Center for Ocean-Atmospheric Prediction Studies

Newsletter
Summer 2010

About COAPS

The Florida State University Center for Ocean-Atmospheric Prediction Studies performs interdisciplinary research in ocean-atmosphere-land-ice interaction to increase our understanding of the physical, social, and economic consequences of climate variability.

COAPS is located in Tallahassee's Innovation Park and has a staff of approximately 50, including teaching faculty, research scientists, and students from the fields of meteorology, physical oceanography, statistics, and the computer and information sciences.

COAPS is a NOAA Applied Research Center and is home to the Florida Climate Center (Office of the State Climatologist) and the Research Vessel Data Center. Sponsors include NASA, NOAA, NRL, NSF, ONR, the State of Florida, USDA, and the U.S. DOE.

Scenes from the Deepwater Horizon oil spill. Image credits (clockwise from top left): Transocean; USCG; USCG; and NASA.

COAPS Aids in Oil Spill Response

The April 20th explosion and subsequent sinking of the Deepwater Horizon oil drilling platform has led to the leakage of an estimated 12,000 to 100,000 barrels of oil a day into the Gulf of Mexico. The Gulf is a primary research area for COAPS oceanographers and meteorologists, and COAPS is responding to this crisis on a variety of fronts to better understand and prepare for the lasting effects the spill will have on our region's ecosystems and economy.

Shortly after the spill, COAPS helped initiate the **Oil Spill Academic Task Force (OSATF)**, a consortium of scientists and scholars from 15 Florida universities working in collaboration with the Florida Department of Environmental Protection. OSATF brings together expertise and resources to help the state of Florida and the Gulf region respond to the spill. The OSATF website (http://oilspill.fsu.edu) includes an "Expert Finder" database for identifying and contacting scientists and scholars in particular research areas.

COAPS is also helping to develop the **Deepwater Horizon Oil Spill: Research at Florida State** website (http://deepwaterhorizon.fsu.edu) for detailed information about relevant research being conducted at FSU. Focus areas extend from marine ecology, fisheries, ocean modeling, winds, remote sensing and meteorology to economics, tourism, risk assessment and remediation.

The Research at Florida State website includes two 7-day forecast animations for the oil spill region by COAPS oceanographers Steve Morey and Dmitry Dukhovskoy. The **Gulf of Mexico surface currents forecast** uses the HYbrid Coordinate Ocean Model (HYCOM), a complex tool being developed by a large consortium of institutions, including COAPS, the Naval Research Laboratory and NOAA. The **oil spill trajectory forecast** uses both HYCOM surface current projections and wind drift projections from NOAA's Global Forecast System (GFS). These forecasts are updated weekly at http://deepwaterhorizon.fsu.edu/projections.php.

To assess the potential **impacts of the oil spill on the Gulf Coast during the tropical season**, scientists at COAPS are working on a proposal to the Florida Catastrophic Storm Risk Management Center. The scientists plan to examine how surface oil may be transported onto the coast during storm surge, whether hurricane activity could cause subsurface oil to rise and threaten coastal areas, and how surface oil may impact the exchange of heat energy between the atmosphere and ocean during a hurricane.

COAPS and FSU will also participate in the **Gulf of Mexico Research Initiative** recently announced by British Petroleum for universities and institutions throughout the Gulf Coast region.

To learn how you can help respond to the spill, please visit Volunteer Florida's emergency support website: http://www.volunteerfloridadisaster.org.

M. Field

Congressman Boyd Visits COAPS

Boyd (left) and COAPS professor James O'Brien.

U.S. Congressman Allen Boyd (D-FL) visited COAPS in May to announce a $2.5 million grant from the U.S. Department of Agriculture for the Southeast Climate Consortium (SECC).

The SECC is a team of over 60 interdisciplinary scientists from 8 southeastern universities, including FSU, who are working together to improve climate forecasting and risk management for agricultural and other natural resource sectors in the Southeast U.S.

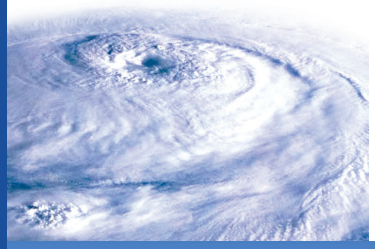
"Agriculture is one of Florida's largest industries, and for more than a decade the Southeastern Climate Consortium has helped strengthen the contributions the agriculture sector makes to our local and national economies," Boyd said. "I commend FSU for their leadership in the Consortium and for the invaluable research they have provided farmers throughout the Southeast region."

2010 Atlantic Hurricane Season Forecast

Scientists at COAPS have just released their second annual Atlantic hurricane season forecast. This year's forecast calls for a mean of 17 named storms, 10 hurricanes, and an accumulated cyclone energy (ACE; a measure of the strength and duration of storms) of 156. These numbers are above the 1995-2009 average of 13.8 named storms and 7.9 hurricanes, and are related to anomalously warm tropical North Atlantic sea surface temperatures, the possible emergence of La Niña conditions and the ongoing positive phase of the Atlantic Multidecadal Oscillation.

