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Across the **Spectrum** COLLEGE OF ARTS AND SCIENCES

A closer look at climate

*Hurricanes, oil spills
among topics for
research at FSU's Center
for Ocean-Atmospheric
Prediction Studies*

Hurricanes, climate change get a closer look at FSU's Center for Ocean-Atmospheric Prediction Studies

By Rosanne Dunkelberger





Ray Stanyard

Eric Chassignet is a professor of oceanography at FSU and director of COAPS.

T

he Earth's climate is determined by the extremely complex interplay of land masses, waters and the atmosphere. Everything matters: water temperature, clouds, mountains, swamps, waves, wind and so much more.

So it only makes sense that when trying to predict where our climate is headed long term — or whether it will rain on your wedding day — the chances of finding answers are much better when scientists who study all of those things work together.

That's the premise of FSU's Center for Ocean-Atmospheric Prediction Studies — COAPS for short — which describes itself as a research center that "performs interdisciplinary research in ocean-atmosphere-land-ice interactions to increase our understanding of the physical, social and economic consequences of climate variability."

"I think it's a good description of what we're trying to do. I think we're successful at doing it," said COAPS director Eric Chassignet. "We have a leadership role in interdisciplinary ocean-atmospheric research and are working hard to educate the next generation of earth-systems scientists. And to increase our collaboration with universities, government agencies and members of the private sector."

COAPS was created by the Florida Board of Governors, and the vast majority of its nearly \$11.6 million in funding is research grants from more than two dozen sponsors, centers and consortia with an alphabet soup of acronyms. The center, located about a mile southwest of FSU's main campus in Innovation Park, has more than 50 people working there, including eight teaching faculty, 20 research scientists and postdoctoral researchers, 16 graduate students, six undergraduate students, and support staff. Also under COAPS' roof is the Florida Climate Center, home to State Climatologist David Zierden.

Part of FSU's College of Arts and Sciences, COAPS is closely aligned with the college's Department of Earth, Ocean and Atmospheric Science (EOAS), and much of the work relates to its fields of study, such as meteorology, aquatic

environmental science and oceanography. But COAPS draws in expertise from other disciplines as well, including computer science, biology, chemistry and engineering.

"In a classic academic setting, you will see teaching faculty working within their own lab and not interacting much with other faculty members," said Chassignet, himself a professor of oceanography. "Here at COAPS, it's to everybody's advantage to work across disciplines toward common goals, so there's a lot of exchanges of ideas and expertise, and a number of multidisciplinary projects."

Much of the work done at COAPS is computer-driven, sorting through vast amounts of data — much of it provided by satellites — to develop models analyzing the



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Danielle Groenen is a COAPS research assistant working toward her doctorate in meteorology.

interplay between earth, sea and air over time to predict climate patterns in the future. Once computer models are developed, they can then be tested with field observations.

And for the record, climate change is real.

"There's no question," Chassignet said. "The scientific evidence is there."

"There's so much data from so many different sources," added COAPS associate director Mark Bourassa, a professor of meteorology who came to FSU two weeks before the center was formed. "It's totally overwhelming that (the climate is) changing."

Why it is changing is a little trickier question but, Bourassa said, "it's very clear that many aspects of the climate are being affected by humans" in ways that go beyond just adding carbon dioxide to the atmosphere. As an example: "We used to have a lot more swampland here in Florida, and that acted as a thermal insulator. Swampland can retain so much energy that when a cold front comes over, it can dampen the front's effects. We are much more affected by cold weather than we used to be."

One well-funded avenue of research relates to the Deepwater Horizon oil spill, which dumped approximately 5 million barrels of oil and gas into the Gulf of Mexico in 2010.

"It was a horrible accident, but a well-observed horrible accident," said Bourassa, giving researchers a chance to test theories and learn in real time of oil's effect on the water and biology. "All of a sudden we're learning how things are coupled in ways we hadn't expected . . . It's really exciting to see how all these things come together. And a lot of the funding is going toward understanding what to do if there's a spill in the future."

One of COAPS' graduate students is Danielle Groenen, a research assistant working toward her doctorate in meteorology.

"My project is on Central American rainfall, trying to understand the past patterns of rainfall and link it to the crops that are important in that area, like coffee and bananas and rice and corn," she explained. "I want to try and understand the past history of the rainfall so

that we can predict the rainfall patterns in the future, especially with climate change."

Unfortunately, her work hasn't taken her to the cloud forests of Costa Rica.

"I wish," Groenen said with a rueful smile. "I do a lot of programming, a lot of taking data and writing the code to analyze it."

Groenen had never heard of COAPS before she visited the FSU campus when first considering her Ph.D.

"I've had a lot of support, and I've had a lot of opportunities through COAPS," she said, including two summer internships at NASA's Jet Propulsion Laboratory. Her research is dependent on data from NASA satellites, and her work is funded by a NASA Earth and Space Science Fellowship.

When the 32-year-old Groenen, who looked up to female astronauts as a teenager, earns her degree, she said she wants to get out from behind the computer and move into a position that involves "a perfect balance of people and science." Formerly a high school physics teacher, Groenen said she'd like to reach out to government leaders, but also to young girls.

"I am very vocal about the need for more role models," she said. "I think it's really important to get out in the community and show kids you can be anything you want. Science doesn't have to fit that stereotypical mold of the lab coat and glasses and being a man."

While most of the scientists have or are working on advanced degrees at COAPS, a small cohort of undergraduate students are also there working on their honors projects.

"It's really great to work with them," Bourassa said of the students, most in their senior year. "They're doing real, original work that's meaningful." Students who go through the process of doing research, writing it up, and being able to communicate are "generally" able to get into the field of graduate study they choose, he says.

A goal of COAPS is to spread the word about climate science, and they do so via an annual open house held in February in conjunction with the National High Magnetic Field Laboratory,



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Mark Bourassa is a professor of meteorology at FSU and associate director of COAPS.

visits to politicians and other decision-makers, and presentations to middle- and high-school students in the Tallahassee community.

"We've collaborated with people trying to develop better teaching tools for students," Bourassa said. "We've been teaching the teachers how to teach better science — they know how to communicate better than we do, for the most part."

One tool reaching out to the wider community is the recently published book, "Florida's Climate." Chassignet was one of the editors for the 800-page volume, a collaborative effort of climate scientists from all of Florida's universities. He says it is not totally a technical work.

"It's for informed people who want to know some of the details, so it's not purely geared toward scientists," Chassignet said. "It's for decision-makers — those who just want to know some of the detail behind Florida's climate."

And regarding that wedding-day forecast?

"One of the (questions) that keeps getting asked is, 'Can you forecast if it will rain on my wedding day, or the day of such-and-such event a year in the future?' No," said Bourassa. "But what we can do is give the odds based on the broader conditions that we expect." ☀