<table>
<thead>
<tr>
<th><strong>Hawaii Ocean Time-series (HOT) measurements and sampling</strong></th>
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Cruise track & typical stations

- **Kahe**: Train new personnel and test equipment
- **ALOHA**: main HOT site with a 6-mile radius
- **Kaena**: appropriate site to study enhanced mixing due to internal tides
CTD stats.

- SeaBird CTD package with dual temperature, conductivity & oxygen sensors along with a SeaPoint Fluorometer
- 24-place rosette with 12L niskin bottles

Sampling stats.

- 1-2 deep casts to 4800m
- ~14 "shallow" casts to 1000m
Partial List of Shipboard Time-series Measurements at Station ALOHA

- Temperature, Conductivity, Oxygen, Fluorescence (CTD)

- Bottle samples for:
  - dissolved \( O_2 \), dissolved inorganic carbon, pH, alkalinity,
  - Dissolved inorganic nutrients (nitrate, nitrite, phosphorus, silica)
  - Dissolved and particulate organic nitrogen, carbon, and phosphorus
  - Pigments (including HPLC accessory pigments and fluorometric chlorophyll)
  - Primary production
  - ATP (biomass)
  - Plankton cell abundances (Prochlorococcus, Synechococcus, non-pigmented picoplankton).
  - Particle export (carbon, nitrogen, phosphorus fluxes)
# HOT DOGS

*(Hawaii Ocean Time-series Data Organization and Graphical System)*

<table>
<thead>
<tr>
<th>Data Types</th>
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<tbody>
<tr>
<td>- CTD: Seabird sensor package</td>
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<td>- Bottle: 24-place rosette and 12L PVC bottles</td>
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<tr>
<td>- Particle Flux: floating sediment traps</td>
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<tr>
<td>- Primary Production: <em>in-situ</em> incubated $^{14}$C</td>
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<th>Data Modules</th>
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<tr>
<td>- Data Extraction: text columns of data</td>
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<tr>
<td>- Display: vertical profiles</td>
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<tr>
<td>- Standard Depths: summary &amp; comparative plots</td>
</tr>
<tr>
<td>- Time-Series: integral, means &amp; horizons</td>
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WHOTS (R. Weller, P.I.) (2004-present)

Subsurface mooring data from ALOHA also available
Quality Assurance

Procedures • Training • Validation

Quality Control

Sampling
- Sample Collection
- Sample Processing and Storage

Analysis
- Analysis of Samples
- Determination of Preliminary Values

Review
- Critical Review of Values
- Assignment of Flags
- Acceptance of Final Data
Quality Assurance

Procedures • Training • Validation

- Establishment and use of written Standard Operating Procedures
- Maintenance of equipment (including documentation of repairs/changes)
- Calibration of equipment to traceable standards
- Training and cross-training of analysts and field technicians
- Standardization of spreadsheets and programs
- Intra- and inter-laboratory comparison exercises
- Periodic review and audit of procedures
- Validation and documentation of changes to methodology
Quality Control

Sampling

- Pre-cruise preparation of sampling equipment and supplies
- Field test of equipment and sample collector training (e.g., Station Kahe)
- Order of sample collection (e.g., gases first)
- Use of appropriate sample containers and preservatives
- Documentation (e.g., console logs, cast sheets, incubation logs)
- Individual bottle temperatures and salinities (to identify mistrips)
- Field replication
- Appropriate sample storage and transfer conditions
Quality Control

- Primary standards of highest quality
- Order of analyses (e.g., low to high concentration)
- Blank assessments
- Reference materials (certified and/or in-house)
- Control charts to monitor performance
- Analytical replication
- Standard additions
- Documentation of analytical conditions/events
- Identification of bad and suspect analyses
Quality Control

Review

- Property vs. pressure, property vs. density plots (historical envelope)
- Property vs. related properties plots (oceanographic consistency)
- Visual and/or statistical identification of outliers
- Investigation of individual outliers (including review of metadata)
- Quality flagging of bad and suspect data
- Final review and acceptance of data by responsible P.I.
- Posting of data by I.T. specialist to secure but accessible database
- Posting of metadata explaining raw and derived parameters