

Autumn 2017

# Atmospheric Circulation

Newsletter of the University of Washington Atmospheric Sciences Department

## Studying the effects of Southern African biomass burning on clouds and climate: The ORACLES mission

by

Professor Robert Wood, Michael Diamond, & Sarah Doherty

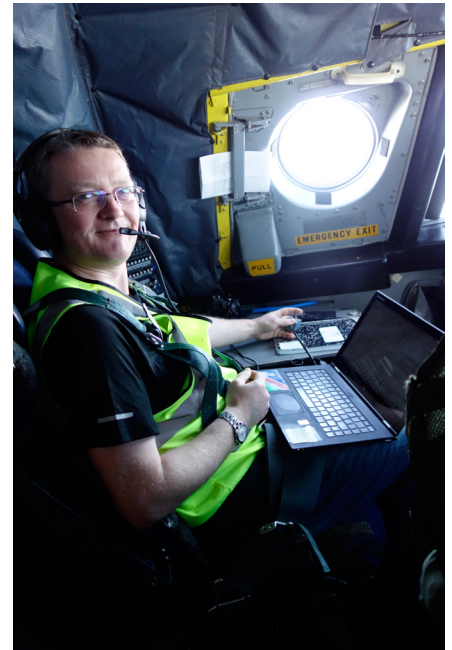
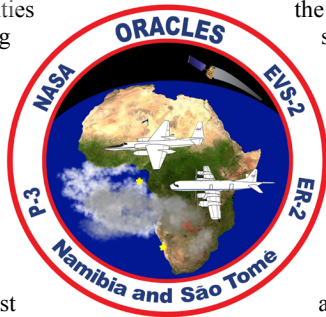
Tiny aerosol particles, emitted by everything from tailpipes to trees, float above us reflecting sunlight, seeding clouds and absorbing solar heat. How exactly this happens – and how it might change in the future – is one of the biggest uncertainties in how humans are influencing climate.

In September 2016, three University of Washington scientists took part in a large NASA field campaign, Observations of Aerosols Above Clouds and their Interactions, or ORACLES, that is flying research planes around clouds off the west coast of southern Africa to see how smoke particles and clouds interact.

ORACLES is a five year program, with three month-long aircraft field studies, and is led by Dr. Jens Redemann from NASA Ames Research Center in California. Department of Atmospheric Sciences professor Robert Wood serves as deputy principal investigator for the program, and spent a month in Namibia in September 2016. Also participating from the UW are Dr. Sarah Doherty, a research scientist with the UW Joint Institute for the Study of the Atmosphere and Ocean, and graduate students Michael Diamond and Hans Mohrmann.

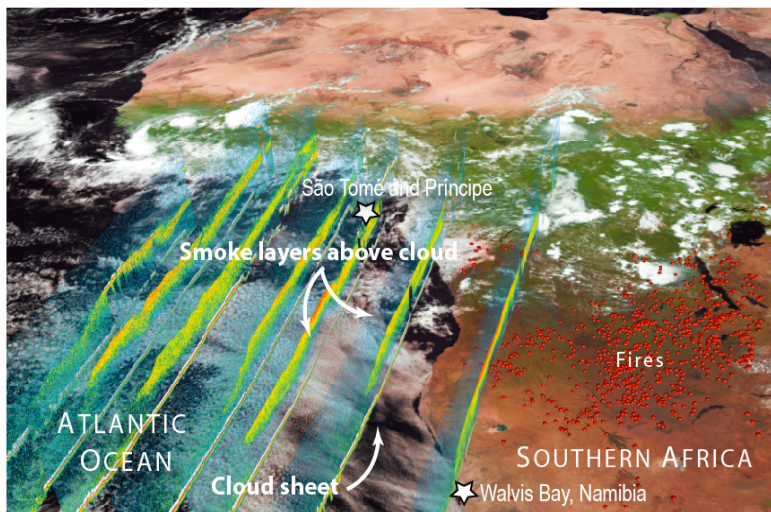
Fires, mainly associated with dry season agricultural burning on African savannas, generate smoke, a chemical soup that includes a large quantity of tiny aerosol particles. This smoke rises high in the atmosphere driven by strong surface heating and then is blown west off the coast; it then subsides down toward the cloud layer over the southeastern Atlantic Ocean. The interaction between air moisture and smoke pollution is complex and not well understood. Southern Africa produces almost a third of the Earth's biomass burning aerosol particles, yet the fate of these particles and their influence on regional and global climate is poorly represented in climate models.

The ORACLES experiment is providing multi-year airborne observations over the complete vertical column of key parameters that drive aerosol-cloud interactions in the SE Atlantic, an area where there are large inter-model differences in how aerosols impact the Earth's radiative budget. In this region, there are three key ways in which the presence of biomass burning aerosol particles can impact radiation. First, particles



Rob Wood acts as flight scientist on a Sept. 6 flight, coordinating between scientists and crew and deciding where to fly next. Photo: Sarah Doherty/University of Washington.

