



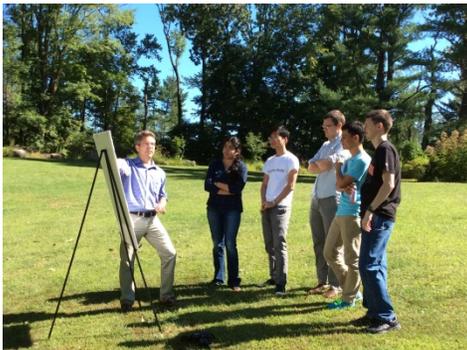
AOS & CICS Newsletter

Fall 2015

Volume 9, Number 3

AOS Retreat Marks Start of Academic Year

The AOS annual retreat marked the beginning of a new academic year with graduate students, postdocs, and faculty gathering under sunny skies for a day of scientific dialogue and social interaction at Mountain Lakes House in Princeton. A relatively recent tradition - the fourth annual retreat was held on Tuesday, September 15th, with one of the largest turn-outs in the event's history, following a morning welcome and introductory session for incoming graduate students at Guyot Hall.



AOS Director Stephan Fueglistaler flanked by AOS Graduate Students Jaya Khanna & Junyi Chai, AOS Postdoctoral Research Associates Nathaniel Chaney & Honghai Zhang and AOS Graduate Student Shawn Cheeks during retreat team-building activity

Designed to create community, the morning icebreaker session saw the return of familiar faces and the welcoming of new students to the program. A team-building activity was introduced this year to challenge teams to come up with the winning overarching scientific theme after putting together a string of key words

rewarded to them by faculty members who had posed questions to the teams following an informal discussion of their research. The activity offered not only a channel for establishing rapport with faculty while becoming familiar with their work, but also opportunities for creating new friendships within the AOS community.

Introduced at last year's retreat, Kubba, a lawn game nicknamed Viking Chess, was a popular lunchtime activity at the 2015 event, as was taking in nature and exploring the grounds of the 90 acre nature preserve. Pub style trivia focusing on various aspects of atmospheric and oceanic sciences was followed by an interactive science experiment with a weather balloon, a retreat highlight. The data obtained from the radiosonde includes measurements of upper air temperature, pressure, altitude, wind direction and speed during the balloon's ascent to the upper atmosphere. Despite the balloon landing ~3km offshore of Asbury Park, a local lifeguard returned the instrument package to the recovery team after finding it near the Sea Girt Lighthouse.



AOS Graduate Student Jeff Strong preparing the weather balloon with AOS Director Stephan Fueglistaler

“The weather balloon experiment at this year's AOS Retreat (the first of its kind in AOS history!) was the culmination of many years of suggestion and planning and I, as well as the rest of the planning

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

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TigerTransit/Shuttle Services
Operating on Fall Schedule:
<http://www.princeton.edu/transportation/troutes/ForrestalF2015.pdf>

committee, am absolutely ecstatic in its success,” Strong said. “In the day’s great conditions, we were able to lift an instrument package almost 21 miles into the atmosphere and collect over 2000 data points over the course of the balloon’s 3.5 hour journey down the shore! Given this year’s achievement, we hopefully will be seeing more of the AOS radiosonde in our program’s activities.”



AOS Graduate Student Rob Nazarian with the radiosonde in tow

The initial redundant data retrieval services allowed for an interactive display of the atmosphere above the retreat site on which attendees could place wagers. The later collection of the intact instrument package meant all the redundant data could be corroborated for continuity through the entire flight.

Following the balloon’s launch, the day’s festivities wrapped up with a friendly but competitive game of AOS-themed Apples to Apples, now a retreat tradition.

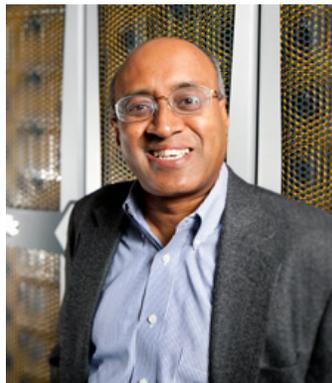
The retreat’s tremendous success is a credit to the hard work of organizational committee comprised of Graduate Students Rob Nazarian and Jeff Strong and Faculty Members Stephan Fueglistaler and Steve Garner, who served on the committee every year since the inaugural event in 2012.

