Coastal Bioluminescence Prediction Network (BPN): An Economical Development by Supplementation of Existing Environmental Monitoring Resources

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LONG TERM GOALS

Our goal is to set up a network of bioluminescence (BL) detectors to assess the annual cycle of coastal bioluminescence and perhaps reveal long-term correlations between BL and environmental conditions along much of the California coastline.

OBJECTIVES

We are inserting relatively inexpensive bioluminescence detectors among already existing environmental instrumentation along the Central and Southern California coast. The basic concept is to obtain the best possible simultaneous picture of BL over the longest possible stretch of coastline at minimal cost.

APPROACH

While initially this DURIP was focused on the Santa Barbara Channel, the recent development of the University of California-funded Network for Environmental Observation of the Coastal Ocean (NEOCO) offered an immediately available and remarkably convenient pathway for getting data to a widely accessible website from several locations of interest. This unexpected cooperation increases the value of both programs with little or no additional cost.

WORK COMPLETED

1. Integration with the CalCOFI survey program. Since the long-standing CalCOFI fisheries survey program assesses several times per year the state of ocean chemistry and biota along the California coast from San Diego through the Santa Barbara Channel, an initial goal of the DURIP was to attempt to include BL measurements in their suite of measurements in order to provide an economic offshore component to our coastal observations. We arranged with Douglas Neilson (SIO) to make the first deployments of two of our bathyphotometers on just completed cruise CalCOFI0304JD. Circumstances limited measurements to 41 sets at 11m depth, hand deployed. It is hoped this opportunity can eventually be expanded. Neilson is proposing a towed system for future work.

2. Populating established NEOCO nodes. One Generation 3 BP has been provided to Mark Moline for installation on Avila Pier, which is now a dedicated marine science facility of CalPoly, SLO.

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14. ABSTRACT
Our goal is to set up a network of bioluminescence (BL) detectors to assess the annual cycle of coastal bioluminescence and perhaps reveal long-term correlations between BL and environmental conditions along much of the California coastline.

15. SUBJECT TERMS

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This BP will be part of an instrument package that will profile from surface to 20 m and input data to a NEOCO node already installed there. Moline's group will monitor the real-time BP signal and conduct appropriate sampling at the pier when indicated. A second BP has been provided to Michael Latz (SIO) for evaluation and installation on the Scripps Pier NEOCO node. The farthest north connection with NEOCO will probably be at the Long Marine Laboratory, UCSC. A node is expected to be established in Santa Barbara in the near future.
3. Seven Generation 3 MBBPs have been built and sea tested in the August 03 AOSN-2 program. These will be installed in the coastal system when more sites are available, and on moorings in the Channel.
4. Work on the prototype minimal-cost profiling mooring with respect to communication and the profiling engine is in progress. All of these moorings will be in the Santa Barbara Channel in telephonic range of the UCSB Marine Laboratory. Their specific placement will be to take advantage of moored optics and chemistry instruments already deployed by the several cooperating activities.

RESULTS

While no along-coast data has been integrated yet, this year has again seen prominent red tides appearing more or less simultaneously from San Diego to at least Avila Pier, just north of Pt. Conception. Locally, we have determined that the BL component is *Lingulodinium polyedra in* very high concentrations.

IMPACT/APPLICATIONS

Successful complete establishment of this cooperative activity will provide web-accessible real-time monitoring of BL activity and many contributing environmental parameters along most of the California coast. The data will be of great pure science value and also will have applied value in signaling conditions favorable to HAB development. For the past two years marine mammal fatalities attributable to domic acid toxicity have been quite common along the S. California Coast. It is presumed that health departments of coastal cities can use the NEOCO web site as an alerting mechanism.

TRANSITIONS

None

RELATED PROJECTS

1.UCSB

a. Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) (Packard Foundation), a research consortium dealing with a comprehensive examination of coastal ecosystem dynamics, involving marine scientists from Oregon State University, University of California Santa Cruz, Stanford University, and University of California Santa Barbara.

b. Long Term Ecological Research Program (NSF) on the land-ocean margin.

c. Plumes and Blooms (NASA) investigation of processes producing sediment plumes and phytoplankton blooms.

2. Monterey Bay Aquarium Research Institute
   Bioluminescence Predictability Pilot Study
   AOSN-II

3. California Polytechnic University San Louis Obispo
   Laboratory of Mark Moline

4. Scripps Institution of Oceanography
   Laboratory of Michael Latz