ORACLES — Continued on page 12



Numerous agricultural fires (red dots) over central southern Africa generate a dense plume of aerosol particles (seen in the yellow-red curtains sampled by the CALIPSO spaceborne lidar). This smoke travels westward over the southeastern Atlantic Ocean, where an extensive deck of low clouds is situated (white colors below the aerosol layer). The first year of airborne sampling took place based out of Walvis Bay, Namibia in September 2016. The second phase, during August 2017, will be based out of the small island nation of São Tomé and Príncipe.

## Alumni News

**Buzz Bernard** ('63 B.S.) retired from the U.S. Air Force, where he finished out his career as the senior Reserve weather officer in Air Combat Command. He later retired from The Weather Channel in Atlanta as a lead forecaster. He didn't remain retired (twice-retired?) for long. He embarked on a late-life profession as a novelist. He now has five published novels, including a number-one best seller on Amazon's Kindle. Not surprisingly, most are weather-themed thrillers: EYEWALL (the best seller), PLAGUE (not weather themed), SUPERCELL, BLIZZARD, and CASCADIA (not weather themed, but set against the Cascadia Subduction Zone--He used a couple of UW profs as tech advisors). He is currently at work on novel number six, FIREWIND, an historical thriller with a backdrop of Oregon's 1933 Tillamook Burn. There's a big weather component in this drama.

**Katie Boyd** ('07 B.S.) received a master's degree from Colorado State University (CSU) in 2011 in Atmospheric Science (working with Christian Kummerow; thesis subject was on effects of aerosols on clouds and precipitation). Following that, she became more interested and involved in educational outreach and science communication. She then went back to school in an interdisciplinary program at CSU and received a second master's degree in 2016. Her second degree was in Ecology (the Graduate Degree Program in Ecology), but since it was interdisciplinary, she focused on education research and studied an outreach program developed by a professor in the Atmospheric Science department; specifically, how he communicated about science through this program and the impacts on student understanding of the nature of science. She is currently working at the Exploratorium in San Francisco as a Research & Evaluation Coordinator.

**Scott Braun** ('95 Ph.D.) was an NCAR Advanced Study Program postdoc (1995-1997), and worked with Richard Rotunno and Joseph Klemp on idealized modeling of fronts moving

over steep 2-D orography. He joined NASA Goddard in 1997 and has primarily worked on hurricanes, including many field campaigns. He co-lead the Genesis and Rapid Intensification Processes (GRIP, 2010) experiment and was PI of the Hurricane and Severe Storm Sentinel (HS3) experiment (HS3, 2010-2015). Bob Houze was involved in both of those campaigns and it was great working with him on them. Scott also had **Deanna Henge** ('11 Ph.D.), **Anthony Didlake** ('12 Ph.D.), and **Jen DeHart** ('17 Ph.D.) involved in HS3. He was Project Scientist for the Tropical Rainfall Measuring Mission (TRMM) from 2008-2017. He is currently the Project Scientist for the Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats (TROPICS) mission, which will use a constellation of Cubesats with microwave imagers/sounders to study tropical cyclones (expected to launch in late 2019 or in 2020). The mission is led by MIT/Lincoln Labs and is funded by NASA's Earth Venture Program (see <https://tropics.ll.mit.edu/CMS/tropics/tropics-mission-implementation>). Scott is also a NASA deputy project scientist for the GOES-R program. NASA builds and launches this new generation of GOES satellites, NOAA operates them once fully checked out.

**Bonnie Brown** ('14 Ph.D.) was hired as the Course Development Program Coordinator at the National Disaster Preparedness Training Center in Honolulu, HI. In her new position she develops FEMA-certified course material on recognizing, assessing, and understanding natural hazards for emergency managers, first responders, government employees, utility operators, and operations managers across the nation.

**Thomas Cheng** ('81 Ph.D.) is still employed even though he is eligible for civil service retirement, but unfortunately he has left the field of atmospheric sciences, not because he no longer loves this field, but primarily because of family situation and the great difficulty in seeking long term position in his geographical area, Washington DC. He is now a linguist for the Department of Justice. He made a six figure income, but he really hates to have been forced

to leave atmospheric sciences. He knows **Dean Churchhill** ('88 Ph.D.) has left the field too. He still loves to watch and read about hurricane research. After he retires, if he is still healthy, he WILL return to atmospheric sciences, self-funded.

