

JIMAR, PFRP ANNUAL PROGRESS REPORT FY 2002

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Project Proposal Title: Development of oceanographic atlases for pelagic and insular fisheries and resource management of the Pacific basin.

Funding Agency: Pelagic Fisheries Research Program

Project Purpose and Indicative Results: The development of broad-based ecosystem approaches to fisheries management is hindered by the bewildering array of oceanographic information currently available. Additionally, there are no consistent coding or formatting standards, and each data source may require different software for access. The Pacific Ocean Atlas project is designed to provide environmental data from a variety of platforms (satellite, shipboard, moorings, and numerical models) in forms useful and accessible to both non-expert and expert users. These data will be provided in a series of oceanographic atlases for all of the U.S. Pacific Island exclusive economic zones (EEZ) and regions of the Pacific basin important for pelagic and highly migratory species fisheries management. Distribution of the full data sets will be conducted primarily over the Internet. Both CD-ROM and limited print versions will be made available for resource managers and researchers in those areas lacking the resources for large Internet transfers.

Project Activities and Progress During FY 2002:

Accomplishments to date

- Conducted 2nd User Workshop meeting at 14th SCTB meeting.
- Acquired and assembled components for Ocean Atlas Web Server
- Established Ocean Atlas Project web page.
- Initiated development of value-added products specified by users:
 - Vertical shear of current from Ocean Model/Data Analyses,
 - Thermocline Depth for the tropics,
 - Surface Ocean Currents from Satellite.
- Processed historical satellite data sets for winds, sea surface temperature (SST) and sea surface height (SSH).
- Worked through a number of test cases in which data sets were exchanged with fisheries researchers.

Personnel

The Atlas Coordinator, Ramzi Mirshak has had a successful year with the project but is now returning to Canada to work on a PhD in oceanography. With roughly one year of salary remaining, the project is once again seeking to hire an oceanographer/programmer to handle the day –to-day affairs of the Atlas Project.

User Work Group

A user working group was convened at the 14th SCTB meeting in Noumea, New Caledonia in August 2001. D. Foley presented an outline of the project, summarized the progress to date and then solicited further input from participants

Of particular note was the preference of users for products best described as “highly derived”, which are much more complicated than the raw data normally available. Based on this meeting, the identification, development and production of these products (current shear indices, frontal-strength indices, etc.) have been assigned top priority.

A third user working group meeting has been scheduled for the 15th SCTB meeting in Honolulu in July 2002. At this workshop, Dave Foley will present progress to date, particularly that relevant to the issues raised in the first two workshops. Dave will work directly with fisheries researchers to test the utility of some of the products developed to date, particularly those derived from oceanic general circulation models, as discussed below.

Data Sets

In situ data

Incorporation of existing *in situ* data sets with the rest of the Atlas data has required a significant amount of attention. While oceanographic data sets, such as COADS and Levitus, provide “highly refined” products, the averaging and interpolation methods employed were generally formulated to examine scales relevant to climate studies and not those necessarily relevant to fisheries and living marine resource management. It is likely that these data sets will adequately provide the larger scale context within which the finer scale information, when available, can be more effectively analyzed. Additionally, the atlas project has searched for and attempted to include other sources of reliable *in situ* oceanographic data. The project is making efforts to obtain the US Navy Master Oceanographic Observations Data Set (MOODS), though much of this data is classified, complicating the acquisition process. Even with all of the available oceanographic data, these regions are generally extremely sparse and not sufficient to describe the physical environment at the level required for most ecosystem based population models.

Remote sensing data and model output

Derived Properties

It was clear from user input that two important parameters for fisheries and resource management are ocean currents and thermocline depth. Development of these products is proceeding along two distinct paths.

Ocean currents may be inferred from a combination of dynamic topography (“geostrophic currents”) and the surface wind stress (“Ekman Transport”). The recent availability of high-quality, daily vector wind fields from the QuikSCAT spacecraft gives us a data set appropriate for the derivation of mesoscale wind-driven ocean currents. Sea surface height data from the TOPEX/Poseidon Satellite is used to account for mesoscale geostrophic flow.

