2010

Internal Chronology: Activities of CIOSS Fellows at the College of Oceanic and Atmospheric Sciences, Oregon State University

updated December 2010

*CIOSS Fellows are in bold.

January 29: The Winter SMILE Highschool Teacher Workshop was held at LaSells Stewart Center on the OSU campus. **Ted Strub** gave a presentation to the teachers on how scientists analyze satellite data to track global climate changes.

January 29: The CIOSS Year 7 Annual Progress Report was completed and turned in through NOAA Grants Online.

February 10: The CIOSS Year 8 Research and Outreach Omnibus proposal was submitted through NOAA Grants.gov.

February 11: Ted Strub and Amy Vandehey attended a meeting with the SMILE planners to talk about the upcoming Highschool Challenge event on April 8-9, 2010. Several people from the Suitland School District and CREST will come to observe the Challenge to get ideas and plan to implement a similar model on the East Coast.

February 18: CIOSS Hot Item

Hyperspectral Coastal Imager Begins Providing Data to CIOSS Research Team

In early 2010, data from the Hyperspectral Imager for the Coastal Ocean (HICO) began arriving for evaluation by Dr. Curtiss Davis' research team at the Cooperative Institute for Oceanographic Satellite Studies (CIOSS). This is the first spaceborne imaging spectrometer designed specifically to sample the coastal ocean. HICO samples selected coastal regions at approximately 90 meter resolution, with full spectral coverage and high sensitivity to resolve the complexity of the coastal ocean. HICO is sponsored by the Office of Naval Research (ONR) and will demonstrate coastal products including water clarity, phytoplankton pigment concentrations, bottom types, bathymetry and on-shore vegetation maps. HICO also demonstrates innovative ways to reduce the cost and shorten the development schedule of space missions by adapting proven aircraft imager architecture and using Commercial Off-The-Shelf components where possible.

Background: Curtiss Davis joined CIOSS in 2004 to lead a Coastal Ocean Applications and Science Team (COAST), which was assembled to help NOAA design a hyperspectral sensor for coastal monitoring on the GOES-R satellite series. After NOAA terminated plans for that sensor in 2006, Dr. Davis' efforts shifted to HICO, which was selected by ONR in January 2007 and launched in September 2009. It is mounted on the Japanese Experimental Module Exposed Facility on the International Space Station.

Significance: HICO imagery will serve as a prototype for future NOAA hyperspectral sensors. Although its orbit is not geostationary, over its 1-3 year mission it will provide coverage of selected coastal areas during different parts of the diurnal cycle for each season. A brief

overview of HICO, as well as a more detailed presentation about the sensor are available. To inquire about the mission, contact Dr. Curtiss Davis (cdavis@coas.oregonstate.edu). This activity supports NOAA Mission Goal 5 - Provide Critical Support for NOAA's Mission.

February 22-26: The AGU Ocean Sciences Meeting was held in Portland, OR at the Convention Center. Many of the CIOSS Fellows attended and presented their latest research.

April 19-21: Ted Strub and Amy Vandehey attended the all NOAA CI Director and Administrator's Meeting that was held in Silver Spring, MD. Presentations will soon be posted to the NOAA CI website. Ted, along with the director of CIMRS, Michael Banks, and the OSU director of federal relations, Kate Sinner, took the opportunity to visit several congressional staffers to raise their awareness of CIs and their research.

April: Pete Strutton left OSU to take a position in Tasmania. Angel White, an Assistant Professor in Biological Oceanography, will be taking over his projects and students and has been invited to become a CIOSS Fellow.

May 4: Alexander Kurapov gave a seminar entitled, "Variational assimilation of satellite observations in the coastal ocean model off Oregon" as part of the COAS Physical Oceanography Seminar Series.

May 10 – July 21: CIOSS is hosting Laxmikant Dhage, a summer undergraduate intern from the Indian Institute of Technology, Guwahati, Assam, India. He worked last summer as an intern in India with Dr. Somayajulu at the National Institute of Oceanography in Goa, using alongtrack altimeter data to look at variability of the West India coastal current. One goal of hosting Laxmikant is to develop collaborations with Indian coastal oceanographers using remote sensing, since we are likely to be using satellite data (scatterometer and ocean color) from India in the future. He will help with the alongtrack altimeter data off the Oregon coast that will be assimilated into Alexander Kurapov's real-time forecast this summer. He will also develop visual and statistical comparison between model and satellite SST and SSH.

June: Congratulations to **Dudley Chelton** for being the recipient of the 2010 Robert L. and Bettie P. Cody Award in Ocean Sciences." The Cody Award recognizes outstanding scientific achievement in oceanography, marine biology, and Earth science. It is presented by Scripps Institution of Oceanography to a scientist who has made significant contributions to his or her field of science specialty.

