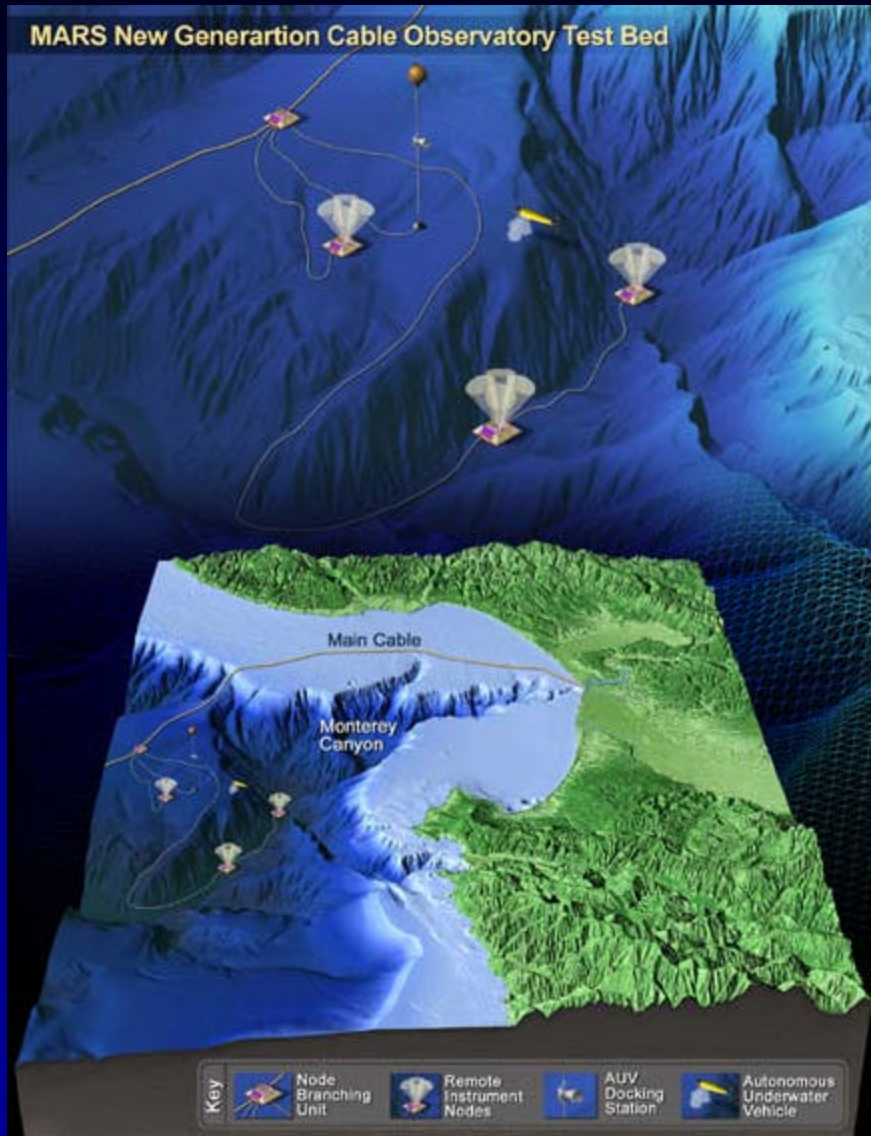






MARS New Generation Cable Observatory Test Bed



- Key
-  Node Branching Unit
 -  Remote Instrument Nodes
 -  AUV Docking Station
 -  Autonomous Underwater Vehicle

Wide Range of “Observatory” Groups (non-exhaustive list)

- Alaska
 - CAOS
 - GEM (Gulf Environmental Monitoring; oil spill recovery)
 - DART (tsunamis)
 - PORTS (NOAA)
- Hawaii
 - HOTS
 - HF array

Wide Range of Observatory Groups

- Northwest
 - Oregon Coastal Observing System (OSU)
 - CORIE (Columbia River)
 - Puget Sound (UW)
- California
 - Monterey (many) ICON, MOOS, MISO, MARS, COTS
 - NEOCO (UCs) and CI-CORE (CalStates)
 - Santa Barbara Channel
 - PORTS (San Francisco)
 - CDIP (waves)
- ACCEO (coastwide CalCOFI)

