



AOS & CICS Newsletter

Spring/Summer 2011

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Lloyd selected as Congressional Science Fellow

Former Graduate Student Ian Lloyd was selected as a Congressional Science Fellow for the 2011-2012 term. The fellowship begins in September and will allow Lloyd free reign to work with committees, or in member's offices, in either the House or Senate on science policy issues.



Former AOS Graduate Student Ian Lloyd

Following a 2-week intensive course on politics and legislative process with other Congressional Science Fellows, Lloyd will be interviewed by congressional offices before being offered a position. Among the varied duties of Fellows, are helping to craft legislation, advising members of Congress on votes, meeting with lobbyists and constituents, organizing hearings, drafting speeches and statements, and assisting during congressional hearings or debates on the floor of the House or Senate. He will join 30 other Fellows in contributing scientific expertise to the policy-making process.

“Ian will make a wonderful ambassador between the two worlds of science and policy,” AOS Director Jorge Sarmiento said. “His experience in geoengineering policy will prove to be a great asset in Washington.”

Lloyd recently earned his Ph.D., researching the effect of climate change on hurricanes. He was selected as a Fellow in March by a panel of AGU members who have served as past Congressional Science Fellows after a competitive review process. His term will mark the 34th year that AGU has sponsored a Fellow and the second year that AGU has sponsored two Fellows concurrently. Lloyd was selected along with Rebecca French who earned her Ph.D. in geosciences at Virginia Polytechnic Institute and State University. ■

AOS Program Sets Applications Record

The AOS Program has once again set a record for graduate students applying for admission, with 62 students having vied for a spot for the fall of 2011. This number of applicants represents a 15 percent increase over last year’s record of 54 and a 51% increase over the previous year’s total. International applicants made up nearly 63% of the applicant pool. This upward trend can be seen across the University marking the first time in the Graduate School’s history that international applicants exceeded U.S. applicants.

According to AOS Director Jorge Sarmiento, “The number of high-caliber students who apply to AOS has continued

Program in Atmospheric and Oceanic Sciences (AOS) & The Cooperative Institute for Climate Science (CICS)

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to grow; this bodes well for the outreach efforts we have implemented over the past few years. There is no doubt that the Program is being recognized throughout the world.”

TigerTransit/Shuttle Services
Operating on Summer Schedule
<http://www.princeton.edu/transportation/ForrestalSummer11.pdf>

This recognition has resulted in seven students accepting offers of admission to the Program. This number of acceptances has not been matched since 1979. “We are very excited about the seven students who accepted; they are an exceptional, diverse group who will undoubtedly make their mark on the Program,” Sarmiento added.

Out of the seven students who accepted offers of admission, three are women; two are international students. ■

CICS Cohosts Land Use Workshop

Contributed by Maria Setzer, GFDL Communications Director

In collaboration with GFDL and the Princeton Environmental Institute (PEI), CICS cohosted a workshop May 17-18, 2011, focused on land use changes -- past and future. Experts from all the major climate modeling and observational groups, worldwide, participated in the workshop.



Steering Committee Members L to R: Stephen Stich (Univ. of Exeter), Joanna House (Univ. of Bristol), Corinne Le Quéré (Univ. of East Anglia), & CICS Scientist Elena Shevliakova

The dynamical models used for making future projections of climate changes over this century and beyond have become progressively more sophisticated over the years. In response to the need to understand future changes in the carbon cycle, climate models have begun to incorporate components to simulate the carbon changes due to direct human activities (e.g., land use changes) and those that result from climate changes.

The goal of the workshop was to organize the land use analysis activity (model and

observations) in support of the next IPCC assessment, due to be released in 2013. The analysis activity has three components. One is to compare the model results to observations over the historical period. This activity will lead to an understanding of what the models can, and cannot, simulate and what new observations are needed to help in this evaluation.

A second component involves the comparison of the models to each other, to understand why they are producing different results. This activity will help quantify the uncertainty associated with the projection of future changes. The third component is the comparison of these model results to simpler models used to make the future emission projections. Errors in the simple models can lead to very important implications for establishing any future emission targets or goals, for example, limiting the future warming below some threshold.

