

Biogeochemical Research with an Autonomous Underwater Vehicle: Payload Structure and Arctic Operations

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Oceans '13 MTS/IEEE Conference

Bergen, June 13th 2013

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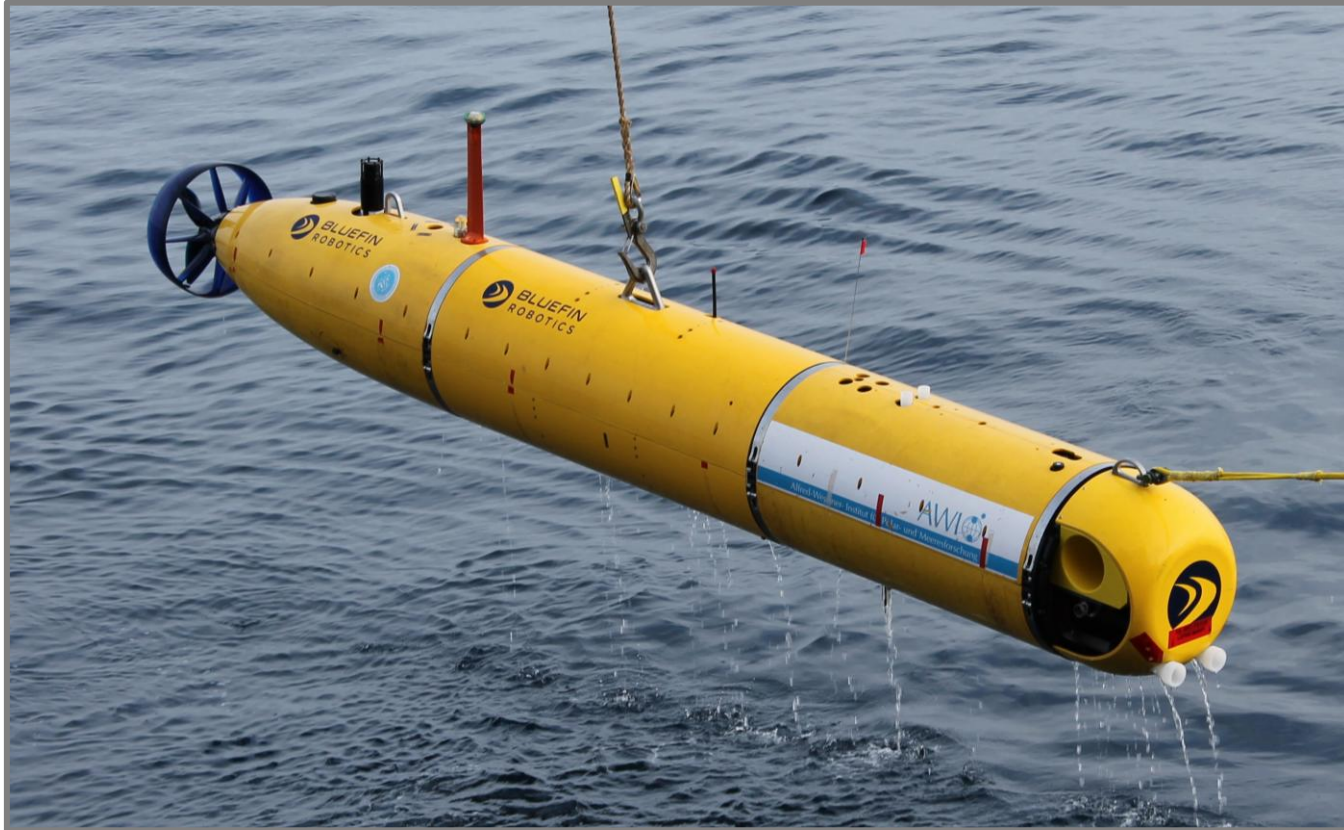


- The Vehicle
- Scientific Question
- The Payload
- Float Maneuver
- Results

The Vehicle

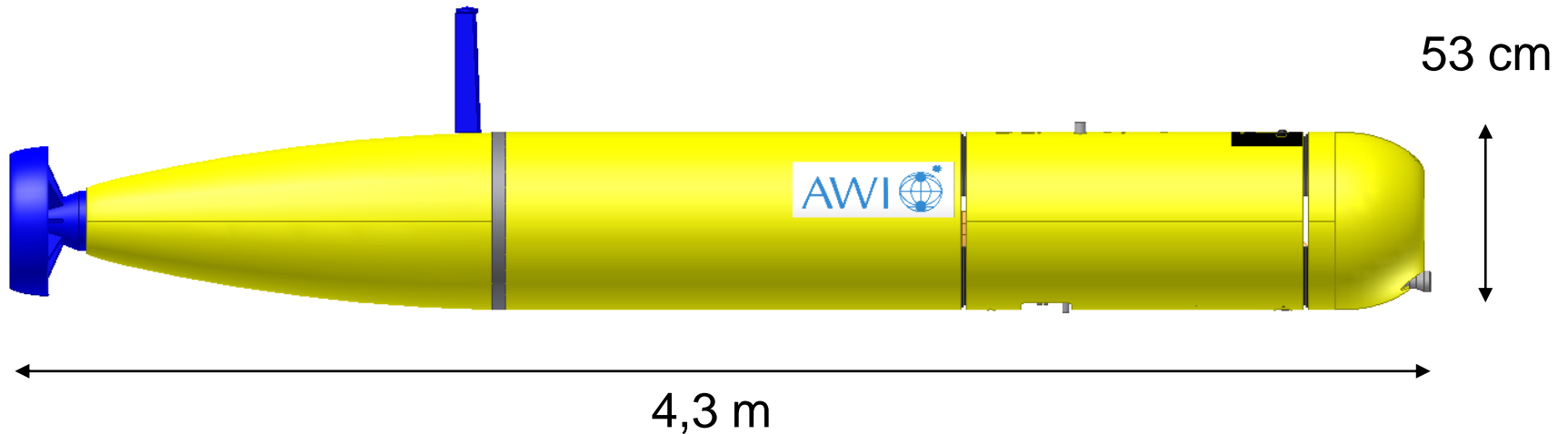


The Vehicle



PAUL: Polar Autonomous Underwater Laboratory

The Vehicle



Type: Bluefin 21



Weight: 480 kg

Range: 70 km

Maximum Depth: 3000 m (currently: 600 m)

