



AOS & CICS Newsletter

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Ramaswamy Honored with Sir Gilbert Walker Distinguished Chair

GFDL Director V. “Ram” Ramaswamy has been named the second Sir Gilbert Walker Distinguished Chair at the Centre for Atmospheric Sciences, Indian Institute of Technology (IIT) in New Delhi, India. This position is a three-year appointment which commenced in the fall of 2013.



GFDL Director V. Ramaswamy

Chosen on the basis of his outstanding research record, including his work to elucidate the role of aerosols and greenhouse gases in climate change in the Indian region, Ramaswamy is scheduled to present the first in a series of special lectures in climate sciences to graduate students and research scholars at IIT Delhi in the spring.

The purpose of the Sir Gilbert Walker Distinguished Chair is “to promote excellence and leadership in teaching, research, and development in any discipline of atmospheric or oceanic

sciences, remote sensing, climate science, and climate change; and to facilitate wider and deeper interaction between the Ministry of Earth Sciences, Government of India (MoES) and IIT Delhi faculty and students in general.”

The Chair benefits IIT graduate students by appointing a distinguished scientist of international repute for a period of three to five years. The endowment covers all expenses, in addition to a research grant that students can use to fund research stemming from lectures and interactions with the Chair.

“To be bestowed this title in the memory of one of the 20th Century’s foremost pioneers in the atmospheric sciences is a great privilege, and I am simply overwhelmed by the recognition,” Ramaswamy said. Sir Gilbert Walker’s novel findings, drawn from a synthesis of observations in the early 20th century, have become fundamental, essential blocks for the understanding of tropical circulation and climate. To follow Professor T. N. Krishnamurti (Distinguished University Professor at Florida State University), one of the world’s leading experts in tropical weather forecasting and the first recipient of this Chair, is an additional honor in itself.”

Walker, an eminent British mathematician and meteorologist, is best known for his groundbreaking description of the east-west atmospheric circulation in the equatorial Pacific, commonly known as “Walker circulation,” a climate phenomenon of profound significance. Walker became Director-General of Observatories in the Indian Meteorological Service in the early 1900’s and introduced the terms Southern Oscillation, North Atlantic Oscillation, and North Pacific Oscillation for the first time in his paper on world weather correlations in 1924. ■

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

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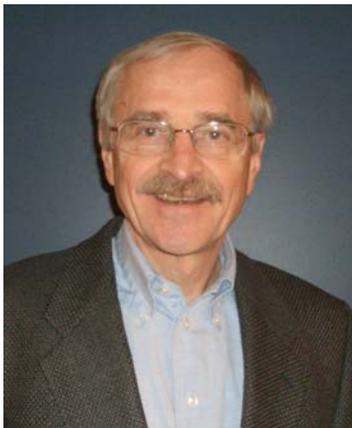
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TigerTransit/Shuttle Services Operating Schedule: <<http://www.princeton.edu/transportation/troutes/ForrestalFall2013.pdf>>.

Wood and Griffies Honored by EGU

The European Geosciences Union (EGU) has named Susan Dod Brown Professor of Civil and Environmental Engineering Eric Wood, a CICS investigator, and Steve Griffies, a physical scientist at GFDL, as recipients of 2014 honors for their important contributions to the Earth, planetary, and space sciences.

Eric Wood has been awarded the Alfred Wegener Medal, "for his pioneering contributions to hydrology and to its interactions with meteorology and climate change, in particular to developing widely used large-scale hydrological models and applications of remote sensing and of land data assimilation methods to help improve surface energy and moisture forecasts."



Susan Dod Brown Professor of Civil and Environmental Engineering Eric Wood

Wood works in the areas of hydroclimatology with an emphasis on land atmosphere interactions, terrestrial remote sensing, and seasonal hydrologic climate forecasts, including land-climate teleconnections. His modeling focuses on the terrestrial water and energy balances and fluxes over a range of spatial and temporal scales, and his remote-sensing research focuses on estimating the hydrologic and energetic states of the terrestrial system, and on validating satellite retrievals on land surface states. These modeling and remote sensing activities are complemented through several field experiments in the U.S. and Canada. Wood is the Director of the Program in Environmental Engineering and Water Resources.