**Ioana Dima-West** ('05 Ph.D.) is currently working for a Reinsurance Broker, Willis Re, in London UK, where she heads up a team called "Model Research and Evaluation." The team is focused on validating, comparing and eventually adjusting catastrophe models, the main tools of estimating risks from natural catastrophes (storms, earthquakes, flood) in the insurance/reinsurance industry. She is married to Jason West, a teacher/musician, and together they have two boys, Paul (8) and Nico (5).

**Garth Ferber** ('86, B.S., '90, M.S.) will retire at the end of 2017 after 30 years of federal service in Seattle at the National Weather Service and at the Northwest Avalanche Center.

**Brian Garcia** ('03 B.S.) has been promoted to Warning Coordination Meteorologist (WCM) with the National Weather Service in Monterey California, as of early 2016. In this capacity he is responsible for partnering with area Federal, State, and Local agencies to ensure they have weather data and an actionable interpretation of the data. This move from operational meteorologist to WCM has come with a large learning curve and significant amounts of travel. That said, this is likely the best position he has held in weather. It allows him to engage with the stakeholder community and learn first-hand the impacts of weather prediction and communication on their partner's operation.

**Steve Ghan** ('79 B.S.) is still developing and applying global climate models at the Pacific Northwest National Laboratory in Richland Washington, where he's worked since 1990. In September 2016 he stepped down from JGR-Atmospheres after ten years as an Editor and four years as Editor-in-Chief. He's also volunteering with Citizens Climate Lobby; he chaired the 2017 Regional Conference in Seattle. He is a steward for a five mile section of the Pacific Crest Trail.

Alumni News — Continued on page 6

## Chair's Column

All of us in atmospheric science know that forecasting is hard. My long-range forecast from June 2012, when I stepped down after serving 5 years as chair of the department turns out to have been a bust. Much to my surprise, as Greg Hakim completed his 5-year term as chair and returned to the regular professorial ranks, I found myself back in the chair's office. My new long-range forecast is that I will not be in this office for a full 5-year term – we'll see how that works out.

Among the pleasures that come with the office of chair is the chance to meet with our alumni and hear about their lives. I'm really pleased that so many of you have sent us updates this year. The alumni news section of this year's Atmospheric Circulation is larger

than ever. I hope you enjoy it as much as I did. Please continue to send us news about your current family or activities that we can share in next year's edition of Atmospheric Circulation.

Another exciting part of the chairship is the chance to encourage new and innovative changes in the department. A great example of such changes, organized under the previous chair, is the recent intensive instruments course (see p. 3) developed by Bob Houze and Lynn McMurdie in concert with scientists at the Pacific Northwest National Laboratory in Richland. This new class was made possible by funds contributed by donors to our department. We are extremely grateful for their support and for all the donations we have received from our alumni and friends. Your help this past year has made a tremendous difference. We hope we can count on you again this year.

Dale Durran



## Meeting of the Minds: UW and Pacific Northwest National Laboratory Join Forces for an Innovative Course

by

Katie Dorsey PNNL, Lynn McMurdie, and Robert A. Houze Jr., UW Atmospheric Sciences

While doing research at Pacific Northwest National Laboratory and teaching at the University of Washington, Bob Houze saw great potential in a possible collaboration between the atmospheric sciences departments at those institutions. Early this fall, Houze's vision finally became a reality.

Thanks to the generosity of a few donors to the department, ten UW Atmospheric Sciences students received funding to travel to Richland and take a two-week instrumentation short course taught by PNNL scientists and engineers.

Focusing on themes such as calibration and accuracy, the instructors developed lectures on ground and airborne instrumentation and measurements, data management, atmospheric chemistry and cloud microphysics.

The participating students came from a wide-range of research interests and expertise, but they all shared a desire to learn more about state-of-the-art, research-quality instrumentation that they may potentially use in their own research or future careers.

"To actually see the insides of some of these instruments and what all goes into obtaining the actual measurement was extremely rewarding," said Robert Conrick, a third-year graduate student focusing on weather model evaluations.