Speed: 6 – 8 km/h

The Vehicle



Tailcone

- Thruster
- MVC
- INS

Batteries

- 3 x 1,5 kWh
- CTD

Payload

- Sensors
- Sample Collector
- PCC

Nose

Scientific Question



Scientific Question

AWI's deep sea observatory „Hausgarten“
Established in 1999
17 stations, annually visited

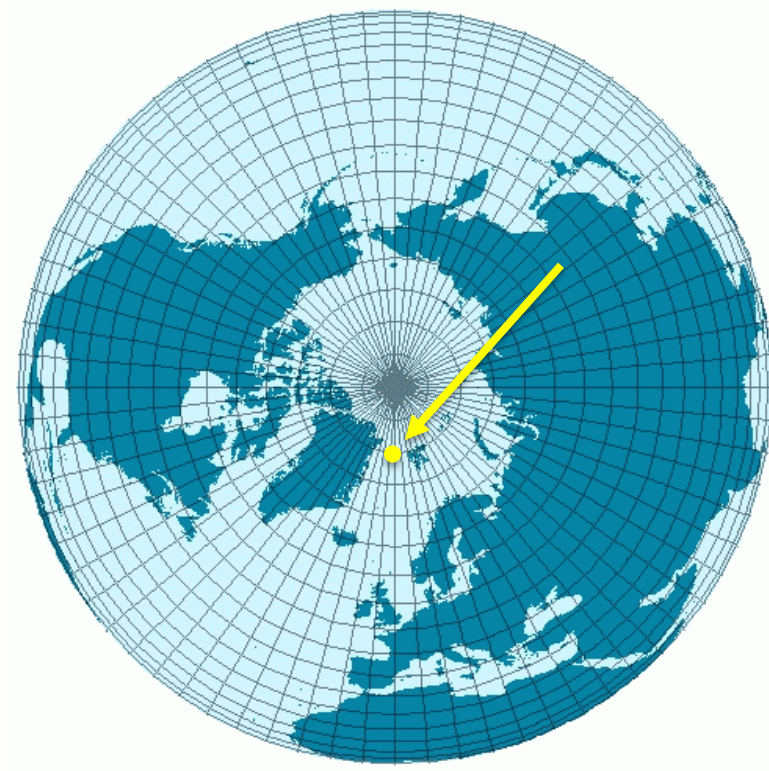


Image: Stefan Kühn