The lead organizer for this workshop was CICS Scientist Elena Shevliakova, a senior climate modeler in the Department of Ecology and Evolutionary Biology. ■

Fluid Dynamics & the Global Environment Student-Postdoc Symposium Held on Main Campus

The third Student-Postdoc Symposium on Fluid Dynamics & the Global Environment was held on Monday, May 23rd in the Bowen Hall Auditorium, with some 30 people in attendance. Organized by the School of Engineering and Applied Science, the AOS Program, and GFDL, the symposium brought together students and postdocs working on cutting-edge fluid dynamical research with a focus on environmental and geophysical applications. The one-day symposium included sessions on *Eddies and Transport (I & II)*, *Fluid Dynamics and the Challenge of Sustainable Energy*, and *SubGrid Scale Parameterizations and Other Modeling Challenges*.

Among the presenters were AOS Graduate Students Amanda O'Rourke and Ying Li and AOS Postdocs Yu (Sophie) Zhang, Maarten Buijsman, and Caroline Muller. O'Rourke kicked off the Eddies and Transport session with a presentation on the interaction of the subtropical and eddy-driven jets in idealized models. Fellow Graduate Student Ying Li opened the second session on Eddies and Transport with an examination of the mechanisms contributing to the tropospheric teleconnection between El Niño-Southern Oscillation (ENSO) and North Atlantic Oscillation (NAO) due to the role of high-frequency transient eddies. Postdoc Sophie Zhang closed the session by exploring the cross-shelf exchange driven by oceanic mesoscale eddies.

Maarten Buijsman, also a postdoc, opened the SubGrid Scale Parameterizations and Other Modeling Challenges session, moderated by AOS Lecturer and GFDL Oceanographer Sonya Legg, with a presentation on modeling dissipation and mixing in the Luzon Strait, located between Taiwan and the Philippines. Presenters from the Civil and Environmental Engineering (CEE) and Mechanical and Aerospace Engineering (MAE) departments included: Dan Li (CEE), Margit Vallikivi (MAE), Owen Williams (MAE), Jeffrey Aristoff (MAE), Juan P. Nogue (CEE), Hang Deng (CEE), and Jing Huang (CEE).

According to Legg, talks ranged from large-scale atmospheric jets, through the atmospheric surface boundary layer, to ocean eddies and waves, and down to flow through fractures in rock. “The most novel application of fluid mechanics to environmental issues was a talk describing the instability and sinking of a floating oil slick caused by the addition of particles of sand.”

“The SEAS-GFDL workshop was unique opportunity to gain exposure to the work being done in environmental fluid dynamics across the geosciences and engineering disciplines here at Princeton. Given that the study of environmental fluid dynamics spans such a variety of disciplines, workshops such as this one are very beneficial, especially at the graduate student/postdoc level,” O'Rourke added. ■

Students Attend AOS Days Conference

Graduate Students Kityan Choi, Joe Majkut, Amanda O'Rourke, Lauren Padilla (MAE), and He Wang took part in the third annual Atmosphere-Ocean Science Days from June 20-22. AOS Days is a multi-day conference for young Atmosphere-Ocean Scientists, hosted each year by a different institution in the Northeast. This year's conference was held at the Massachusetts Institute of Technology (MIT) on June 20-21 and at the Woods Hole Oceanographic Institute (WHOI) on June 22.

With the aim of fostering a community of future AOS faculty in the region, planting the seeds of future collaborations and professional relationships, and promoting the scientific and professional development of early-career scientists in an informal setting, the conference included talks by attendees as well as enrichment activities, including a welcome reception and a conference dinner with the keynote speaker, and an optional day trip on June 22 to WHOI to tour the facilities and the research vessel R/V Knorr.

"A good time was had by all at the AOS Days meeting this year. We saw some very exciting research, ranging from observational to theoretical, from students in other departments and took advantage of the opportunity to socialize with our peers," Majkut said.

Organized by and for graduate students and postdoctoral researchers in all areas of atmosphere-ocean dynamics, the conference welcomed participants from fluid dynamics, physics, geophysics, applied math, engineering and other related fields with a broad interest in atmosphere-ocean science. According to the conference organizers, the main intent of the conference is to build connections between early-career scientists in the Northeast.

The event was cosponsored by MIT and WHOI. ■

CMI Hosts 10th Annual Meeting

On April 12 and 13, 2011, the Carbon Mitigation Initiative (CMI) program members gathered on Main Campus for the CMI 10th Annual Meeting. Over 70 participants attended over the course of two days, including Princeton faculty and students. According to AOS Director and Lead Project PI for CMI's Science Group Jorge Sarmiento, "The event presents a forum for an exchange of perspectives on crucial questions surrounding the carbon and climate dilemma."

