### Salinity Normalized Total Alkalinity (µmol /kg)

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>22.8</td>
</tr>
<tr>
<td>20</td>
<td>23.0</td>
</tr>
<tr>
<td>30</td>
<td>23.2</td>
</tr>
<tr>
<td>40</td>
<td>23.4</td>
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<tr>
<td>50</td>
<td>23.6</td>
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<td>60</td>
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<tr>
<td>70</td>
<td>24.0</td>
</tr>
<tr>
<td>80</td>
<td>24.2</td>
</tr>
<tr>
<td>90</td>
<td>24.4</td>
</tr>
<tr>
<td>100</td>
<td>24.6</td>
</tr>
<tr>
<td>110</td>
<td>24.8</td>
</tr>
</tbody>
</table>

### pH and DIC Data

- **DIC** (µmol/kg)
- **Temperature** (°C)
- **Oxygen** (µmol/kg)

#### SOCCOM Program

- Monterey Bay Aquarium Research Institute, Moss Landing, CA 95039, USA
- School of Oceanography, University of Washington, Seattle, WA 98225, USA

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**Development of the Deep-Sea DuraFET pH sensor was supported by the National Oceanographic Partnership Program. Deployments in the Southern Ocean are supported by the NSF Division of Polar Programs. Work at MBARI is supported by the Packard Foundation.**

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**How does the sensor work?**

It's an Ion Sensitive Field Effect Transistor (ISFET) with a AgCl pseudo reference that uses seawater Cl⁻ to set the reference potential.

Submitted to Analytical Chemistry

Deep-Sea DuraFET: A pressure tolerant pH sensor designed for global sensor networks

Deep-Sea DuraFET pH sensor and an Apex profiling float with pH sensor at deployment.

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**Sections of pH, DIC, Temperature and Oxygen determined with the float array at 1 day profile intervals, and at the HOT station at approximately monthly intervals (10 cruises/year).** All float data can be downloaded in real time at www.mbari.org/chemsensor/floatavi.htm

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**OS13B-2037 Upper ocean carbon cycling inferred from direct pH observations made by profiling floats and estimated alkalinity**


*Monterey Bay Aquarium Research Institute, Moss Landing, CA 95039, USA
†School of Oceanography, University of Washington, Seattle, WA 98225, USA

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**A comparison of shallow (0 to 20 m) data measured by the float array (black dots) with comparable values observed at the HOT Station Aloha (green squares). The mean difference between float and HOT data for 23 contemporaneous measurements is 0.000 ± 0.008 pH, 6.82 µmol/kg A, 12.3 ± 10.3 µmol/kg DIC, and 1.28 ± 0.4 µatm pCO2 (1 std. dev.).**

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**The annual cycle of dissolved inorganic carbon (DIC) is a key tracer of net community production and carbon export in the upper ocean (Gruber et al., 1999; Keeling et al., 2006). In particular, the DIC concentration is much less sensitive to air-sea gas exchange, when compared to oxygen, another key tracer of upper ocean metabolism. However, the annual DIC cycle is observed with a seasonal resolution at only a few nitrate stations in the open ocean. Here, we consider the annual carbon cycle that has been observed using profiling floats equipped with pH sensors. In addition to a net carbon budget, the DIC level can be derived from the float observations of temperature, salinity and oxygen using equations that are derived from a relationship obtained from a globally available hydrographic dataset that includes nitrate data.**

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