SEAKEYS Data Management

A Research and Support Component of the
South Florida Ecosystem Restoration, Prediction and Modeling (SFERPM) Program

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Abstract

The SEAKEYS program has since 1992 provided hourly data from up to seven meteorological and oceanographic monitoring stations situated throughout the Florida Keys National Marine Sanctuary and Florida Bay. These data are collected and presented via email and the Web daily, and are supplied through a historical database on the Web. Unique software (Environmental Information Synthesizer for Expert Systems—EISES) developed for SEAKEYS data operates in near real-time and provides alerts as to conditions conducive to natural events such as coral bleaching (Coral Reef Early Warning System—CREWS), larval conch survival, and in the future, harmful algal blooms. The future will also bring a database with quality controlled data supplied via the Web, as well as new uses for EISES and new capabilities for CREWS.

Background and Purpose

The SEAKEYS network is comprised of seven meteorological and oceanographic monitoring stations throughout the Florida Keys and Florida Bay. This network has been operating uninterrupted since 1992 and has provided near real-time meteorological and oceanographic data from Fowey Rocks, Molasses Reef, Long Key, NW Florida Bay, Sombrero Key, Sand Key and Dry Tortugas. The data are sent via GOES satellite on the hour, every hour, and posted to the Web once a day (for last 72 hours' worth of data) and every hour from 6am to 6pm. Historical data are also provided via our "neptune" data server on the Web at http://www.neptune.aoml.noaa.gov. The object of the SEAKEYS Data Management project is to continue to provide near real-time access to raw SEAKEYS data, to provide quality-controlled data via the neptune server, and to provide value-added data products, especially to gain maximum use of the data in a timely fashion.

Approach and Findings

The SEAKEYS Data Management effort has four basic components: raw data retrieval and presentation via the web, historical data access via a server, quality control of raw data to produce a final data set for researchers, and timely use of the data for researchers and Florida Keys National Marine Sanctuary (FKNMS) management.

Raw Data Acquisition and Presentation

A computer script (program) written (for various additional purposes) by Mike Minton and Jay Harris of AOML's Physical Oceanography Division acquire the station-uploaded data from the data retrieval and storage facility maintained at Wallups Island, Virginia by the National Data Buoy Center (NOAA). The data retrieved by the Minton/Harris scripts are processed by scripts and programs written by Jim Hendee (Ocean Chemistry Division [OCD]) and parsed to produce a raw data report which is posted to the Web at http://www.coral.noaa.gov/cman/cman_menu.html at 4:30am, to show the last 72 hours worth of

data, and every hour to show the last 12 hours worth of data, from 6:30am to 6:30pm. These data are roughly quality-controlled in that -9s are replaced with obviously garbled (i.e, characters mixed with numbers) data. The once-daily raw data reports are also automatically sent via email to researchers wishing to receive them. The Web report format is occasionally maintained and changed by the OCD WebMaster, Monika Gurnee.

Historical Data Access

Clarke Jeffris of AOML/OCD maintains an historical data server at http://www.neptune.aoml.noaa.gov. Users can select specified parameters from specified stations for specified periods of time for download. At this time, the data from this server are raw data and do contain some errors. Work is currently progressing on incorporating the new instruments' data (transmissometry, fluorometry) in the database

Quality Control of Data

Deborah Danaher of AOML/OCD has been hired to quality control the historical data for populating a new database that will contain only the QC'ed data. Deborah is a trained marine scientist with a Master's degree and knowledge in data analysis and thus is qualified in decisions regarding good vs. compromised data. We anticipate that the QC'ed database will be available via the Web by Spring, 2001.
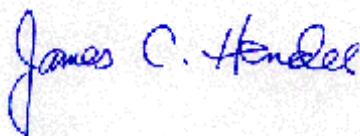
Timely Use of Data

Two very powerful pieces of software have been constructed to handle the incoming SEAKEYS data in near real-time. The Environmental Information Synthesizer for Expert Systems (EISES) synthesizes information from the data, and the Coral Reef Early Warning System (CREWS) uses these data to alert FKNMS management and coral researchers, via email, as to when conditions are conducive to coral bleaching. These alerts are also saved to a Web site so researchers and management may review the alerts at a later time. Besides coral bleaching, other applications can be written based on EISES preformatted data. For instance, a prototype early warning system has been constructed for monitoring conditions conducive to the onset of harmful algal blooms, and for alerting when conditions might be conducive the survival of conch larvae.

For a report on how EISES was used in the harmful algal bloom application, please see http://www.coral.noaa.gov/coastal/eises3.pdf. For a report on how CREWS predicted coral bleaching in the FKNMS, please see http://www.coral.noaa.gov/ncri/ncri-sk5.pdf.

Evaluation

The goal of supplies of providing near real-time SEAKEYS data to users via the Web and email, providing historical data, and providing information for use by sanctuary management in near real time have been met. The new goal of providing quality controlled historical data will be met by Spring, 2001.

Not only have the data products been supplied to users almost as soon as they are made, but several papers and presentations have been published and presented on the use of CREWS, EISES and SEAKEYS projects, both nationally and internationally.