

# Evaluation of Self-Calibrating Pressure Gauges for Seafloor Geodesy: Instrument Comparisons at Axial Seamount, Barkley Canyon, and Endeavour Segment

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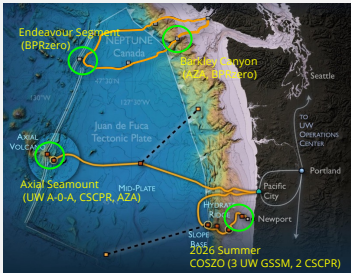
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## Motivation

We compare multiple types of cabled pressure gauges deployed long-term on the Ocean Observatories Initiative (OOI) Regional Cabled Array and Ocean Networks Canada (ONC) NEPTUNE observatories to understand in situ self-calibrating pressure gauge performance.

## Cabled APG observations in the Northeast Pacific

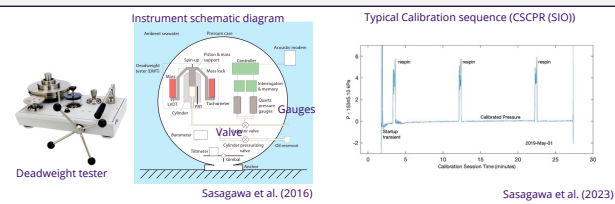
Approximately 20 cabled APGs are online. Scientific applications include geodesy of seafloor volcanoes on the Juan de Fuca Ridge and the Cascadia subduction zone, and studies of ocean circulation.



## Two types of Self-calibration

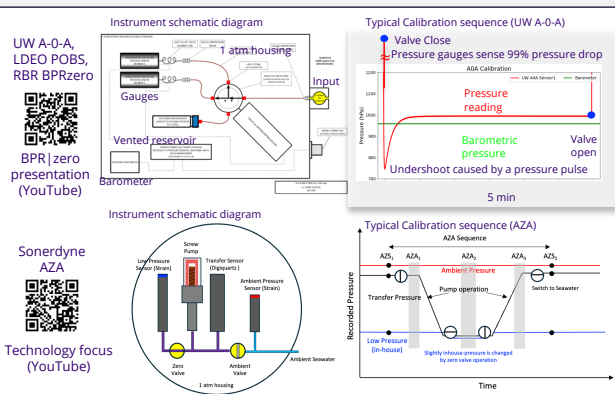
### Piston cylinder calibration

The cabled self-calibrating pressure recorder (CSCPR) developed by Scripps Institution of Oceanography generates a reference pressure that is close to ambient (5% less weight) using a dead weight tester (DWT).



### A-0-A (Ambient-Zero-Ambient) calibration

The A-0-A (ambient-zero-ambient) calibration method uses atmospheric pressure in the instrument housing as a reference. It has been implemented by both academic institutions (University of Washington (UW) Geodetic and Seismic Sensor Module (GSSM) and A0A, Lamont Doherty Earth Observatory POBS, Tohoku University) and commercial vendors (Sonardyne AZA, RBR BPRzero).



