Recent and Upcoming Events
Cooperative Institute for Oceanographic Satellite Studies (CIOSS)
College of Oceanic & Atmospheric Sciences (COAS)
Oregon State University (OSU)

Past events

2005

March 1-3: CIOSS Fellow Dudley Chelton co-authored a poster at the CLIVAR Climate Model Evaluation Project (CMEP) Meeting in Honolulu, Hawaii. The poster was presented by Eric Maloney. The title of the poster was "SST Influence on Surface Wind Stress in Coupled Climate Models."

March 23-25: CIOSS Fellow Dudley Chelton attended the NASA Ocean Vector Winds Science Team (OVWST) meeting in Seattle, Washington and gave a presentation titled "An Assessment of the Accuracy of SST Influence on Low-Level Winds in the ECMWF and NCEP Numerical Weather Prediction Models."

March: The CIOSS Council met as a review panel and selected the proposed project to forward to Eric Bayler, which was approved with minor modifications. The CIOSS omnibus proposal for year 3 was then submitted on March 25.

March 28: The new CIOSS Administrative Specialist, Amy Vandehey, started in the CIOSS Office.

March 30-31: CIOSS Fellow Dudley Chelton visited NESDIS in Camp Springs, MD to participate as a member of the Hiring Committee for the Branch Chief of the Ocean Dynamics and Data Assimilation Branch (formerly known as the Laboratory for Satellite Altimetry). While in Camp Springs, Dudley also gave a seminar in the Joint Center for Satellite Data Assimilation (JCSDA) seminar series. The title of the seminar was "The Impact of SST Specification on Surface Winds in Numerical Weather Prediction Models."

Abstract:
Satellite observations of surface winds and SST from QuikSCAT and the AMSR reveal that the ocean exerts a strong influence on boundary layer winds in regions of SST fronts associated with ocean currents. This ocean-atmosphere interaction is clearly evident in the surface wind fields of the NCEP and ECMWF operational models, albeit with reduced intensity and increased spatial scale. From comparisons with QuikSCAT, the accuracy of SST-induced perturbations of surface winds in the

ECMWF model improved dramatically after May 2001 when the SST boundary condition was changed from the Reynolds SST analyses to the higher resolution and more accurate Real-Time Global SST analyses.

Dudley is working with Dick Reynolds on methods to increase the horizontal resolution of the fields produced at NOAA.

April: The following article, which was partially supported by CIOSS funds, just appeared in the April issue of the Journal of Physical Oceanography.

Choboter, P. F., R. M. Samelson, and J. S. Allen, 2005. A new solution of a nonlinear model of upwelling. Journal of Physical Oceanography, 35, 532-544.

April 14-15: CIOSS and The Science and Math Investigative Learning Experience (SMILE) Program are collaborating on developing a curriculum for the 12 high school after-school clubs that meet throughout the school year. The new curriculum is focused on oceanography, remote sensing and mapping. SMILE has held two teacher-training workshops on the Oregon State University campus to introduce teachers from SMILE's rural and minority school districts to oceanography, remote sensing, and mapping. The culmination of these after-school club meetings was the SMILE High School Challenge during April 14-15, a one-and-a-half-day event, during which SMILE high school club members, teachers, and volunteers convened at Western Oregon University and Oregon State University to play out a disaster scenario. This year's challenge was called, "Reaction, Action and Remediation of an Oil Spill". Members of the NOAA/NOS HazMat team in Seattle contributed to the scenario by making available the GNOME trajectory model, which the students used to asses the possible paths the oil spill might take.

April 25-29: CIOSS Fellows Jack Barth and Dudley Chelton, along with graduate student Renato Castelao, attended the European Geophysical Union (EGU) Meeting in Vienna. Renato presented results of an ongoing collaboration with Tim Mavor in NESDIS: "Spatial and temporal variability in sea surface temperature fronts in the California Current System from satellite observations".