June 8: Andrey Koch gave a seminar entitled, "Near-Surface Dynamics of the Upwelling Jet Separated off Oregon" as part of the COAS Physical Oceanography Seminar Series.

June 10: Angel White gave a seminar entitled, "Hyperbole and the North Pacific Plastic Patch" as part of the COAS Chemical/Biological Oceanography Seminar Series.

June 15-16: CREST hosted this year's NESDIS CI Director's meeting in New York. The Administrator's meeting was held on August 18-19.

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July-August: Ted Strub, Hal Batchelder, Amy Vandehey and Linda Lamb (COAS Publishing) have been working on an updated version of the CIOSS Brochure.

July 22-23: A report from Andrey Koch, a postdoctoral researcher that visited the University of Puerto Rico at Mayaguez (UPRM) through the NESDIS/STAR/CoRP Exchange Program.

The first day, July 22, I met with Dr. Jorge Capella who works as a research consultant in the Department of Marine Science http://www.uprm.edu/cima/ of the UPRM and as a Modeling Coordinator of the Caribbean Coastal Observing System (CariCOOS) http://www.caricoos.org/drupal/. He gave me a broad overview of research being conducted at the Department and we talked about their efforts in ocean modeling, too. I also met with Julio Morell who is a professor in the Dept. of Marine Sciences, PI of the Caribbean Regional Association (CaRA) http://cara.uprm.edu/ and Executive Director of the CariCOOS. He went through their projects in observational and modeling efforts focusing on the east Caribbean and the areas adjacent to Puerto Rico Island. A graduate student, Juan Gonzalez, told me about his project on modeling the Caribbean with coupled ADCIRC and SWAN models. During this first day I also met Dr. Yasmin Detres, a researcher of the Bio-Optical Laboratory in the Dept. of Marine Sciences, and Dr. Juan Gonzalez-Lagoa, a professor at UPRM and an expert in plankton taxonomy and dynamics. On the same day I gave a seminar at the Dept. of Marine Science on Magueyes Island entitled "Modeling investigations of physical and biological processes off the Oregon coast." I covered the topics of near-surface dynamics associated with separated jets in the coastal transition zone off Oregon and bio-physical modeling and hypoxia in the Oregon coastal ocean. The seminar was received with great interest and enthusiasm. I received many interesting questions on characteristic physical and biological processes in the coastal ocean off Oregon and technical aspects of my modeling work.

The second day, July 23, I spent mainly with my host, Dr. Fernando Gilbes, the director of the Geological and Environmental Remote Sensing Laboratory at the Department of Geology http://gers.uprm.edu/. He went through his projects with me dealing with assessing primary production and suspended sediments in the Mayaguez Bay. He showed me his experimental laboratory and the GIS/ENVI laboratory where they process and interpret ocean color images. Dr. Gilbes explained to me the procedure of developing the algorithms for deriving the information on primary production, suspended material and other marine ecosystem parameters from satellite images using in-situ measurements. He also took me to their study area – Mayaguez Bay and the mouths of the rivers entering it. The same day, I met with Aurelio Mercado, a professor of the Dept. of Marine Sciences who works on modeling the tectonic and tsunami waves in the Caribbean basin with ADCIRC and HYCOM models. We discussed with him modeling aspects of their projects. On the same day I met with Dr. Hamed Parsiani, head of the Engineering Department http://ece.uprm.edu/, who is also a PI of the NOAA/CREST funded program at the UPRM. Dr. Parsiani showed us his laboratory where they have a LIDAR for atmospheric sensing, the only one operating in the whole Caribbean basin. We discussed with him and Dr. Gilbes possible areas of collaboration within the time frame of the coming 5-year cycle of NOAA/CREST support. One of possible ideas is to set up two experimental areas on the Oregon coastal ocean and in Mayaguez Bay, and compare them in terms of physical and ecosystem conditions and their predictability using modeling and satellite imagery.