The award was named after Wegener, a German climatologist and geophysicist who, in 1915, published an expanded version of his 1912 book *The Origin of Continents and Oceans*. This work was one of the first to suggest continental drift and plate tectonics.

Steve Griffies, an AOS visiting research collaborator, has been awarded the Fridtjof Nansen Medal by the EGU for "for his outstanding contribution and leadership in ocean general circulation model development and critical insights in the physical nature and parameterization of ocean processes."



GFDL Physical Scientist Steve Griffies

Griffies' research activities include ocean models - including algorithms, physical parameterizations, and analysis; and ocean climate - including eddies, large-scale overturning, decadal climate variability and predictability. He is also co-chair of the GFDL Ocean Model Development Team.

The award was named after Fridtjof Nansen whose first major contribution to oceanography was the transpolar expedition made by freezing the vessel "Fram" in the Arctic drift ice, north of the New Siberian Islands, in 1893. He made several improvements in measuring techniques (for both physical and biological parameters) and in our understanding of ocean processes.

Joining an esteemed group of former EGU medal recipients, Wood and Griffies will receive their prizes at the EGU 2014 General Assembly, which will take place in Vienna on April 27 – May 2, 2014.

The EGU is Europe's premier geosciences union, dedicated to the pursuit of

excellence in the geosciences and the planetary and space sciences for the benefit of humanity worldwide. It was established in September 2002 as a merger of the European Geophysical Society (EGS) and the European Union of Geosciences (EUG), and has headquarters in Munich, Germany. ■

GFDL Scientists Awarded DOC Silver Medal

A team of GFDL scientists were recently awarded a Silver Medal for Scientific/Engineering Achievement by the Department of Commerce "for the development and application of NOAA's first comprehensive Earth System Models that couple the carbon cycle and climate to project future change." Medal Recipients include: John Dunne, Steve Griffies, Robert Hallberg, Matthew Harrison, Jasmin John, John Krasting, Bonnie Samuels, Lori Sentman, Ronald Stouffer, and Andrew Wittenberg.

In her announcement to the winners, Kathryn Sullivan, Acting Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator, applauded the expertise and creativity the Earth System Models Team used to develop the GFDL ESM2M and ESM2G Earth System models.

"This pioneering modeling effort is the culmination of several years of systematic research and development at GFDL to numerically simulate the complex interactions between the atmosphere, ocean, land, and the carbon biogeochemical cycle," GFDL Director V. Ramaswamy said.

While the GFDL team deservedly earned this distinction as principal developers of the models, an interdisciplinary team of CICS, AOS, and PEI scientists were associated with the project as well. "To my mind, the recognition afforded by this medal is a powerful message of the demonstrated successful synergy of a Cooperative Institute with the associated OAR lab to deliver a critical mission objective for NOAA," Ramaswamy said.

The second highest honorary award granted by the Secretary, a Silver Medal is awarded for “exceptional performance characterized by noteworthy or superlative contributions which have a direct and lasting impact within the Department.” To merit a Silver Medal, a contribution must focus on qualitative and quantitative performance measures reflected in the Department's Strategic Plan and be identified in one of the following areas: leadership, personal and professional excellence, scientific/engineering achievement, organizational development, customer service, administrative/technical support or heroism.

The Silver Medal was awarded at an Honor Ceremony on Wednesday, January 29, 2014 in Washington, DC. ■

Coral Reefs: Can they Adapt to Climate Change?

Cheryl Logan leads team of researchers to find out

Coral reefs may be able to adapt to moderate climate warming, according to a recent study funded by the Cooperative Institute for Climate Science (CICS) through the NOAA Coral Reef Conservation Program, but can they adapt fast enough to keep pace with the rate humans are burning fossil fuels?

The study, published in the journal *Global Change Biology*, has uncovered evidence that corals may already be adapting to temperature changes in the ocean. However, reductions in coral bleaching, a potentially fatal process in which reef-building corals eject algae living inside their tissues, will only be possible if greenhouse gas emissions are significantly reduced. Corals bleach when oceans warm only 1-2°C (2-4°F) above normal summertime temperatures. Because those algae supply the coral with most of its food, prolonged bleaching and associated disease pose a substantial risk to coral ecosystems around the world.