Abstract:
Three and a half years (2001-Jun 2004) of Geostationary Operational Environmental Satellites (GOES) sea surface temperature (SST) frontal data over the shelf and slope along the U.S. west coast are used to analyze variability in the California Current System. Maps of seasonal probability of detecting a front (SPDF) reveal significant temporal and spatial variability in the area. Winter is characterized by very low SPDF along the entire coast. In spring, SPDF is still low north of Cape Blanco (43N), but

increases considerably south of it. This is consistent with the wind stress seasonal cycle and the seasonal development of upwelling fronts. The SPDF reaches maximum values in summer. The continuous input of energy from the wind to the system leads to intensification of the fronts and of the coastal upwelling jet. High SPDF are found around the 200 m isobath north of Cape Blanco, but span a much wider area south of it, presumably due to instability of alongshore currents and the generation of meanders and eddies, which increase in scale as the system adjust toward equilibrium. During fall, the SPDF decreases considerably, but the offshore extent of the area of higher activity is maximum. The interaction of the flow with major topography perturbations seems to strongly control the position of the fronts. Off Oregon, for example, high values of SPDF in 2001 are found inshore of the pinnacles of the Heceta Bank complex (44.2N) during spring, but move over and seaward of the pinnacles during summer. Mooring observations show that the coastal jet moves seaward of the pinnacles over a period of ten days in early July during a strong upwelling favorable wind event. A similar offshore shift is observed in the daily GOES-derived SST fronts position. Flow topography interactions in the vicinity of topography perturbations are investigated in more detail using a numerical model.

Dudley Chelton's presentation was titled "The dispersion characteristics of westward propagating sea surface height variability".

Abstract:
The accuracy and 12-year duration of the merged TOPEX/POSEIDON, ERS-1, ERS-2 and Jason altimeter datasets have allowed detailed investigations of westward propagating sea surface height (SSH) variability with high spatial resolution throughout the world ocean. Outside of the equatorial waveguide, analyses of the altimeter data in the space-time domain have consistently found that the observed propagation speeds are faster than predicted by the classical theory for extra-tropical Rossby waves. In this study, SSH variability along a variety of extra-tropical latitudes is examined in the zonal wavenumber-frequency domain to investigate the dispersion characteristics of westward propagating SSH variability. The resulting spectra are sorted according to a nonlinearity parameter computed from hydrographic data and the standard deviation of SSH variability. It is found that the westward propagation in regions of higher nonlinearity tends to be nondispersive over the range of wavenumbers resolved by the SSH fields computed from the merged altimeter datasets. The results are compared with predictions from theories that have recently been proposed to explain the discrepancies between the observations and the classical linear waves.

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. Curt will be visiting CIOSS May 9-10 to work on the proposal and make further plans for his move to Corvallis in June.

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 Chois 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

