

NOAA CoastWatch/OceanWatch Quarterly Newsletter

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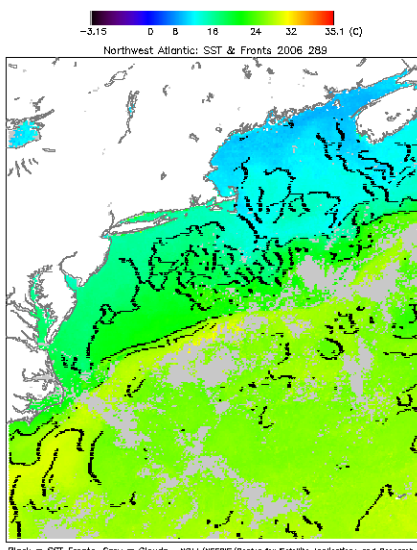
The CoastWatch quarterly newsletters showcase the progress and accomplishments of the CoastWatch program, including each of the Nodes. If you have any comments or suggestions, please email them to Shawna.Karlson@noaa.gov.

Central Operations

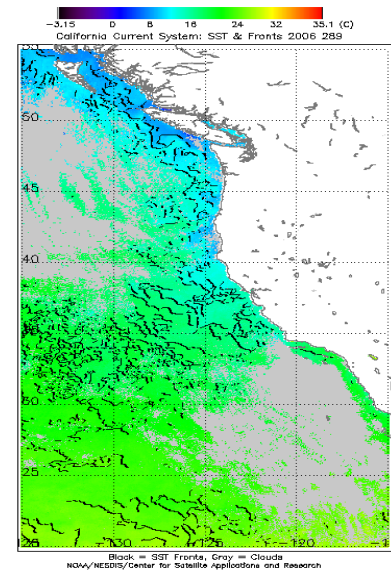
Kent Hughes and Xiaofeng Li traveled to China in December and met with Dr. Hui Lin, Director of China University of Hong Kong/Institute of Space and Earth Information Science. Director Lin expressed an interest in installing an AVHRR HRPT facility as part of new construction of his Institute (to be completed next year). Ocean remote sensing would be an important, but not exclusive application. Dr. Lin is also committed to establish a Node at his Institute to be called the South China Sea CoastWatch Node with strong opportunities for collaboration with NOAA CoastWatch.

Also discussed in China was the Center for Remote Sensing and Eco-system Based Management of Living Marine Resources at the Shanghai Fisheries University (SFU). SFU seeks to establish the Center "jointly" with NOAA. A proposed agreement was developed during the meeting and will be evaluated through the appropriate NOAA and Chinese channels. The nature of the Center is to provide a free and open data exchange with a focus on living marine resource observations and science. Professor Zendi PAN, a participant of the meeting, offered support for trying to resolve broader issues of timely data exchange that became evident after the VADM's visit to Beijing in October 2006. Professor PAN encouraged NOAA – SFU collaboration as a means of enriching the cal/val effort and fostering improved timely ocean data exchange between the two countries.

The daily GOES-SST Frontal Product was declared operational on December 14, 2006. The data is currently accessible from the NESDIS/OSDPD server, but should be



available through the Central website soon. The products use the Canny Edge Detection (CED) Algorithm, which was designed to be an optimal edge detector under specific criteria. The input is a 24-hour daily-averaged GOES SST binary image, while the output is another binary image showing the positions of SST fronts (1 for corresponding frontal locations, 0 to non-frontal locations). Intermediate steps include a dilated SST image (where non-SST values correspond to 0) and median filtered SST images are



generated. The CED Algorithm is actually performed on the median filtered SST image using various criteria. Once the output edge image is generated, it is masked using the dilated SST image to eliminate non-SST fronts, such as clouds and land edges.