# Side-by-side instrument comparisons demonstrate that self-calibrating gauges reduce drift to < 1 cm/yr.

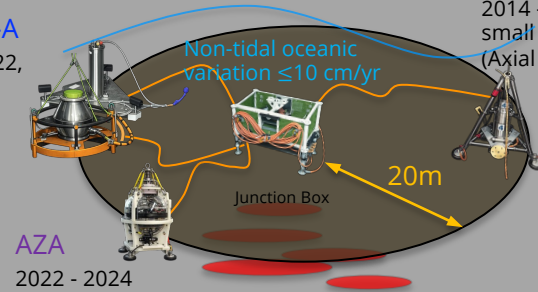
## Axial Seamount

### UW A-0-A

2019 - 2022,  
2024 -

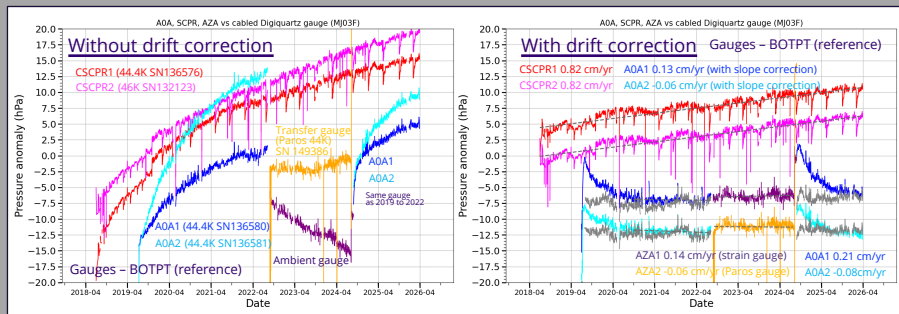
### CSCPR

2018 -

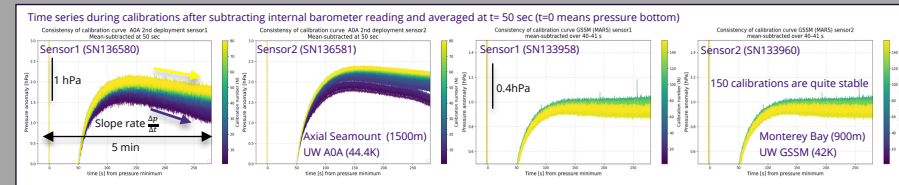


## BOTPT (reference)

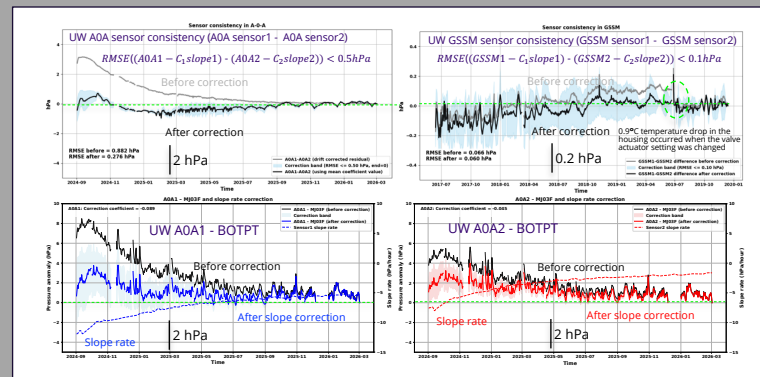
2014 -  
small drift rate < 0.5cm  
(Axial cruise report 2024)



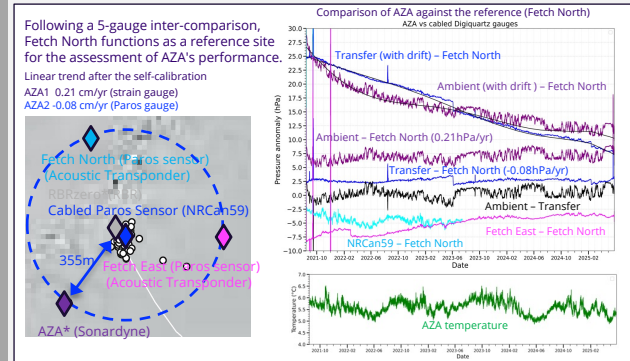
## A-0-A calibration records offer insights into the sensor's condition.



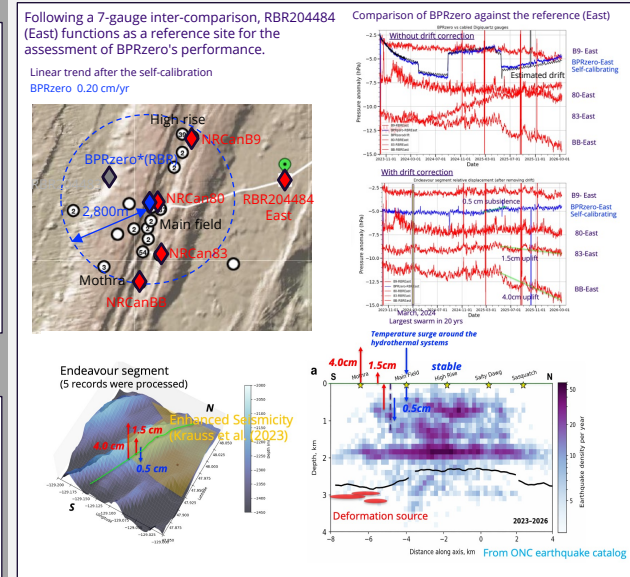
## Second-order drift correction based on slope rate change (creep) can enhance the consistency between sensors.



# Shallow-water observations at Barkley Canyon (400 m) highlight the importance of correcting for temperature sensitivity.



## At the Endeavour Segment, a single self-calibrating pressure gauge helps calibrate a dense array.



## Laboratory tests reveal differing sensor behavior during calibrations.