According to NOAA, the recent oil spill in the Gulf of Mexico is expected to have little to no impact on this season's hurricanes because the extent of the oil spill is relatively small compared to the extent of a typical hurricane. However, a hurricane in the Gulf could affect where the oil spreads, as well as how fast the oil breaks up. Because a hurricane's winds rotate counter-clockwise, NOAA states that a hurricane passing to the west of the oil spill could push the oil toward the coast, while a hurricane passing to the east could push the oil away from the coast.[1]

Table 1 shows the 2010 COAPS forecast in comparison to other major forecasts, and Table 2 shows the 2009 forecasts as well as the actual number of observed storms. As shown in Table 2, the 2009 COAPS forecast proved quite successful. The 2009 season was below average due to strong El Niño conditions in the tropical east Pacific and relatively cool tropical Atlantic Ocean temperatures.



COAPS scientists use a numerical computer model with global sea surface temperature forecasts from NOAA to develop their forecasts. This forecast differs from more traditional statistical models in that it uses the equations of motion and physics to objectively determine tropical activity. Hopefully, with continued success, these forecasts will lead to a better understanding of climate predictability, and improved hurricane preparedness.

For more information about the COAPS hurricane forecast, contact Associate Research Scientist Tim LaRow (tlarow@fsu.edu).

[1]Source: http://www.nhc.noaa.gov/pdf/hurricanes_oil_factsheet.pdf.

M. Field and T. LaRow

Table 1: 2010 Atlantic hurricane season forecasts.

Organization	Method	Issue Date	Named Storms	Hurricanes	Accumulated Cyclone Energy
Colorado State University	Statistical	4/7/10	15	8	150
FSU/COAPS	**Dynamical**	**6/1/10**	**17**	**10**	**156**
NOAA	Hybrid	5/27/10	14-23	8-14	155%-270% of median
Tropical Storm Risk	Statistical	5/25/10	16	8	Not available

Table 2: 2009 Atlantic hurricane season forecasts and actual observations.

Organization	Method	Issue Date	Named Storms	Hurricanes	Accumulated Cyclone Energy
Colorado State University	Statistical	6/2/09	11	5	85
FSU/COAPS	**Dynamical**	**6/2/09**	**8**	**4**	**65**
NOAA	Hybrid	5/21/09	9-14	4-7	65%-130% of median
Tropical Storm Risk	Statistical	6/4/09	10.9	5.2	69
UK Met Office	Dynamical	6/18/09	6 (70% chance of 3-9)		60 (70% chance of 40-80)
Observed			***9***	***3***	***52***

Student Spotlight: *Josh Cossuth* (M.S. Student, Meteorology)

This fall, I will start graduate school at FSU with Dr. Robert Hart, focusing on hurricane intensity prediction. My research interests include tropical cyclones, forecasting and operations, and climatic oscillations. I just finished undergraduate studies in meteorology and philosophy.

In spring of 2008, Shawn Smith hired me as a sophomore to work on the FSU Winds project in the COAPS data center. I provided quality control for Pacific Ocean scalar and vector data, helping to complete the high-resolution products from 1978-1990. My work at COAPS allowed me my first opportunity to gain experience in a research environment.

Through a NOAA Hollings Scholarship, I received an internship at the Central Pacific Hurricane Center in the summer of 2009. Under the direction of Rick Knabb, I calculated probabilities of tropical cyclone development from intensity estimates by the Dvorak technique. I continued this work at COAPS for my honors thesis and recently presented it at the AMS tropical conference. These probabilities will be available in real time at http://moe.met.fsu.edu/genesis/.

I am fortunate to receive an internship at the Naval Research Laboratory in Monterey this summer. Under Jeff Hawkins and Peter Black, I will analyze surface wind fields of tropical cyclones.

Alumnus Spotlight: *Michelle (Hite) Gierach* (M.S. Meteorology, 2006)

I am a postdoctoral associate at the University of Miami's Rosenstiel School of Marine and Atmospheric Science (RSMAS) in the Applied Marine Physics Division/ Center for Southeastern Tropical Advanced Remote Sensing (CSTARS) under Dr. Hans Graber. My past and present research focuses on utilization of satellite data and model simulations to study air-sea interactions, ocean dynamics, and atmospheric processes.

I originally started my graduate career in the meteorology field, developing a vorticity-based technique to detect tropical cyclogenesis using QuikSCAT and GOES under Drs. James O'Brien and Mark Bourassa.

It was while conducting such research that I became increasingly interested in how tropical cyclones impact the ocean, and thus turned to the field of oceanography for a Ph.D. at the University of South Carolina under Dr. Subrahmanyam Bulusu. My dissertation research involved understanding the biophysical responses of the upper ocean to hurricanes in the Gulf of Mexico using satellite observations, model simulations, and in situ measurements.

My current research at RSMAS allows me to combine my meteorology and oceanography backgrounds, in which I characterize SAR-derived gap winds in the Philippine Archipelago and assess the response of the ocean to enhanced wind forcing.

In my free time, I am taking advantage of Miami's climate and outdoor activities. I ran my first half-marathon, with ambitions of competing in a mini-triathlon and full marathon. Though at UM, I always stay true to my alma mater. GO NOLES!