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August 4: CIOSS Hot Item
CIOSS Develops QuikSCAT Data Product with Enhanced Coastal Coverage

In June 2010 the Cooperative Institute for Oceanographic Satellite Studies (CIOSS) researchers, Barry Vanhoff and Craig Risien, transitioned a novel QuikSCAT Ocean Vector Wind (OVW) data product to NASA's Jet Propulsion Laboratory (JPL). This OVW product provides high spatial resolution (0.1° latitude by 0.1° longitude) wind fields for 12 variables including, wind speed, wind speed squared, wind speed cubed, zonal and meridional wind components, wind curl and divergence, wind stress magnitude, zonal and meridional wind stress components, and wind stress curl and divergence, derived from approximately 124 months (July 1999 – November 2009) of QuikSCAT scatterometer observations over the California Current System (CCS). This dataset is unique in that it contains a narrower land mask than QuikSCAT observations processed using standard methods. The new "empirical land mask" allows wind retrievals within 5-20 km of the coast. This data product will be made publically available by Fall 2010, via the JPL Physical Oceanography Distributed Active Archive Center (PO.DAAC) website (http://podaac.jpl.nasa.gov/).

Background: The SeaWinds scatterometer was launched on 19 June 1999 onboard the QuikSCAT satellite. The geophysical data record extends from 15 July 1999 to 22 November 2009. During this period QuikSCAT provided global ocean vector wind data with unprecedented resolution, accuracy, and coverage. As a result of antenna side lobe contamination, standard 0.25^o x 0.25^o QuikSCAT measurements cannot be obtained closer than about 30 km to land. NASA JPL has produced a 12.5 km gridded QuikSCAT product with an arbitrarily imposed 20 km land mask. The novel OVW data set presented here includes a more sophisticated land mask. This relatively narrow, geometry-dependent, land mask was developed by Barry Vanhoff, with support from NASA's Research Opportunities in Space and Earth Science program (ROSES), and CIOSS.

Significance: This OVW data product eliminates the need for researchers interested in the CCS to download and grid QuikSCAT data themselves as it provides gridded wind fields for 12 variables for the entire QuikSCAT data record. In addition, this product includes wind retrievals within 5 - 20 km of the coast where gradients in the wind field are dynamically important for ocean circulation. This activity supports NOAA Mission Goal 2 - Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond.

August 10-11: The Annual CoRP Symposium was held at CIRA in Fort Collins, Colorado. The theme this year was "Satellite Applications to Mesoscale Meteorology and Oceanography." The Symposium website is: http://rammb.cira.colostate.edu/corp/symposium/. Presentation and poster titles are given below.
Dudley Chelton – *AMSU Observations of SST Influence on the Troposphere over the Gulf Stream* (presentation)
John Osborne – *Geometry of the SST Front in a High Resolution Tide- and Wind-Forced Coastal Ocean Model* (poster – won best poster award)
Andrea Vander Woude – *Remote Sensing of Southern Ocean Air-Sea CO2* (presentation)
Peter Gaube – *Satellite Observations of Eddy-Induced Ekman Pumping* (presentation)

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Peng Yu – *Application of Satellite Data in the Data Assimilation Experiments off Oregon* (presentation)

August 10-12: SMILE held their Summer Teacher Workshop at La Sells Stewart Center in Corvallis. Shakila Merchant from CREST, NY and Sylvia Quinton, an educator from Suitland, MD visited to experience the SMILE program model first hand. There has been an increased effort to develop NOAA-related partnerships over the next 3 years. Eda Davis-Lowe (SMILE Director) and her staff have followed up on the Suitland connections and will be helping their school district to try to set up a SMILE-like program, for grades 4-12.

August 16-17: A report from Andrea J. Vander Woude, a postdoctoral researcher that visited CIMSS in Madison, WI through the NESDIS/STAR/CoRP Exchange Program.

On August 16th and 17th, I visited the Cooperative Institute for Meteorological Satellite Studies (CIMSS), part of the University of Wisconsin, Madison. My main goal of the visit was to meet with Galen McKinley, an Assistant Professor in the Atmospheric and Oceanic Sciences department. She conducts similar research to mine at Oregon State University. I also have an interest in working on the Great Lakes and spent my time speaking to her about those opportunities. The visit was also intended to learn about any upcoming faculty or research opportunities at UW Madison.

I first met with Galen McKinley and her postdoctoral research Colleen Mouw. We discussed their current research on Lake Superior to understand the carbon cycling within the lake using a coupled biogeochemistry, physical and ecosystem model. They also covered their recent work in the North Atlantic and local lakes surrounding the UW Campus. Colleen discussed her work on validating Lake Superior chlorophyll retrievals from satellite, her doctoral research as well as her newly funded research on the Bering Sea. I then presented my postdoctoral research to them and Galen had insightful input on different approaches for my research. I also briefly met with Jim Davies.

On the second day, I spoke with other faculty who are working on the Great Lakes and those that work within CIMSS. The list included Chin Wu in Civil and Environmental Engineering, Steve Ackerman, Jeff Key, and Val Bennington. I also gave a seminar to people associated with CIMSS and AOS that afternoon. Many seminar participants had valuable input on my work.