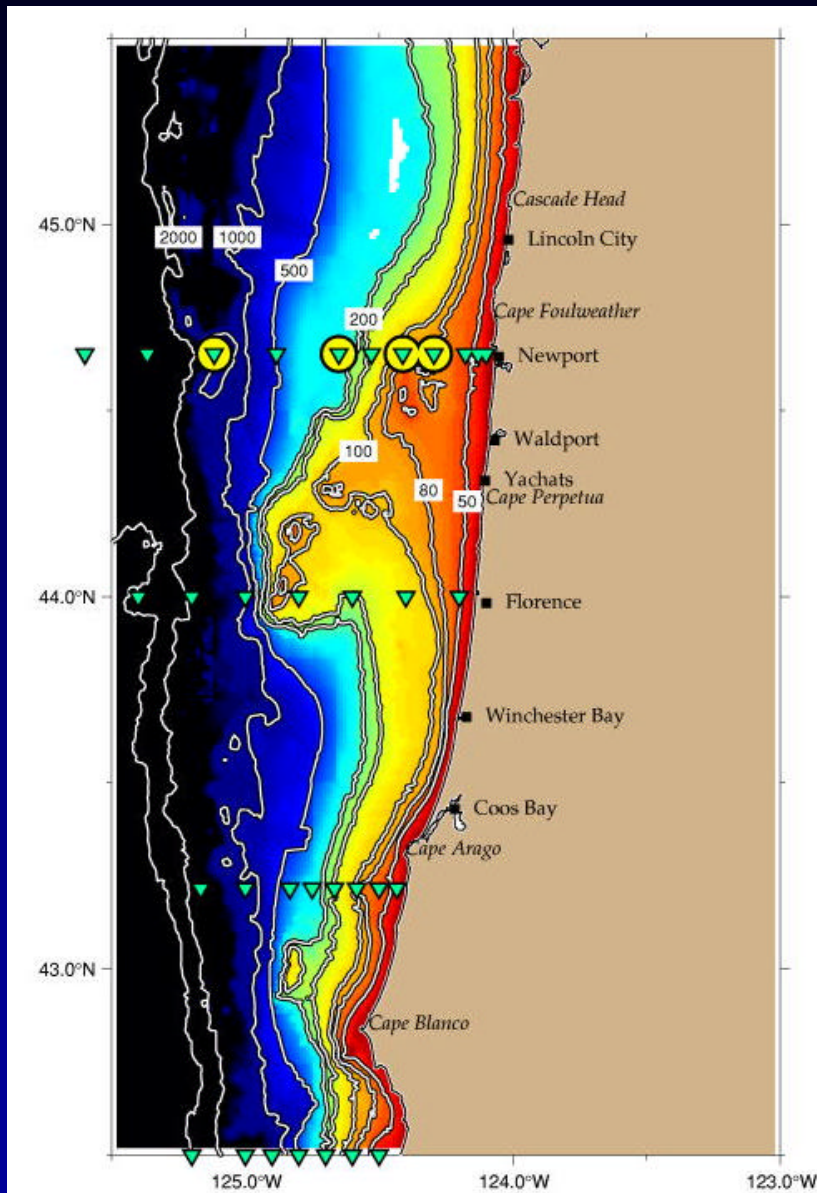
Wide Range of Observatory Groups

- Federal agency programs
 - NDBC buoys
 - Tide Gauge network
 - PORTS
 - DARTS (tsunamis)
 - NMFS

Components of the Oregon Coastal Observing System

- **Repeat Ship-based Sampling:** CTD, ADCP, drifters, plankton, nutrients, O₂, via station, SeaSoar (future: robotic).
- **Long-term moored measurements**
- **Extensive HF remote-sensing (CODAR) array** for surface current mapping, with real-time reporting.
- **Satellite remote sensing:** SST, color, winds, altimetry
- **New techniques:** dye studies, AUV, video
- Observations strongly coupled with **high-resolution coastal modeling** (physical, biological, meteorology).