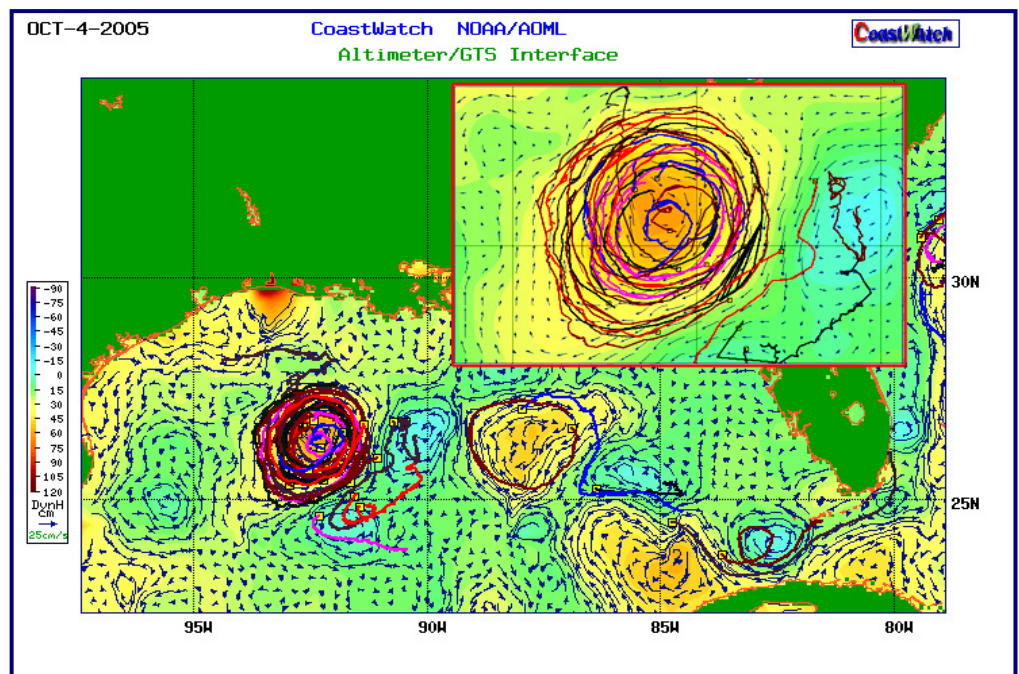
Node Updates

➤ Carribbean/Gulf of Mexico

Progress continues to be made on a new GIS-based interface, which is expected to be launched next quarter. Necessary work is required on the processes involved to process the data and prepare the products. Features of this tool include quick selection of the variable to display and access to external web map services and display layers from other servers. It will also allow the user to overlay raster and vector layers, such as currents and winds on top of multi-day SST maps.

A new set of procedures were developed to estimate the Tropical Cyclone Heat Potential (TCHP) and TCHP-related fields using altimeter data provided by Ssalto/Duacs. This work has been performed using both delayed-time (for historical studies) and near real-time (for operational purposes) datasets.

To continue the validation and error analysis of products, a new web interface has been implemented to compare the TCHP estimates from various models. The models include: 2-Layer assimilating NRLSSC satellite data, 2-Layer assimilating AVISO data, multi-regression assimilating NRLSSC data, multi-regression assimilating AVISO data, and TCHP estimates from the NCEP/GODAS model. The interface shows the statistics, scatter plots, and spatial distribution of measurements and errors on 5-day, monthly, and annual scales. It also allows selection of the basin where tropical