“This year’s retreat was, in my opinion, the best retreat the planning committee has ever put together and was a resounding success,” said Strong. “Not only was the committee able to put together an engaging and fun schedule, but also each of the monumental number of attendees made this retreat the best in memory.” ■

GFDL Director Named Walter Orr Roberts Lecturer in Interdisciplinary Sciences

Contributed by Maria Setzer, GFDL Communications Director

The American Meteorological Society has announced its 2016 award recipients, and GFDL’s Director, V. “Ram” Ramaswamy has been named the Walter Orr Roberts Lecturer in Interdisciplinary Sciences. Ram is being recognized, “For pioneering scientific achievements that have synthesized atmospheric radiation, physics of greenhouse gases and aerosols, and state-of-the-art Earth system modeling.”



GFDL Director V. Ramaswamy

The lectureship is presented only occasionally and recipients are chosen for their significant contributions to the understanding of atmospheric processes through multidisciplinary research. The lectureship was created to foster exchanges and collaboration between atmospheric science and other disciplines.

Ram’s lecture will be presented at the AMS Annual Meeting, or an appropriate specialized conference. It will also be published in the *Bulletin of the American Meteorological Society*. ■

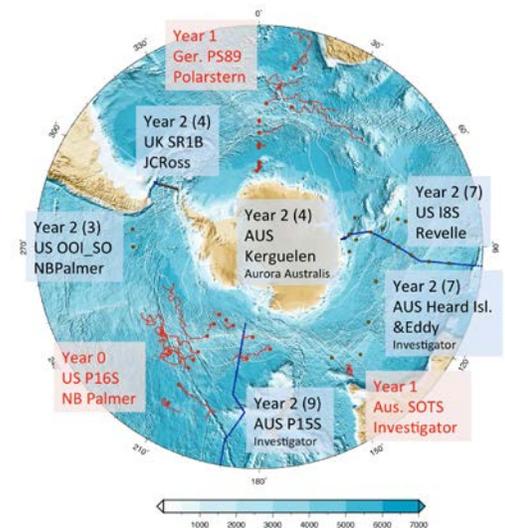
Upcoming Event:

*GFDL’s 60th Anniversary Symposium
Monday, November 2 –
Tuesday, November 3, 2015*

SOCCOM to Deploy Second Round of Biogeochemical Floats

Contributed by Roberta Hotinski, Project Manager, SOCCOM, Princeton Environmental Institute

Austral summer is approaching and the Southern Ocean Carbon and Climate Observations and Modeling (SOCCOM) project will soon be actively deploying its second round of autonomous biogeochemical (BGC) floats in the Southern Ocean. This season 34 floats will be launched in the Pacific, Atlantic, and Indian sectors of the Southern Ocean from seven different cruises (see map below), bringing to 57 the total number of active SOCCOM BGC floats measuring pH, oxygen, and nitrate in the region.



SOCCOM Year 2 planned cruises (number of floats in parentheses) and BGC float deployment locations (brown dots) planned thus far, with Year 1 cruises, floats, and trajectories in red. Blue dots are additional possible deployment locations.

To accomplish this year’s deployments, SOCCOM is partnering with organizations around the world to launch SOCCOM floats from planned research cruises, including:

- The U.S. National Science Foundation’s Ocean Observing Initiative (OOI)
- The U.K. Natural Environment Research Council (NERC)

- Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO)
- The Global Ocean Ship-based Hydrographic Investigations Program (GO-SHIP)

SOCOM will kick off the float deployment season with a Google Hangout in early December featuring scientists and engineers involved with our first OOI cruise out of Punta Arenas, Chile. Check the SOCOM website for upcoming details on the Hangout, along with information on SOCOM-relevant sessions at the Fall AGU meeting, and data and updates from all of our cruises (<http://socom.princeton.edu>).

Building Mentoring Relationships at the 2015 Pattullo Conference

CICS Associate Director Sonya Legg, an AOS faculty member, was the lead organizer for the 2015 Pattullo Conference from October 4-7, 2015. The conference is considered the centerpiece of the Mentoring Physical Oceanography Women to Increase Retention (MPOWIR) Program, for which Legg is the lead Principal Investigator (PI). MPOWIR provides mentoring to physical oceanographers from late graduate school through their early careers with the aim of reducing the barriers to career development for all junior scientists in the field, with a particular focus on improving the retention of junior women.



