Welcome

It's hard to believe we are already half way through the 2015-16 academic year! It's been another busy year in ESS. We welcomed two new faculty members, Dr. Elizabeth Crook and Dr. Alex Guenther, and have been busy renovating and maximizing space in Croul Hall to allow our research to expand and grow in new directions.

Congratulations are in order for Dr. Michael Prather who has been named UCI Distinguished Professor. "This title is used to recognize scholars who have demonstrated unusual academic merit and whose continued promise for scholarly achievement makes them of exceptional value to the university." ESS and UCI are indeed lucky to have him.

Our first year graduate students have been hard at work completing their core courses. Our good friends and long-time supporters, the Jenkins Family, generously provided some of the funding to allow them to focus on coursework in their first year. We look forward to hearing about the students’ research ideas in the spring, when we will be dedicating a seminar room to honor the Jenkins’ long time commitment to and support of ESS.

As we look towards spring we are excited about welcoming prospective graduate students to campus. ESS is a special place where scientists from many backgrounds come together for a common purpose. I encourage everyone to share with our visitors, and others, about what brought you to ESS, how this department is unique, and what continues to inspire you.

Warmly,
Gudrun Magnusdottir, Professor and Chair
Department of Earth System Science

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Front Cover: Massimo Lupascu | Back Cover: Aparna Krishnamurthy
Events: AISI ESS students in Anza Borrego - Jorge Alex Flores | Radiocarbon Shortcourse students - Claudia Czimczik
Faculty Spotlight: Photos provided by Alex Guenther and Elizabeth Crook
Alumni Spotlight: Photo provided by Stephen Chen
Graduate Student Spotlight: Photos provided by Johann Lopez and Hrishik Chandanpurkar
Data Science Initiative Fellows: Photos provided by Gregory Britten, Jessica Wang and Morgan Gorris
Content and Design: Dana Link-Herrera

Honors & Awards

Congratulations to our newest Ph.D. graduates!

Alysha Coppola
Forrest Hoffman
Pei-Yuan Hsieh
Xin Li

Gergana Mouteva
Ashley Payne
Tyler Sutterley
Hongying Yang

Professor KATE MACKEY received the Kavli Fellow of the National Academy of Sciences and was one of the first AAAS Marion Milligan Mason Awardees.

Congratulations to the ESS graduate students who were among the 2015 UCI Data Science Initiative Graduate Summer Fellows: GREGORY BRITTEN, MORGAN GORRIS and JESSICA WANG (read more on page 9-10).

Congratulations to ESS graduate student CLAYTON ELDER, winner of the 2015 United States Permafrost Association Early Career Travel Grant. Clayton Elder was selected for this award opportunity based on the quality of his application and the importance of his research topic to the advancement of permafrost science.

Professor KEITH MOORE was selected as the recipient of the 2015 Community Earth System Model (CESM) Distinguished Achievement Award. Professor Moore has made significant contributions to the development of the ocean ecosystem and biogeochemical components of the CESM project over the years.

Professors JAMES RANDERSON, ERIC RIGNOT and ISABELLA VELOCIGNA have been named among the world’s most influential researchers on the Thomas Reuters 2015 Highly Cited Researchers list.

Professor ERIC RIGNOT was named one of 2015’s 100 Most Influential in Orange County for his groundbreaking research on the melting of glaciers.

Professor MICHAEL PRATHER was awarded the title of UCI Distinguished Professor, in recognition of his contributions to this campus and to his continuing study in atmospheric and climate science, in addition to receiving the 2015 Clean Air Award.

Congratulations to ESS graduate student ASHLEY PAYNE for being selected as a President’s Postdoctoral Fellow at the University of Michigan.
AISIESS is seeking undergraduate students to conduct field research and cultural activities. In the university environment, learn study skills, conduct field research and camping on the UC Irvine campus where students will engage in the university environment, learn study skills, and attend field trips and cultural activities. AISIESS is seeking undergraduate students to serve as paid Resident Assistants.

