Progress to Date (November 2004):
Grant OCE-0000733, GLOBEC Long-Term Observation Program
in the Marine Ecosystem of the Northern California Current
(A. Huyer, J. A. Barth, P. M. Kosro, R. L. Smith, P. A. Wheeler)

Key Objectives:

- to continue the seasonal sampling (five times per year) of the two-dimensional temperature, salinity, density, velocity, dissolved oxygen, nutrient, chlorophyll and zooplankton fields fof central Oregon through 2003;
- to determine whether the characteristics of the upwelling ecosystems north and south of Cape Blanco differ significantly;
- to determine whether the domains north and south of Cape Blanco have similar interannual variability;
- to continue our long-term shelf mooring through September 2003;
- to determine whether the 1976-1977 regime shift in the large-scale climate is reflected in significant differences between contemporary (1997-2003 and historical (1061-1973 observations of the marine ecosystem. If so, what is the structure and intensity of this signal in the hydrographic and nutrient fields?

Summary of Results:

We have completed six years (1997-2003) of physical and biological oceanographic seasonal sampling in the region of the northern California Current system between 42ºand 45ºN (Figure 1 and Table 1 in this proposal). With this grant, we have conducted 18 hydrographic cruises making physical, chemical and biological oceanographic measurements since January 2000. These cruises also included net and acoustical sampling for zooplankton (by W. T. Peterson et al., HMSC, NOAA funds), and water sampling for microzooplankton (by E. & B. Sherr, OSU, separate NSF funds). We also conducted six mooring deployment/recovery cruises to service the NH-10 mooring (Kosro, OSU, this grant) and other shelf moorings off Coos Bay (B. Hickey, UW, other NSF funds) and the Rogue River (S. R. Ramp, NPS, NOAA funding).

Much of our work on this grant was devoted to successful completion of the field work, but we have made substantial progress in data analysis and preliminary synthesis. Our major fundings to date include:

- Both **seasonal signals and interannual signals** in physical, chemical and plankton characteristics are strong (e.g., Smith et al., 2001).
- The equatorial **El Niño/La Niña cycle is a major source of interannual variability** in the temperature, currents, water masses, nutrients and chlorophyll concentrations in this region (Smith et al., 2001; Huyer et al., 2002; Kosro, 2002; Corwith and Wheeler, 2002).
- An **unusual invasion of Subarctic Pacific Water** into the northern California Current region in the summer of 2002 produced dramatic results (Huyer, 2003): upwelling source waters were unusually cold (Freeland et al., 2003) and enriched in nutrients (Wheeler et al., 2003); southward flow was unusually strong (Barth, 2003; Kosro, 2003); chlorophyll concentrations were exceptionally high (Wheeler et al., 2003); and hypoxia occurred in the near bottom waters over the inner shelf (Wheeler et al., 2003; Grantham et al., 2004) resulting in mortality of crabs and fishes (Grantham et al., 2004).

Publications

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Data Sets:

All the CTD data and most biochemical data collected under this grant have been processed and summarized, and are available online. Graphics summarizing the drifter data and the NH-10 mooring data are also available online. List by data type:

cruise reports	now available on http://ltop.coas.oregonstate.edu
CTD data reports (Fleischbein et al, 2001; 2002, 2003)	now available on http://ltop.coas.oregonstate.edu
Biochemistry data reports (Moses and Wheeler, 2004; Wetz et al., 2004)	now available on http://ltop.coas.oregonstate.edu
CTD data	now available on http://ltop.coas.oregonstate.edu
underway weather & 5-m intake data	now available on http://ltop.coas.oregonstate.edu
nutrient and chlorophyll data	now available on http://ltop.coas.oregonstate.edu
organic nitrogen and carbon data	on http://ltop.coas.oregonstate.edu soon (Jan 05)
drifter trajectories	now available on http:/diana.coas.oregonstate.edu/drift
drifter data	now available on http:/diana.coas.oregonstate.edu/drift
current meter time series	now available on http:/bragg.coas.oregonstate.edu/NH-10
current meter data	online soon (March 2005)
shipborne ACDP data	online soon (March 2005)
DOC	online soon (June 2005)

Other Data Products:

Seasonal and monthly means of 1961-71 historical temperature, salinity, and density data from the NH-line off Newport, Oregon: now available on http://ltop.coas.oregonstate.edu.

Papers in Progress that will be completed with present funding:

Barth, J. A. and A. Erofeev. Surface drifter observations of the seasonal circulation in the northern California Current. (submission likely in March 2005)

Huyer, A., J. H. Fleischbein, J. Keister, P. M. Kosro, N. Perlin, R. L. Smith and P. A. Wheeler. Two coastal upwelling domains in the northern California Current. (submission expected likely in January 2005)