"Earlier modeling work suggested that coral reefs would be gone by the middle of this century. Our study shows that if corals

can adapt to warming that has occurred over the past 40 to 60 years, some coral reefs may persist through the end of this century," said study lead author, Cheryl Logan, an assistant professor at California State University and an AOS collaborator. Co-authors of the study include GFDL Research Oceanographer John Dunne, Mark Eakin, Director of the NOAA Coral Reef Watch monitoring program, and Simon Donner, an associate professor at the University of British Columbia.

Exploring a range of possible coral adaptive responses proposed by the scientific community, the study provides a more optimistic outlook for the future of coral reefs than past work that overlooked adaptation – but with some important caveats. The study results suggest that, through genetic adaptation, the reefs could reduce the currently projected rate of temperature-induced bleaching by 20 to 80 percent of levels anticipated by the year 2100, if there are large reductions in carbon dioxide emissions. Experts caution, however, that adaptation provides no significant slowing in the loss of coral reefs if we continue to increase our rate of fossil fuel use.

Coral reef ecosystems are among the most diverse in the world, housing tens of thousands of marine species. The paper calls for further research to test the rate and limit of different adaptive responses for coral species across latitudes and ocean basins to determine if and how much corals can respond to increasing thermal stress.

“Genetic adaptation, symbiont shuffling, and physiological acclimatization can all increase coral’s thermal tolerance,” said Logan. “We determined the rates at which these processes would have to act in order to keep pace with climate warming through this century. Future work needs to experimentally measure these rates to better determine which coral species may be able to keep up and which ones will not.” ■



Vecchi and Oppenheimer Discuss Recent IPCC Report

Gabriel Vecchi, a lecturer in the Department of Geosciences and the AOS Program and head of the Climate Variations at Predictability Group at GFDL, joined Albert G. Milbank Professor of Geosciences and International Affairs Michael Oppenheimer, an AOS associated faculty member, to discuss the Intergovernmental Panel on Climate Change Working Group I Fifth Assessment Report (IPCC WGI AR5) at a standing room only event held on November 20, 2013 on Main Campus. The seminar “Putting the New IPCC Report in Context” was presented by the Princeton Institute for International and Regional Studies (PIRS) research community on Communicating Uncertainty: Science, Institutions, and Ethics in the Politics of Global Climate Change and was attended by approximately 90 people, including faculty and graduate students from various social science and science disciplines.

The new IPCC report provides a comprehensive assessment of the physical science basis of climate change and is the panel's fifth major assessment since 1990. Reaffirming many of the conclusions of past reports, the new report said, “Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased.”

During his talk, Vecchi noted that the statements about detection and attribution of tropical cyclone trends in the IPCC WGI AR5 expressed a lower level of confidence than in the earlier IPCC AR4, in contrast to the statements on global temperature, which expressed growing confidence in the existence of warming since the mid-20th century and on the role of CO₂ in driving the warming.

“This evolution of confidence on the role of humans in changes in tropical cyclone activity is not, on the surface, what one

tends to expect from the evolution of understanding, where we expect that research leads to understanding and then to increased confidence,” Vecchi said. “I argue that this quasi-paradoxical progress in understanding, where we become better aware of the existence and impact of uncertainties is crucial to developing true confidence in the future.”

Vecchi’s research focuses on the interactions between the atmosphere and oceans on timescales from weeks to centuries, including the El Niño-Southern Oscillation phenomenon and Asian-Australian monsoon. Predicting short- and long-term changes to tropical circulation and variability, including characterizing the impact of climate change on tropical cyclones and hurricanes, and global patterns of rainfall and drought are among his recent research efforts.

Oppenheimer, who was not directly involved in the Working Group I report, is a coordinating lead author of the second working group report scheduled for approval in March 2014, which will examine the risks and consequences of climate change for humans and nature. His research interests include science and policy of the atmosphere, with a particular emphasis on climate change and its impacts. Much of Oppenheimer’s research aims to understand the potential for dangerous outcomes of increasing levels of greenhouse gases by exploring the effects of global warming on ecosystems such as coral reefs, on the ice sheets and sea level, and on patterns of human migration.