Repeat Sampling



▼ Ship-based CTD, ADCP, zooplankton, nutrients, fluorescence, bioacoustics

- Newport Hydrographic Line: long-term record

- 1961-1971, typically 6-12 repeats/year

- 1997-present, 5 repeats/year

- 2/month sampling from small *Elakha* during spring and summer

- Four occupations/yr of lines at Heceta Head, Coos Bay, Rogue River, and Crescent City

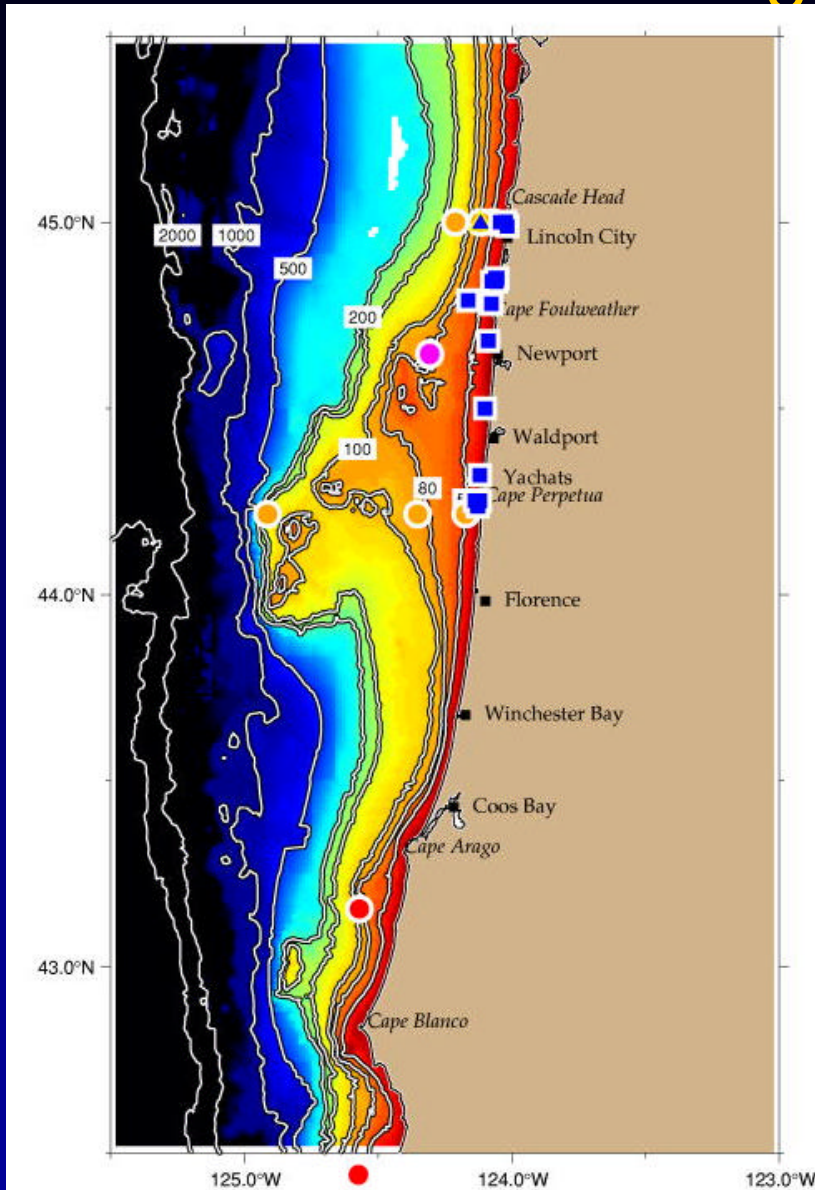
Drifter Releases

● 5 drifters, 3 times per year
(Apr, July, Sept)

SeaSoar Surveys

- High horizontal resolution, repeated over 4 years

Shelf Moorings



Newport Long-Term Mooring:

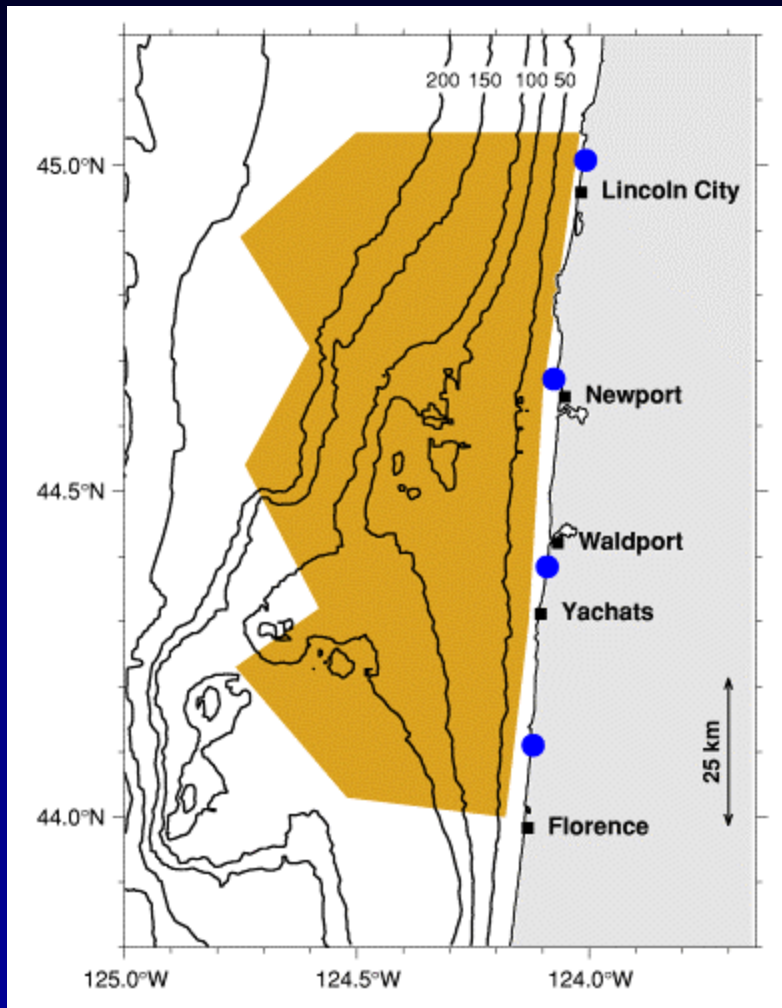
- 80m on the Newport Line (NH10)

Near historical CUE mooring sites.

- $u(z,t)$, $v(z,t)$ since 1997
- $T(z,t)$ (10 depths) since 2000
- $S(z,t)$ (3 or 4 depths) since 2000
- FI at 20m since 2000

- Coos Bay Long-Term Mooring
1981-1991 (OSU); 1997-present (Hickey)
- Rogue River Mooring
- COAST moorings (u, v, T, S, FI)
- COAST met buoy
- PISCO buoys (u, v, T, S, FI)
PISCO shore stations (not shown)

HF Mapping Array: Shelf (conventional-range systems)