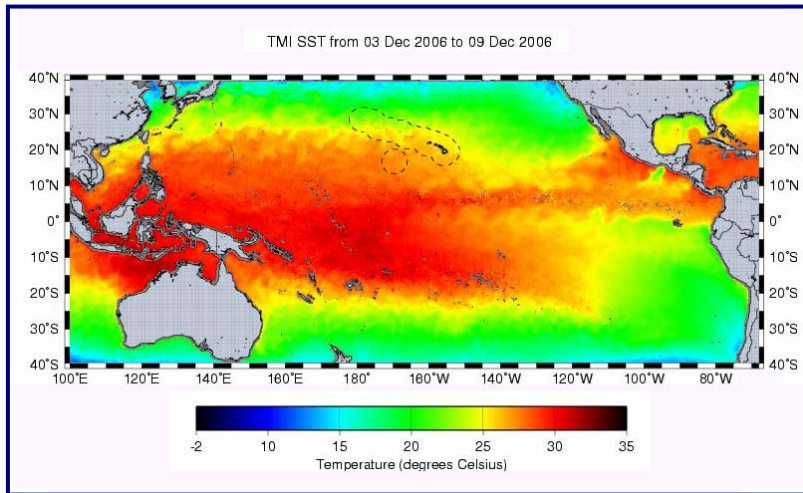
cyclones occur, improving the capabilities of the system for regional studies and interaction. The image to the right shows the drifters locations and the geostrophic currents estimated after Hurricane Rita passed through the Gulf of Mexico. The drifter trajectories closely follow the anti-cyclonic current field of a warm eddy, which has been estimated using altimetry.

Plans are in the works to upgrade the satellite receiving station in February. Global Imaging personnel visited last November in order to determine what equipment is needed to perform the upgrade. This company received a NESDIS contract to upgrade AOML's HRPT system in order to receive METOP data.

Due to problems related to the quality and availability of sea height satellite data, the processing system has been setup to automatically switch between all available data sources, and preprocess and reformat the data accordingly.

➤ Central Pacific

A new product has been added to the current inventory: the TRMM Microwave Imager (TMI) utilizes



microwave measurements for the retrieval of SST, minimizing the effects of cloud cover. At present, the TMI dataset consists of 3-day, weekly, and monthly composites which are updated daily. This example of a TMI weekly composite shows localized upwelling occurring at the Gulf of Tehuantepec as a result of wind forcing, in addition to the seasonal warming of the Pacific Basin.

A THREDDS/OPeNDAP server has been installed, and will be publicly accessible soon. Currently, the data server contains test data for conducting

various tests and evaluating present and future logistical requirements. In addition, a web client is currently being implemented for accessing the data server in real-time and provide users with enhanced data access and flexibility.

Central Pacific has provided detailed metadata information of its current satellite remote sensing data holdings to the Pacific Island Fisheries Science Center's "Metadata Compilation" project. This information will be compiled with other research groups' data at PIFSC for the establishment of a detailed data inventory repository.

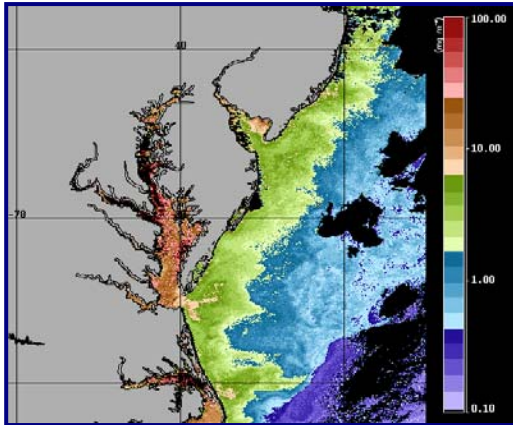
Multiple data requests were received this quarter from a variety of users:

- In support of a NOAA PIFSC oceanographic cruise (Highly Migratory Species Ecology/Longline), researchers were provided with daily GOES SST charts for the Big Island region, JASON-1 SSH and geostrophic currents data, as well as model SSH from the U.S. Navy.
- Various GOES SST, Jason-1 SSH, and Aqua/MODIS ocean color products were provided to the World Wildlife Fund (WWF) – Indonesia in support of their ongoing sea turtles migration and behavioral studies. In addition, WWF – U.S., requested customized AVISO SSH, GOES SST, and Aqua/MODIS ocean color products at 2-day, weekly, and monthly composites. These datasets are being utilized with the objective of analyzing fish recruitment and its relation to oceanographic and atmospheric features (e.g.: eddies).
- As a follow-up of previous collaboration efforts with the NOAA PIFSC Protected Species Division, customized animations were generated of satellite remote sensing imagery (including SSH and SST) and where overlaid with data from various sea turtles that were released off Kauai, Hawaii.
- Users in New Zealand were provided customized ocean wind satellite data for the region covering N.Z. – Easter Island at 3-day and weekly temporal intervals. The data will be used in preparation for the trans-Pacific sailing event with a Maori traditional double-hull "waka".
- NOAA/NOS Biogeography Division requested various remote sensing products focusing on the Northwestern Hawaiian Islands region, including SSH, wind speed, wind stress, and wind curl data time series from 1997 – present.

