

Recent and Upcoming Events

Cooperative Institute for Oceanographic Satellite Studies (CIOSS)

College of Oceanic & Atmospheric Sciences (COAS)

Oregon State University (OSU)

Past events

2005

April-May: CIOSS efforts are expanding within two NOAA initiatives: (1) The Research-to-Observations (R2O) project led by Stan Wilson (NESDIS); and (2) the GOES-R Risk Reduction (GOES-R3) research led by Paul Menzel (NESDIS). Supplemental proposals have been submitted for four R2O projects concerning improved wind fields for operational use (two projects), specifications for ocean color Climate Data Records and evaluation of re-engineering plans for the next ocean color cal/val buoys (MOBY2). A supplemental proposal is being prepared by members of the COAST team for further GOES-R3 projects, to be directed by Curt Davis in CIOSS and to include Principal Investigators at OSU, NESDIS and other academic and federal institutes.

May: Recent progress on the Oceans and Human Health project: "Oceans and Human Health: Optical tagging and tracking of water masses for prediction of human health hazards." PIs: Peter Strutton (OSU) and Michelle Wood (UO). Michelle reports that:

A toxic phytoplankton bloom is currently occurring off the Oregon coast. Michelle Wood's group plans to sample this event on a cruise later this month.

Last month, Michelle and two students from the University of Oregon visited the laboratories of Mary Silver and Raphael Kudela at the University of California at Santa Cruz where they learned methods for collecting samples and detecting domoic acid in seawater, suspended particulates and animal tissues. These techniques will be combined with phytoplankton sampling and sampling for saxitoxin to provide data on the extent to which phytoplankton blooms that carry toxins can be detected and/or predicted using remote sensing.

May: CIOSS Update from COAS/OSU:

RESEARCH

During its first 2 years, the CIOSS strategy has been to use its core funding to hire post-docs to work on key CIOSS Research Themes. Initially, three post-docs were hired.

Iain MacCallum is finishing two years of work with Ricardo Letelier. Iain collated the in-situ and satellite optics data for cal/val activities, as part of the GOES-R3 activities that are now beginning.

Significance: Ocean color algorithms used in coastal waters (Case II) are more problematic than those used in the clearer open ocean waters (Case I). In situ optical measurements have been made off Oregon during cruises in a number of programs over the past years. Developing a data set of collocated satellite and in situ measurements in coastal regions requires a great amount of effort but should be invaluable in evaluating alternative algorithms in coastal waters of upwelling systems found in many regions of the global ocean.

CIOSS Research Theme 1: Satellite Sensors and Techniques

Guang Guo is in his first year, working with Jim Coakley to create a matched data set of AVHRR radiances and in situ surface radiation measurements from research cruises. These will be used to formulate and validate algorithms to parameterize radiation at the surface of the ocean from satellite data.

Significance: Estimates of surface radiation at the ocean's surface provide one of the driving terms in the heat budget of the ocean.

CIOSS Research Theme 1: Satellite Sensors and Techniques

CIOSS Research Theme 2: Ocean-Atmosphere Fields and Fluxes

Paul Choboter is nearing the end of his two years, working with John Allen and Roger Samelson. Paul has upwelling systems, such as the California Current using analytic models and the numerical ocean circulation model, run at NRL by John Kindle's group (one of the original "partners" of CIOSS). Paul is presently looking at the relationship between the variability of alongshore surface slopes (that could be estimated from altimeter data) and the strength of the poleward undercurrent.

Significance: Analytic solutions provide one test of numerical model fields, which need to be evaluated as a step leading to data assimilation. Once there is faith in the model, it can be used to explore the dynamics of poorly understood ocean features, such as the ubiquitous poleward undercurrents found in all eastern boundary currents.

CIOSS Research Theme 3: Ocean-Atmosphere Models and Data Assimilation

Three new post-docs are now, or will soon be, joining CIOSS.

Hai-Ying Jiao has recently joined CIOSS and is working with Mike Freilich, evaluating and improving experimental scatterometer wind fields with higher spatial resolution. The increased resolution is needed in the coastal ocean, as is the reduction in the gap between the coast and the first usable data.

Significance: Winds are poorly known in the coastal ocean, where the presence of land can cause amplifications and strong wind stress curl. These features have small scales and may be important for local upwelling and changes in the circulation. Increasing the horizontal resolution and reducing the gap next to the coast in remotely-sensed winds is a difficult but necessary problem.

CIOSS Research Theme 1: Satellite Sensors and Techniques

CIOSS Research Theme 2: Ocean-Atmosphere Fields and Fluxes

Byoung-Ju Cho is will join CIOSS in June to work with John Allen, Gary Egbert and Bob Miller, on the assimilation of radar and altimeter data into coastal ocean circulation models.