Participants will spend the first week conducting field research and camping on the La Jolla Band of Luiseño Indians Reservation. The second week will be spent on the beautiful UC Irvine campus where students will engage in the university environment, learn study skills, and attend field trips and cultural activities. AISIESS is seeking undergraduate students to serve as paid Resident Assistants.

For more information please visit [sites.uci.edu/aisiess](http://sites.uci.edu/aisiess)

**Radiocarbon in Ecology and Earth System Science**

The Radiocarbon Short Course will expose participants to the uses of radiocarbon in ecology and Earth system science. Classroom activities provide an overview of radiocarbon in the current and past global carbon cycle as well as in the atmosphere, oceans and terrestrial ecosystems. Hands-on activities focus on creating a tracer-free lab environment and avoiding contamination in the field and lab, collecting samples in the field, choosing standards and blanks, processing and analyzing samples in the laboratory, and analyzing and interpreting radiocarbon data.

The program is seeking participants with broad interests in ecology and Earth system science who are planning on, or are currently using radiocarbon techniques as part of their research, and wish to expand their understanding of this important and useful tool. This course is suitable for graduate students, postdoctoral scholars and researchers, and welcomes others with a strong interest.

For more information please visit [ess.uci.edu/radiocarbon](http://ess.uci.edu/radiocarbon)

**American Indian Summer Institute in Earth System Science**

ESS Professor Kathleen Johnson will once again host the American Indian Summer Institute in Earth System Science (AISIESS), a two-week residential summer program for Native high school students, fully funded by the National Science Foundation. Going into its fifth year, the program was created to address the critical need for Earth and environmental professionals within tribal communities, and encourage higher education amongst Native American youth.

Published August 2015, Science Magazine’s Water Security Debate Series, *Watching Water: From Sky or Stream?*, featured ESS professors JAY FAMIGLIETTI and ISABELLA VELICOGNA in their contribution, *Satellites provide the Big Picture. “*Satellite observations have revolutionized our understanding of hydrology, water availability, and global change, while catalyzing modern advances in weather, flood, drought, and fire prediction in ways that would not have occurred with relatively sparse ground-based measurements alone.”

Citing his recent paper published in the journal Nature, Professor STEVE DAVIS was interviewed for the New York Times article, *China’s Carbon Dioxide Emissions May Have Been Overstated by More Than 10%,* discussing how much responsibility China bears for global warming, compared with other nations, and the inaccuracies surrounding measurements of China’s Carbon Dioxide emissions.

Published August 2015, *EPA Ozone Mandates,* featured in the US News article, *National Parks Fail to Meet Ozone Standards,* discussing how power plants have done a great job cleaning up their emissions and ozone-causing pollutants.

Published November 12, 2015. “There are clear warnings that the ice sheets have entered a phase of dangerous and unknown instability ... a conclusion borne out by the ice-sheet data he scrutinizes every week.”

Professor James Randerson discusses his research with Scientific American in the article, *El Niño Could Ignite Amazon, Drench California,* published December 16, 2015. “This El Niño, which has helped trigger more than 100,000 fires in Indonesia and spewed an estimated 1.75 billion metric tons of carbon dioxide equivalents into the atmosphere, will next threaten tropical forests in Southeast Asia and in southern Mexico, Guatemala and other countries in Central America,” said James Randerson.

Professor Saewung Kim was featured in the US News article, *National Parks Fail to Meet Ozone Standards,* discussing how power plants have done a great job cleaning up their emissions and ozone-causing pollutants.

Professor Adam Martiny, introduced a new campus initiative, *UCI OCEANS,* which aims to create connections between the university and the public on the topic of ocean issues. The effort will break new ground in another way: forging unprecedented links among science, social science and the arts, as well as governance and law, to improve the national coastal environment and the well-being of those who live there.
The Department of Earth System Science welcomes our new faculty!

