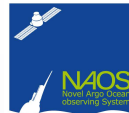# Deep-Arvor: a CTD & DO profiling float for Argo

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Ifremer

The first prototype of Deep-Arvor was deployed this summer. Deep-Arvor is designed to achieve more than 150 profiles from 3500 meters depth, with CTD continuously pumping and oxygen measurements. High resolution profiles are transmitted by the Iridium satellite system.
Deep-Arvor maintains the self-ballasting feature of Provor/Arvor and the easy deployment of Arvor thanks to its light weight.

✓ The starting point of the development is Arvor (2000m), whose sub-assemblies have been improved and extended: the SBE41CP CTD includes a reinforced pump, the volume of the hydraulic pump has been decreased in order to address the high pressure constraint, the volume of oil has been increased to fit with the new range of depth (and future additional sensors) and the antenna has been strengthened.

The housing is made by filament winding. This technology gives lightness while maintaining the withstand of the pressure. It also offers manufacturing advantages (ordering by few units, reducing costs).

The heart of Deep-Arvor is the I535 controller already used in Arvor.

Deep-Arvor deployment (Strasse 2012)

✓ Sub-assemblies have undergone intensive tests: several hydraulic engines passed the equivalent of 150 cycles at operating pressure; the composite housings withstood the cycles of compression and steady state which are representative of their life; the effect of swell has been assessed; real time missions were performed in the pressure tanks or in pool.

Hyperbaric tests of hydraulic engine
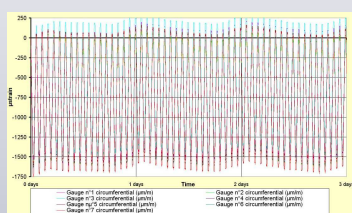
*Housing: pressure cycling, circonferential gauges.*

Pressure tank testing

Swell testing in pool

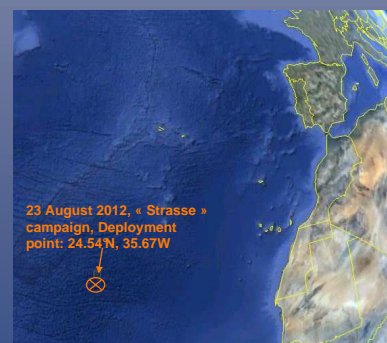✓ Industrialization phase: first units planned for 2013 (NKE Manufacture)

First results at the sea:

- The first prototype is cycling every 3 days in mid-Atlantic ocean, 10 cycles has been achieved (23 August - 20 September 2012),
- According to the Argo oxygen meeting conclusions (Brest, may 2011), the float transmits raw data (phases) of the optode. Thus oxygen concentration may be post-calculated with a suitable algorithm.
- The power balance shows that the objective of 150 cycles at 3500 meters is realistic,
- A second prototype is being tested and will be deployed soon.
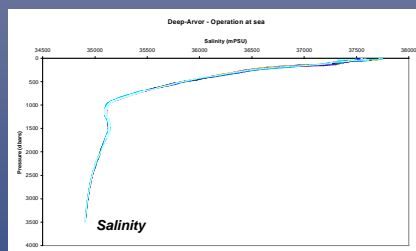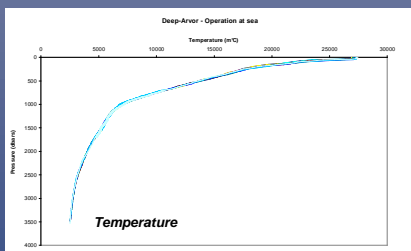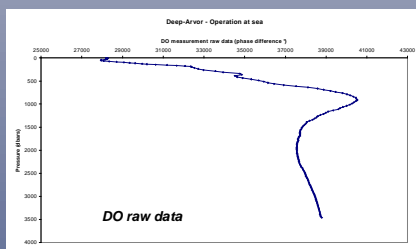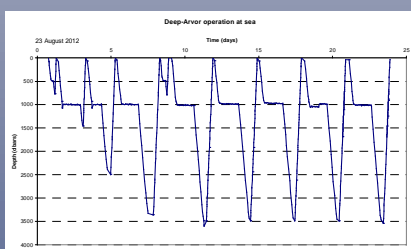
Main features of Deep-Arvor:

- Full scale accuracy of CTD: 3500 meters,
- Pressure withstanding: 4000 dbars
- 150 profiles at 3500 meters depth,
- Seabird 41CP CTD + Aanderaa 4330 optode (raw data: phases + T),
- Fully programmable cycle during operation (period, parking & profile pressure, alternate pressure to go deeper every *n* cycle…),
- 3 sampling areas (depth, middle, surface) with high resolution capabilities (1 meter),
- Over 1000 points profile with CTD & DO transmitted (programmable),
- Iridium transmission & GPS positioning, mission parameters are remote controlled,
- Weight in air: 26 kg,
- Dimensions: hull diameter 14 cm, total length 216 cm.

DO raw data

Temperature

Salinity

23 August 2012, « Strasse » campaign, Deployment point: 24.54'N, 35.67W