Techniques such as this will be needed in the coastal observing and modeling systems planned for the U.S. coastal regions as part of the IOOS (Integrated Ocean Observing System) program.

Significance: The IOOS coastal observing systems will undoubtedly involve modeling of the circulation, assimilating the observations to produce more uniform fields required for various applications. Coastal radars are expected to provide estimates of surface currents in all regions of the U.S. coastline, and thus are obvious elements of the assimilated data. Altimeters estimate coarser fields of surface height, providing data offshore of the region seen by the radars. Altimeters cannot be used in the region within 10-20 km of the coast, where the radars provide the highest resolution. Thus the combination is the logical first step in constraining coastal models.

CIOSS Research Theme 3: Ocean-Atmosphere Models and Data Assimilation

Martin Saraceno has been hired to work with Ted Strub and Mike Kosro to develop methods of producing fields of surface velocity from altimeter, scatterometer and coastal radar data. The resulting velocity fields will be used investigate the mesoscale circulation in the northern California Current.

Significance: As described in the previous project, the combination of the coarser altimeter surface height fields offshore (where spatial scales of circulation features are larger) and higher resolution surface velocity fields closer to the coast (where spatial scales are smaller) is a

natural combination. Velocities estimated from the altimeter height fields are geostrophic, lacking the influence of the surface winds. Scatterometer wind fields can provide this component, making the satellite-derived surface velocities compatible with the radar surface velocities. A number of problems must be overcome with regard to sampling and scales of resolution, before the surface velocity fields produced by this combination can be analyzed with confidence.

CIOSS Research Theme 1: Satellite Sensors and Techniques

CIOSS Research Theme 2: Ocean-Atmosphere Fields and Fluxes

CIOSS Research Theme 4: Ocean-Atmosphere Analyses

OUTREACH

CIOSS will be partnering with Hatfield Marine Science Center (HMSC) in Newport to bring Chris Moore from UW/PMEL to demonstrate a 3-D projection system that can be used to show 3-D surveys of the ocean, combining satellite fields with in-situ data. This technology is under consideration for public displays at HMSC, along with other types of interactive technology. Chris will also demonstrate the system at the annual SeaFest celebration, held at HMSC on June 25, 2005.

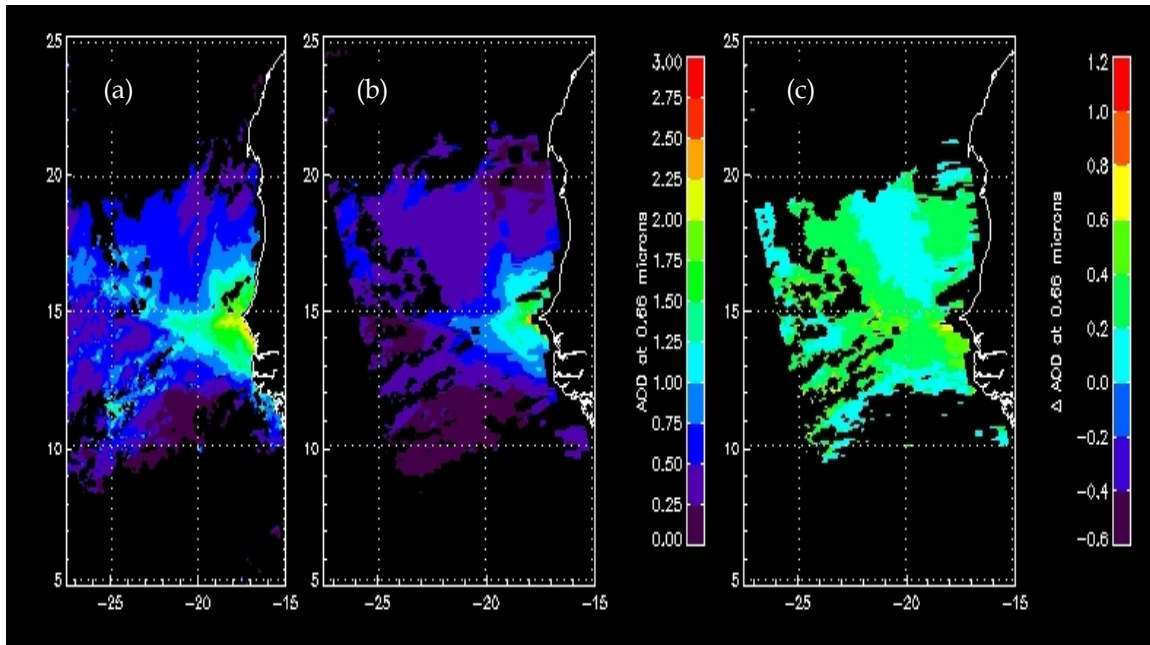
Significance: Educating the public, with regard to the science that NOAA does, is an important activity. This is especially true in the coastal ocean, as the U.S. invests in a coastal ocean observing system. The public wind of HMSC has a long history of public education on topics of marine science. It also offers a "laboratory" in which to study how best to introduce scientific material to the public. This event will offer an opportunity to evaluate the public response to a new technology that may literally open the ocean to the public view, during an annual celebration of the ocean at HMSC.

