

**JIMAR, PFRP ANNUAL PROGRESS REPORT  
Fiscal Year 2004**

**P.I. Name:** Russell E. Brainard  
Co-I's: John Sibert and Dave Foley

**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

**1. Purpose of the project and indicative results.**

Marine ecosystems and fisheries are influenced by a broad range of oceanographic and environmental conditions and processes. The development of broad-based ecosystem approaches to fisheries management is hindered by the bewildering array of unsynthesized oceanographic information currently available. Additionally, there is no consistent coding or formatting standards, and each data source may require different software for access. The Oceanographic Atlas of the Pacific is designed to provide a single point of access to environmental data from a variety of platforms (satellite, shipboard, moorings, and numerical models) in forms that are useful and accessible to both non-expert and expert users. This will be accomplished through 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. Data coverage will be provided at basin-wide and regional scales as well as for various biogeophysical sub-regions and, contingent upon data availability, individual islands, banks, or reefs. Distribution of the full data sets will be conducted primarily over the Internet using an interactive web interface that allows users to customize various aspects of data selection and display. Both CD-ROM and limited print versions will also be made available for resource managers and researchers in those areas lacking the resources for large Internet transfers.

**2. Progress during FY 2003. Provide a thorough discussion of accomplishments and problems.**

**Personnel:**

Mr. Russell Moffitt was hired in late August of 2003 as the new Atlas Coordinator after some vacancy. Mr. Moffitt continues to hold the position, actively working to develop the Atlas project.

**Web Site:**

While work on the Atlas project in previous years has tended to concentrate primarily on the research into and development of novel and highly derived data products, to varying levels of success, current work has shifted

focus towards the development of the atlas data delivery mechanism. Upon construction of a suitable interactive interface to the Atlas and tests using well-known existing public data, effort will go into developing and incorporating custom derived datasets into the Atlas framework.

Intended to be the flagship Atlas product, the website under development is designed to be a sophisticated yet easy to use interface to *in situ*, satellite, and model data. The strength of this system is its ability to let users combine and compare any data available through the Atlas by selecting combinations of basemaps and overlays in a manner similar to many GIS applications. To date, the skeleton of this system is in place, including map plotting abilities, zooming/panning/selecting regions, and basic data visualization reformatting. Still under development, the crucial link between the interface and the underlying raw data is a metadata management system that informs the interface about any described dataset.

### **Data Sets:**

#### ***Remote Sensing Data and Model Output***

The development of science-quality historical time series and climatologies is one of the fundamental goals of the project. The Atlas project recently partnered with NOAA's National Environmental Satellite, Data, & Information Service (NESDIS) and National Oceanographic Data Center (NODC), using their expertise to help derive climatologies from the best available remote sensing and other wide-coverage gridded oceanographic datasets. The Atlas will also benefit down the road from resources within NESDIS to develop algorithms for various derived products. So far, sea surface temperature (Pathfinder 9km and 4km, ERSST extended historical timeseries), ocean color/chlorophyll (SeaWiFS, MODIS), and wind speed/stress (QuickSCAT) climatologies have been generated. Variables such as sea surface height, currents, and other directional parameters do not lend themselves to climatologies. Other statistics, summaries, or trends derived from these variables may need to be created as necessary.

Many datasets included in the Atlas are provided in near real time on an operational basis by the Hawaii CoastWatch node. Others are freely available from various locations, and arrangements to acquire those datasets on an ongoing basis are being prepared.

Model output from OGCMs provides an important component of the Atlas. Due to the limitation of satellite measurements to surface waters and the extremely sparse spatial and temporal distribution of *in situ* and shipboard measurements, models must provide many estimates of subsurface dynamics. Work is being done to tap into near-real-time and archived output from NRL's Navy Layered Ocean Model (NLOM) for high quality estimates of temperature, salinity, ocean height, and currents. Tests have been made in the past with several model outputs available through the International Pacific Research Center (IPRC) Asia Pacific Data Research Center (APDRC), some of which may provide useful historical estimates of parameters for which no other data is available.

## **In Situ Data**

Incorporation of existing *in situ* data sets with the rest of the Atlas data will continue to require a significant amount of attention. While oceanographic data sets, such as COADS and Levitus/World Ocean Atlas, 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. Along with remotely sensed products, these data sets will adequately provide the larger scale context within which the finer scale information, when available, can be more effectively analyzed. The Atlas has acquired several collections of publicly available *in situ* measurements, including the World Ocean Database, as well as near real time data from NMFS Coral Reef Ecosystem Division moorings and drifters in the northwest Hawaiian archipelago and other US Pacific Island EEZs. Through a geographical query process on the Atlas web interface, users can see locations where in-situ measurements are available and then access profiles and timeseries as graphs and raw data.

### **3. Plans for the next fiscal year.**

The current Atlas Coordinator will concentrate on implementing the basic suite of web-based services that will integrate the existing data archives and infrastructure. As the web-based Atlas matures, this person will also work with the project Principal Investigators to produce regional “hard copy” atlases at a level appropriate for scientific publications. Additionally, extensive documentation needs to be created for all Atlas data so users can better understand what is offered on the web and in the hard copy. Tutorials also need to be written to help users learn how to work with the web interface and all of its features.

Numerous tools and add-ons will be developed for the atlas, enabling features such as interactive animation, *in situ* profile/timeseries queries, and optional map views such as depth-contour and lat/lon vs. time. The ability to upload custom data sets to the Atlas will also be a useful tool for researchers wishing to compare their own data with the oceanographic parameters available through the Atlas. While datasets currently available will be the first added to the Atlas catalog, new derived products may need to be created to best meet the needs of users.

Once the initial development phase is complete, the Atlas may need to be moved to a different location that can better handle the rigor of maintaining an operational product with a potentially large user-base. CORIS has already offered to host the site on their operational servers at no cost to the Atlas project, although it may also be feasible to allow the Atlas to remain at the NMFS Honolulu lab. The Atlas team has not made a decision at this time.

### **4. List of papers published in refereed journals during FY 2002.**

None

**5. Other papers, technical reports, meeting presentations, etc.:**

Moffitt, R.A., R.E. Brainard, W. Skirving, and J. Sibert. Progress of the Oceanographic Atlas of the Pacific project. PFRP PI meeting. Dec., 2003, Honolulu, HI

**6. Names of students graduating with MS or Ph.D. degrees during FY 2001. Include title of thesis or dissertation.**

Thus far, there have been no students directly associated with this project.