

See Pages 4-5
Summer 2014
NSF-funded
REU Program!

CCPO CIRCULATION

Center for Coastal Physical Oceanography

OLD DOMINION UNIVERSITY

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Surface Current Mapping Using Radar Technology 1

Notes from the Director 2

Rough Seas: Stefanie Mack blogs about cruise 3

A Summer of Research: NSF-funded REU Program 4

Just the Facts 6

MARI & CCPO Seminar Series Schedule 7

The seminar series has a new location! See page 7 for details.

Surface Current Mapping Using Radar Technology

Teresa Updyke

High frequency (HF) radars are now observing and mapping coastal surface currents all over the world. They are providing a unique perspective on currents, one that is quite distinct from the perspective of a traditional moored or towed current profiling instrument. CCPO uses these radars to monitor currents in local and regional

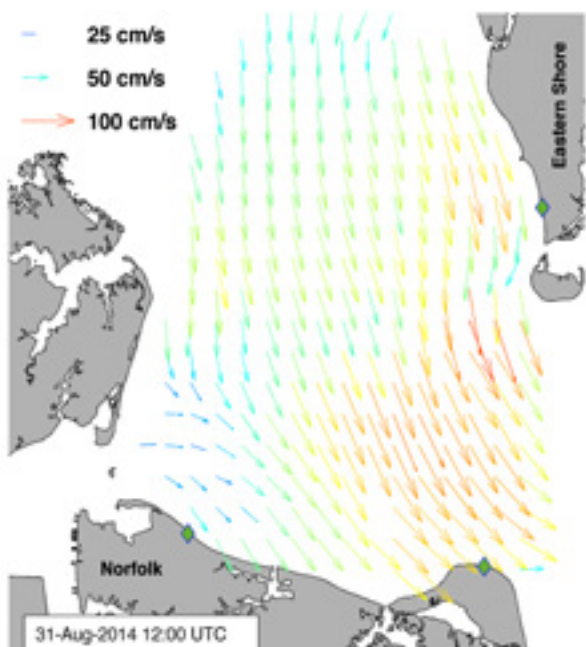
waters. The map shown below was produced by a system of land-based HF radars located in the lower Chesapeake Bay. The radars measure surface current velocities over large areas and maps are typically produced each hour. Increasingly over the last two decades, this radar view of currents has led to the development of several practical applications. These range from aid to search and rescue operations to pollution tracking to informing numerical forecast models.

CCPO partners with the Center for Innovative Technology to operate several radar sites in the lower Chesapeake Bay and along the Mid-Atlantic coast as part of the Mid-Atlantic Regional Association Coastal Ocean Observing System (MARACOOS). In turn, the MARACOOS stations are a part of the vast network of sites located around the

United States coastline which make up the HF Radar National Network funded by NOAA. Teresa Updyke, a researcher at CCPO, directly maintains six radar stations and helps oversee the operation of seven others located from North Carolina's Outer Banks north to Delaware Bay. Mark Bushnell of CoastalObsTechServices provides valuable assistance with site maintenance.

The systems in the Chesapeake are standard range systems with a range of 30 to 40 kilometers. The long range systems looking off the Atlantic coast "see" out to 180 kilometers on average. The data are freely available to researchers and the public. Since 2009, the Mid-Atlantic offshore data have been delivered in near real-time to the U.S. Coast Guard's database for conducting search and rescue operations.