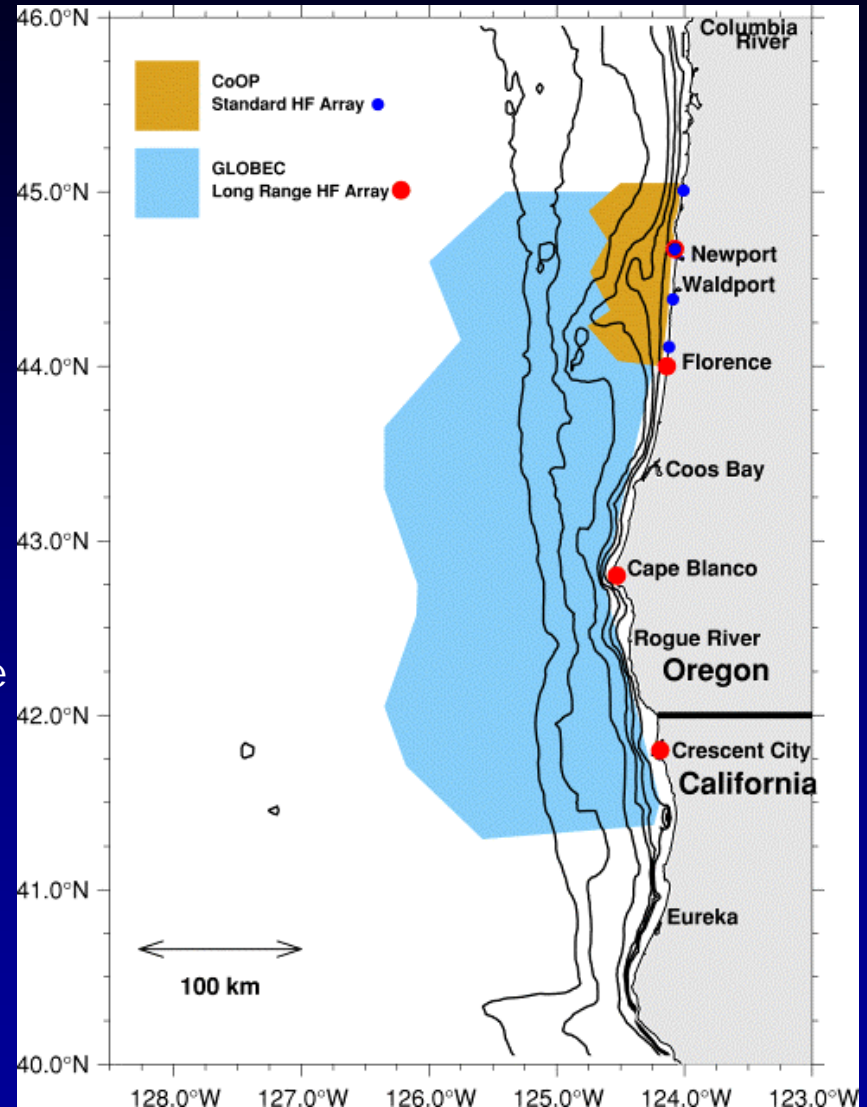
- Started 1997 (2 sites). Operated continuously.
- Expanded now to 5 sites
- Radial currents toward/away-from each site.
- Range: O(45 km)
- Resolution: 2km range, 5 degs angle
- Combine measurements from different sites to get full vector currents
- Hourly maps, near-real-time

HF Mapping Array: Slope (Long-range systems)

Long Range (180 km):

