

Periodic Report: Activities of CIOSS Fellows at the College of Oceanic and Atmospheric Sciences, Oregon State University
May 11, 2006

March 13-18: The Ocean Surface Topography Science Team meeting was held in conjunction with the Symposium on 15 Years of Progress in Radar Altimetry during the week of March 13-18. The Symposium addressed a wide range of topics, including High- and Low-Frequency Signals (within the 15-year record), the Cryosphere, Hydrology and Land Processes, Coastal Applications, Tropical Applications, Tides, Marine Meteorology, Marine Geodesy, Changes in Mean Sea Level, Integrated Approaches to Altimetry, Outreach and the Future of Altimetry. The OST Science Team meeting addressed specific issues for the TOPEX/POSEIDON and Jason-1 projects, including algorithm and model improvement, CalVal activities, merging with other altimetric satellites (GFO, ENVISAT), preparation for the Jason-2 mission. A number of CIOSS Fellows and their colleagues in COAS and NESDIS attended the two related meetings and gave oral presentations and posters. Those in attendance included Dudley Chelton, Gary Egbert, John Lillibridge, Ricardo Matano, Laury Miller, Walter Smith and Ted Strub. Some members of the CIOSS Working Group on dynamics and SSH used the opportunity to meet and discuss efforts to increase the resolution of altimeters in near-shore coastal regions.

March 17: Sam Laney, a Biological Oceanography PhD student under CIOSS Fellows Ricardo Letelier and Mark Abbott, presented "Ubiquitin levels in antarctic phytoplankton" as part of the COAS Student Seminar Series.

ABSTRACT

Ubiquitin is a small 8.5 kDa protein found in all eukaryotic cells, used to mark damaged proteins for proteolysis. The amount of ubiquitin in a cell is a rough indicator of the amount of damaged proteins. Experiments were conducted in January 2006 at McMurdo Station, Antarctica to assess a) whether or not current assays for ubiquitin work with phytoplankton samples, and b) whether or not measurable changes in ubiquitin content could be induced by exposure to natural and artificial UV treatments. We found that photosynthetic pigments made measuring ubiquitin with a common current method difficult, but qualitative differences in ubiquitin as a function of UV treatments in our samples could still be identified.

Ubiquitin assays may therefore provide an alternate approach for assessing systematic UV damage in antarctic phytoplankton.

March 22: Guillaume Vernieres, a PhD candidate in Physical Oceanography under CIOSS Fellow Bob Miller, presented his thesis entitled, "Modeling Studies of Ocean Circulation Using Inverse Methods and Bifurcation Theory".

March 30: Hal Batchelder submitted a proposal through CIOSS on Grant.gov that was funded by GLOBEC (NOAA/NOS). The CIOSS supplement was called the "GLOBEC NW Atlantic Year-1 Project."

April 3-5: CIOSS Director Ted Strub and CIOSS Grants Accountant Carol Wallace attended the "all-NOAA" meeting for CI Directors and Administrators held in Silver Spring, MD. From the agenda, "The purpose of the meeting [was] to support quality research partnerships between Cooperative Institutes and NOAA through dialog and information dissemination."

April 14: Larry O'Neill, a Physical Oceanography PhD student under CIOSS Fellow Dudley Chelton, presented a seminar as part of the COAS Student Seminar Series. "Ocean Response to Small-Scale SST-Induced Wind Stress Perturbations: Preliminary Model Results." The abstract summarizes the talk:

ABSTRACT

Larry O'Neill

Patches of warm and cool sea surface temperature (SST) perturbations with spatial scales of about 50-1000km strongly influence the overlying surface wind stress field. Warm SST perturbations increase the surface wind stress and cool SST perturbations decrease the surface wind stress via a response of atmospheric boundary layer turbulence stress divergence and surface air pressure to horizontal SST variations. Near the Antarctic Circumpolar Current, large SST perturbations result from quasi-stationary meanders in the current and transient eddies. Observations have shown that these SST perturbations produce wind stress curl perturbations of nearly the same magnitude as the background wind stress curl field. Given the large magnitude of the wind stress curl perturbations, the ocean circulation should respond in some way. In my presentation, I will present results from a series of ocean circulation model experiments conducted to describe the modelled ocean response to these SST-induced wind stress perturbations. As it turns out, SST-induced wind stress perturbations distinctly influence the horizontal and vertical structures of the large-scale ocean currents. In the interests of time, I will mainly limit my presentation to meridional heat transport associated with the Agulhas Return Current. We have concluded from our preliminary model results that the coupled feedbacks of SST-induced wind stress onto the ocean are likely important.

April 17: CIOSS Fellows Dudley Chelton and Mike Freilich's MS student, Craig Risien, submitted a journal article to Remote Sensing of Environment.

