The Oxygen Activities of JAMSTEC

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JAMSTEC
JAMSTEC’s science plan with BGC Argo

JAMSTEC’s middle-long term science plan is to clarify global/regional scale variability on biogeochemical and physical processes:
   a. Carbon cycle
   b. Ocean acidification
   c. Bio diversity

Local / process study
Focusing on the biogeochemical observing station “K2” in the subpolar North Pacific Ocean

Global Network (including deep ocean)

Integrated analyses of biogeochemical and physical processes in the global ocean by BGC floats, GO-SHIP, Argo and other observation with ESTOC.

Time series of Anthropogenic CO2 concentration estimated from ESTOC. Doi et al. (2015)
JAMSTEC will deploy the two types of floats equipped with oxygen sensor by March 2017.

- **Deep-APEX with optode 4831** in February 2017 in MIRAI cruise
- **BGC-APEX with optode 4330 and FLbb-AP2** in November 2016 at the biogeochemical observation mooring site K2 station [47N, 160E] maintained by JAMSTEC.
We are developing Deep NINJA float equipped with RINKO which can measure oxygen to 4,000 dbar.

RINKO-DeepNINJA is expected to be deployed in summer 2017.

**Specifications**

<table>
<thead>
<tr>
<th></th>
<th>ARO-FT</th>
<th>RINKO under development</th>
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<tbody>
<tr>
<td>Measurement principle</td>
<td>DO: Phosphorescence, T: Thermistor</td>
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<tr>
<td>Range</td>
<td>DO: Concentration: 0-425 μmol/L, Air saturation: 0-200%</td>
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<td></td>
<td>T: -3 - 45°C</td>
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<tr>
<td>Resolution</td>
<td>DO: 0.01 μmol/L, Temperature: 0.00°C</td>
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<tr>
<td>Response time (63%) (at 25°C typical)</td>
<td>DO &lt;1s(from air saturated water to anoxic water) T&lt;1s</td>
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<tr>
<td>Sample interval</td>
<td>1s (shorter interval at request)</td>
<td></td>
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<tr>
<td>Pressure rating</td>
<td>2,000 dbar</td>
<td>6,000 dbar</td>
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</table>
ARO-FT sensor mounted on S2A float

- Two S2A floats with ARO-FT (RINKO) sensor were deployed in July 2014 near Japan.
- ARO-FT sensors on-board S2A were calibrated in our lab before deployment.
- Both are now inactive. One of them had operated for 18 months.
Comparison between ARO-FT and in-situ data after about a year of deployment

Profile After 325 days of float deployment

First profile of ARO-FT

DOXY profile of ARO-FT matches in-situ data well in the layers deeper than 26.8 $\sigma_0$ after about a year.

Distance: 29.5 km
Time lag: 19 days
(The ARO-FT data was observed later than R/V Keifu.)
Time series of DOXY from ARO-FT shows no remarkable time drift.

\[ \theta = 2.2^\circ C \]

(* The profile depths were shallower than 1500 dbar.

- Time series of DOXY from ARO-FT shows no remarkable time drift.
JAMSTEC will deploy the two types of BGC floats by March 2017.

JAMSTEC is developing Deep NINJA equipped with RINKO.

There is no remarkable time drift of ARO-FT data, which is mounted on floats.