Southern California Coastal Ocean Observing System

(Collaborative HAB programs)

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(University of Southern California)

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Collaborative HAB programs

• 5-member SCCOOS HAB Monitoring Program.
• RADPALERT (NOAA MERHAB)
• CENS (Center for Embedded Networked Sensing).
• West Basin Desalination Pilot Study.
• Proposed: Viral studies of toxigenic Pseudo-nitzschia.
Southern California HAB Monitoring Program (SCCOOS - HABs)

Mark Moline (Cal Poly, SLO)
Mark Brzezinski (UCSB)
Grace Chang (UCSB)
Rebecca Shipe (UCLA)
Burt Jones (USC)
David Caron (USC)
John McGowan (UCSD)
Melissa Carter (UCSD)
Overall goal
Provide template for OOS-HAB interactions

Focus of SCCOOS-HAB effort is *Pseudo-nitzschia* and domoic acid

**Bloom monitoring**
(Shoreline [i.e. pier] surveillance of HABs and toxins)

**Product Development and Display**
(Web-based dissemination of information)
(Jennifer Bowen - UCSD)

**Bloom Tracking (space and time)**
(Glider observations, buoy reconnaissance)

**‘Event Response’ Sampling**
(by region - very limited!)

**Regional Ocean Characterization**
(Environmental forcing factors)
(Nutrient upwelling mapping, modeling)
SCCOOS HAB Group
Parameter measurements
(Weekly pier-based measurements)

1) Live and preserved specimens for major HAB species.
   (a ‘HABMAP’ format)

2) Domoic acid concentrations in plankton samples.
   ELISA
   (Samples processed at USC)

3) Primary inorganic nutrients.
   Nitrate + nitrite
   Phosphate
   Silicate
   (Samples processed at UCSB)

4) Extracted chlorophyll from plankton samples.

5) Temperature, salinity.

...sent on to SCCOOS for web design
SCCOOS HAB Group
‘Event Response’ measurements
(this will be a very limited effort)

1) Glider studies
   SCCOOS & MERHAB (RAPDALERT) Webb SLOCUM gliders
   Temperature, salinity, chlorophyll fluorescence,
   CDOM, phycoerythrin, optical backscatter at
   three wavelengths***.
   (We’re going in the water later this week!)

2) Limited ancillary ship work to characterize extent of a
   HAB event***.

***Bight ‘08 (SCCWRP, regional collaborative effort, now in ‘10)
HARMFUL ALGAL BLOOMS

View harmful algal bloom study efforts on the map below, or learn about why algal blooms are problematic, how field sampling is conducted, and how species identification is performed.

[Map of Southern California showing harmful algal blooms]
HARMFUL ALGAL BLOOMS

View harmful algal bloom study efforts on the map below, or learn about why algal blooms are problematic, how field sampling is conducted, and how species identification is performed.

SCRIPPS PIER
32° 52.02’ N, 117° 15.42’ W
Provided by: SIO
Last Sampled: 2 weeks ago
[2009-01-22 17:10:00 UTC - 2009-01-22 09:10:00 PST]

HAB Species

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>CELLS/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akashiwo sanguinea</td>
<td></td>
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<tr>
<td>Alexandrium spp.</td>
<td></td>
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<tr>
<td>Dinophysis spp.</td>
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<tr>
<td>Lingulodinium polyedrum</td>
<td></td>
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<tr>
<td>Procentrum spp.</td>
<td></td>
</tr>
<tr>
<td>Pseudo-nitzschia delicatissima group</td>
<td></td>
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<tr>
<td>Pseudo-nitzschia seriata group</td>
<td></td>
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</tbody>
</table>

Last Sampled: 2 weeks ago
[2009-01-22 17:10:00 UTC - 2009-01-22 09:10:00 PST]

Observations

<table>
<thead>
<tr>
<th>OBSERVATION</th>
<th>VALUE</th>
<th>LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Chlorophyll</td>
<td>1.08 mg/m3</td>
<td></td>
</tr>
<tr>
<td>Silicate</td>
<td></td>
<td>56.28 °F</td>
</tr>
<tr>
<td>Temperature</td>
<td>14.6 °C</td>
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</table>

Note: Harmful algal bloom data is collected for the purpose of scientific study and is not intended to be used as an indicator of health or safety. For information on...
RAPDALERT
Rapid Analysis of *Pseudo-nitzschia* & Domoic Acid, Locating Events in near-Real Time

NOAA MERHAB funded
PIs: Caron, Sukhatme, Jones, Weisberg (SCCWRP), Estrin (UCLA)

Research Foci:
- *Pseudo-nitzschia* and domoic acid on the San Pedro Shelf.
- Ship-based sampling.
- Glider (Webb) surveys.
- Networking and retasking of glider missions.

Client: Water Quality Management Groups
CENS (Center for Embedded Networked Sensing)

NSF funded (STC at UCLA: Deborah Estrin, director)

Primary thrust:
- Wireless sensor network in King Harbor, Redondo Beach
  PIs: G. Sukhatme, D. Caron
  NAMOS: Networked Aquatic Microbial Observing Systems
  coming on-line ‘live’ later this spring.

Research Foci:
- ENG: Development of wireless networks and robotic vehicles.
- BIO: Understanding fish kills resulting from HABs in King Harbor.

Client: City of Redondo Beach, Water Quality Management Groups

(Marina Del Rey - beginning to come on line later this year).
Water quality study prompted by fish kills in King Harbor during summer 2005

Fish kill in 2005
West Basin Desalination Pilot Study

Prop 50 funded through West Basin: “Critical raw water quality issues unique to seawater: marine phytoplankton blooms, their associated biotoxins”
PIs: Caron, Jones

Research foci:
- Benchtop experiments to examine RO-toxin interactions.
- RO Permeate analyses for ASP (PSP, NSP, if necessary).
- Two coastal ocean moorings; present and future pilot plant locations.
  (Redondo Beach and El Segundo)

Client: West Basin Municipal Water District, City of Redondo Beach, Water Quality Management Groups
Viral Studies of Toxigenic Pseudo-nitzschia

Proposal stage only.

PI: Jiang (UCI)  Informal collab with Jones, Caron

Collaboration on sampling at Newport Beach with USC SCCOOS HAB program.
Some Issues/Questions for Conducting HAB Monitoring Programs within OOSs…

‘Nuts and bolts’:
- Coordinating and standardizing sampling/analyses
  - Sampling: when, how, what
  - Analyses: analytical methods
    *west coast ‘bake-off’
- Format(s) for web presentation
  *Style pages (for ‘non-core’ HAB data)
    (extrapolate to inter-state efforts)

Conceptual:
- How to fund HAB monitoring component
- Potentially different missions/observation sites
- How to integrate chem/phys/HAB products of OOSs
  *Predictive HAB modeling

The Potential:
- OOSs and HAB programs already coexist. The potential for mutual benefit is great.