Climate-change mitigation will be addressed in the third working group report to be approved in April 2014. The synthesis report — of which Oppenheimer is a member of the core writing team — will offer an overview of the IPCC’s work and will be released around October 2014.

The PIIRS’ research community examines issues of uncertainty with respect to global climate change and other international environmental problems and aims to improve the capacity to discuss and weigh related policy prescriptions. ■

Climate Experts Converge on Main Campus to Examine World Carbon Trends

Despite significant progress in carbon cycle science, there are a number of unanswered questions about the processes driving the growth of atmospheric CO₂. Multiple modeling and observational approaches are important to understanding atmospheric CO₂ trends.

This was the message of the Workshop on World Carbon Trends, held November 5-7, 2013 on Princeton’s main campus, where a team of interdisciplinary experts from nine leading research institutions explored ways of improving their understanding of these processes and the resulting CO₂ trends. The workshop brought together experts from different components of the carbon cycle: fossil fuel emissions, ocean, land, and the atmosphere.

It is well established that only about half of anthropogenic carbon emissions, generated by industry and agriculture, remains in the atmosphere. The other half is taken up by oceans and ecosystems on land, commonly referred to as the biospheric carbon sink. This behavior slows global warming by decreasing the rate of atmospheric carbon dioxide increase, but that trend may not continue. Studies have shown that the biospheric sink has been increasing steadily since the mid-20th century.

Given its vulnerability and large climate sensitivity, questions arise as to why and how the biospheric sink is increasing. The scientists presented their latest research to address questions surrounding the relative contribution of ocean versus land sinks; deforestation and whether or not old-growth forests and re-growing forests are continuing to serve as sinks; and the step versus gradual CO₂ increase on ecosystem responses.

Progress towards resolving these and other issues raised in this workshop will require further consideration. In the coming months, the researchers will continue gathering data from observations and models and synthesize their findings. This

effort will not only shed more light on the topic, but may also prove to be useful for informing response strategies.

The workshop was hosted by Princeton University, with the support from the USDA Forest Service and the Finnish Society for Sciences and Letters. ■

Persad Recipient of AGU Outstanding Student Paper Award

AOS Program Graduate Student Geeta Persad was the recipient of an Outstanding Student Paper Award (OSPA), in the Atmospheric Sciences Section, by the American Geophysical Union (AGU) at the 2013 Fall Meeting in San Francisco, the largest worldwide conference in the geophysical sciences. Her presentation entitled, “The Role of Aerosol Absorption in Solar Dimming over East Asia and its Implications for Regional Climate” was one of only 15 papers chosen for this distinction in the Atmospheric Sciences Section. Typically, the top 3-5% of presenters in each section/focus group is awarded an OSPA.

Persad’s advisor is GFDL Director V. Ramaswamy, a coauthor of the paper. Yi Ming, a lecturer in the AOS Program and GFDL physical scientist, is also a coauthor of the study.



AOS Graduate Student Geeta Persad

“It’s a great honor to have won the award, especially given the exceptional quality of the student papers that I saw presented at AGU,” Persad said.

The OSPAs are awarded to promote, recognize, and reward undergraduate, Master's and Ph.D. students for quality research in the geophysical sciences. Relying entirely on volunteer judges, the process provides young scientists at the beginning of the careers with valuable feedback about presentation style and scientific research.

More than 22,000 Earth and space scientists, educators, students, and other leaders gathered at the 2013 Fall Meeting to present groundbreaking research and connect with colleagues. The Meeting offered a wide variety of activities and events for students to network, interact with renowned scientists, present their work, and receive career path advice. AOS Graduate Students Junyi Chai, Spencer Hill, Jaya Khanna, Yumi Oh, Sam Potter, Zhaoyi Shen, and Anna Trugman were among the attendees who joined Persad at the December Meeting. ■

AOS Program Sets Applications Record

The AOS Program received a record number of applications for the fall of 2014-15, with 63 students vying for a spot in the Program. This is the largest applicant pool in the Program's history. This number represents a 10.5 percent increase over last year's total and a nearly 54 percent increase over the fall of 2009's total.