**Faculty Spotlight**

**Professor ALEX GUENTHER** is a leading expert in measuring and modeling the processes controlling biogenic trace gas emissions into the atmosphere and the associated impacts on air quality and climate. He earned a Ph.D. in Civil and Environmental Engineering from Washington State University in 1989. He was head of the biosphere-atmosphere research group at the National Center for Atmospheric Research (NCAR) for over two decades and led more than 40 multidisciplinary field studies across the globe and the development of biogenic emission models that are widely used by the scientific and regulatory communities. He was a Laboratory Fellow at the Pacific Northwest National Laboratory (PNNL) and is now a Professor of Earth System Science at the University of California, Irvine. Guenther is an American Geophysical Union (AGU) Fellow, an ISI highly cited researcher and recipient of the AGU-AS Kaufman award and UCAR outstanding publication award. He serves as the Co-Chair of the International Geosphere Biosphere Program (IGBP) integrated Land Ecosystem-Atmosphere Processes Study (iLEAPS) and was a contributing author to IGBP synthesis and Intergovernmental Panel on Climate Change (IPCC) assessment reports. He is a member, and past Co-Chair, of the IGBP Global Emissions Initiative (GEIA). He is also a member of the editorial boards of the Atmospheric Chemistry and Physics, Geoscientific Model Development, and Elementa journals. Nearly 300 of his peer-reviewed publications have appeared in scientific journals and together have received more than 16,000 citations reported by Web of Science.

**Dr. ELIZABETH CROOK** received her undergraduate degree from Stanford University, where she graduated in 2006 with honors in Human Biology. She then joined the Teach for America program and served for two years in New York City, teaching middle school science in the Bronx. During her time in New York, she obtained her Masters in Education from Pace University. Elizabeth returned to California in 2008, and began a Ph.D. in biogeochemistry at the University of California, Santa Cruz. Her dissertation focused on the impacts of ocean acidification on calcifying corals and coral reef ecosystems. Elizabeth was excited to join UC Irvine in the summer of 2015 and is looking forward to integrating her love of teaching with her enthusiasm for the Earth sciences.

**Where is the most exciting place your research has taken you?**

Most of my dissertation research was focused on corals of the Mesoamerican Barrier Reef off the coast of Quintana Roo, Mexico. I'm quite partial to any coral reef and have been fortunate that my research has allowed me to dive in some incredible locations (Tahiti, Mexico, Hawaii, and the Great Barrier Reef).

**What is your favorite hobby?**

Hiking, reading, swimming, sewing, and anything to do with the beach.

**What are you most excited about in the Irvine/OC area?**

Spending as much time at the beach as possible and learning how to surf!
When President Obama spoke at UCI’s Class of 2014 graduation commencement ceremony, he spoke extensively on climate change. I thought it was such an inspiring speech that I decided to send a hand-written letter to President Obama thanking him. In September of 2015, I received a phone call from the White House saying that my letter had been read and the Obama administration wanted to invite me to a White House State Dinner in honor of the President of China, Xi JinPing.

I took my mother as my plus one and we were off to possibly the highest class dinner we will ever attend in our lives. Upon entering the White House, we were greeted by trays of champagne; we each took a glass and proceeded to explore. There were beautiful sitting rooms, libraries stocked with books from floor to ceiling, and rooms filled with each President’s unique set of fine china selected for his term in the White House. Gorgeous, and great photo opportunities!

For dinner, we ate a four course meal – most of the dishes included hints of Chinese cuisine. Our meal included mushroom soup, lobster, lamb, and a rich lemon bread pudding for dessert. After dinner, we moved over to another room where we experienced a live performance by R&B artist, Ne-Yo. He gave a phenomenal performance and an amazing conclusion to a magical night. It was such an honor to be invited to such a high profile event all because of a thank-you letter.

Stephen Chen

As an undergraduate in the ESS department, I worked in the Martiny research group looking at variation in several variables as a function of growth rate in a major group of Cyanobacteria. I wished to continue such work, and was fortunate enough to be welcomed by Dr. Mackey into the ESS Ph.D. Program. There, I will investigate the toxicity of ambient Copper concentrations on the growth/dynamics of respective phytoplankton communities. This work will be multidisciplinary and will involve extensive culturing in the aim of parameterizing the growth-limiting thresholds that are known to vary between functional groups. I was also fortunate in receiving the NSF Bridge to the Doctorate fellowship upon admittance to the program. Through this fellowship, I was able to participate in the Graduate Division’s Competitive Edge 8-week program during the past summer, and was allowed to begin some of my research early. Currently, my work in the lab has slowed down, with courses being my main focus, however, I do sample water from the Newport pier three days a week in an effort to augment the long time series that has been accomplished by the members of the Martiny lab. I am also in the early stages of a review paper on the toxicity of copper to nitrogen-fixing diazotrophs, which I hope to increase understanding of.