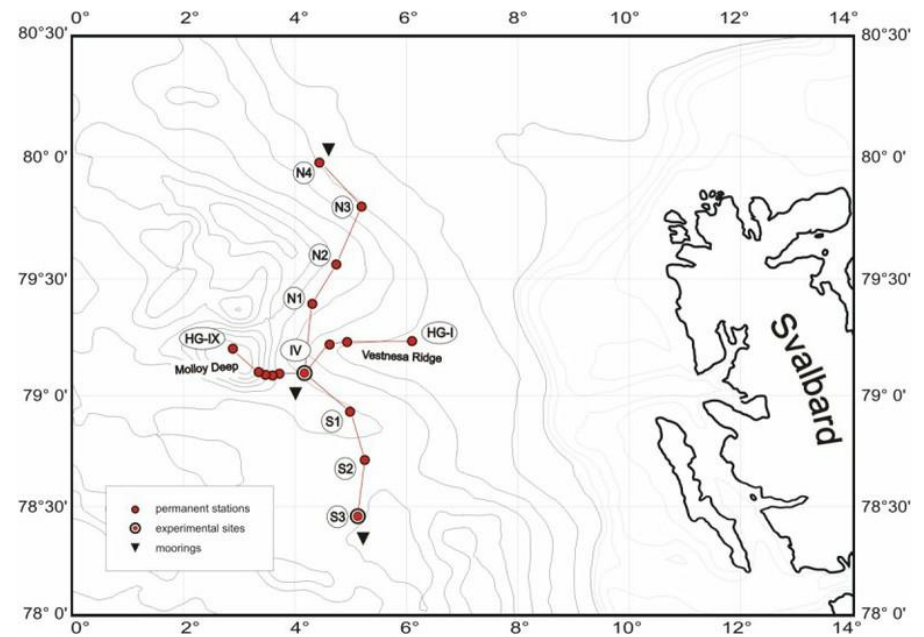


Image: AWI

Scientific Question

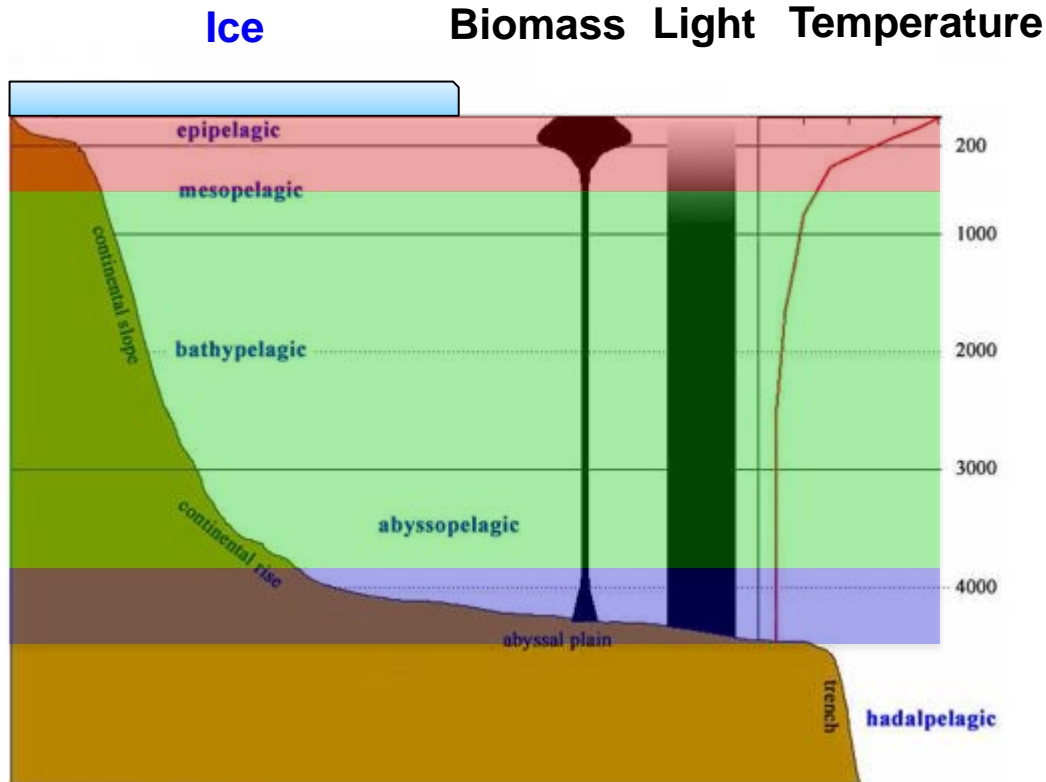


Image: Jeffrey Drazen, University of Hawai'i



Image: K.U.M

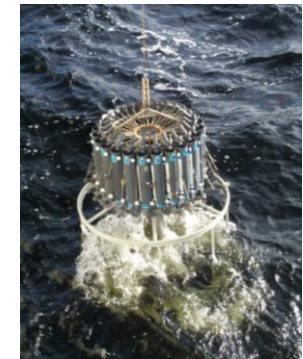


Image: AWI

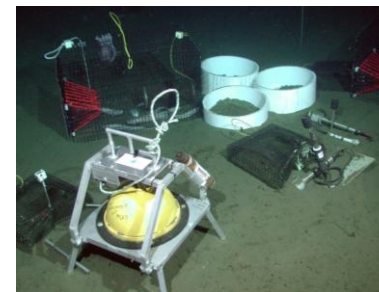


Image: MBARI

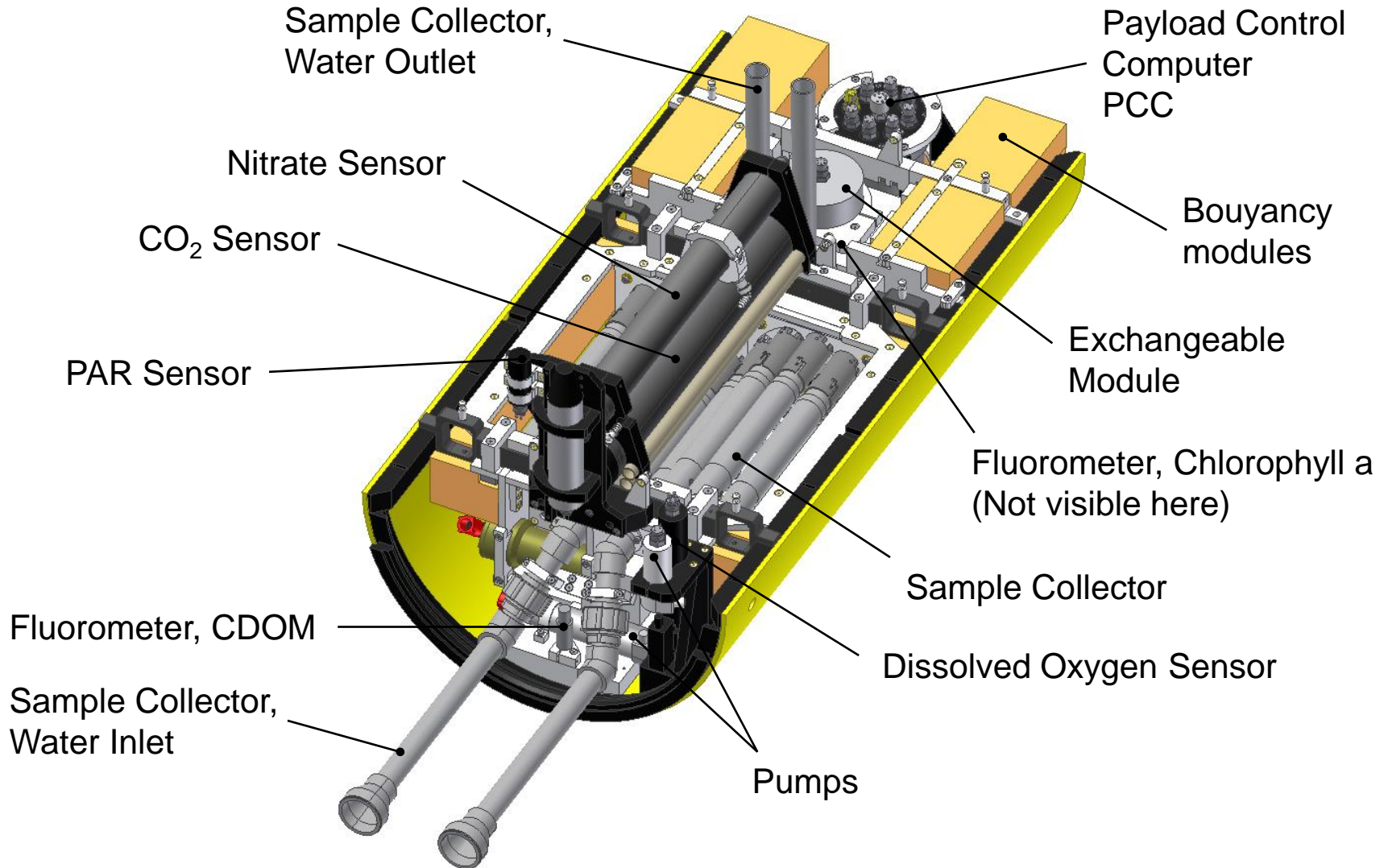


Image: MARUM