CICS Associate Director Sonya Legg

The three-day event offered both educational and professional enrichment, bringing junior women and senior

scientists from many institutions across the U.S. together to share experiences and career advice, and to voice concerns. AOS Faculty Member Bob Hallberg was one of the invited senior participants and Sulagna Ray, a postdoc working with Gabe Vecchi, and Haidi Chen, a postdoc working with Jorge Sarmiento, were among the junior participants. Other goals articulated by conference organizers and participants were: building community networks with peers and senior scientists; getting feedback on current research; and raising awareness of issues confronting junior women among the senior scientist community. The agenda allowed ample time for one-on-one interaction between the scientists as well as unstructured time for informal networking.



2015 Pattullo Conference Participants

As in past years, the intensive retreat format of the conference lent itself to the exchange of ideas between junior researchers, their peers, and senior scientists on how to make the next steps in their careers, as the junior women navigate the transitional postdoctoral years from Ph.D. students and postdocs to PIs. In addition to research, teaching, communications and science policy were among the topics explored. Recognizing the diversity of careers some of the junior participants are considering, organizers invited one senior scientist who teaches at a small liberal arts college, another who conducts both teaching and research on plastic waste in the ocean at the Sea Education Association, and another who conducts research at a small for-profit research company, as well as scientists in more "traditional" government and academic positions, according to Legg.

Strategies for funding, proposal writing, negotiations, and balancing work and family were addressed during professional development sessions and round-table discussions, in addition to research talks by junior scientists. "We had a very dynamic

negotiations speaker, who got us all discussing the double binds that women often find themselves in; when they're considered 'not nice' if they negotiate like a man, but ignored if they don't stick up for their own interests," Legg said. Another conference highlight, according to Legg, was the bold and fearless Q&A session organized by the junior participants. Senior participants were asked to share experiences on gender bias and sexual harassment, initiating a discussion about actions they can take to improve the climate for all women.

"I was really, really worried before the conference that we might be affected by Hurricane Joaquin," said Legg. "Fortunately, on this occasion the GFDL hurricane prediction turned out to be wrong! Thanks to all the GFDL hurricane experts who assured me that the forecast was too uncertain to even consider canceling the conference in advance – the weather turned out fabulous, perfect for strolling the grounds in intense conversation."

The conference, named for June Pattullo, the first woman to receive a Ph.D. in physical oceanography, was held at the Airlie Center in Warrenton, Virginia. Since Pattullo, the number of women obtaining Ph.D.'s in physical oceanography has dramatically increased; however, as in other science and engineering fields, the balance of female principal investigators does not reflect this increase. Legg and her MPOWIR colleagues are working to change that. To learn more, visit the MPOWIR website. ■

Supplementing AOS Coursework with 3rd Annual Student-Run Workshop

For the third consecutive year, the AOS Program hosted a student-run workshop generously funded by Isaac Held's 2012 BBVA Foundation Frontiers of Knowledge Award in Climate Change. This summer's workshop, held from August 5-7, 2015, focused on the challenges of modeling extreme climates, with approximately 30 students in attendance.

Co-organized by AOS Graduate Students Tsung-Lin Hsieh, Jaya Khanna, and Nick Lutsko, the workshop supplemented AOS coursework by exposing students to varying yet complementary perspectives on how to tackle a range of extreme climate scenarios. Over the course of three days, invited Speakers Natalie Burls (George Mason University), Matthew Huber (University of New Hampshire) and Robin Wordsworth (Harvard University) led a motivational roundtable, theoretical and observational tutorials, hands-on sessions in which the speakers provided short exercises for the attendees to complete or papers to read, public seminars, a career roundtable, and a closing panel discussion.

In her talk, Wordsworth described 3D climate simulations with realistic radiative transfer that have shed new light on the early Martian climate, a long-standing challenge in planetary science. Huber discussed the history and application of models in greenhouse paleoclimate contexts and related topics including how tectonics and ice sheets affect climate, the stability of the tropical ocean atmosphere circulation structure, the conceptual underpinnings of climate sensitivity, and the ability of models to inform interpretations of paleoclimate information. In a final public seminar, Burls highlighted contrasts in the hydrological cycle in past and future warm climates, including the Pliocene epoch which, according to Burls, arguably provides one of the closest analogues to modern greenhouse gas conditions.

“The topic was largely unfamiliar to the AOS community, as few of us think about modeling paleoclimates or the climate of extra-terrestrial planets such as Mars, and so the workshop seemed to be quite productive in terms of introducing the students and postdocs to new material,” said AOS Graduate Student Nick Lutsko, a co-organizer of the event. “The speakers touched on a broad range of related topics, including atmospheric radiation, ocean dynamics and land-atmosphere interactions; there was something for everyone.”