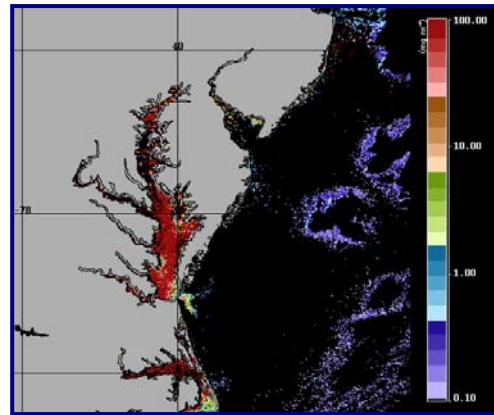
➤ East Coast

The Chesapeake Bay SeaWiFS Chl-a products are now available in experimental form online:

http://CoastWatch.chesapeakebay.noaa.gov/cb_seawifs.html. As requested by the NOAA's Ocean Color Product Oversight Panel (OCPOP), the OC4v4 empirical algorithm and the semi-analytical algorithm GSM01-CB were introduced into the processing stream. OCPPOP also recommended the stepped-sequential color scheme from the Department of Geography, University of Oregon be implemented as the color scale for the PNG images. SeaWiFS Level 1A data are sub-scened and transferred from Central Operations in near real-time. Data are then processed to Level 2, locally, using the SeaDAS 5.0 software. The images can be accessed through the web interface while the HDF data files are password protected. The next step is to provide this product in the CoastWatch format with the help from Central Operations.



OC4v4 on Jan 06, 2007



GSM01-CB on Jan 06, 2007

Live Access Server (LAS) version 6.5 has been installed on the data server. A new Java program was developed to convert the data from CoastWatch HDF format to NetCDF format. The next step is to produce AVHRR SST weekly composites and make them available to users via LAS.

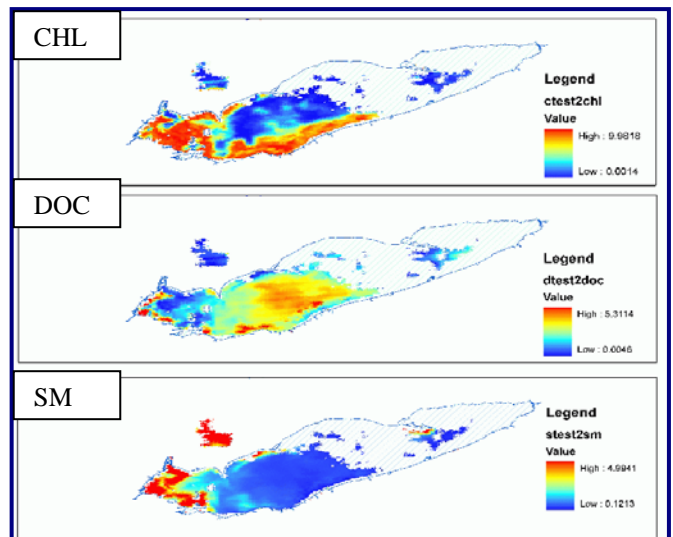
A new member has joined the Observations team at NOAA's Chesapeake Bay Office (NCBO). Dr. Chris Kinkade started in November and brings a wealth of ocean remote sensing knowledge from his time with MOBY. He will contribute to the local remote sensing efforts around the Bay while also serving as liaison between NCBO, Coastal Services Center, and NESDIS. Chris will assist in implementing a high-resolution TSM product for the Chesapeake Bay.