Risien, C.M., D.B. Chelton, J.W. Good, and M.H. Freilich, 2006. A satellite-derived climatology of global ocean winds. Remote Sensing of Environment, submitted.

ABSTRACT

An interactive Climatology of Global Ocean Winds (COGOW) is presented based on five years (August 1999 – July 2004) of QuikSCAT satellite measurements of wind speed and direction 10 m above the sea surface. This climatology provides the first high spatial resolution, observationally based, online atlas of ocean winds. Users can retrieve climatological wind maps and wind statistics, both in tabular and graphical form from the COGOW web-based atlas. The global coverage of these data provides uniformly accurate information about the wind statistics in regions of the world ocean that are sparsely sampled by ships and buoys. A case study of the recovery of the vessel Ehime Maru off the Hawaiian island of Oahu is presented to demonstrate the usage and value of COGOW. Evidence of air-sea interactions, one of many wind phenomena visible within COGOW, is discussed to further familiarize users with COGOW. Finally, the utility of COGOW with regard to various operational and research communities is summarized.

April 20-21: The SMILE High School Challenge was held at Western Oregon University and OSU. The theme this year was Fisheries in the Community. Students collected data about fisheries and their associated communities, then formed and presented plans to manage these resources. This was the second year that the Challenge event was centered on oceanographic and remote sensing themes, with CIOSS support. The purpose of SMILE is to provide science and math enrichment for underrepresented and other educationally underserved students in grades 4-12.

April 21: Jeffrey Early, a PhD student in Physical Oceanography under CIOSS Fellow Roger Samelson, presented "A Brief Look at Inertial Dynamics" as part of the COAS Student Seminar Series.

April 25: CIOSS Fellow Bob Miller presented a seminar entitled, "Observing System Simulation Experiments: A Review" as part of the Physical Oceanography Seminar Series.

May 1-3: CIOSS Director Ted Strub and CIOSS Fellow Curt Davis attended the GOES-R Users Conference near Boulder, CO. Curt gave a talk describing the COAST

activities and Ted displayed a poster describing the CIOSS Outreach activities. The Conference Objectives were to:

- 1) Seek ways/define methodologies to ensure user readiness for GOES-R;
- 2) Continue to improve communication between NOAA and the GOES user communities;
- 3) Inform users on the status of the GOES-R constellation, instruments, and operations; and
- 4) Promote understanding for the various applications of data and products from the GOES-R series.

May 4: CIOSS Fellow Mike Kosro submitted a proposal through CIOSS on Grants.gov entitled, "FY06 Integrated Ocean Observing System (IOOS) High Frequency Radar (HFR) Project."

May 8: CIOSS Fellows Dudley Chelton and Mike Freilich led a very successful effort that summarized the scientific needs for oceanographic satellite observations over the next decade and communicated those needs to the members of the NRC Earth Science Decadal Survey via an open letter from the oceanographic community. A more complete summary of this activity is available at:

(http://cioss.coas.oregonstate.edu/CIOSS/Documents/Summary_of_Survey_Letter.pdf)

as well as the original text of the letter at:

(<http://cioss.coas.oregonstate.edu/CIOSS/letter.html>).

May 12: Two students under CIOSS Fellows gave presentations as part of the COAS Student Seminar Series. Nilesh Araligidad, an Atmospheric Sciences MS student under CIOSS Fellow Eric Maloney, presented "Madden-Julian Oscillation : Wind Evaporation Feedback" (no abstract available). RaeSeol Park, an Atmospheric Sciences PhD student under CIOSS Fellow Eric Skyllingstad, presented "Air-sea interaction over the Gulf Stream - Preliminary data focusing on the mixing layer" (see abstract below).

ABSTRACT

In the winter, lots of storms are developed and move following the Gulf Stream. The wind velocity and wind stress near to the storm are very strong and can affect the ocean variables such as the mixing layer, the lateral advection or the surface current. Also, the SST in this region can affect a storm developing. My big questions are how SST distribution can affect the storm intensity and track and how the storm intensity and moving speed can be related to the change of the mixing layer and the surface current. However, in this presentation, I'll focus on the change of the mixing layer and the surface current with different wind forcing for a simpler, more idealized model.

The surface current is not affected by the weak wind but can be changed by the strong wind forcing and this effect can be explained with Ekman transport. The mixing layer is governed by the wind magnitude and the wind direction.

June 2: CIOSS Fellow Jack Barth's student, Renato Castelao, will defend his PhD thesis in Physical Oceanography. The title is "Coastal ocean response to topographic effects and spatial variability in the wind forcing."

June 20-22: The Directors and Administrators of the NESDIS Cooperative Institutes will hold their annual meeting at CIOSS, in Corvallis, Oregon.