Continued on page 3



OLD DOMINION UNIVERSITY

Center for Coastal Physical Oceanography

I D E A F U S I O N

Letter from the Director



John Klinck bringing in an anchor on the shallow Gavelston Bay. (Early 1990's)

A Trip Down Memory Lane

Dear Reader,

Research has been the central part of my academic career. It is important to be reminded, at times, how fascinating, provoking, enriching, frustrating, confusing and engaging it can be. This summer, as part of an NSF-funded REU (research experience for undergraduates) program, undergraduates from several schools worked with faculty in the OEAS department and CCPO as part of ongoing research projects. The students were informed, energetic and committed to research, but at times, they were unsure of their path, steps and goals. Helping these students find their way with their projects showed me a view of my early days trying to answer science questions. These students have reminded me (as if I really needed reminding) why I enjoy an academic life as part of a university community teaching the next generation. Let's give a big welcome to Yongcun Cheng, a new postdoctoral research associate researching sea level change with Dr. Hans-Peter Plag and new graduate students for CCPO and MARI Russell Ives, Judy Hinch, Brett Buzzanga, Andrew Foor, Brynn Davis, and Praveen Kumar!

Sincerely,

John Klinck

Professor of Oceanography
Director, CCPO

Just Swimmingly

*Tales of grad student life in oceanography.
A mixture of science and survival skills.*

A blog by Stefanie Mack



<http://ohjustswimmingly.blogspot.com>

See more of her adventures on pg. 3

CCPO SPOTLIGHT

Teresa Updyke
Research Scientist



Teresa Updyke received a B.S. in earth and atmospheric sciences with a focus in geophysics from the Georgia Institute of Technology in Atlanta, Georgia. Following internships at the Skidaway Institute of Oceanography and the Center for Operational Oceanographic Products & Services at NOAA, she began a master's degree program in oceanography at CCPO in the fall of 2003. As a research assistant under the advisement of Dr. Ann Gargett, she helped develop a method to determine Thorpe scales (vertical overturning scales of turbulent eddies) from CTD measurements.

After graduation in August 2005, she traveled around the world and then returned to CCPO for further work with Dr. Gargett. In 2007, she started work with Dr. Larry Atkinson on a project to study and map surface current velocities in the lower Chesapeake Bay using high-frequency radar. This project expanded and she continues with this work today. In her free time, she enjoys traveling, playing Ultimate frisbee, camping, hiking and biking.

Surface Current Mapping Using Radar Technology *(continued)*

Teresa Updyke



Long Range Receive Antenna

Photo Credit: Teresa Updyke

An important milestone for the Chesapeake Bay radars occurred this year. As of April 2014, the data in the Bay have been incorporated into NOAA's PORTS system and used to generate tidal current predictions as a standard NOAA product. Also, the Bay data and data offshore of North Carolina, Virginia and Maryland coasts have recently been assimilated into different numerical models by researchers aiming to improve ocean forecasting. Pairing radar observations with the predictive capability of numerical models can lead to many exciting and powerful tools for the oceanographic community. Research in this area is expanding.

Land-based antennas do not face some of the same troubles as in situ oceanographic equipment, such as biofouling; however, there are challenges to maintaining these systems. Lightning is a concern, of course, as well as rodents munching on cables. Digging trenches to bury cables is no easy task and field work hazards include large stinging flies and ticks. On the upside, most of the radar sites are located on nice beaches so a work trip is still a trip to the beach! If anyone in the area would like to visit a radar site, please contact Dr. Larry Atkinson or Teresa Updyke for an introduction to these antennas and this exciting technology.

For more information, check out these websites:

- <http://www.ccpo.edu/currentmapping>
- <http://www.maracoos.org>
- <http://cordc.ucsd.edu/projects/mapping>
- <http://www.ioos.noaa.gov/hfradar/welcome.html>
- <http://tidesandcurrents.noaa.gov/hfradar>

Rough Seas

Stefanie Mack blogs about research cruise

In August, CCPO graduate student Stefanie Mack participated in a research cruise to the mid-Atlantic. The project, the Deposition of Atmospheric Nitrogen to Coastal Ecosystems, or DANCE, is a joint venture with scientists from ODU, VIMS, and Penn State. The overall object is to determine what role nitrogen from the atmosphere plays in stimulating primary production in the open ocean.

This transfer of nitrogen from the atmosphere to the ocean occurs mainly during rain events. The purpose of the research cruise was to sample the rain events as they occurred over the ocean, and sample the ocean itself before and after the rain.