In addition to reflecting on the program's accomplishments, participants shared research findings in climate science, carbon capture and storage and policy. Panelists from academia, government and industry addressed the present and future prospects of Carbon Capture and Storage (CCS) policy and regulation. During two deep dive sessions convened at the meeting, environmental opportunities and challenges for unconventional fuels in North America were discussed.

"The CMI annual meeting was a great opportunity to network with people working in the field of carbon capture and storage, and to learn more about their current research," AOS Postdoctoral Research Fellow Thomas Frolicher said.

Formed in 2000, CMI is led by CMI Co-Directors Stephen Pacala and Robert Socolow with the aim of integrating scientific understanding with technological and policy expertise.

For additional information about CMI, please see their website at: <http://cmi.princeton.edu/>. ■

GFDLEA Sixth Annual 5K Race

On Monday, May 9th, racers from GFDL and AOS raised over \$800 for Mercy Corps and their Japan Tsunami Relief Effort during the GFDLEA Sixth Annual 5K Race. Since March 14th, Mercy Corps

and partner Peace Winds have delivered supplies and support to approximately 42,000 displaced survivors in several tsunami-devastated cities.

Winners of this handicapped event were female walker **Ashley Gross**, male walkers **Kirk Bryan** and **Zhi Liang**, female runner



AOS Senior Scientist and 1st Place Men's Walker Winner Kirk Bryan

Sonya Keel, and male runner **Gabe Vecchi**. Immediately following the event, racers and their families enjoyed the first GFDLEA spring cook-out of 2011. Thanks to sunny skies, the efforts of Race Organizer Rich Gudgel, and the generous contributions of many, the event was a tremendous success. ■

CICS Hot Item

Periodically, NOAA's cooperative institutes are asked to submit a newsworthy "Hot Item" relating to recent research or an exciting development in the field. The Hot Items page is used by OAR and NOAA senior management to learn about the research that is being funded and conducted by NOAA.

The most recent Hot Item from CICS discusses observational evidence for oceanic controls on hurricane intensity. It highlights the findings of a recent study by CICS Researcher Ian Lloyd and GFDL Researcher Gabriel Vecchi:

Observational Evidence for Oceanic Controls on Hurricane Intensity

In a recent study published in *Journal of Climate*, Ian D. Lloyd of the Cooperative Institute for Climate Science - Princeton (CICS-P) and Gabriel A. Vecchi of the Geophysical Fluid Dynamics Laboratory (GFDL) analyzed observational data to examine the influence of upper oceanic conditions on hurricane intensity. The study finds that hurricanes can only achieve high intensities if they develop in regions where oceanic temperatures in the upper 250 meters (~800 feet) are favorable (with deep mixed layer and thermocline). The study provides evidence that one must account for subsurface oceanic conditions – in addition to atmospheric conditions – in order to make accurate projections and predictions of hurricane intensity.

Background:

A long-term goal for the climate research community has been to improve our ability to predict the evolution of intense hurricanes. Traditionally, hurricane forecasts have focused on using atmospheric variables such as temperature, relative humidity, and vertical wind shear. However, modeling studies and in-situ observations have shown a prominent role for upper ocean thermal structure in limiting hurricane intensity. Ocean conditions affect hurricane intensity because vigorous ocean mixing caused by hurricanes brings cold water to the surface and can limit intensification through negative ocean feedback. The study shows that predictions of hurricane intensity can be improved by accounting for large-scale oceanic conditions.

Significance:

Hurricane intensity projections under climate variability and change will be improved by accounting for large-scale ocean conditions, in addition to atmospheric factors. Furthermore, to improve the representation of hurricanes in high-resolution global climate models it will be necessary to include coupled interactions between the ocean and atmosphere. This research supports NOAA Mission Goal #2: Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond.

Reference

Lloyd, I. D., and G. A. Vecchi (2011), Observational evidence for oceanic controls on hurricane intensity, *Journal of Climate*, 24(4), doi:10.1175/2010JCLI3763.1.

Past Hot Items can be found on the CICS website at:

<<http://www.princeton.edu/cics/news-events/hot-topics/>>. ■

AOS & CICS News

AOS Graduate Student **Ihissa Ocko** was honored with the Outstanding Student Poster Presentation Award at the 91st American Meteorological Society (AMS) Meeting.

June Yeung (CEE), who works with AOS Associated Faculty Member **Jim Smith**, was selected to receive an Outstanding Student Paper Award from the Hydrology section of AGU for her presentation at the 2010 AGU Fall Meeting in San Francisco.

