocean water to ultimately study astrophysical neutrinos. The observatory is comprised of spherical modules with outward-facing PMTs held along kilometre-long mooring lines rising from the ocean floor. Since this dynamical system freely sways in the ocean, a fraction of the optical modules (P-OM) are calibration modules (P-CAL) monitoring the detector by calibrating its geometry and optical properties using nano-second light pulses and an acoustic system.

This talk outlines and analyzes the characterization of currents and the resultant bending in the Cascadia Basin, with emphasis on developing a calibration baseline for detector geometry and optical properties. By analyzing on-site ocean current data over consecutive years and applying marine dynamics simulations, I place bounds on expected node movements. These are used in Markov Chain Monte Carlo simulations to estimate geometry calibration precision from photon arrival times. This works in tandem with ongoing prototyping and construction of an apparatus to calibrate light flashers to meet precision requirements. These results are used to design calibration modules for the first neutrino detector string: P-ONE-1.

Author: JOHNSON, Hamish (SFU, P-ONE)

Presenter: JOHNSON, Hamish (SFU, P-ONE)

Session Classification: Session II