During the cruise Stefanie participated by taking daily measurements of Photosynthetically Active Radiation, or PAR, which is the portion of sunlight that phytoplankton can use. These measurements will be used to help develop a model of the study area and conditions. Stefanie also assisted with drifter deployment and spent much of her time documenting the experience for her personal blog. A major part of every research project like DANCE is the impact the project has on people other than the scientists, from training graduate students to expressing science to the general public. By documenting her cruise experience and explaining what scientists do while at sea, Stefanie is assisting in the effort to reach the public.

Retrieving a drifter in high seas after a rain storm



Photo Credit: Stefanie Mack



Research Experiences
for Undergraduates Program

REU SPOTLIGHT:

Matthew Bessasparis

Matthew Bessasparis came to us from Millersville University as a rising senior. Matthew is a meteorology major, and has skills

in programming, making him a perfect match for Dr. John Klink as his mentor. With Dr. Klink's guidance, Matthew embarked on a project evaluating the atmospheric variability along the Antarctic coast. Specifically, Matthew evaluated data from 2005 from 15 automated weather stations on the West Antarctic Peninsula, the

Amundsen Sea, and the Ross Sea. While no long-term trends were found, there was seasonal variability such that the frequency and intensity of storms in this region were found to be highest in winter. This research project was influential in our understanding of the effect of climate change on physical processes in the Antarctic.

A Summer of Research

OEAS & CCPO Participate in NSF-funded
Research Experiences for Undergraduates
Katherine C. Filippino

As part of the National Science Foundation's (NSF) Research Experience for Undergraduates (REU) Program, nine students were selected to conduct research within the Department of Ocean, Earth, and Atmospheric Sciences at Old Dominion University. The theme for their research was centered on climate change and sea level rise. All students were paired with a mentor, a professor within the department, to conduct a research project over their 10-week stay. Three students conducted research at the Center for Coastal and Physical Oceanography (CCPO), in which modeling was the main focus of their projects.

Through enrichment activities, workshops, seminars, and volunteer events, these students learned about scientific communication, professional development, graduate school and employment opportunities in the ocean sciences

field. The students benefited from ODU's commitment to climate change research, outreach and education. These three students also contributed significantly to the on-going work being conducted at CCPO. Their work would not have been possible without the support of the faculty. Special thanks to Stefanie Mack, CCPO graduate student, for her assistance with the REU students.



Dr. Richard Whittecar, Associate Professor of Oceanography, led a geology field trip through Hampton Roads.



2014 ODU REU Students: Front row (left to right): Carrie Pfleiger, Leanne Brittain, Kaitlynn Carroll, Kathryn Keller-Miller, Chanton Phan; Back row (left to right): Logan Ellis, Max Vido, Austin Vacek, Matt Bessasparis



Research Experiences
for Undergraduates Program
REU SPOTLIGHT:
Austin Vacek

Rounding out our Pennsylvania natives, Austin Vacek came to us also from Millersville University as a rising senior with a major in meteorology and a passion for storm chasing. Austin's mentor was Dr.

Eileen Hofmann, and his research was entitled "Evaluating surface heat fluxes in the Antarctica Ross Sea." Working with atmospheric and oceanographic data collected during a 2012 research cruise, Austin constructed surface heat budgets for three regions of the Ross Sea. Key findings of his work suggest that predicted projections of ice-free condi-

tions in the Ross Sea coupled with changes in atmospheric storm frequency could have the potential to alter the overall surface heat budget in the Ross Sea. Austin will be presenting a poster of his finding at a meteorological meeting this fall.



Austin Vacek exercised his fossil finding skills.



Carrie Pfleiger, REU student, was mentored by Dr. Rodger Harvey, OEAS department chair. Carrie presented on "Polycyclic aromatic hydrocarbons and aliphatic hydrocarbons in Lafayette River sediment."



