FODTS Experiment: Acoustic Tank Temperature Profile

Home Experiment Series
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Amherst MA

Purpose:

The purpose of this experiment was to test the fiber in a water column as a way to measure a time series of a temperature profile. See Acoustic Tank site below:

Experimental Set-Up:

- A cable of length approximately 87m in length was used in this experiment.
- A small weight was attached to the unterminated end of the fiber.
- The URI Ocean Engineering Acoustic Tank is approximately 11 ft (3.35m) deep
- The fiber was lowered into the tank near the edge, and taped to the side to retain tension and a straight fiber.
- The remaining fiber between the fiber in the tank and the DTS system was coiled on the ground.
- Fiber was plugged into XT DTS system Channel 1.
- Fiber was left to rest approximately 5 minutes.
- Probe 1 was secured to side of acoustic tank with tip resting in the water.
- XT DTS system set to start sampling for approximately 2 hours.

XT Client Configuration:

- Units: Metric; Time zone: (UTC-05:00) Eastern Time (US & Canada)
- Fiber length set to 2 km
- Zero reference set to 1m
- Sampling Interval: 0.25 m; Measurement Length: 87 m; Acquisition time 180s
- Probe 1 selected – Probe section: 83m – 87m (approximate length of fiber in the tank)
- Differential loss correction: Fixed Value: 0.25 [dB/km]
- Temperature offset correction: External Probe
- Measurement mode: Continuous

Experiment Notes:

- Fiber was almost straight up/down in tank, but had a slight angle as was required to hold the fiber taught in the water column.
- Acoustic Tank was near a garage door, and air temperature was quite cold.
- Outside weather was rainy/slushing.

Results Notes:

- Results show an approximately 1 deg C variation throughout the water column.
- Results show a cold surface layer with a warm core, and colder bottom water.
- .ipynb script contains example of how to cut a specific length of nodes, and plot them vertically as a depth profile.