"Over the last five years, we have seen a fairly steady increase in applicants to our Program," Sarmiento said.

Bolstered by the University's international reputation, the Program continues to be very attractive to students from all around the globe. International students accounted for over 68 percent of the AOS Program's applicant pool, with largest representation from China. The number of applications from international students exceeding the number of applications from U.S. citizens and permanent residents is an upward trend that can be seen across the University over recent years.

Among the total applicants to the Program, over 36 percent were women. "It is extremely gratifying to see a near record

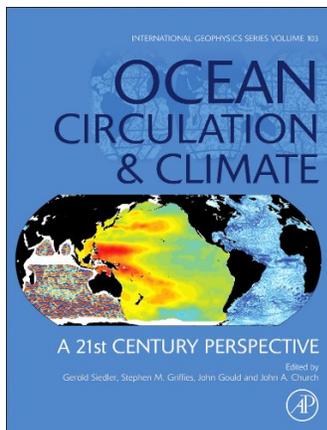
number of women applicants," Sarmiento said. "As a Program, we work to foster a collegial atmosphere and positive environment for women pursuing careers in science."

Traditionally underrepresented in the sciences, women in the AOS Program and GFDL have taken a lead role this past year with regard to recruitment and retention efforts aimed out women and early career scientists. The GFDL Women's Caucus and Princeton Women in Geosciences (PWIGS) are among such initiatives.

The strong applicant pool is a testament to not only Princeton's reputation as a world-class institution, but to the growing global reputation of the AOS graduate program and its distinguished faculty.

Applicants to the Program were notified of admission decisions in early February. ■

Stephen Griffies, Co-Editor of *Ocean Circulation and Climate - A 21st Century Perspective*



Ocean Circulation & Climate: A 21st Century Perspective Cover

GFDL Physical Scientist Stephen Griffies, an AOS visiting research collaborator, co-edited *Ocean Circulation and Climate - A 21st Century Perspective*, published in 2013. This book aims to present the current state of understanding surrounding the role of the ocean in the climate system.

Gerold Siedler (Germany), John Gould (UK), and John Church (Australia) were editors of the first edition and were joined by Griffies who provided additional expertise on theory and modeling.



The editors of Ocean Circulation and Climate - A 21st Century Perspective

The new book aims to present ocean science and its relevance to climate change more than a decade after the first edition. It contains 31 chapters that span the present state of knowledge and provides an extensive update to the first edition, published in 2001, which is now a standard reference text for ocean and climate researchers worldwide. This second edition grew out of an enhanced understanding of the inherent variability of the ocean not available in 2001, and the relentless growth in computational power that permits better representation of crucial ocean processes.

As noted by Griffies, "Scientific understanding of the ocean's role in the earth climate system has greatly evolved since the first edition of this classic book. This understanding has come from improved observations, theory, and modeling. In particular, we now better appreciate the role of variability and trends; biogeochemistry and ecosystems are now basic to studies of the earth system; fundamental physical processes are more faithfully represented or parameterized in simulations; and large-scale coupled phenomena are better observed and simulated. These, and other, points provided strong motivation for the editors to garner input from leading ocean scientists to realize this second edition."

The book's 78 authors provide a global perspective as recognized experts in their respective fields. It was produced simultaneously with the preparation of the 2013 IPCC WG1 5th assessment report and provides valuable and up-to-date background on ocean-related issues central to the IPCC's assessment.

The book is structured to guide the reader through the analysis, interpretation,

modeling, and synthesis of ocean climate phenomena, with extensive cross-referencing between chapters and a comprehensive index. The book was published by Academic Press in Oxford and has close to 900 pages. ■

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 Angelique Melet who spent two and a half years in the AOS Program.]

Postdoctoral Research Associate Angelique Melet left the AOS program in December to join the French spatial agency (Centre National d'Etudes Spatiales, CNES). Angelique will be working at LEGOS, in Toulouse, on sea level rise using observations and climate models.



