Deep-Arvor: a profiling float for deep sea applications

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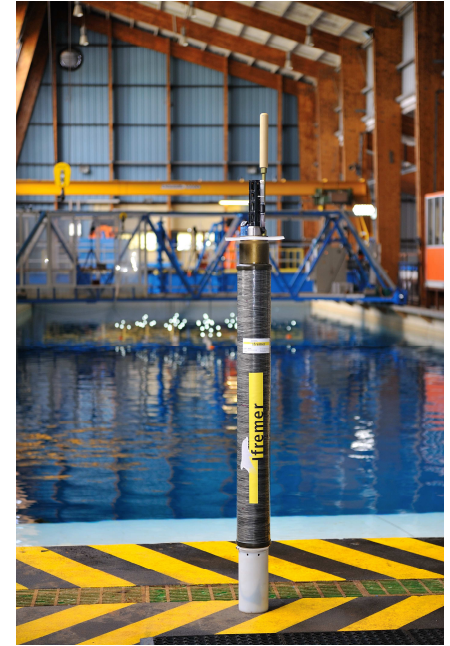
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Deep Arvor :
based on Arvor technology
150 profiles @ 4000 dbars

Main features of Deep-Arvor

• Operational depth	**4000 dbars**
• Pressure test	4580 dbars
• Nb of cycles	**150 profiles** at 4000 dbars
• Sensors	- **Seabird 41CP CTD** (continuous pumping)
	- **Aanderaa 4330 optode** (raw data: phases + T)
	- Optional additional sensor available
• Data acquisition	- 3 sampling areas (depth, middle, surface) with high resolution capabilities (**1 meter**)
	- Over **1000 points** profile with CTD & DO transmitted (programmable)
	- Remote control available (period, parking & profile pressure, alternate profiles…)
• Transmission	Iridium (&GPS)
• Housing	Filament winding
• Weight in air	26 kg
• Dimensions	Housing diameter 14 cm, total length 216 cm

Qualifications

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;
- the effect of swell was assessed;
- real time missions were performed in the pressure tank or in pool.

*Qualifications : Pressure tank testing*

Results at sea

Two prototypes of Deep-Arvor have been deployed at sea in August 2012 and in October 2013, for a total of 115 cycles.

The first prototype achieved **60 profiles at 3500 dbars** between August 2012 and January 2013, cycling every 3 days in mid-Atlantic ocean.

The second prototype has been deployed in October 2013 in the bay of Biscay, and has achieved **55 profiles at 3500 dbars** and is still cycling.
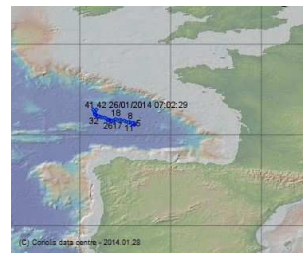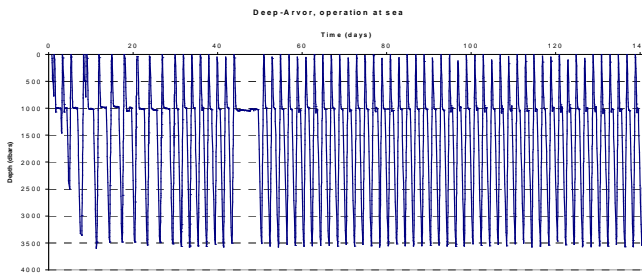
*Oxygen profiles. Data from the Deep-Arvor are colored and data from the calibrated CTD-O2 data are in black. The comparison suggests a bias of about 40 μmol/kg and the float profiles exhibit a drift toward lower oxygen value. (Left panel) Uncorrected Argo data. (Right panel) Corrected Argo data (DOXY_ADJUSTED = 1.003*DOXY +41.3).*
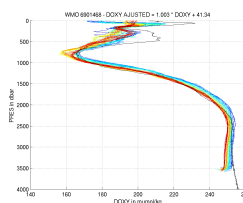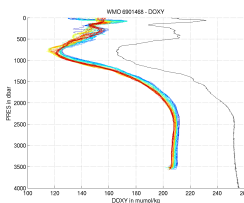
Deep potential temperature, salinity and potential density profiles. Data from the Deep-Arvor are colored (see legend on the left) and data from historical CTD are in black. The comparison also suggests a fresh bias of the conductivity sensor of about 0.01.

Industrialization
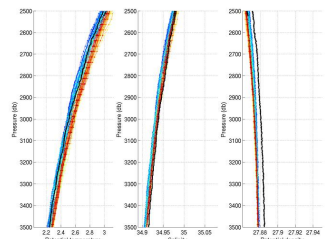
nke INSTRUMENTATION

Industrialization and commercialization is done by NKE instrumentation (France). The first manufactured floats will be deployed in spring.

OI 2014 : stand C300

This development has been achieved within the **NAOS - Novel Argo Ocean observing System -** project framework (www.naos-equipex.fr). It is one of the projects selected in the *Equipex* call for proposals of the French program *"Investissements d'avenir"* (www.naos-equipex.fr). Its two main objectives are:
• To consolidate the French contribution to the Argo core mission (global temperature and salinity measurements) by deploying 10 to 15 additional floats per year from 2012 to 2019 (in total 110 floats).
• To develop and validate the next generation of Argo profiling floats. New float capabilities will include: improved performances, integration of biogeochemical sensors, deeper measurements and under ice operations in the polar seas. NAOS is a strong partnership between IFREMER (coordinator), UPMC (co-coordinator), CNRS, UBO/IUEM, SHOM and two private companies: CLS for satellite telecommunication aspects and the NKE SME which is in charge of the industrialization and commercialization of French Argo floats.

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