The two days spent in Madison were highly valuable in terms of future collaborations with those working on the Great Lakes and also possible job opportunities in the future after my postdoctoral appointment is finished. I plan on keeping in contact with Galen McKinley and Colleen Mouw in the future and we spoke about possibly writing a proposal to do the same predictive model that I have used for the Southern Ocean on the Great Lakes.

August 18-19: The annual NESDIS CI Administrator's meeting was held in New York, NY, hosted by CREST. A summary of the meeting and notes can be found here.

September 20-22: From Chris Mooers: ePOPf (Eastern Pacific Ocean Prediction Forum) West Coast Modeling Workshop, Portland, OR.

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This is a time of rapid scientific development and programmatic change (IOOS, OOI, etc.) for coastal ocean modeling and prediction, including on the West Coast. Several of us have recognized that the West Coast Modeling Community has an inherent need and a probable opportunity to seek the implementation of a West Coast super-regional operational ocean prediction system to support the needs of the continental margin and estuarine modeling systems for open boundary conditions. To "advance the cause", a subset of us have decided to convene the workshop.

September 22-25: EPOC, Portland, OR.

October 14-22: CIOSS sponsored a group of people to attend several altimetry meetings that were held in Porto and Lisbon, Portugal. The Fourth Coastal Altimetry Workshop (CAW-4, http://www.coastalaltimetry.org) was in Porto, Portugal, October 14-15, and the week-long "Altimetry for Oceans and Hydrology" event was held October 18-22 in Lisbon. The Lisbon meeting was composed of two relevant pieces to the sponsored participants: the 2010 Ocean Surface Topography Science Team (OST-ST) meeting during October 18-20; and the Special Meeting, "Towards High-Resolution of Ocean Dynamics and Terrestrial Surface Waters from Space, 21-22 October 2010 [see http://www.ostst-hydro-2010.com/ for both of the Lisbon meetings].
The people that CIOSS sponsored (with their guiding professor(s) in parentheses if applicable) are:

- Christian Buckingham, University of Rhode Island (P. Cornillon)
- Vincent Combes, Oregon State University (T. Strub, R. Matano)
- Laxmikant Dhage, Indian Institute of Technology (Somayajulu Yenamandra)
- Alexander Kurapov, Oregon State University
- Matthieu LeHenaff, RSMAS, Miami (V. Kourafalou)
- Ebenezer Nyadjro, University of South Carolina (S. Bulusu)
- Subrahmanyam Bulusu, University of South Carolina
- Dian Putrasahan, Scripps Institute of Oceanography (A. Miller)
- Matt Strassburg, University of Colorado (R. Leben)
- Hok Sum Fok, Ohio State University (C.K. Shum)

November 4-5: A NOAA Cooperative Institute Administrator's meeting was held in Seattle, organized by JISAO. This is the first semi-annual meeting of the CI Administrators to be held outside of the Silver Spring annual meeting. Topics on the agenda included sharing information about our programs and activities, best practices and Task I funding issues. In addition, everyone was taken on a tour of the PMEL lab, as well as given a short science talk and chance to talk with NOAA personnel at the lab.

November 8: John Cortinas and others in NOAA have been actively looking for a solution to associating competitively selected projects with CIs. John put together a draft of a new mechanism and asked for comments from the CI Directors and Administrators.

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November 16: John Cortinas asked for more specific information about minimum and maximum Task I funding requirements. This information will help the NOAA CI Committee to: (1) understand the range of expenses that it takes to operate a CI, (2) determine a reasonable level of Task I that is necessary to operate a CI, (3) understand the current contribution of universities to running a CI, and (4) consider suggestions from CIs for determining additional Task I funding.

November 19: SMILE held a planning meeting for this year's afterschool club activities and highschool challenge event. The 2011 highschool challenge will focus on the large over-arching theme of ocean habitats and food-web dynamics, while weaving in a human-interest topic, toxicity build-up in fish. A critical concept in the 2010 - 2011 theme is that habitat in the ocean is defined more by ocean conditions than by location within the ocean. This differs from the more familiar terrestrial ecosystems that are defined more by locations. To answer questions about ocean habitat, researchers must use parameters other than location to define and observe the conditions that support primary productions and create the food webs that support fisheries. SMILE would like to potentially look at several different fisheries, including salmon. Satellite data specific to this theme will include: sea surface temperature, satellite winds and ocean color.

December 7: Roger Samelson gave a seminar entitled, "Time-Dependent Adjustment in a Simple Model of Mid-Depth Meridional Overturning" as part of the COAS Physical Oceanography Seminar series.