To complement the workshop’s lecture-based format, greater participatory engagement was encouraged through hands-on sessions and a career roundtable. “This year the invited scientists were particularly thoughtful in how they engaged the AOS students -- the three

hands-on sessions included basic radiative transfer calculations, running of a simple radiative/convective equilibrium 1-D model, and presentations of papers relevant to modeling the Pliocene,” said Jane Baldwin, an AOS graduate student. “The exercises helped me appreciate the scientific questions these visiting scientists focus on, and get a taste of their day-to-day research. The career discussion was alternately pragmatic and inspiring – I really appreciate how willing the visiting scientists were to give candid responses to our questions. The workshop gets better each year!”

The workshop series was launched in 2013 after Held received the BBVA Award. Beginning with the inaugural event, students have welcomed the opportunity to bring in innovative scientists from institutions other than Princeton and GFDL to interact with AOS students on topics of their choosing. Students actively plan and host the event and use the opportunity to extend the bounds of intellectual conversations. The 2015 “Challenges in Using Current Atmospheric Models to Study Extreme Climate Scenarios” workshop was a follow up to previous student-led AOS Program workshops including the inaugural workshop on “Using Diverse Observations in Climate Modeling Research” held in September of 2013 and the 2014 “Ice in the Climate System” workshop. ■

Persad “Expert Scientist” at Climate Game Jam

Games are increasingly used in educational settings to help inspire curiosity, creativity, collaboration, optimism, and problem-solving skills among a variety of audiences. Although the field of games focused on climate change is growing, there remains a gap in the type of content covered. From October 2-4, 2015, Graduate Student Geeta Persad participated as an Expert Scientist in the Climate Game Jam held at the California Academy of Science in San Francisco. The Game Jam brought together game developers, scientists, artists and educators to create new game prototypes focused on increased understanding of and engagement with climate science and impacts.



AOS Graduate Student Geeta Persad

Organized by the White House Office of Science & Technology (OSTP), as part of their Climate Education and Literacy Initiative launched in December of 2014, Game Jams were held throughout the U.S. at 12 different sites, including the Cal Academy. The nationwide event was a unique opportunity for students of all ages, educators, scientists, artists, game designers and interested public members to work together on the development of climate game prototypes that span a range of platforms, topics, and audiences.

Serving as a science advisor to five separate game development teams at the Academy’s Game Jam, whose focus was the impact of climate change on freshwater resources and ocean and land ecosystems, Persad briefly presented on the key tenets of a scientifically accurate game, advised teams on the scientific content of their games, and helped the teams find peer-reviewed resources for background information for their games. Cal Academy teams included developers from Google and Glasslab, independent developers and a team who participated via remote connection.



Climate Game Jam teams “hard at work” developing their games

“It was really encouraging and fun to watch the game developers, who had no prior background in climate science, get incredibly energized and interested in their game topics,” Persad said. “Many of the teams expanded or changed their game topic after getting excited about something that I or another one of the scientists talked about in our briefing. Helping the teams find reliable scientific resources for their games was a great reminder of the immense body of knowledge that even young climate scientists like myself have access to and the fun and unexpected ways in which it can be useful.”

According to organizers, Climate Game Jam participants share a common theme and constraints, and create a working prototype in a prescribed time (maximum of 48 hours). The brief time span is meant to help encourage creative thinking to result in small but innovative and experimental games. The games developed at the Cal Academy, one of the primary organizers of the Game Jam, included: *Owl Together*, a two-player strategy game highlighting the dynamics of invasive species of owls; single-player games on coral reef health (*Reef Revival*) and nudibranch species (*Nudibranch Bioblitz*); *Ecovoi!*, a multi-player game on the distribution of limited water resources between a city and its surrounding agricultural lands; and *Cornucopia*, a resource management game looking at the tradeoffs between climate mitigation and human activities.



Screenshot of Reef Revival Game (Credit: Cal Academy)

“It was amazing to see the games go from initial idea to testable prototype in the course of two days,” Persad said. “The Cal Academy games were tested by a group of tech-savvy teen judges at the museum and will hopefully eventually be used as a classroom resource. It was really refreshing to see that scientific knowledge can go from raw information to actionable ideas so quickly, concisely, and engagingly!”



