

BoraBora, SPUNK-G: Hardware Update

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Contents

1 BoraBora: DISC Borehole Logger

2 SPUNK-G PVA: Transmitters

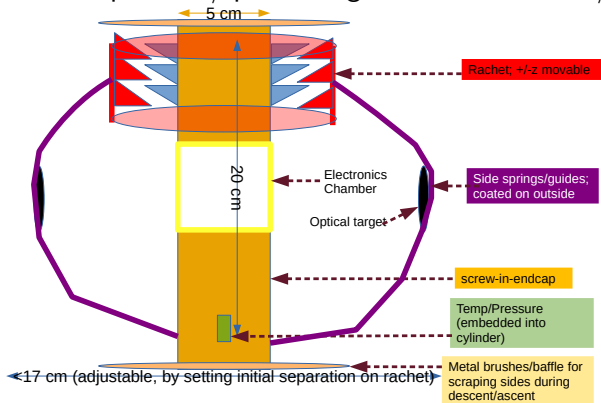
DISC borehole: Closure Rate Updates

The Deep Ice Sheet Coring (DISC) characteristics:

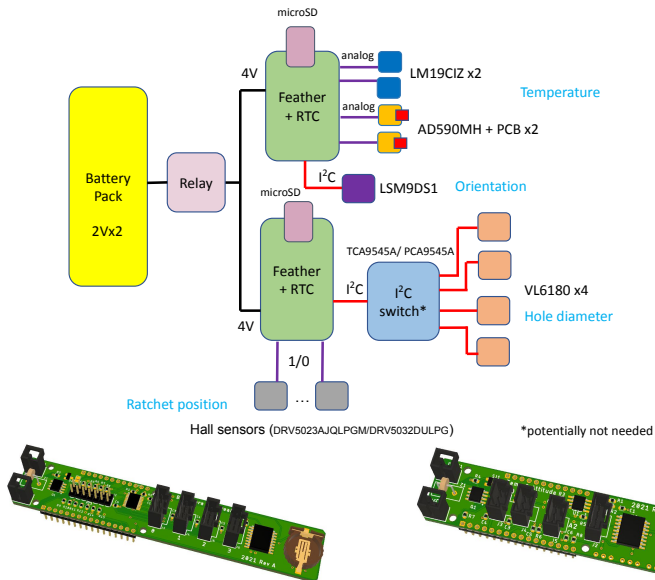
- Final depth: 734.3 m
- Final diameter: 17 cm (after deployment, 2006)
- Drilling Fluid – Isopar K, it is described as "clear water-white liquid".
- level of liquid in the borehole was 233 m below the surface after deployment (2006)
- **Abby: antenna into fluid at 140' = 42.67 m depth (2013) $\Rightarrow Z_{fluid,2006} = 501.4$ m; $Z_{fluid,2013} = 691.6$ m. Assuming no leaching:**
 - $691.6 \times r_{2013}^2 = 501.4 \times 17^2 \Rightarrow \langle r_{2013} \rangle = 14.5$ cm
 - Assuming constant volume loss per year $\Rightarrow \langle r_{2021} \rangle \sim 10.7$ cm
- In reality, "leaching begins at 80 m"
- Only 3-4 mm clearance for SPUNK-1 (the outer diameter is ~ 10 cm)!

BoraBora: DISC Borehole Logger

cf: <https://mountsopris.com/ql40-abi-2g-acoustic-televviewer/>

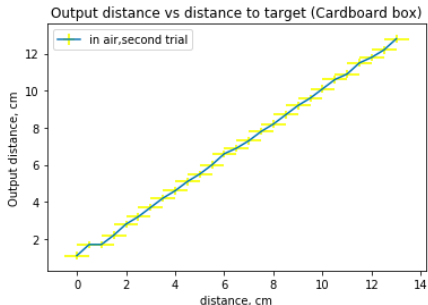
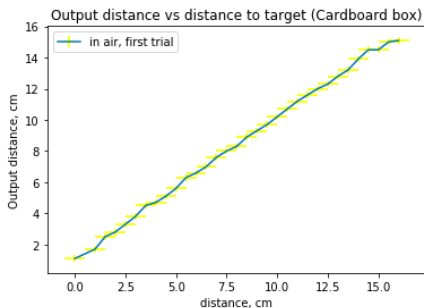
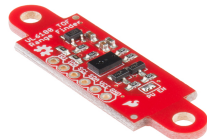


BoraBora: DISC Borehole Logger

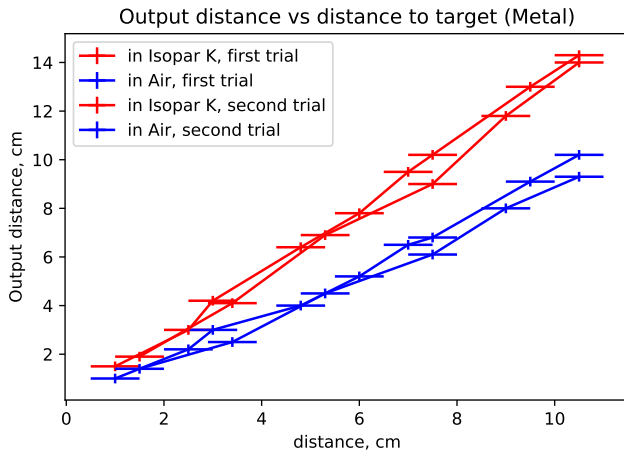


VL6180 Sensor

- Digital Time of Flight sensor;
- I²C interface;
- Showed good response for 1-10 cm distance range.