CIOSS Research Theme 5: Outreach

May: Update from CIOSS Fellow Alexander Ignatov at NOAA.

NESDIS 3rd generation ocean aerosol algorithm employed at EUMETSAT with the *Spinning Enhanced Visible and Infra Red Imager (SEVIRI) onboard Meteosat Second Generation (MSG-1; renamed Metosat-8)*. The 3rd generation NESDIS aerosol algorithm currently operational with AVHRR/3 onboard NOAA-16 and -17 has been implemented with the Meteosat-8/SEVIRI data at EUMETSAT, Germany (Drs. J. Schmetz/M. Koenig), Royal Meteorological Institute, Belgium (Drs. S. DeWitte/B. De Paepe), and Imperial College, UK (Dr. H. Brindley). Dr. Ignatov traveled to EUMETSAT from 10-23 April 2005, by their invitation, to assist with implementation and testing of the NESDIS algorithm. He also gave an invited one hour talk "Aerosol retrievals from AVHRR and MODIS: Lessons for SEVIRI" which was attended by over 40 EUMETSAT staff members and consultants. Also Dr. H. Brindley drafted a paper on SEVIRI aerosol analyses. Attached are two figures from Dr. Brindley's paper that

show the distribution of aerosol optical depth from SEVIRI using NESDIS algorithm(left), Aqua MODIS (center), and their difference (right) (A. Ignatov, E/RA3, (301)763-8053 x190)



(a) Aerosol Optical Depth at 0.66 μm derived from SEVIRI observations at 15:15 UTC on 12 October 2004 using the adjusted NESDIS 3rd generation aerosol model; (b) same derived from MODIS observations at 15:10 UTC on 12th October 2004. (c) (a)-(b).

Significance: This is important international recognition of the aerosol research at NESDIS and quality of AVHRR aerosol product over oceans. The SEVIRI product will contribute to generation of the aerosol climate data records (CDR) directly comparable to the AVHRR aerosol product, and three other AVHRR-like aerosol products currently produced at NASA/LARC from the Visible and Infrared Scanner (VIRS) flown onboard the Tropical Rainfall Measuring Mission (TRMM) satellite since 1997, and from two Moderate Resolution Imaging Spectroradiometer (MODIS) flown onboard the Terra (since 1999) and Aqua (since 2002) platforms.

Supports the following NOAA Mission Goals:

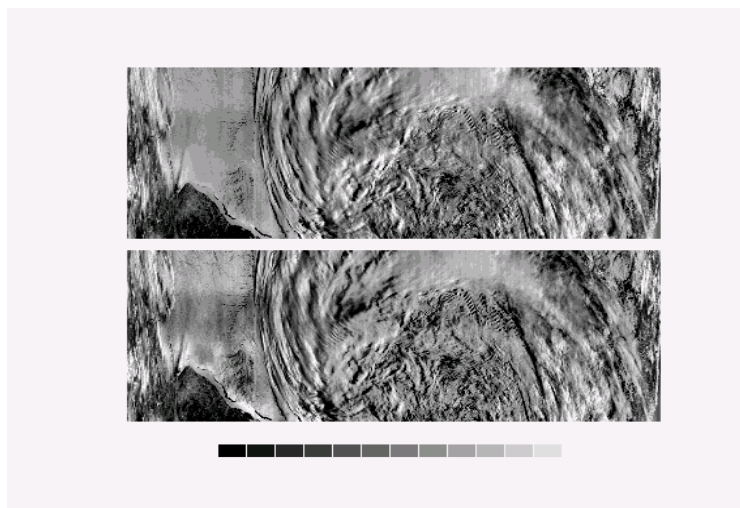
2. Understand climate variability and change to enhance society's ability to plan and respond.
3. Serve society's needs for weather and water information.
4. Support the Nation's commerce with information for safe, efficient, and environmentally sound transportation.