Screenshot of Owl Together Game (Credit: Cal Academy)

At the event’s conclusion, teams submitted their games for evaluation by the OSTP. Winning entries that feature sound scientific concepts have the opportunity to be included on the Smithsonian’s new Learning Lab and will be available to educators across the nation. Select finalists will be offered the opportunity to be showcased in an arcade on the grounds of the Smithsonian’s National Museum of Natural History which will take place in November. ■

GFDL Host to Earth Science Research Community

Meeting scientific and societal challenges in understanding and preparing for global environmental change requires improvements in the model representation of processes in components of Earth system models. From October 15-16, 2015, GFDL opened its doors to members of the Earth science research community who converged on the Forrestal Campus with the goal of improving the transfer of process understanding to the development of climate models in the United States.

Approximately 90 scientists were on hand to participate in the “Translating Process Understanding to Improving Climate Models” Workshop whose aim was to assess the current understanding of physical processes, which could lead to significant climate and weather prediction model improvements on a 5-year timescale. Program managers were among the attendees, and an additional 80 people followed the talks via webcast. The workshop was sponsored by US Climate Variability and Predictability (CLIVAR) and funded by NSF, NOAA, DOE and ONR.

According to AOS Faculty Member Sonya Legg, a co-chair of the Scientific Organizing Committee, the workshop was intended to identify priority model improvement needs and opportunities through interaction and communication among modeling centers and the broader community of observationalists, theorists, and process modelers. Historically, climate modelers often had little overlap with those engaged in process studies. In the past decade, “climate process teams,” including several with GFDL participation, have brought together members of these different communities with the aim of bridging that gap and using the process understanding to improve the climate models. “An important goal of the workshop was to assess the opportunities for new collaboration between these groups to expedite climate model improvement,” Legg said.

To address this goal, a wide array of topics were discussed: scale-aware parameterizations of subgrid scale processes; ice-ocean interactions and sea-ice dynamics; air-sea interactions; shallow and deep convection in the atmosphere; cloud macro- and micro-physics; coastal/marginal sea processes, such as estuarine mixing and coastal upwelling; surface processes in the ocean; land surface physics parameterizations; diurnal-to-annual surface processes for both land and ocean; ocean eddy processes; and physical processes that affect the carbon cycle.

AOS Faculty Member Isaac Held and Legg were among the speakers at the workshop with talks on “Key issues arising in CM4 development at GFDL,” and “Ocean climate process teams: Successes and lessons learned,” respectively. Breakout sessions were convened daily to generate and synthesize new ideas on specific topics associated with the ocean, atmosphere, cryosphere, air-sea interactions, and climate model biases, as well as mechanisms to encourage the translation of process understanding to climate model improvement. AOS Research Oceanographer Alistair Adcroft showcased his collaborative efforts with AOS Colleagues Olga Sergienko, Alon Stern, and Bob Hallberg in a poster titled “The calving and icebergs CPT,” during the Thursday evening poster session at McDonnell Hall’s Brush Gallery on Main Campus. The poster was among the nearly 40 presented during the session, all of which can be viewed [online](#).

“The high level of interest in forging connections between climate modelers and process studies was evident in the attendance of scientists from many different institutions and sub-disciplines related to climate science, at both senior levels and early career stages,” said Legg. “Early career scientists, who will be the future leaders of these collaborations, were given prominent roles as both invited speakers and discussion rapporteurs.”

Immediately following the workshop, a brief summary document was generated to provide highlights for consideration by US CLIVAR Panels, the Scientific Steering Committee, and sponsoring agencies. In early 2016, a more detailed white paper will be issued as a US CLIVAR report, synthesizing workshop presentations, discussions, and recommendations together with responses to questionnaires and surveys, to inform the broad research community and interested agencies. ■

AOS Students Bring Science to Area Soup Kitchen

On June 10, 2015, AOS Graduate Students Rob Nazarian and Todd Mooring, volunteer tutors at the Trenton Air Soup Kitchen (TASK), hosted a science workshop, with approximately 35 people in attendance. The workshop, partly funded by CICS, served as a primer for adult students who would be venturing out on a field trip to the Liberty Science Center later in the summer. The field trip is part of TASK’s Adult Education Program which recognizes that patrons have a hunger beyond a hot meal and provides one-on-one tutoring in preparation for the High School Equivalency Test (reading, writing, social studies, science and mathematics), as well as computer literacy, for adults students, 18 years and older.