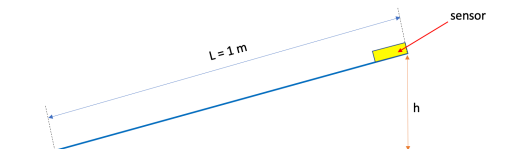


VL6180 in Isopar-K



$$\frac{n_{\text{IsoparK}}}{n_{\text{Air}}} \approx \frac{\text{ToF}_{\text{IsoparK}}}{\text{ToF}_{\text{Air}}} \approx \frac{\text{Slope}_{\text{IsoparK}}}{\text{Slope}_{\text{Air}}} \approx 1.4$$

Orientation Logger: Inclination (accelerometer)



Run1:

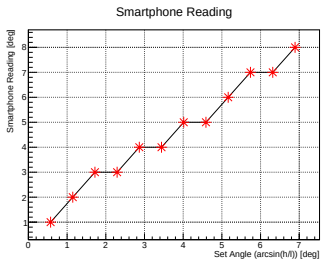
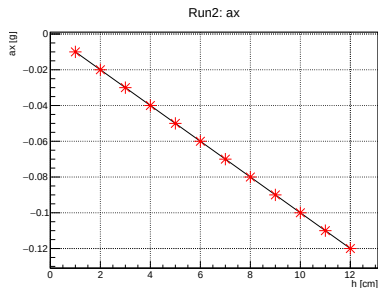
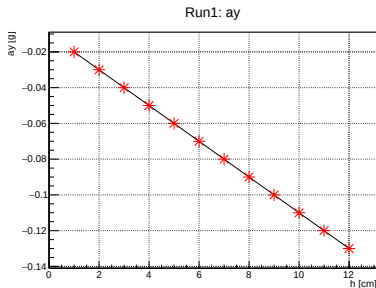
- a_x is fixed
- a_y is changing

Run2:

- a_y is fixed
- a_x is changing

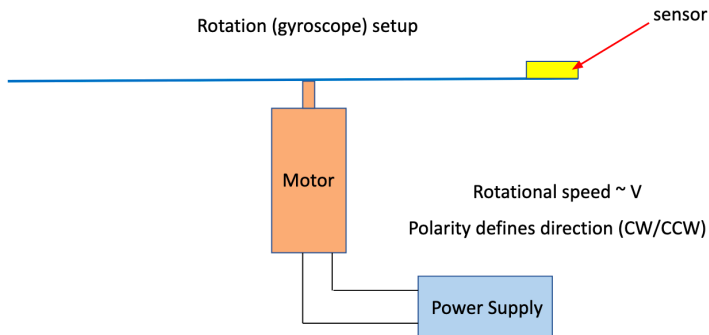
Crosscheck - smartphone sensor

Orientation Logger: Inclination (accelerometer)

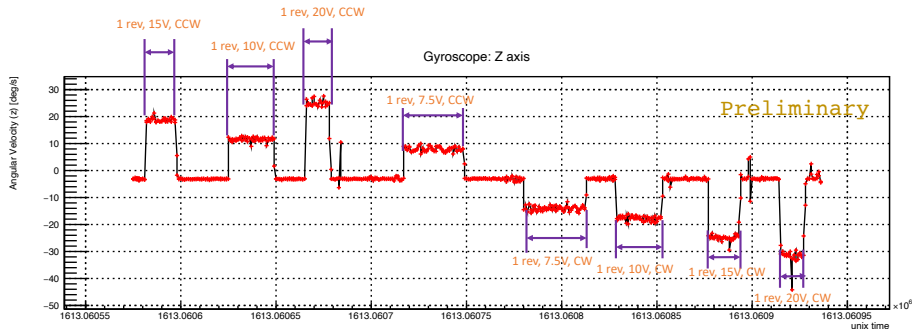


ToDo: tests with BoraBora & calibration

Orientation Logger Initial Tests: Rotation (gyroscope)

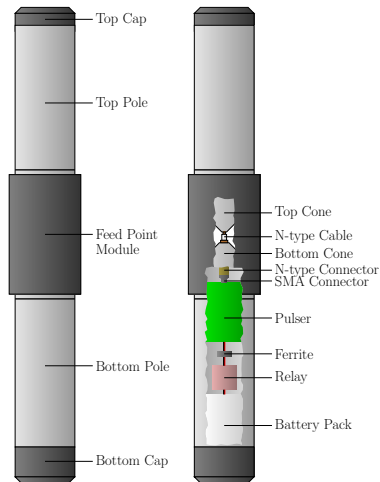


Orientation Logger Initial Tests: Rotation (gyroscope)



ToDo: tests with BoraBora & calibration

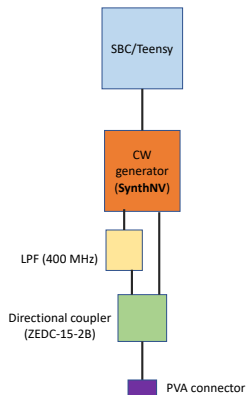
SPUNK-G PVA (Pressure Vessel Antenna)



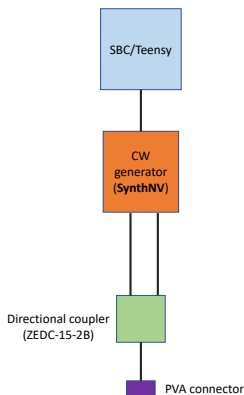
- Used in SPICE in 2018 and 2019
- 3 types of transmitters:
 - IDL1, IDL2 (consistent at $T > -35^{\circ}\text{C}$);
 - HVSP1, HVSP2 (possible higher amplitude, better low temperature performance);
 - **CW Generator;**
- Batteries: Lead Acid (0810-0004 EnerSys Cyclon)

CW Generator

Low frequency run



High frequency run



We can have the return loss measurements "for free".