Awards & Honors

Josh Cossuth (M.S. Student, Meteorology)
- Bess H. Ward Honors Thesis Award (FSU)
- Graduate Fellowship (AMS)
- Outstanding Senior Scholar Award (FSU)
- Presidential University Fellowship (FSU)

Daniel Gilford (B.S. Student, Meteorology)
- Ernest F. Hollings Scholarship (NOAA)

Austin Todd (Ph.D. Student, Oceanography)
- Guy Harvey Excellence Award in Marine Science (Florida Sea Grant)

Henry Winterbottom (Ph.D. Student, Meteorology)
- Best Research Paper (FSU High Performance Computing)

Pirates of the Indian Ocean Affecting Climate Research

Recent increases in pirate attacks in the northwestern Indian Ocean have led to unexpected consequences for climate research.

Several hundred merchant vessels pass through this region each month, many of which collect valuable weather-related data including wind speed and direction, sea surface temperature, and salinity. To avoid pirate attacks, vessels have been advised to adjust their routes eastward and stay at least 600 nautical miles off the coast of Somalia, which has led to a hole of approximately 2.5 million km2 in the marine weather observing network.

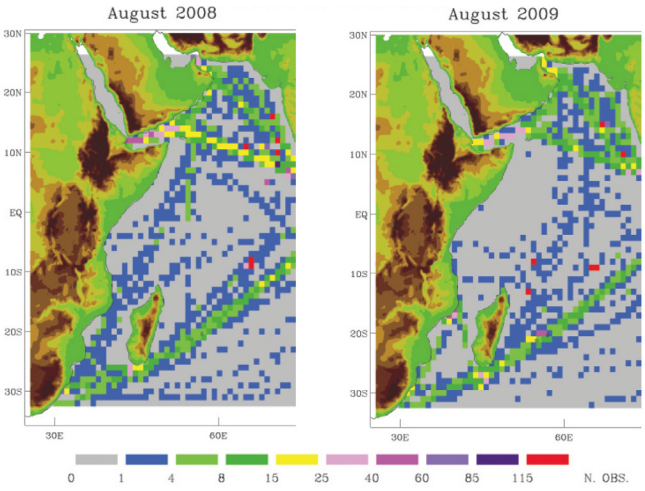
Scientists at COAPS use wind data collected from merchant vessels to create monthly wind analyses, which are in turn used by climate researchers to study long-term climate variability. This void in observations adversely affects these and other wind products by creating an artificial change in the characteristics of this portion of the wind fields.

The data loss in the northwestern Indian Ocean will particularly impact studies of the Somali Low Level Jet, a belt of strong southwesterly winds that is a main driver of the Indian Summer Monsoon. Long-term analyses of the Somali Low Level Jet are now showing man-made anomalies.

While wind data may also be retrieved from satellites, the most accurate research methods involve cross-referencing both satellite records and surface-level data collected from vessels. Until the pirate attacks decrease and ship routes return to normal, scientists needing only wind data for the past decade can turn to satellite derived wind products (also developed at COAPS). Satellite products, however, also show artificial changes from when the QuikSCAT satellite ceased to measure winds in 2009; other satellites have not yet been adequately intercalibrated for climate applications. Researchers needing multi-decade records gathered from a single type of observing system must adapt to the spurious climate changes caused by piracy. Quantifying the impacts of the data void may be possible through simulations using years when piracy was not adversely affecting the Indian Ocean.

For more information, contact Research Associate Shawn Smith (ssmith@coaps.fsu.edu).

M. Field, S. Smith, M. Bourassa and M. Long



A comparison of the number and location of merchant vessel wind observations in the northwestern Indian Ocean during August 2008 and August 2009.

Family Activity: Make a Storm Surge Model!

Make a model coastline and decide where houses are placed along it. Then test your model to see where your coastline would flood during a storm.

Equipment:
• Pie plate • Playdough • Sugar cubes • 1 cup water tinted with blue food coloring • Hair dryer

Instructions:
Using playdough, create a coastline against one side of the plate. Then place sugar cube houses along the coast. Fill the plate with blue water to represent the ocean. Test your model by aiming the hair dryer so that wind blows across the ocean towards the land.

Did you see water pile up along the coast? Were any of your sugar cube houses flooded? Change the shape of the coastline to see how it affects storm surge. Change the location of the houses to see if there is anywhere where they will not flood.

What's Happening:
In this model, the blowing hair dryer is like the winds of a hurricane. Hurricane winds push water into a mound at the storm's center. As the hurricane gets closer to the coast, the mound of water is unable to escape anywhere but onto land. A hurricane will cause more storm surge in areas where the ocean floor and coastal areas slope gradually.

Source: University Corporation for Atmospheric Research

The Florida State University Center for Ocean-Atmospheric Prediction Studies
2035 E. Paul Dirac Dr., 200 R.M. Johnson Bldg., Tallahassee, FL 32306-2840
Phone: 850.644.4581 Fax: 850.644.4841 www.coaps.fsu.edu contact@coaps.fsu.edu
Newsletter Editor: Meredith Field, mfield@coaps.fsu.edu