Payload



Payload



Payload



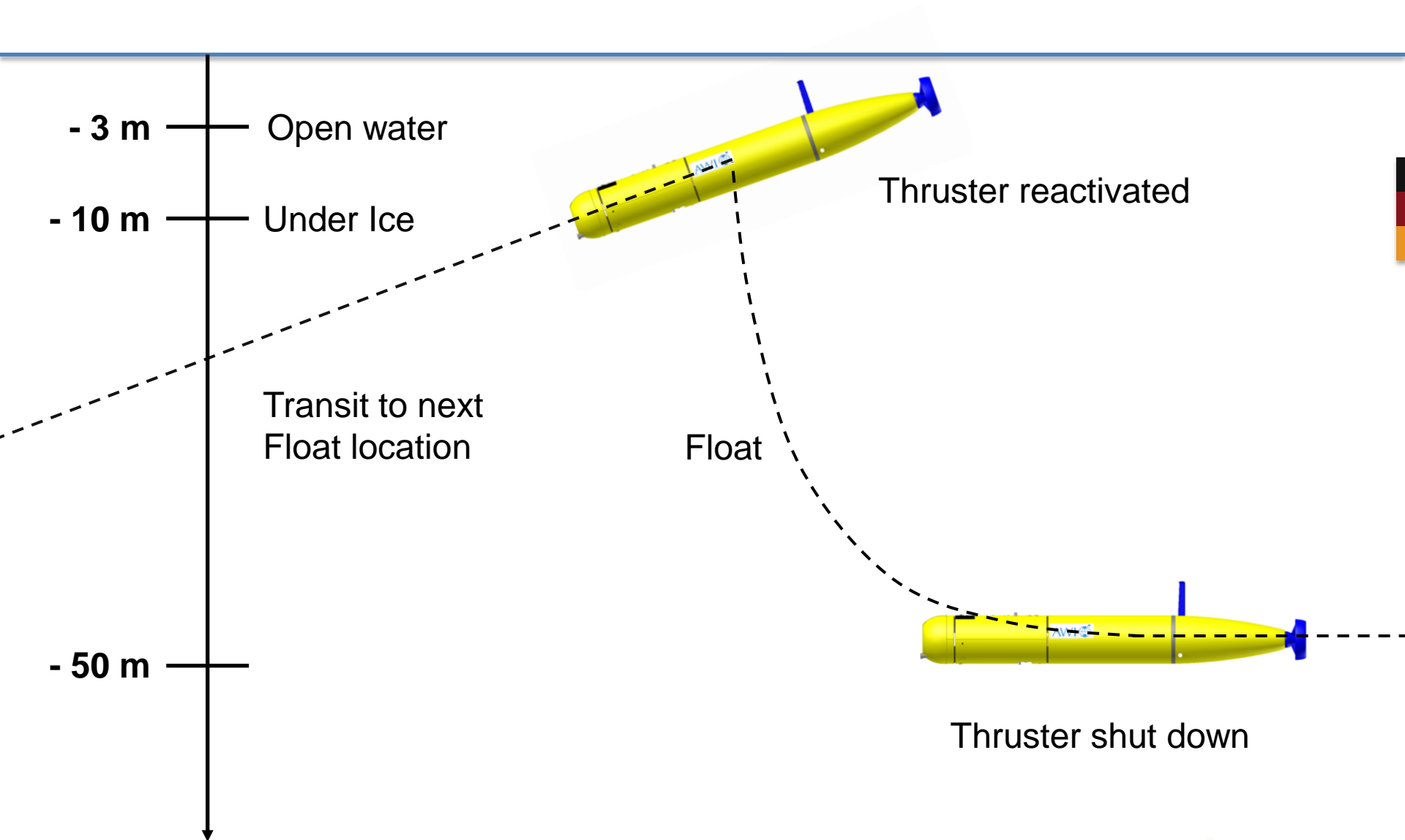
- **CTD** (SBE 49)
- **Nitrate Sensor** (Satlantic Deep Suna)
- **CO2 Sensor** (Contros HydroC)
- **Dissolved Oxygen Sensor** (SBE 43)
- **Fluorometer (CDOM)** (Turner Designs C7 “u”)
- **Fluorometer (Chl. a)** (Turner Designs C7 “c”)
- **PAR Sensor** (Satlantic PAR-log-s)