Minghui Diao, a third-year Ph.D. student in AOS Associated Faculty Member **Mark Zondlo**'s group, was awarded an Outstanding Student Paper Award from the Atmospheric Sciences section of AGU at the 2010 Fall Meeting.

Former AOS Postdoctoral Research Associate **Rym Msadek** was invited to speak at the NASA Jet Propulsion Lab in April, as part of the NASA MPOWIR (Mentoring Physical Oceanography Women to Increase Retention) Speaker Series. The goal of the series is to familiarize junior women in the field of physical oceanography with the research conducted at NASA labs and to inform NASA scientists of the research conducted by junior scientists in the community.

Well-deserved congratulations to **Ian**

Lloyd who successfully defended his thesis, "Extreme Subseasonal Tropical Air-Sea Interactions and their Relation to Ocean Thermal Stratification" on Thursday, May 5th. Ian's advisors were Gabriel Lau and Gabriel Vecchi.



Congratulations to AOS Senior Research Specialist **Eda Chang** who received her



Ph.D. from National Taiwan Normal University on June 3rd. Eda's thesis consists of eight chapters from

seven publications, including 4 in the *Journal of Physical Oceanography* and 3 in *Ocean Dynamics* and one manuscript (*Journal of Climate*) that she wrote in the past two years while working with Leo Oey at AOS. Eda will continue her postdoctoral study with Leo.

AOS Graduate Student **Daniele Bianchi** recently accepted a postdoctoral position in the Earth System Evolution group of the Canadian Institute for Advanced Research (CIFAR).

Need to Print a Poster?

GFDL now has access to a large-format printer on site, giving them the ability to print posters locally. **CICS supported personnel** and **AOS personnel who collaborated with GFDL co-authors** may contact Thai Truong at GFDL for poster printing assistance.

Climate Science Blog

A few months ago, Isaac Held, a lecturer with rank of Professor in the AOS Program and senior research scientist at GFDL, started a blog on climate science.

If you haven't had a chance to check it out yet, it can be accessed at:

< <http://www.gfdl.noaa.gov/blog/isaac-held/>>.

Employee Solar Program

This employee program offers faculty and staff a meaningful way to take advantage of this renewable energy source. By installing a solar power system at your home, you can reduce carbon emissions, save money on your utility bills and meet a significant portion of your home electricity needs. For more information, visit the SunPower website.

Arrivals

On April 15th, **Pablo Zurita-Gotor**, a visiting faculty member from the Universidad Complutense de Madrid in Spain, arrived; he will be working with Geoff Vallis.

Chris Ober arrived in late April as the new Systems Administrator for the AOS Program.

Brendan Carter arrived on June 6th from Scripps Institution of Oceanography (SIO) to work in Jorge Sarmiento's group as a postdoctoral research associate.

Summer Undergraduates **Andrew Budnick**, **Devika Balachandran**, **Brian Huang** and **Jonathan Moch** arrived in early June to work in Jorge Sarmiento's group.

Alexis Berg arrived on June 7th; he'll be working with Kirsten Findell at GFDL as a visiting postdoctoral research associate.

Jessica Harper, a summer intern, arrived in early June to work alongside of Maria Setzer at GFDL on communications and outreach.

Sameer Ansari, a summer student, arrived in mid-June to work with V. Balaji on the ExArch project

Sarah Brody, a graduate student at Duke, arrived in June to work with John Dunne for the summer and **Caitlin Whalen**, a graduate student at Scripps, also recently arrived to work with Sonya Legg for the summer months. Sarah and Caitlin are both recipients of MPOWIR (Mentoring

Physical Oceanography Women to Increase Retention) internships. The competitive internship scheme, NOAA's contribution to MPOWIR, is designed to give female physical oceanography graduate students experience working in a NOAA lab to complement their graduate research.

Nina Ridder, a visiting graduate student at the University of New South Wales in Sydney, arrived in mid-June to work in Jorge Sarmiento's group for the summer.

Todd Mooring arrived at the end of June to work with John Wilson at GFDL for the summer months. He is one of seven graduate students who will join AOS in the fall.

Departures

Sandy Clark – April 2011
University of Pennsylvania

Maria Rugenstein - April 2011
Returned to ETH Zurich, after spending a year here as a visiting graduate student.

Junfeng Liu – May 2011
Faculty position at Peking University

Thomas Spengler – May 2011
Faculty position at the University of Bergen, Norway

Patrick Lynette – June 2011
Returned to Texas A&M, after spending a year here as a visiting fellow.

Antoine Venaille – June 2011
Physics Department of ENS-Lyon

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