Integrating Measurements Across Multiple Time And Space Scales
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Church, Lomas, Muller-Karger submitted
CalCOFI – A 63-Year-Old Ocean Observing System
by Ralf Goericke and Tony Koslow (UCSD, Scripps Institution of Oceanography)

In response to a collapse of the California Sardine fishery in the latter half of the 1940s, fisheries managers and stakeholders implicated either environmental degradation or overfishing. Although they did not reach consensus on the primary driver of this collapse, they did employ a typical political solution: “to study the problem,” hence the birth of the California Cooperative Oceanic Fisheries Investigations (CalCOFI) program, a partnership of the Scripps Institution of Oceanography (SIO), the NOAA National Marine Fisheries Service (NMFS), and the California Department of Fish & Game. Thus far, nothing unusual had happened; in response to an environmental crisis, a political solution had been implemented. This, however, changed once scientists were charged with planning the program. At a meeting.

Figure 1. Map of current CalCOFI stations. The 66 standard stations have been occupied quarterly since 1984. A set of nearshore stations was established in 2004, providing the opportunity to characterize nearshore processes in the context of larger-scale dynamics. The CCE-LTER program carries out basic sampling at all 66 stations, with more focused sampling at stations on lines 80 and 90. Gliders operate continuously on these two lines. The CCE-LTER program and others operate two moorings at stations on line 80.
In the absence of time-series data sets, contemporary field observations are hidden in the ‘invisible present’ 

Dickey 2003

These shipboard time series studies and integration of autonomous sampling platforms allow researchers to integrate and synthesize data over multiple temporal and spatial scales.
Integrating Measurements Across Multiple Time And Space Scales

**Steve Emerson** – Net Community Production in the Ocean from a time series perspective

**Mark Ohman**- California Current Ecosystem Dynamics

**Katja Fennel**- Patterns of Phytoplankton Limitation and Hypoxia in the Northern Gulf of Mexico: Observation, Simulations and Predictability

**Galen McKinley**- The Regional Carbon Cycle Assessment and Processes (RECCAP) Effort
HOT ~24 years
BATS ~ 24 years
CARIACO ~ 17 year
Long-term Trends in \( p\text{CO}_2 \) and \( \text{pH} \) at HOT, BATS and CARIACO
Sea Change: Charting the course for ecological and biogeochemical ocean time-series research

*(OCB Scoping Workshop, Honolulu, HI, Sept. 2010)*

**WORKSHOP OBJECTIVES**

- Provide a synthesis of ongoing research and knowledge obtained at HOT, BATS, and CARIACO Time-series sites
- Highlight current capabilities of each time-series site
- Obtain community input on the time-series sites
- Discuss new opportunities for future research at HOT, BATS, and CARIACO
Workshop report and new papers from HOT, BATS and CARIACO will be published in volume of Deep Sea Research II - *Editors Lomas, Church, Muller-Karger*
KEY RECOMMENDATIONS FROM OCB COMMUNITY

1. Shipboard Time-series programs are vital community resource and need to continue to resolve decadal variability of key C and biogeochemical variables

2. Continue to provide core measurements and infrastructure and allow individual & integrated process studies to develop and push new science frontiers

2. Utilize time-series to implement, test and validate new observing technologies
4. Promote the use of Time Series data to develop and validate numerical ecosystem models

5. Create network where data and data products from TS around the globe are centralized and publicly accessible

6. Maintain high-quality measurements (staff training and retention)
International Time-Series Methods Workshop

Co-Chairs – Laura Lorenzoni, Kathy Tedesco, Heather Benway

November 28-30, 2012
Bermuda Institute of Ocean Sciences (BIOS)
Rationale

Growing need in the community to *inter-compare* data collected at different ocean time-series sites in order to achieve an improved understanding of our changing global ocean.

Objectives

- Review current time-series sampling and analytical methods
- Define standard methods across time-series (when/where possible)
- Examine new techniques available, including the use of autonomous sensors
Participation

• 30 representatives (invitation only) from established international time-series sites making biogeochemical measurements

• Representation from OceanSITES and Repeat Hydrography programs

Anticipated Outcomes

• Best Practices publication on biogeochemical sampling and measurement protocols (for broad community distribution)

• Increased communication, coordination and data/methods-sharing among international sites