- **Sample Collector**

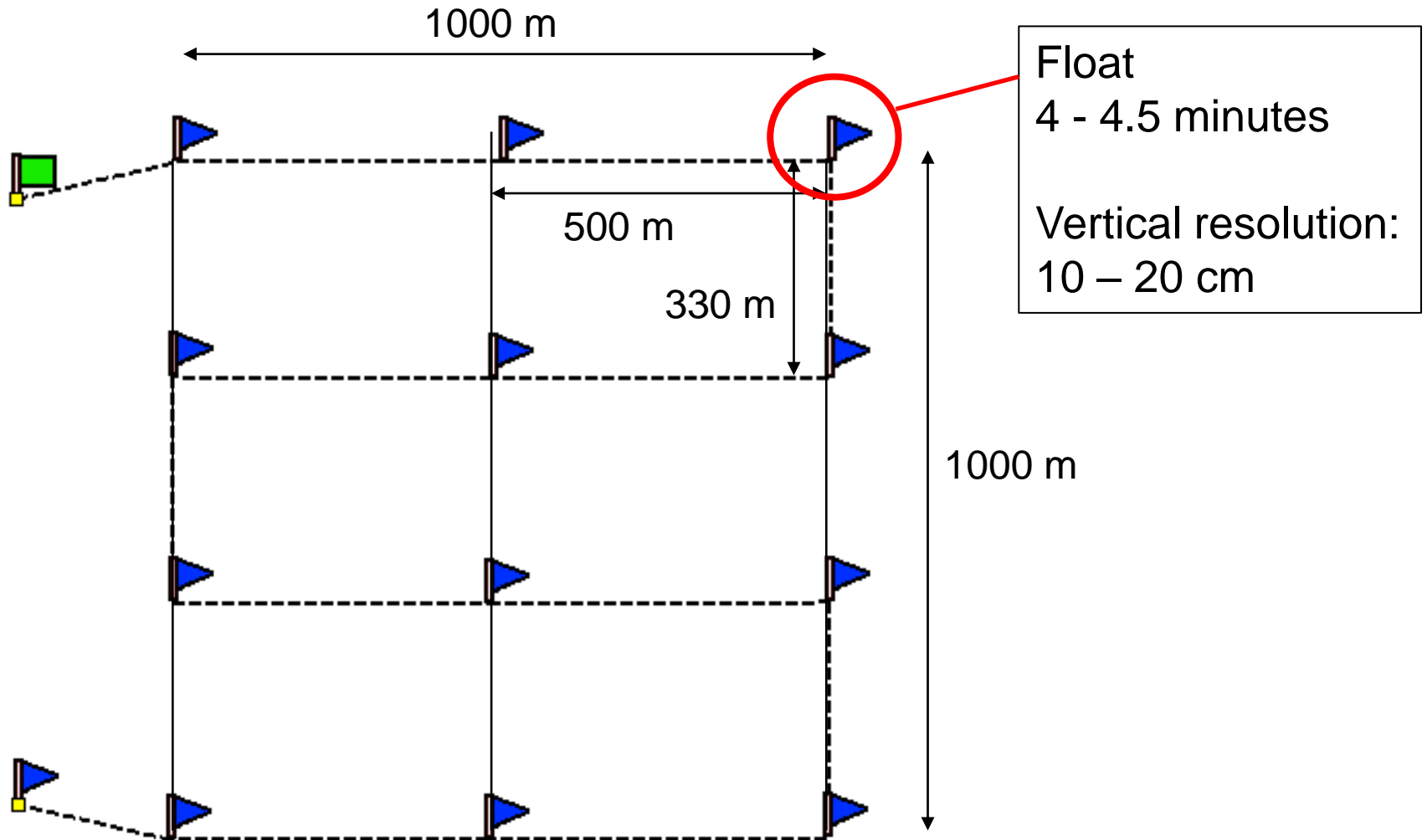
Float



Float



Float



Results



Results