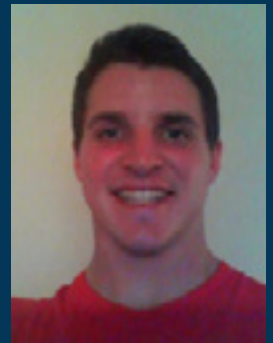
Chanton Phan, REU student, was mentored by Dr. Fred Dobbs, professor of oceanography. Chanton presented on "Antibiotic resistance of Vibrio vulnificus."

Find out what other ODU REU students researched this summer!

Go to: www.ccpo.odu.edu/REU/2014/

Research Experiences for Undergraduates Program
REU SPOTLIGHT:

Max Vido



Max Vido conducted research with Dr. Hans-Peter Plag as his mentor, on a project entitled "Dissecting the sea level rise signal in the Hampton Roads and Chesapeake Bay area." Max also came to us from Pennsylvania as a rising junior at Penn State University. Max is majoring in meteorology with an option in weather risk management.

The research that Max conducted will be very valuable to the Hampton Roads region, as it incorporated the seasonal variability in local sea level rise that is showing an increasing trend that is greater than the global average. His findings pointed to the importance of wind in the seasonal sea level cycle, and this information can be very important for helping to improve our predictive capabilities of future rise.

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Davis, L.B., **E.E. Hofmann**, A. Piñones, and **J.M. Klinck**, "Climatological distributions of *Euphausia superba* and *E. crystallorophias* in the Ross Sea", Ocean Sciences Meeting, Honolulu, Hawaii, February 2014.

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Hofmann, E.E., D. Bushek, S. Ford, X. Guo, D. Munroe, T. Ben-Horin, E. Powell, D. Haidvogel, J. Levin, and **J. Klinck**, "Development of a Theoretical Basis for Modeling Disease Processes in Marine Invertebrates", Ocean Sciences Meeting, Honolulu, Hawaii, February 2014.

Hofmann, E.E., D. Bushek, S. Ford, X. Guo, D. Munroe, T. Ben-Horin, E. Powell, D. Haidvogel, J. Levin, and **J. Klinck**, "Development of a Theoretical Basis for Modeling Disease Processes in Marine Invertebrates", National Shellfisheries Association Annual Meeting, Jacksonville, Florida, April 2014.

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Just the Facts

Continued...

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Salmon, E., **M. Dinniman** and **E. Hofmann**, "NPZD-Iron lower trophic level model of the Ross Sea: Processes controlling the seasonal cycle of biological production", Advances in Marine Ecosystem Research IV Symposium, Plymouth, UK, July, 2014.

The Mitigation & Adaptation Research Institute and the Center for Coastal Physical Oceanography presents

8 September

Hans-Peter Plag

Mitigation & Adaptation Research Institute
ODU

15 September

Caroline Massey

MACRI, NASA GSFC Wallops Flight Facility

22 September

Sarah Cooley

Ocean Conservancy
Washington, DC

29 September

Christopher Hein

Virginia Institute of Marine Science

6 October

Blair Greenan

Bedford Institute of Oceanography
Canada

20 October

Jennifer Irish

Virginia Tech

27 October

Richard Luettich

Institute of Marine Sciences
University of North Carolina

3 November

Gorka Bidegain

University of Southern Mississippi

17 November

Richard Miller

East Carolina University

24 November

Ariel Pinto

Engineering Management &
Systems Engineering
ODU

MARI joins CCPO in seminar series!

Hans-Peter Plag, professor of oceanography and MARI director, and Eileen Hofmann, professor of oceanography and newly elected Fellow of the American Geophysical Union, will host the series.

New Location!

Seminars are now held at the
Innovation Research Park II - Conference Center
4211 Monarch Way, Norfolk, VA 23508

Reception begins at 3 PM

Seminar begins at 3:30 PM

Check us out online!

http://www.mari.odu.edu/academics/2014_ccpo_mari_



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★★★
22
years

EDUCATION: Training the next generation of ocean scientists

RESEARCH: Investigating ocean processes with observations and models

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