According to Nazarian, who has been a math and science tutor at TASK since January of 2013, science is one of the most difficult subjects these adults need to master for their GED diploma. As a way of engaging students more in the sciences, as well as preparing them for the field trip to the Liberty Science Center, Nazarian and Mooring conducted a series of five hands-on, AOS-themed experiments illustrating:



AOS Graduate Student Rob Nazarian explaining angular momentum to a group of students as TASK student, Yvonne, demonstrated by spinning in the chair with arms outstretched. (Credit: TASK)

ocean acidification, tropical cyclones/hurricanes, atmospheric pressure, the greenhouse effect, and tornados; all of which are prominently featured at the museum as a part of their exhibits on the effects of climate and Hurricane Sandy. Before diving into the experiments, Nazarian explained the underlying physics to the tutors (who were on hand to assist the students) and students (many of whom who have not succeeded in a typical classroom environment) to help them navigate the five AOS-themed topics.



AOS Graduate Student Todd Mooring assisting students to create a stratified fluid which served as the basis for their tornado in a bottle (Credit: TASK)

“We wanted to make sure that the students were adequately prepared for their trip to the Liberty Science Center and that they had some working vocabulary to understand and appreciate the exhibits,” Nazarian said. “The experiments were also intended for them to practice formulating a

working hypothesis and then testing it.” Nazarian, who has served on TASK’s advisory council since 2013, noted the increasing difficulty of the science portion of the GED and said the workshop additionally served as a form of test preparation for the students.

“The experiments were a success, both in introducing students to the scientific method and preparing them for their field trip,” said Nazarian. “Given the one-on-one tutoring approach of the Adult Education Program at TASK, such opportunities for students to work together on science problems are rare, and they really made the most of it. Weeks after the workshop, students were still talking about it, and using their newfound scientific method to carefully dissect each of the exhibits at the Liberty Science Center. It was also an educational experience for Todd and me, as we don’t often conduct table top experiments.”

The mission of TASK is to feed those who are hungry in the Trenton area and offer programs to encourage self-sufficiency and improve the quality of life of its patrons. Tutors in the Adult Education Program do not need to be certified teachers or even have teaching experience. What patrons really need, according to the TASK website, is an open and friendly individual to work with them one-on-one. Nazarian and Mooring (and two colleagues from Geosciences, Alliya Akhtar and Danielle Ramos) attempt to address this need on a weekly basis. For them, time volunteering at TASK is time well spent. ■

The New Jersey Japanese School Students Meet Suki Manabe

Contributed by Maria Setzer, GFDL Communications Director

Students from The New Jersey Japanese School visited GFDL in June, and were captivated by talks from Suki Manabe and Spencer Hill. Their teacher, Tomoko Higashi, arranged the visit so the students could meet Suki, who gave a very animated talk about his life and career.



Suki Manabe presenting an animated talk to the students from The New Jersey Japanese School



Suki Manabe and the students of The New Jersey Japanese School

Graduate student Spencer Hill also gave the students a very engaging, short lesson in the fundamentals of climate modeling. The 26 seventh, eighth, and ninth grade students, and the four teachers who accompanied them, were an attentive and appreciative audience. ■

GFDL 2016 Poster Expo Planned



On Wednesday, January 27, 2016, the third GFDL Poster Expo will bring together members of the broader GFDL Community to share their research, explore the research of colleagues, and build relationships and possible cross-disciplinary collaborations. All of GFDL's local partners – Princeton (AOS & CICS), Rutgers, UCAR Visiting Scientists – will be invited to present posters or attend the event.

The expo gives young researchers experience presenting their ideas in the format used by many academic

conferences, and it provides an informal forum for more seasoned GFDL scientists, AOS students, postdocs, and research scholars to discuss cutting-edge research and creative topics with the wider Princeton community. The last GFDL Poster Expo, held in January 2015, showcased 30 posters and attracted over 40 attendees.

The winter 2016 Poster Expo will be held in GFDL's Smagorinsky Seminar Room. Registration details for the half-day event will be distributed in November. ■

AOS & CICS Research in Action

[This column is intended to focus on AOS & CICS research accomplishments and milestones, past, present, and future. In this issue, we highlight the accomplishments of AOS Postdoctoral Research Associate Dan Li who spent two years in the AOS Program.]

After two years in the AOS Program as a postdoctoral research associate, Dan Li will be leaving for the Department of Earth and Environment at Boston University where he has accepted a position as an assistant professor effective January 1, 2016. Dan earned his bachelor degree at Tsinghua University and came to Princeton University as a Ph.D. candidate in the Department of Civil and Environmental Engineering in September of 2009. He completed his Ph.D. study in September of 2013 and joined the AOS program two months later.



