Provor: a range of profiling floats for Operational Oceanography

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Provor : the Marvor heritage

Based on experience gained in developing & operating multi-cycles MARVOR floats

- A 7 year at sea experience
- ~200 MARVOR floats deployed
- reliable, long life

Currents at a depth of 800 m in the Antarctic Intermediate Water mass.

Nearly 100 Marvor floats have been launched during the SAMBA experiment in the Brazil Basin between 1994 and 1997 for a 5 year mission
MARVOR results: 65% still alive after 3 years

MARVOR floats statistics
143 MARVOR floats launched for Arcane, Eurofloat, Samba experiments
Provor - main features

- FSI or SeaBird CTD packages
- Self-ballasted, with active buoyancy control (hydraulic pump)
- Max profiling depth: 2000 m
- 100 to 150 cycles
- Possibility of data acquisition on down-profile to parking depth
- Great versatility in vertical sampling strategy (upper and deep layers with different resolution)
- ARGOS data transmission
Provor Range of floats

Provor T
Seascan

Provor CT-F2
FSI Excell

Provor-CT-S
Seabird 41 CP
Metocean Provor CT-S

- SBE sensor
- ready to deploy (removable magnet)
- 150 cycles (36 lithium D-cells)
Provor mission programme

Sampling on down cast

Sampling on up cast

Select:
- Upper and lower layers depth
- Sampling interval in each
- Parking depth
- Timing of all actions
- ARGOS parameters

Max. sampling depth ≈ 2000 m
Buoyancy control

• Transfer of oil between an internal reservoir and an external ballast
• No ballasting operation before launching
• +/- 30 dbars at depth
• About 2.3 liters of usable oil:
  – emergence at the surface: >1 liter
  – from surface to depth: 350 cm³ (function of difference of density)
  – quality of machining: 500 cm³
# Data Acquisition

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>T</th>
<th>C/S</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provor-T</td>
<td>1 dbar</td>
<td>0.01 °C</td>
<td>-</td>
<td>Chords</td>
</tr>
<tr>
<td>Provor-CT-F2</td>
<td>1 dbar</td>
<td>0.01 °C</td>
<td>0.01mS/cm</td>
<td>Slices</td>
</tr>
<tr>
<td>Provor-CT-S</td>
<td>1 dbar</td>
<td>0.002 °C</td>
<td>0.005 PSU</td>
<td>Slices</td>
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</tbody>
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- One sample every 10 seconds (1 sample per meter). No power switching to avoid electrical noise.

- From 2000 points to 100 to reduce the time at the surface (using Argos data transmission system).

- 2 data reduction methods: chords or slices.
Data reduction: Chord
Segments between real points
Maximum allowed error or number of points
More points when variations are higher.
Data reduction: Slices Method

- 2 layers (upper and lower)
- Each layer is divided into slices which height is user-defined
- All measurements which are gathered inside every slice are averaged (1 sample / meter)
Provor deployments

• On going experiments (North Atlantic)
  – 1999-2000: technology experiment *Pommier* (5 profilers)
  – 2000-2001: scientific experiment *Pomme* (16 profilers including 6 Provor CT-F2)

• *GyroScope (funded by EU)* (40 profilers - PROVOR-CT-F2)
  – deployments in 2001 and 2002

• *Coriolis* (50 profilers - PROVOR-CT-F2)
  – deployments in 2002

• *Jamstec floats*: 70 METOCEAN PROVOR-CT-S
  – deployments in 2001 and 2002
Provor float deployment from a ship of the French Navy near the Azores