*AOS Postdoctoral Research Associate
Angelique Melet*

Angelique joined the AOS program in July 2011 and worked at GFDL with Robert Hallberg and Sonya Legg. She was part of a Climate Process Team on internal wave driven mixing, which aims at improving representations of internal-wave driven mixing in global ocean models. Turbulent mixing in the ocean interior is a crucial driver of downward transport of heat and dissolved greenhouse gases and upward transport of nutrients. Turbulent mixing is also a major source of mechanical energy needed to drive the abyssal global overturning circulation. In the ocean interior, most turbulent mixing is driven by breaking internal gravity waves. Global levels and patterns of mixing are hence set by the detailed geography of internal wave

generation, propagation and breaking. However, this small scale process is very poorly represented in current climate models.

During her time in Princeton, Angelique worked on a variety of processes associated with internal wave driven mixing. She implemented parameterizations of specific processes in GFDL's climate models and evaluated their impacts on the ocean state. Her research highlighted the importance of using a physically-based vertical distribution of the dissipation of internal waves.

Angelique also implemented a parameterization of the dissipation of ocean mountain waves generated by the interaction of deep geostrophic flows with rough topography. She found that this process, which is especially important in the Southern Ocean, specifically impacts the ventilation, stratification and meridional overturning in the deep ocean, and warrants serious consideration for inclusion in climate models.

Angelique also performed analytical calculations of the energy input into internal tides due to abyssal hills, the dominant small scale topography that is unresolved in standard bathymetric products. Using a statistical distribution of abyssal hills, she found that over mid-ocean ridges, the energy input into internal tides due to small scale topography can be as large as that due to large scale topography.

"Angelique is a remarkably insightful and productive scientist. I have been deeply impressed with her ability to master and extend theories of how internal wave mixing should work in the ocean, and to demonstrate their importance in climate models," Hallberg said. "Angelique's position here at Princeton was a part of a multi-institution Climate Process Team, and she made the most of this by establishing close collaborations and writing papers with a number of the team members from outside of Princeton and GFDL. It has been a true pleasure working with Angelique here at GFDL."

"I really enjoyed my time in Princeton, both personally and professionally," Melet said. "I came to learn about the world of climate modeling, and working in GFDL and as part of a nation-wide CPT was an honor. This working environment was just

highly motivating, with so many possible studies to be done."

"While we will miss having her here, we also look forward to our continued collaborations from afar and to seeing what new research directions she takes as she establishes her career back home in France," Hallberg said.

"I'd really like to thank Bob and Sonya and the AOS program for giving me that opportunity," she said. "While I am really thrilled about the two and a half years we spent in Princeton, we decided as a family to go back to our homeland. For those wondering, yes, wine and cheese also carried weight in our decision! I'm also very excited to work on the crucial issue of sea level rise back in France!" ■

AOS & CICS News

Join Us!

Upcoming Outreach Opportunities

Event date: Friday, March 21, 2014
PPPL's 13th annual Young Women's Conference in Science, Mathematics, Technology and Engineering

Event date: Saturday, May 17, 2014
Ocean Fun Days at Island Beach State Park

Event date: Sunday, May 18, 2014
Ocean Fun Days at NJ Sea Grant Consortium Headquarters, Sandy Hook

If you are interested in any of the above outreach opportunities, contact AOS Associate Research Scholar **Allison Smith** for further information.

AOS Graduate Student **Claire Radley** was the recipient of a Best Poster Award at the SPARC (Stratosphere-troposphere Processes And their Role in Climate) 2014 General Assembly, held in Queenstown, New Zealand from the January 12-17, 2014. Her poster was entitled "Cloud and radiative balance changes in response to ENSO in observations and models."

AOS Postdoctoral Research Fellow **Sarah Kapnick** has been awarded a NSF

Atmospheric and Geospace Sciences
Postdoctoral Research Fellowship for two
years beginning November 1, 2013.

AOS Postdoctoral Research Fellow **Ivy
Frenger** has been awarded an Early
Postdoc. Mobility Fellowship, for eighteen
months beginning February 2014, by the
Swiss National Science Foundation
(SNSF).

Congratulations to our GFDL colleagues
who are NOAA Bronze Medal Winners:

GFDL Administrative Services Group
GFDL Technical Services Group
Rusty Benson
Ron Bewtra
Jeff Flick
Frank Indiviglio
Bernie Siebers

and additional congratulations to
Distinguished Career Award Winner **Tony
Rosati**.