AOS Postdoctoral Research Associate Dan Li

Dan's research focuses on developing models to represent cities in global climate simulations. Although global climate simulations are primarily used to identify the impacts of anthropogenic activities on

the climate system, most of these simulations ignore cities where 50 percent of the global population lives. To address this issue, he developed an urban canopy model within the framework of the land model, LM3, to represent urban surface and hydrological processes. Currently, he is testing this urban canopy model for global simulations and plans to include this feature in the next generation of Earth system models at GFDL which will pave the way to study, for example, the impacts of global climate change on human health and energy use in urban areas. He also plans to use this feature to study the impacts of urbanization on local and regional climate change.

In his spare time (i.e., over weekends), he also works on a variety of other projects, including developing new turbulent theories, testing new turbulent schemes, as well as analyzing field experimental data on atmospheric turbulence. In collaboration with Gabriel Katul from Duke University and others, he developed and validated the co-spectral budgets model and now he is trying to implement this new model into GFDL's global climate models.

Dan has greatly enjoyed his time at AOS/GFDL. "It has been an extremely rewarding experience for me to work in the AOS program and at GFDL, and with so many great scientists such as Elena Shevliakova, Sergey Malyshev, John Dunne, SJ Lin, Lucas Harris, and Isaac Held – just to name a few," he said.

According to Dan, one unique aspect of AOS Program is that there are always so many great seminars by accomplished scientists every week. "Sometimes the number of seminars maybe overwhelming, but all seminars I've been to have taught me a lot," he added. "Some seminar speakers later became my friends and we even started collaborations and published papers together. Also, there are always people in the building who you can talk to about any ideas you might have. Personally I enjoyed my interactions with many oceanographers who certainly understand the role of small-scale turbulence more than I do."

"Dan's technical prowess combined with his excellent theoretical background, outstanding communication skills, ability to think independently and creatively, has made him an emergent leader in the environmental and climate sciences," said

GFDL Physical Scientist Elena Shevliakova, a visiting scientist at PEI.

Although Dan is sad to leave AOS and GFDL, he is also looking forward to building his own research team and teaching new courses at Boston University. He will continue working on refining the urban canopy model for global climate simulations and using it for many applications. He will also continue his strong interest in turbulence. In addition, he also expects to open up new research directions in collaboration with scientists at Boston and from around the globe. ■

In Pictures:

Summer Undergraduate Hike Delaware Water Gap August 2015



(Credit: Lauren Santi)



(Credit: Lauren Santi)

AOS & CICS News

Congratulations to **Rob Nazarian**, an AI (Assistant in Instruction) in GEO 425, for receiving the 2015 Arnold Guyot Graduate Student Teaching Prize, the first AOS student to receive the award! The prize is awarded for excellence in instruction and interactions with graduate students, contribution to course curricula and length

of service of teaching a course in the Geosciences Department. The award was announced at the Geosciences picnic in September and comes with an honorary certificate and a monetary prize.

Congratulations to **Kit-Yan Choi** who successfully defended her Ph.D. Thesis "El Niño-Southern Oscillation: Asymmetry, nonlinear atmospheric response and the role of mean climate on August 21, 2015.

Congratulations to **Wenyu Zhou** who successfully defended his Ph.D. Thesis "Non-Rotating and Rotating Radiative-Convective Equilibrium" on October 5, 2015.

GFDL has established an Early Career Scientist Committee to foster the career development, productivity, and well-being of early career scientists. The Committee will be setting up public forums to seek broad input from the lab. Committee members include: **Charlie Stock, Vaishali Naik, David Paynter, Fabian Paulot, Amy Langenhorst and Sarah Kapnick.**

[More Rain Leads to Fewer Trees in the African Savanna](#)

In 2011, an influx of remote sensing data from satellites scanning the African savannas revealed a mystery: these rolling grasslands, with their heavy rainfalls and spells of drought, were home to significantly fewer trees than researchers had previously expected given the biome's high annual precipitation. In fact, the 2011 study found that the more instances of heavy rainfall a savanna received, the fewer trees it had. This paradox may finally have a solution due to a new study coauthored by AOS Faculty Member **David Medvigy** and recently published in the [Proceeding of the National Academy of Sciences](#). In the study, researchers use mathematical equations to show that physiological differences between trees and grasses are enough to explain the curious phenomenon.

