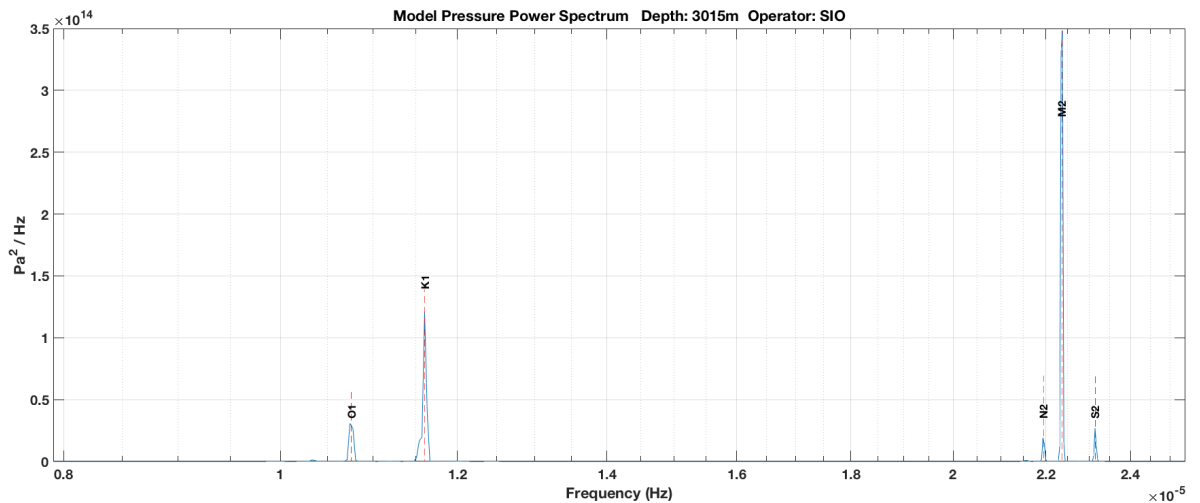


The calibration of Differential Pressure Gauges

John A. Orcutt, Jonathan Berger
Institute of Geophysics & Planetary Physics
Scripps Institution of Oceanography
University of California, San Diego
La Jolla, CA 92093

Differential pressure gauges (DPGs) were developed in the late 1980's at Scripps by Charles (Chip) Cox, Thom Deaton and Spahr Webb. The pressure gauge relied upon measuring the differential pressure between the deep ocean and a confined pressure chamber in the gauge. The differential pressure was measured with a small strain gauge while the reference chamber was connected to ambient pressure via a capillary leak formed with a standard hypodermic needle. The leak ensured that the reference chamber did not deform as pressures increased. The DPG has been effectively used to measure deformation at the seafloor caused by long waves passing overhead at frequencies $>1\text{mHz}$. We found that the gauges were also effective in recording tides at semidiurnal and diurnal frequencies as well as fortnightly tides. Since the great successes of radar altimetry have provided accurate tidal models, we have been able to use measurements of tides (in particular) to calibrate seafloor DPG's with considerable accuracy at very low frequencies. The tides M2, K1, O1, S2, and N2 are particularly useful in this calibration.



In addition to tidal calibrations, we have also built a laboratory system for calibrating DPGs over a broad band of frequencies at ambient pressures and temperatures for the seafloor. This calibrator emulates the calibrations made at the seafloor for Zumberge/Sasagawa geodetic measurements using Absolute Pressure Gauges (APG) to remove drift. Planned modifications to this apparatus are required to allow the routine calibration of DPGs in the laboratory between seafloor deployments.