Supports the following NOAA Cross-Cutting Priorities:

- § Integrated Global Environmental Observation and Data Management System
- § Sound, Reliable, State-of-the Art Research
- § International Cooperation and Collaboration

May: Second Update from Alex Ignatov

AVHRR Calibration paper published. Paper titled “The usefulness of in-flight measurements of space count to improve calibration of the AVHRR solar reflectance bands” by A. Ignatov, C. Cao, J. Sullivan, R. Levin, F. Wu, and R. Galvin published in *JTech*, **22**, 180-200. Space counts are measured in all AVHRR bands, but currently they are used for calibration of only thermal bands. This paper explores potential use of space count data to constrain the calibration offset in the visible bands, and emphasizes the need for additional quality control of AVHRR reflectances. The attached figure demonstrates large errors in the AVHRR reflectances resulting from Moon contamination of the space view in the current data with no quality control. (A. Ignatov, E/RA3, (301)763-8053 x190)



NOAA-15 AVHRR orbit, 19 Apr 2000, 1325UTC, Hudson Bay, Canada, centered at 60°N, 78°W. Top: channel 1, bottom: channel 2. Stripe of depressed signal in both bands is due to Moon contamination in space view.

Significance: AVHRR visible bands are often said to be not calibrated onboard. In fact, calibration intercept can be constrained from the space count data and the study recommends that this be done. This improvement would be critically important for low AVHRR signals applications such as aerosol retrievals over oceans, and for improved quality control of AVHRR data.

Supports the following NOAA Mission Goals:

2. Understand climate variability and change to enhance society's ability to plan and respond.
3. Serve society's needs for weather and water information.
4. Support the Nation's commerce with information for safe, efficient, and environmentally sound transportation.

Supports the following NOAA Cross-Cutting Priorities:

- § Integrated Global Environmental Observation and Data Management System
- § Sound, Reliable, State-of-the Art Research

June 2-3: CIOSS Director Ted Strub attended the Cooperative Institute Directors Meeting in New York, hosted by CREST.

June 6: Curt Davis from ONR joined OSU as a new Professor (Senior Research). Curt and Mark Abbott are leading the team known as COAST (Coastal Ocean Applications and Science Team) This team is defining the applications and specifications of a new sensor that will fly on the next generation of geostationary satellites (presently called GOES-R) - the Hyperspectral Environmental Suite - Coastal Waters imager (HES-CW).

June 2005: Oceans and Human Health project: "Oceans and Human Health: Optical tagging and tracking of water masses for prediction of human health hazards." PIs: Peter Strutton (OSU) and Michelle Wood (UO). Update on harmful algal bloom and field efforts.

In late April and early May, the Oregon Department of Agriculture detected high levels of domoic acid in coastal razor clams and mussels. Domoic acid is a neurotoxin produced by the diatom *Pseudonitzschia*. Harvesting of razor clams and mussels has been closed since May and the ODA continues to monitor toxin levels in coastal shellfish.

In order to map the *Pseudonitzschia* bloom that is presumably the cause of the domoic acid accumulations, Peter Strutton and Michelle Wood (funded under NOAA's OHHI) recently obtained samples from ~50 stations off the coast of Oregon and northern California. These data were collected courtesy of Bill Peterson and his group at NOAA's Northwest Fisheries Science Center in Newport, OR. In coming months these samples will be analyzed in conjunction with satellite physical and ocean color data, as well as shore-based surface current measurements to determine the origin and trajectory of the bloom.

Looking ahead:

June 19-24: Ted will be presenting a talk at the ASLO Meeting in Santiago de Compostela, Spain entitled, "Satellite Estimates of Eddy-Mediated Offshore Transports in Eastern Boundary Currents".

June 25: CIOSS will be partnering with HMSC in Newport to bring in Chris Moore from UW/PMEL to demonstrate a 3-D projection system that can be used to show 3-D surveys of the ocean at annual SeaFest celebration. This technology is under consideration for public displays at HMSC, along with other types of interactive technology.

Summer 2005: 3 new Post-Docs are working or will be starting this summer to work on CIOSS projects, as part of Task II: Core Research, Funded by NESDIS. The projects involve improving the resolution of scatterometer wind fields in the coastal ocean, combining altimeter, coastal radar and wind fields to better resolve mesoscale circulation features in the California Current, and assimilating altimeter and radar fields into high-resolution models of the coastal ocean.

July 2005: CIOSS will welcome visiting scientists Dick Reynolds and Laury Miller to work with Dudley Chelton, Ted Strub, and other CIOSS fellows on specific research projects and to look more generally at how interactions with NOAA research scientists can be enhanced by visits—both short and long—to CIOSS.

July 13-14: Several CIOSS Fellows and their students will attend and present at the NOAA/NESDIS Cooperative Research Program Second Annual Science Symposium: Satellite Calibration and Validation in Wisconsin.