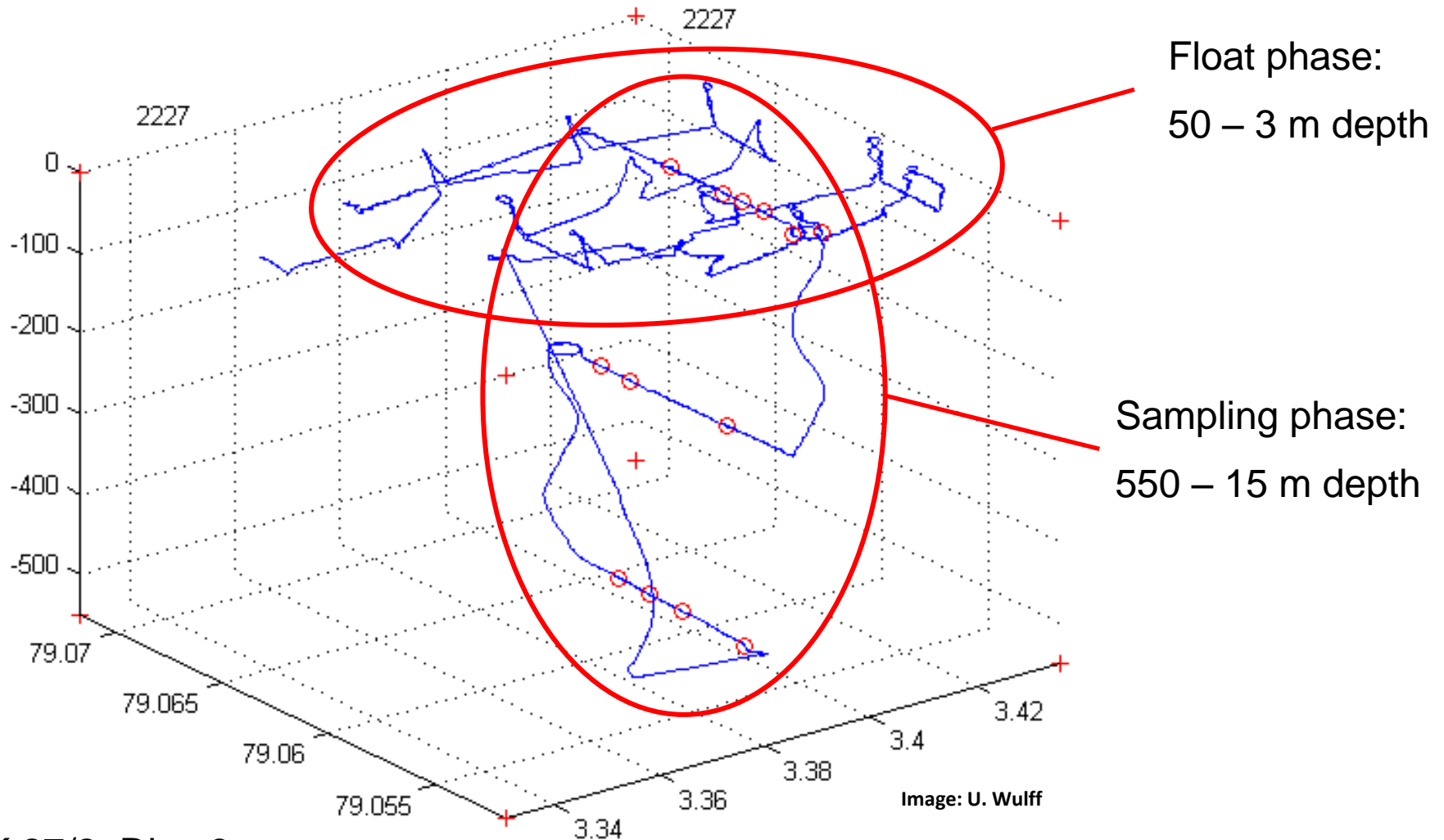
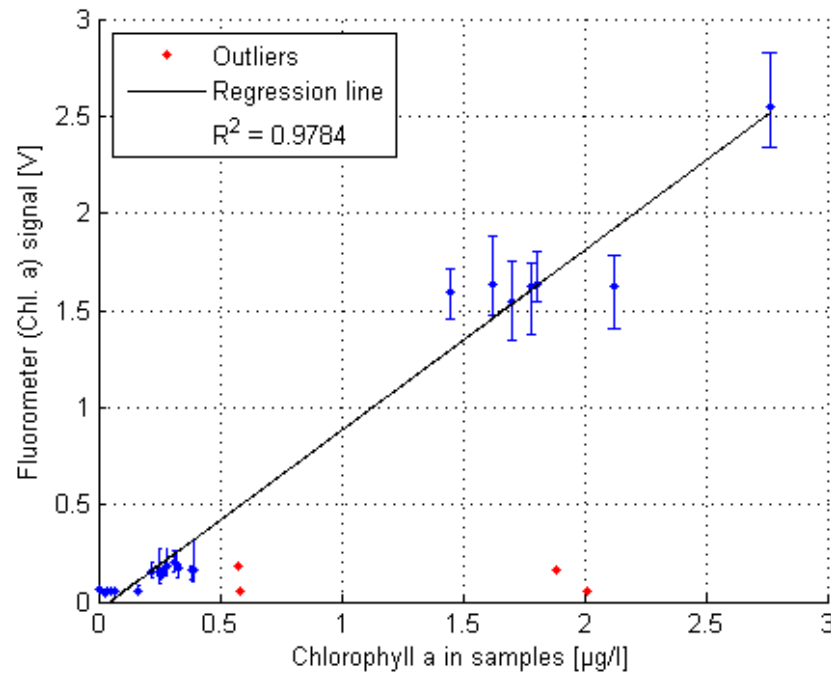
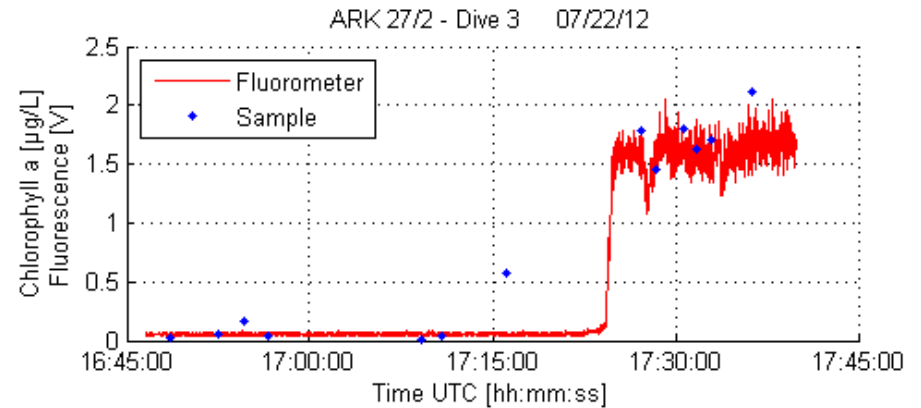