[One-Two Punch of Rising Seas and Bigger Storms Relationship Magnifies U.S. East Coast Floods](#)

Many studies predict that future sea-level rise along the U.S. Atlantic and Gulf coasts will increase flooding. Others suggest that the human-caused warming driving this rise will also boost the intensity and frequency of big coastal storms. Up until now though, these two hazards have been assessed mostly in isolation from each other. Now a [recent study](#) coauthored by **Gabe Vecchi**, an AOS faculty member, quantifies how they could interact to produce alarming spikes in the combined height and duration of flooding. It projects that coastal flooding could possibly shoot up several hundredfold by 2100, from the Northeast to Texas. The study was published in the journal *Nature Climate Change*.

[An Assessment of Phytoplankton Primary Productivity in the Arctic Ocean from Satellite Ocean Color/In Situ Chlorophyll-a Based Models](#)

AOS Visiting Research Collaborator **Vincent Saba**, a research fishery biologist at NOAA National Marine Fisheries Service, is the coauthor of a recent study that investigates 32 phytoplankton primary productivity models by assessing their skill in the Arctic Ocean. The study suggests that ocean color primary productivity models need to be carefully tuned for the Arctic Ocean since most of the models performing relatively well were those that used Arctic-relevant parameters. The [study](#) was published in the *Journal of Geophysical Research: Oceans*.

Alumni News

Former AOS Graduate Student, **Irina Marinov**, assistant professor in the Department of Earth & Environmental Science at the University of Pennsylvania, recently published three papers on the impacts of twenty-first century climate change on global ocean ecology and O₂ cycling in the latest generation of Earth System models.

Access the studies below:

A latitudinally banded phytoplankton response to 21st century climate change in

the Southern Ocean across the CMIP5 model suite
<http://www.biogeosciences.net/12/5715/2015/bg-12-5715-2015.html>

Consistent global responses of marine ecosystems to future climate change across the IPCC AR5 earth system models
<http://link.springer.com/article/10.1007/s00382-014-2374-3>

Oxygen minimum zones in the tropical Pacific across CMIP5 models: mean state differences and climate change trends
<http://www.biogeosciences.net/12/5429/2015/bg-12-5429-2015.html>

Arrivals

The AOS Program extends a warm welcome to our new graduate students: **Shawn Creeks** (Marshall University), **Aaron Match** (Cornell University) and **Elizabeth Yankovsky** (University of South Carolina).

Yongkun Xie, a visiting student from Lanzhou University, arrived in early September to work with Yi Ming.

Linjong Zhou arrived in late September from the Chinese Academy of Science. He is working with S.J. Lin and Lucas Harris as a postdoctoral research associate.

Karin van der Wiel arrived in early October from the University of East Anglia. She is working with Gabe Vecchi as a postdoctoral research associate.

Usama Anber arrived in early October from the Lamont-Doherty Earth Observatory, Columbia University. He is working with S.J. Lin and Lucas Harris as a postdoctoral research associate.

Ping Zhai will arrive in early November from North Carolina State University. She will be working with Keith Rodgers as a postdoctoral research associate.

Bing Pu will arrive in early December from Texas A&M University. She will be working with Paul Ginoux as an associate research scholar.

Angel Muñoz will arrive in early December from the Lamont-Doherty Earth Observatory, Columbia University. He will

be working with Gabe Vecchi as a postdoctoral research associate.

Welcome Back!

Martin Jucker returned to the AOS Program in September as an associate research scholar. He is collaborating with Geoff Vallis and working remotely out of NYU.

Departures

Ivy Frenger, a postdoctoral research fellow in the Sarmiento Group, returned to Germany in late July.

Nir BenMoshe, a postdoctoral research associate, has accepted a position as an environmental researcher at Breezometer in Israel.

Dan Li, a postdoctoral research associate, accepted a position as an assistant professor in the Department of Earth & Environment at Boston University effective January 1, 2016.

Birth Announcements

Congratulations to **Irina Marinov**, an AOS student alumna, and her husband, Justin Khoury '03 (Physics), on the birth of their son, Sebastian, on June 18, 2015. He is welcomed by his older brother, Luca.

Congratulations to **Vincent Saba**, an AOS visiting research collaborator, and his wife, Grace, on the birth of their son, Kellan Matthew, on August 27, 2015. He is welcomed by his older brother, Dean.

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