In a new study led by AOS Research
Scholar **Meiyun Lin**, researchers found
that since the mid-1990s, shifts in
atmospheric circulation have caused Asian
ozone pollution reaching Hawaii to be
relatively low in spring but rise
significantly in autumn. The findings,
published online Jan. 26 in *Nature
Geosciences*, indicate that variability in
airflow patterns must be considered when
attributing observed ozone changes to
human-induced trends in precursor
emissions. Access the study here:

<<http://www.nature.com/ngeo/journal/v7/n2/full/ngeo2066.html>>.

Gabriel Vecchi, a lecturer in the
Department of Geosciences and the AOS
Program and a GFDL researcher, is the co-
author of a Perspectives piece on seasonal
hurricane predictions appearing in *Science*
February 7. The piece discusses the
current state and ways forward on seasonal
hurricane prediction, including prediction
verification, learning from failed
predictions, and correctly describing and
communicating uncertainty.

The piece can be accessed here:
<<http://www.sciencemag.org/content/343/6171/618.full>>.

Former AOS Postdoctoral Research
Associate **Lucas Harris** has accepted a
spot on GFDL's Computer Users'
Advisory Board (CUAB).

GFDL and the AOS Program collected and
donated 187 pounds of nonperishable foods
and personal care products to the Mercer
Street Food Bank during the November
Feds and Friends Fall Food Drive.
Thanks to all for your generosity and to
**Marian Westley, Steve Mayle, and Laura
Rossi** for coordinating this effort!

**Secrets of the Southern Ocean Featured
in 'Discovery: Research at Princeton'**

Though it makes up less than a third of the
world's ocean coverage, the Southern
Ocean surrounding Antarctica soaks up
about half of the man-made carbon dioxide
absorbed by the world's oceans from the
atmosphere each year. **Jorge Sarmiento,**
Bob Key and **Daniel Sigman** are among
Princeton researchers pushing through the
challenging conditions of the Southern
Ocean because they want to learn more
about the waters at the bottom of the
globe. Check out the full story at:

<<http://discovery.princeton.edu/2013/11/03/secrets-of-the-southern-ocean/>>.

Arrivals

Dan Li arrived in mid-November from
Princeton's Department of Civil and
Environmental Engineering (CEE). Dan
will be working with Elena Shevliakova,
S.J. Lin, and Chris Milly as a postdoctoral
research associate.

Karen Paffendorf arrived from Hewlett
Packard in California in early December.
She will be working with Gabe Vecchi as a
professional specialist.

Liping Zhang arrived in early January
from the University of Miami. Liping will
be working with Tom Delworth as a
postdoctoral research associate.

Ivy Frenger arrived in late January from
ETH Zurich to join the Sarmiento group as
a postdoctoral research fellow. Ivy was
awarded a fellowship from the Swiss
National Science Foundation (SNSF).

Professor **Ben-Jei Tsuang**, a visiting
faculty member from the National Chung
Hsing University in Taiwan, arrived in
mid-February to work with S.J. Lin.

New Associate Research Scholar **Fabien
Paulot** will arrive in March from Harvard
University to work with Larry Horowitz
and V. Ramaswamy.

Zhengzhao (Johnny) Lu, a visiting faculty
member from the City College of New
York - CUNY, will arrive in March to
work with Leo Donner.

Departures

In late November, **Xianglei Huang**, a
visiting research scholar from the
Department of Atmospheric, Oceanic, and
Space Sciences at the University of
Michigan, returned to his home institution
after 3 months in Princeton. While here,
Xianglei collaborated with V. Ramaswamy
and his group.

In mid-December, AOS Postdoc
Angelique Melet accepted a postdoctoral
position at CNES/LEGOS in Toulouse,
France. (See *Research in Action* profile.)

James Watson, a postdoc in the Sarmiento
group, accepted a research position with
the Stockholm Resilience Centre at the
University of Stockholm in late December.
His research aims to improve governance
of marine systems and mitigate the impact
of these disturbances. His work focuses on
understanding crucial feedbacks between
physical, ecological and social processes.

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