The NCBO Observations Program is working on to integrate CoastWatch satellite remote sensing products with other local observation systems such as the Chesapeake Bay Observing System.

➤ **Great Lakes**

Algorithm development continues on a chlorophyll, dissolved organic carbon, and suspended minerals MODIS algorithm. 2006 field data will be incorporated to produce a 3rd generation algorithm, and validation will begin soon after.

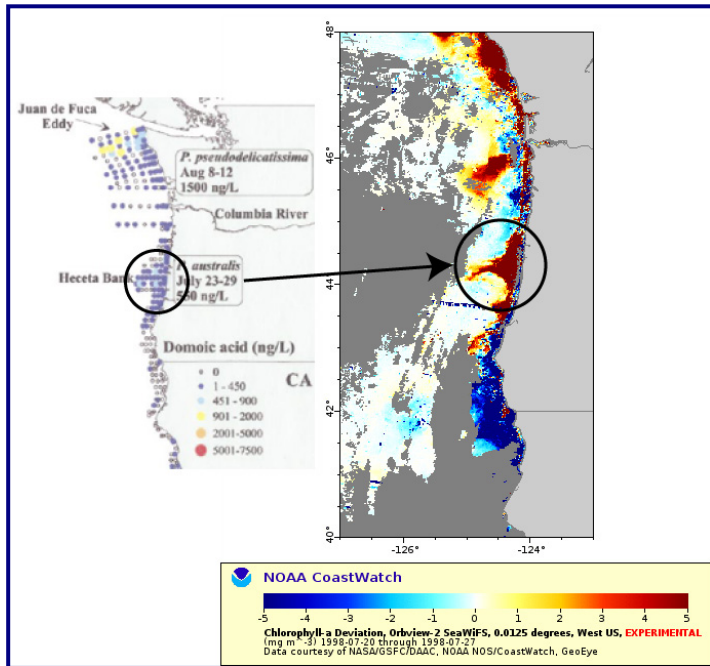
Continued converting the GLSEA composite chart to 1024x1024 format which involves a new compositing algorithm and reformatting the winter ice cover produced by the National Ice Center to the new format. SST imagery and ice overlay files have been compared. As well, work continues on the new Great Lakes landmask file which will match both the ice overlay file produced by NIC and the SST imagery.



The program "glsea_reader" has been modified to work on Solaris (IDL 5.2.). The executable file is available at through the FTP server: <ftp://CoastWatch.glerl.noaa.gov/software>

On November 16, an attack was made on the Great Lakes CoastWatch FTP server, but was detected and successfully blocked. The automated attack apparently originated from a DSL IP address and began pounding the CoastWatch FTP server in the morning with repeated login attempts. Over 14,000 attempts were made to login to the CoastWatch FTP server using several non-existent usernames.

➤ West Coast



Designed and deployed a near-real-time chlorophyll deviation product to assist State and Municipal Agencies with sampling efforts for detecting and monitoring Harmful Algal Blooms in Oregon. The system has been running in near-real-time since mid-November 2006. The basic strategy, roughly based on the method developed by Rick Stumpf for the Gulf of Mexico, is to compare a recent composite with a long-term running mean. The time periods adopted for the Gulf of Mexico (15-day image, 60-day reference) were shortened to reflect the relative transience of the dominant physical oceanic features on the west coast (8-day image, 30 day reference). A sample product is shown here. The partners in this project include Peter Strutton at Oregon State University and the Cooperative Institute for Oceanographic Satellite Studies (CIOSS), Michelle Wood at University of Oregon, and Zach Forester of the Oregon State Department of Health. Preliminary comparisons