Image: U. Wulff

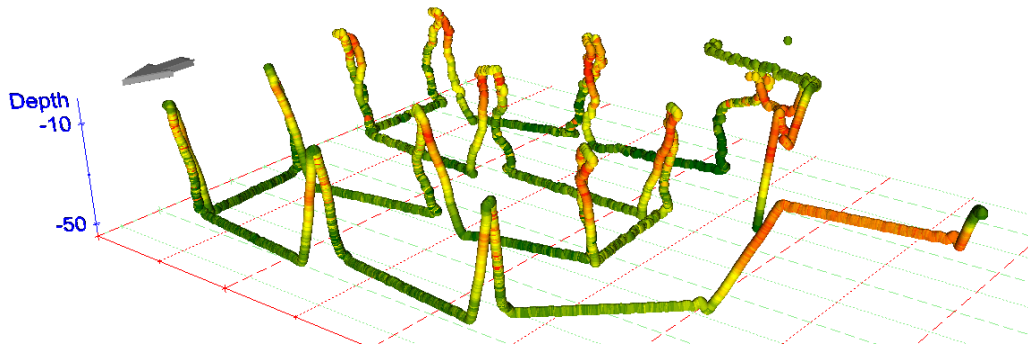
ARK 27/2, Dive 3
July 22nd 2012, Fram Strait

Results

Calibration of Fluorometer data (Chl. a)
using AUV Sample Collector
(ARK 27/2, July 2012, Fram Strait)