By Johann Lopez

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By Hrishikesh Chandanpurkar

I’ve always been intrigued by the natural world. Having dabbled in life and Earth sciences, and in the built environment, I found myself being equally fascinated by all the spheres of nature and reluctant to specialize in just one for the rest of my life. I realized that natural processes don’t exist in isolation, so why study them so? That’s when I was introduced to, and quickly found a home in, the discipline of Earth system science. Being in ESS has enabled me to study several spheres of the natural world while exploring their connections. In other words, exploring the Gaia principle, but scientifically! My current research explores the connection between land hydrology and oceanography by studying global continental discharge, and its effects on the ocean. I use modern satellite data with global coverage to provide more holistic estimates of global discharge in a format useful for ocean model forcing. Since August, I have been visiting the National Corporation for Atmospheric Research (NCAR) as a part of their Advanced Study Program as a Graduate Student Visitor. Here, I work further towards my research goals as I conduct ocean modeling experiments to understand how changes and uncertainties in discharge forcing affect the ocean. Visiting NCAR gives me the experience of working in a non-university setting, and provides insights into the work life of full-time scientists. The visit has helped me connect with several brilliant scientists and has facilitated discussions and collaborations. I highly recommend my fellow students to actively seek such outside-university experiences.
Unlike studies examining how animal and plant species will respond to climate change, few studies have focused on fungal species’ response. Projected changes in climate may alter a fungal community’s composition and abundance, and also redefine species’ habitable environments. My Data Science Initiative project used Coccidioides (Cocci) as an agent to study these larger implications.

Cocci causes the incurable, infectious disease called valley fever, which is endemic in the southwestern U.S. where the fungal species resides in the desert soils. Valley fever is contracted by the inhalation of airborne spores and causes symptoms ranging from short term, flu-like illness to severe, long term morbidity and fatality. The number of reported cases throughout the Southwest has recently fluctuated and increased for unknown reasons, causing concern.

My project had three goals: (1) create the first robust valley fever incidence database, (2) collect and analyze soil samples to define the environmental conditions in which Cocci lives, and (3) use these data in combination to predict where valley fever hotspots may occur, and what new locations may be suitable for Cocci to survive due to climate change. I completed a soil and air sampling transect in collaboration with a graduate student in Ecology and Evolutionary Biology, in which we collected over 150 samples at 60 sites across five states (Figure 1). This was the first extensive spatial sampling for Cocci. The setup of the air sampler can be seen in Figure 2, with the skyline of Las Vegas, NV in the background.

By Morgan Gorris

The most exciting aspect of the Data Science Summer Fellowship Program was the opportunity to collaborate with the Statistics Department, which is something I have hoped to do since I began my Ph.D. last October.

My research with Dr. Francois Primeau focuses on ocean carbon budgets and how to empirically model them using ocean tracer data and global circulation models. With a background in statistics, my goal is to focus on the development of the statistical methodology. The Data Science Summer Fellowship Program was the key to synthesizing this collaboration which I hope will continue through my degree and have meaningful contributions to my work. I connected with Yaming Yu, a statistician interested in applications of High Dimensional Markov Chain Monte Carlo. Coincidentally, that is the methodology I hope to develop within our ocean modeling framework. Francois and I couldn’t be happier. So I extend my great thanks to the Data Science Initiative for supporting our work and beginning what I think will be a big chapter of my time at UCI.
ESS Alumni - We want to hear from you!

Share your story with us for your chance to be featured on our website or in the next edition of “the Dynamic Earth”

ess.uci.edu/alumni or email essinfo@ess.uci.edu