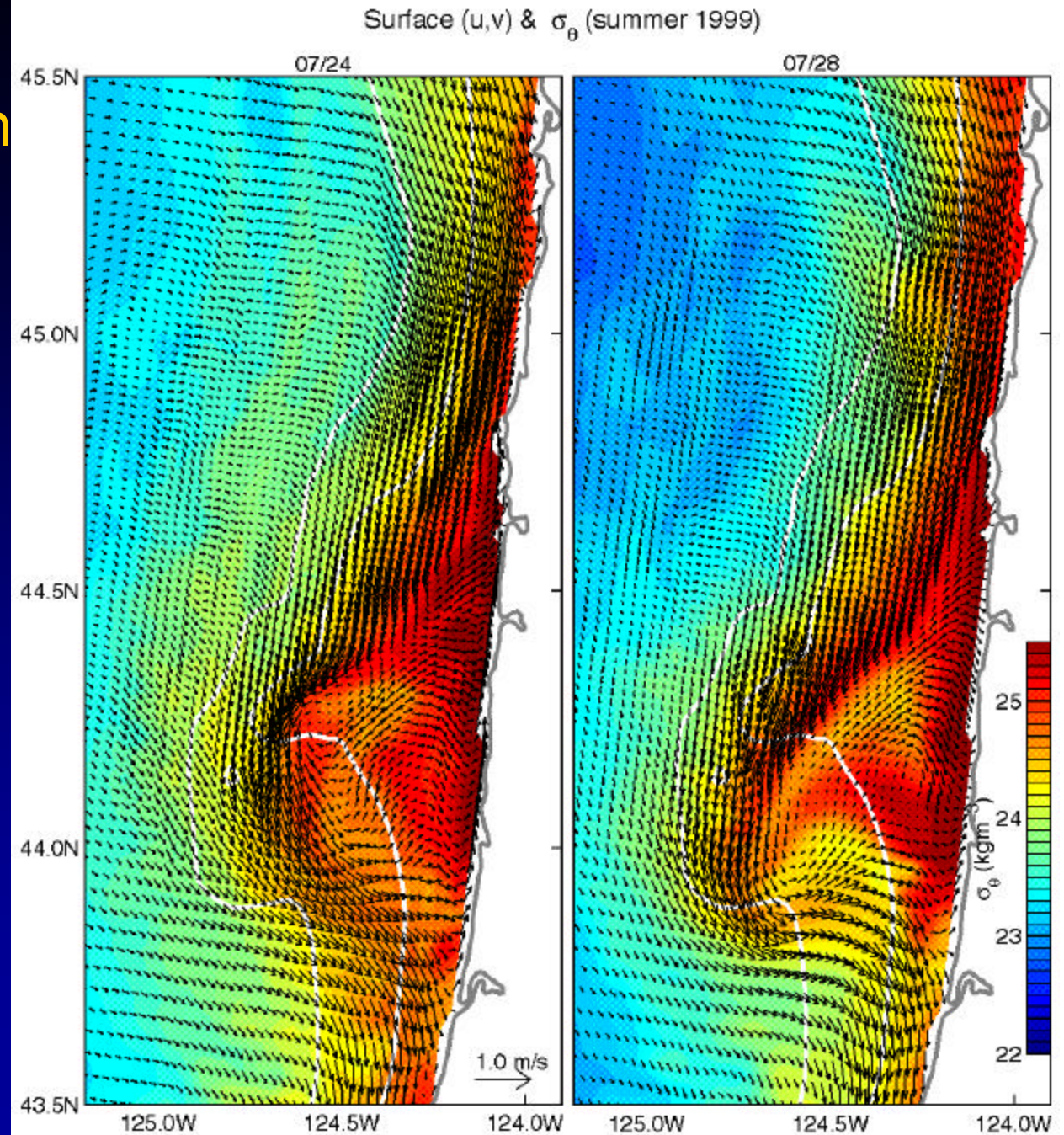


- Always on
- Surface currents
- Range: O(180 km)
- Resolution: 6 km range, 5 deg. angle
- Data brought from coast every 2 hrs
- Maps to be presented on web in near real-time
- Recently expanded to 4 coastal measurement sites



Coastal Model with Data Assimilation

J. Allen, G. Egbert,
P. Newberger,
P. Oke, J. Gan,
A. Kurapov, R. Miller



Center for Integrated Marine Technology: DATA

Satellite-based Measurements

Sea surface temperature (AVHRR)
Surface chlorophyll (SeaWiFS)
Primary production
Sea surface winds

Shore-based Measurements

Surface Currents

Mooring-based Measurements

Atmospheric pressure
Wind
Sea Surface Temperature
Ocean Temperature at Depth
Chlorophyll at Depth
Ocean Currents at Depth
Macronutrients - Nitrate, Silicate
Micronutrients - Iron
Phytoplankton Abundance and Structure
Zooplankton Abundance- active hydroacoustics

Ship-based Measurements

Water temperature with depth
Macro/Micronutrient distribution and abundance
Sea surface chlorophyll
Phytoplankton community structure
Zooplankton abundance and distribution
Zooplankton community structure
Schooling fish distribution and relative abundance
Seabird distribution and abundance
Marine mammal distribution and abundance
Sea turtle distribution and abundance

ACCEO

A Proposed California Current Survey Plan

[January 2003 Edition]



Plankton and fish samplers still need to tow nets from ships.

Traditional Ship-based

- ACCEO (West Coast CalCOFI)
- HOTS
- Newport Hydrographic Line
 - CTD/rosette, ADCP, surface T/S/Fl
 - Moorings (months to year)
 - Net tows
 - Bio-acoustics
 - Trace-metal chemistry
- IOOS proposes an array of 500 moorings.

Real Time/Adaptive Sampling

- More realtime data on ocean conditions will make adaptive sampling more feasible.
- Data assimilating models will provide inspiration for adaptive sampling
- Increased need for flexible scheduling, low cost.

Two-way high bandwidth information exchange

- Receive inputs from data sources
 - Satellite SST, color, altimetry
 - HF current maps
 - Model now-casts and forecasts
- Provide ship-based results to shore quickly
 - Share with partner investigators in coordinated surveys
 - Provide input for model assimilation
- Provide access to the wider world of information via www.
 - Emphasis on http for data discovery in present planning.