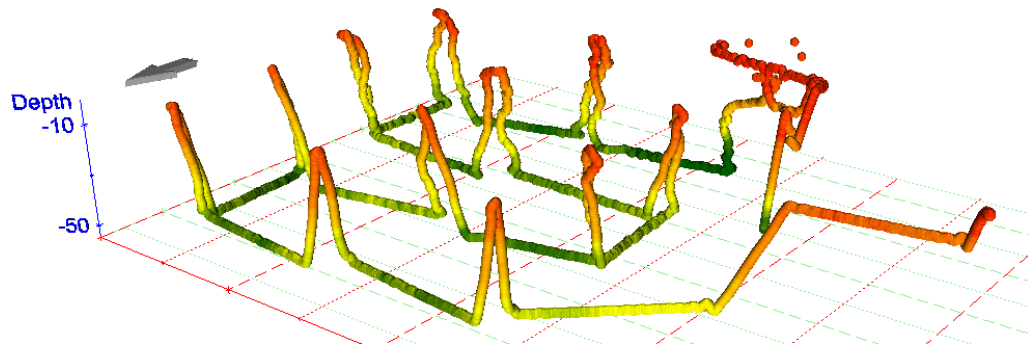


Results



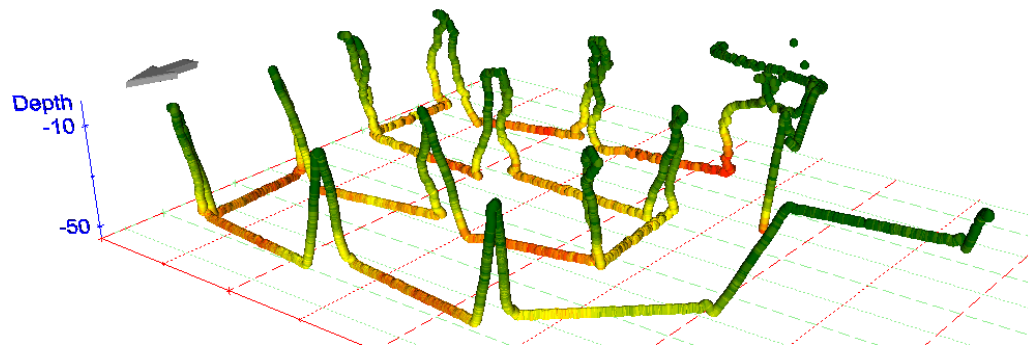
Chlorophyll a

0.2 [µg/l] 2.0



Dissolved Oxygen

319.4 [mmol/l] 376.9

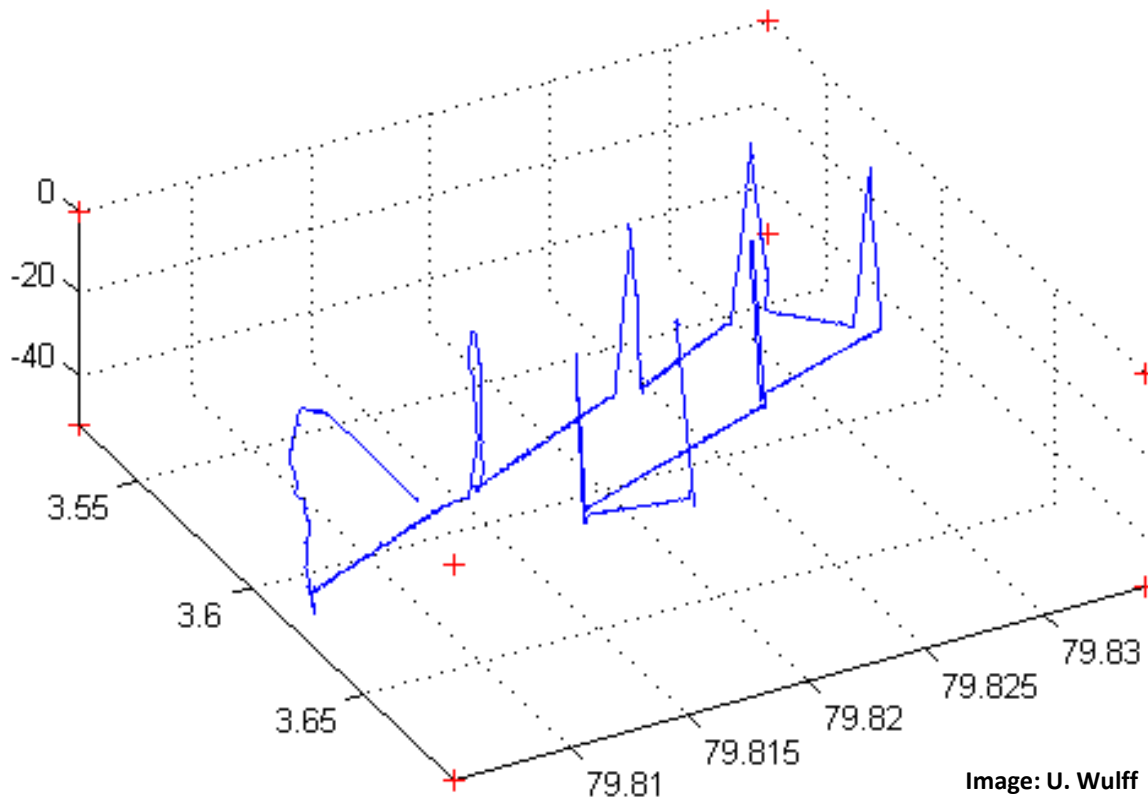


Nitrate

0.0 [µmol/l] 11.3



Results

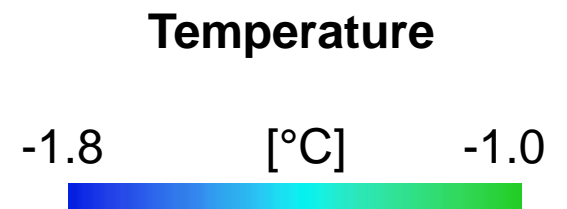
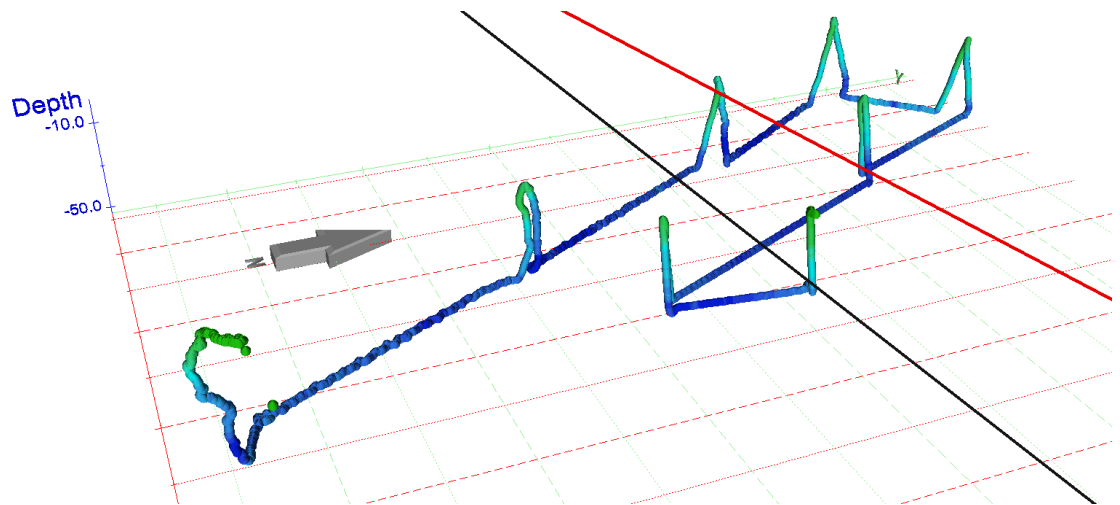
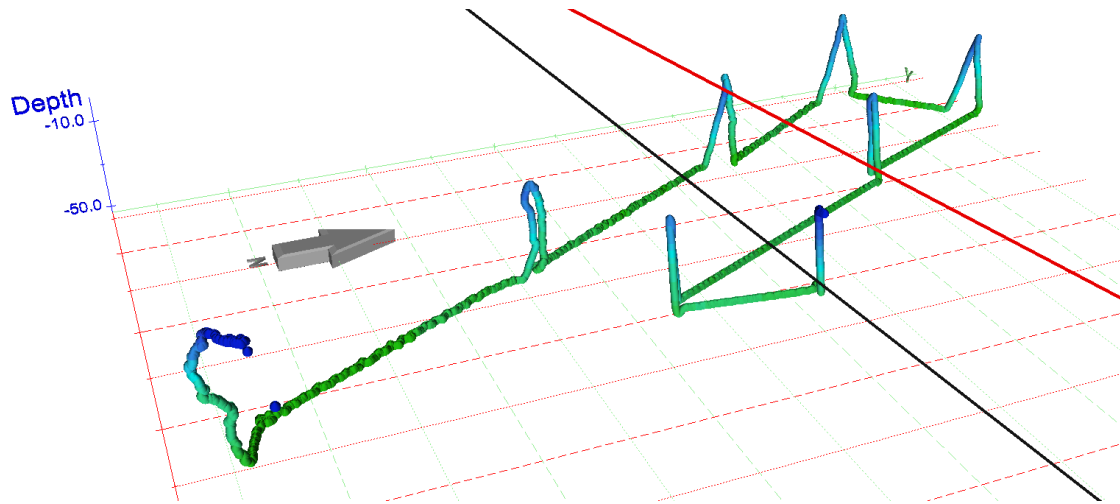


Float phase:
50 – 10 m depth

Sampling phase:
Separate dive

ARK 27/2, Dive 4A
July 24th 2012, Fram Strait

Results



Thank you