Thermocline depth estimates will be derived from Satellite altimeters. An initial test has been conducted using 10 years of TOPEX SSH data and *in situ* temperature data from each of the moorings on the TAO array. Strong correlations between SSH deviation and thermocline depth were apparent at virtually all of these sites, which span much of the equatorial Pacific Ocean. The PFRP Bigeye Tuna Oceanography Project is further evaluating the use of altimeter data to estimate thermocline depth. Expanding this technique to cover the rest of the Pacific Basin will be performed using opportunistic temperature profiles from XBTs and CTDs using the Levitus and MOODS.

At present, there are no established methodologies for estimating the vertical shear of ocean currents using satellite platforms. Although investigators with the PFRP Bigeye Oceanography Project are investigating the use of satellite altimetry and other surface features for this purpose, this work is on-going and conclusive results are not likely to be available for some time. When observations of currents and shear are not available, the best source for “historical” current profiles is likely to be “ocean re-analysis products” (ocean general circulation models with full data assimilation). We have successfully extracted such a data set from the International Pacific Research Center (IPRC) and are now applying the data to several case studies (e.g., marine debris tracing). Because the format of one set of model output is much like any other, we feel that this represents significant progress towards our goal of serving model data and products to the fisheries community.

Pierre Kleiber at the Honolulu Laboratory convened a PFRP-funded workshop in May 2002. Both Foley and Mirshak of the Ocean Atlas project participated in the workshop and proposed data types and sources that may be effective in the efforts to evaluate the effect of ocean currents on longline fishing efforts.

Planned Project Activities for FY 2003: The basic plan is to continue with the tasks already initiated according to the schedule shown below in table 1. During the time remaining before his departure, the current Atlas Coordinator will concentrate on implementing the basic suite of web-based services. There are also several test cases underway in which Atlas personnel work directly with fisheries researchers to establish useful products and to investigate optimal means for transmitting the relevant environmental information. Test cases of this sort will continue throughout the duration of the Atlas project.

Atlas Task	FY02	FY03	FY03	FY03	FY03
	4th quarter	1st quarter	2nd quarter	3rd quarter	4th quarter
Develop web site	[Solid red bar]				
Acquire <i>in situ</i> data	[Solid blue bar]		Continues indefinitely for some data		
Reprocess <i>in situ</i> data	[Solid red bar]		Continues indefinitely for some data		
Acquire satellite data			Continues indefinitely via CoastWatch		
Reprocess satellite data	[Solid red bar]		Continued on ad hoc basis by CoastWatch		
Produce Atlases	[Solid blue bar]				
Distribute Atlases			[Solid red bar]		

Table 1. Time line with target dates for completion of Atlas project components in fiscal year 2003

Papers Published in Journals During FY 2002: None.

Other Papers, Reports, and Presentations During FY 2002:

- User workshop conducted by Foley at 14th SCTB meeting in Noumea, NC (August 2001).
- Presentation by R. Mirshak at PFRP PI meeting (December, 2001).
- Presentation by R. Mirshak at Ocean Sciences Meeting in Honolulu, HI (February 2002)
- Presentation by R. Mirshak at Tuna Conference, Lake Arrowhead, CA
- 3rd User workshop scheduled for 15th SCTB meeting in Honolulu (July 2002).

Graduating Students with MS or Ph.D. Degrees During FY 2002: Thus far, there have been no students directly associated with this project.

BUDGET: FY 2003

Development of oceanographic atlases for pelagic and insular fisheries and resource management of the Pacific basin

I. DIRECT COSTS:

A. Personnel:

Oceanographer (12 mo)	
Total Salaries and Wages	48,000
Fringe Benefits (reg. 25%, student 2.5%)	<u>12,000</u>
TOTAL PERSONNEL:	\$ 60,000

B. Equipment:

Software and Licensing	<u>2,000</u>
TOTAL EQUIPMENT:	\$2,000

C. Travel:

Tuna Conference, PICES etc.	<u>9,000</u>
TOTAL TRAVEL:	\$ 9,000

D. OTHER DIRECT COSTS:

Printing & Publications	4,000
Materials & supplies & shipping	<u>3,000</u>
TOTAL OTHER DIRECT COSTS:	\$ 7,000

TOTAL DIRECT COSTS: \$ 78,000

II. INDIRECT COSTS:

20.4% of MTDC \$ 15,912

TOTAL BUDGET FOR YEAR 2: \$ 93,912