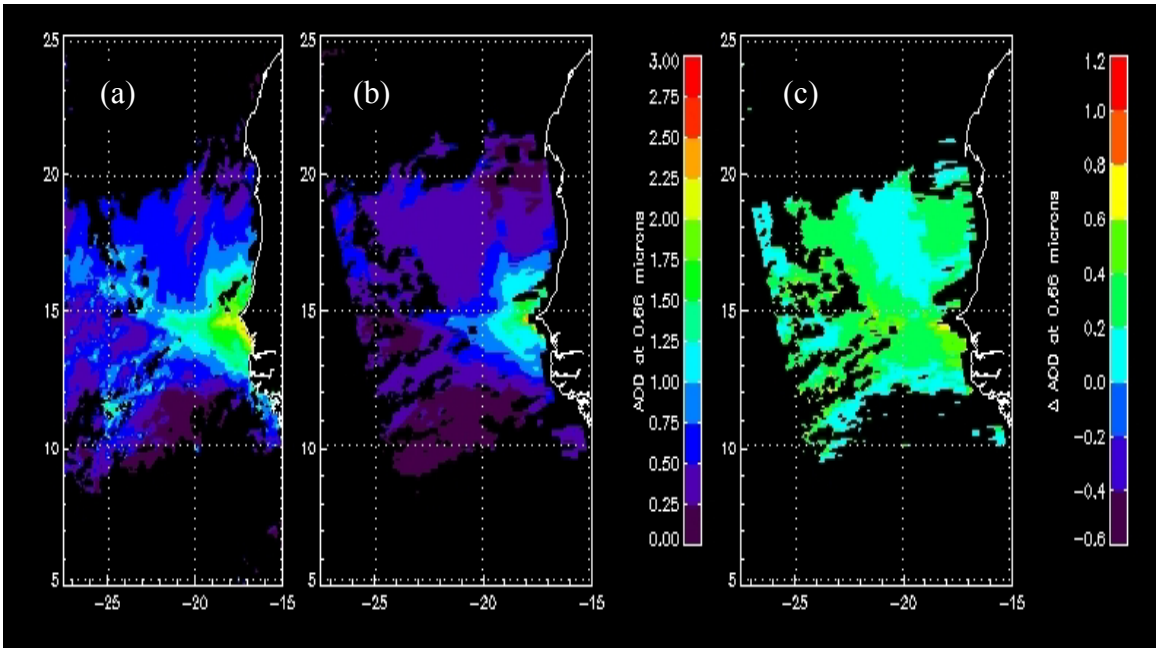
OUTREACH
CIOSS will be partnering with Hatfield Marine Science Center (HMSC) in Newport to bring Chris Moore from UW/PMEL to demonstrate a 3-D projection system that can be used to show 3-D surveys of the ocean, combining satellite fields with in-situ data. This technology is under consideration for 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 □m 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:

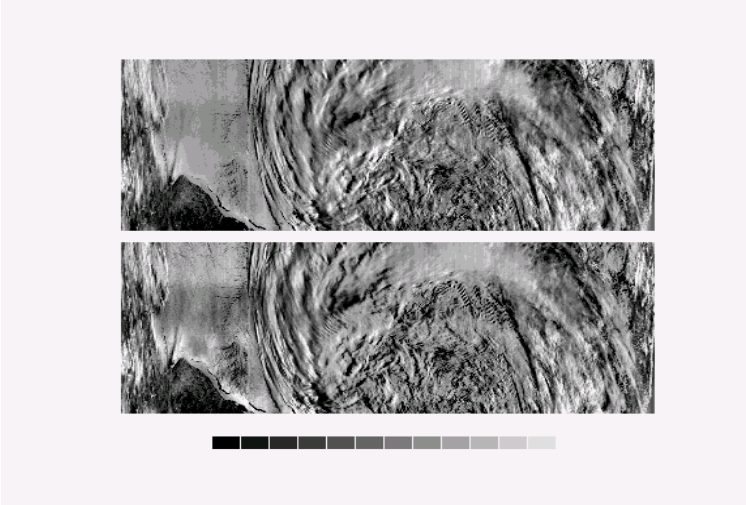
2. Understand climate variability and change to enhance society's ability to plan and respond.
3. Serve society's needs for weather and water information.
4. Support the Nation's commerce with information for safe, efficient, and environmentally sound transportation.

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.

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Looking ahead:

May: The first meeting of the Executive Board for CIOSS scheduled for May 25-26 has been postponed due to scheduling conflicts until late summer with the date TBD. The Board will meet to review progress of CIOSS in its first two years, and to make suggestions of what needs to be changed or added before the major review about two years from now. The goal is to get a consensus on a fairly specific and realistic list of objectives and milestones to accomplish over the next two years.

June 2-3: The Cooperative Institute Directors' meeting in New York City this year will be hosted by CREST. The Administrator's portion of this meeting was postponed to October 26 and 27, 2005 because of scheduling conflicts.

June 6: Curt Davis, Executive Scientist of the COAST project, will be joining COAS from NRL as a Senior Research Faculty, working with Ricardo Letelier and Mark Abbott.

Summer 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.