with in-situ measurements of neurotoxins indicate that the rapid acceleration of phytoplankton growth detected by the chlorophyll deviation product does indeed seem to provide a mechanism to help direct sampling efforts. It is also thought to be useful for providing a limited (1 to 2 weeks) forecasting capability, when used in conjunction with ocean models or HF Radio-derived currents. The group is currently funded to further develop these products by the NOAA ECOHAB program. The role of the CoastWatch West Coast Node will be to integrate the required data sets and implement a system for delivery to the appropriate parties. The most difficult problems are making such data available due to the restrictions on near real-time distribution of the SeaWiFS HRPT data. While the approved users at CIOSS can access the actual data sets, the general user is restricted to viewing pictures on the CoastWatch Browser (<http://CoastWatch.pfel.noaa.gov/CoastWatch/CWBrowser.jsp>). The image below is an example showing a domoic acid concentration off Heceta Banks during July 1998 with the chlorophyll deviation product several days prior to the in-situ measurements. (Image courtesy of Peter Strutton, presented at CIOSS Review, October 2006)

Education and Outreach

Cara Wilson of the West Coast Node is convening a second NOAA Fisheries Ocean Satellite Data Course from March 27-29, 2007, at Oregon State University in Corvallis, OR. The course focuses on methods of accessing and utilizing the suite of available environmental satellite datasets. During the course, participants will work on individual projects, each aimed at utilizing satellite data to better characterize the ecosystems of living marine resources and marine sanctuaries. The first course, taught in August 2006, was extremely successful, and the instructors received strong encouragement from all participants to hold similar courses in the future. The class was originally made possible by

funding from NOAA's Research & Operations (R&O) project in NESDIS. This class will be funded by the Cooperative Institute for Oceanographic Satellite Studies/Oregon State University and NMFS, though all applicants will be responsible for their own travel.

Lucas Moxey of the Central Pacific Node was invited as a guest speaker to provide a review of the Northwestern Hawaiian Islands to the middle school Academy of the Pacific in Honolulu, HI. The talk included its oceanography and the effects of marine debris accumulation in the newly designated National Marine Monument.

Presentations/Publications

Workshop on Regional Needs for Coastal Remote Sensing, NFRA, Oct. 3-5, 2006, Durham, NH
Great Lakes Observing System (GLOS) representative.

"Algorithm Development for Operational Satellite SAR Classification and Mapping of Great Lakes Ice Cover" G. A. Leshkevich and S. V. Nghiem OceanSAR2006, Oct. 23-25, 2006, St. John's, Newfoundland

"Ice Mapping at the NOAA/Great Lakes Environmental Research Laboratory" Great Lakes Icebreaking Operations Conference (U.S. and Canada) November 14-15, 2006, Cheboygan, Michigan

"CoastWatch Great Lakes Program Update - 2006" Limnology classes from Bowling Green State University and Eastern Michigan University NOAA/GLERL, November 30, 2006

Trans-Pacific Oceanic Propagation of Vibrio Pandemics by the El Nino waters. J. Ansedo-Bermejo and J. Martinez-Urtaza (1); B. Huapaya, R. G. Gavilan, and V. Blanco-Abad (2); C. Cadarso-Suarez and A. Figueiras (3) & J. Trinanes (4) *Nature* (submitted). CoastWatch is acknowledged in this paper as a source of data. The article describes a method to evaluate and monitor ocean-related infections that can be applied for operational purposes.

(1)Institute of Aquaculture, University of Santiago de Compostela, Spain.

(2)National Health Institute, Peru.

(3)Faculty of medicine. University of Santiago de Compostela, Spain.

(4)Caribbean/Gulf of Mexico Node

Satellite SAR Remote Sensing of Great Lakes Ice Cover Part 1. Ice Backscatter Signatures at C-Band
S.V. Nghiem and G. A. Leshkevich *Remote Sensing of Environment* (submitted)

Satellite SAR Remote Sensing of Great Lakes Ice Cover Part 2. Ice Classification and Mapping
G. A. Leshkevich and S. V. Nghiem *Remote Sensing of Environment* (submitted)

NOAA/NESDIS/CoastWatch
5200 Auth Rd, Room 601
Camp Springs, MD 20746
Phone: (301) 763-8013
Fax: (301) 763-8572
<http://coastwatch.noaa.gov>