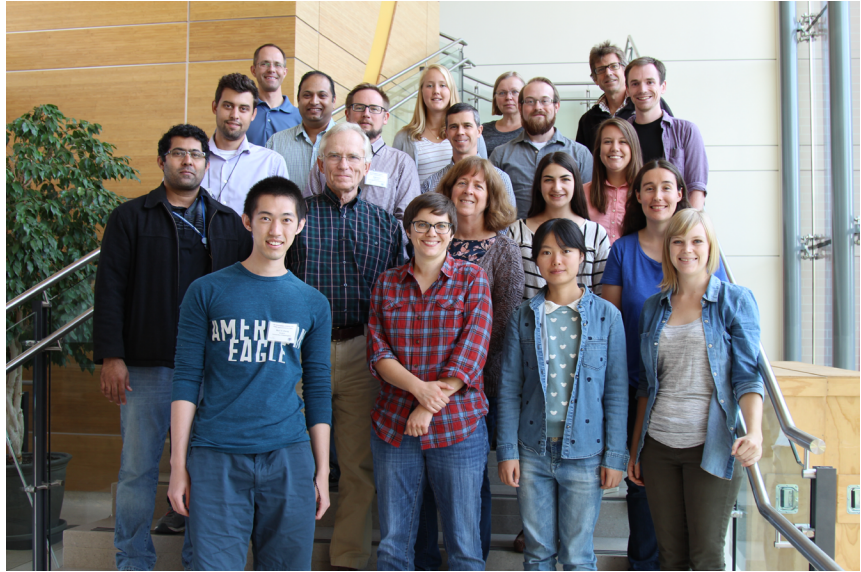
This unique and creative course on atmospheric instrumentation was made possible by the generous support of donors to the UW Department of Atmospheric Sciences fellowship funds including the Hobbs Quality Enhancement Fund, Hamilton Student Support Fund, Warren Endowed Graduate Fund, Businger Endowed Fellowship, Fleagle Support Fund, and Leovy Endowed Graduate Fund. These departmental fellowships covered the lodging and transportation expenses for the students and instructors during their visit to PNNL.

Laura Riihimaki of PNNL's Atmospheric Sciences and Global Change Division assisted Profs. Houze and McMurdie in organizing the course. Riihimaki recruited fellow PNNL scientists to serve as course instructors.

These instructors reinforced their lectures through experiments, demonstrations, computer activities, or—in the case of aircraft instructor Jason Tomlinson—close examination of the Gulfstream-I aircraft that PNNL operates for the U.S. Department of Energy. The plane helps collect airborne measurements in and out of clouds for field campaigns of the Department of Energy Atmospheric Radiation Measurement user facility.

"I wanted the students to get an idea of the whole end-to-end process from sticking an instrument out in the field to bringing in the data, doing the data quality, looking at what it really means, and then how would you archive it so that people can use it in the future," Riihimaki said.

This course provided practical experience and theoretical foundations in how observations are made and to see what it would be like to work in a national lab. The students will receive credit for the course and each student is currently following up by completing a project under the guidance of a PNNL scientist that highlights one of the topics of study using research data available from PNNL.



Group picture taken on the last day of class. From bottom row left: Wei-Yi Cheng, Laura Riihimaki, Qiaoyun Peng, Megan McKeown, Nitin Bharadwaj, Robert Houze, Lynn McMurdie, Rachel Atlas, Kelly Balmes, Andrew Geiss, Gourihar Kulkarni, Bradley Isom, John Shilling, Robert Conrick, Jessica Haskins, Samuel Pennypacker, Ian Kraucunas, Eliza Dawson, Alla Zelenyuk-Imre, Rob Newsom.

"I feel much more confident to conduct a field experiment after the course, as I absorbed a lot from the practical experience and theoretical foundations that the PNNL scientists have instructed us during this intensive two weeks," Qiaoyun Peng, a second-year graduate student said.

Jessica Haskins, a fourth-year graduate student who uses aircraft instrument data in her research, called the class an "unprecedented opportunity."

"This course was by far the one I've learned the most from in graduate school," Haskins said, "and I'm so thankful for the partnership between the UW and PNNL that was able to allow us to learn from the

people who operate, build, and process that data every day."

Those kinds of responses have Houze believing that similar PNNL-UW courses could be just as successful in the future.

"We'd love to do this every two years," he said.

For more information on how to support vital educational opportunities like this one, please contact the Department of Atmospheric Sciences' Advancement liaison, Gerald Cournoyer, at [gcourn@uw.edu](mailto:gcourn@uw.edu) or 206-221-0562.



With the Gulfstream I aircraft in the background, Jason Tomlinson (left) explains making aircraft measurements to the UW students.

## Spotlight on Erika Navarro (PhD '16)

by  
Jennifer DeHart



Earlier this summer, Hurricanes Harvey, Irma, and Maria left trails of devastation along the Gulf Coast and in the Caribbean. If you tuned into the Weather Channel's coverage, you were unlikely to miss Erika Navarro (PhD '16), who spent numerous long days updating viewers with the latest observations and forecast. Deftly managing weather data, interviews with field reporters, and updates from local officials, Erika's poise shone through each broadcast.

Erika's unconventional journey from graduate student to on-air expert began with a fortuitous meeting. A friend introduced her to Chris Warren, a meteorologist on the Weather Channel, which led to a conversation with senior hurricane specialist Bryan Norcross and the offer of an unpaid internship. With the support of her advisor, Prof. Greg Hakim, Erika spent two summers behind the scenes in Atlanta supporting on-air meteorologists. Near the end of graduate school, she was offered a permanent job and began working as an on-camera meteorologist and expert in late 2016.

In contrast to the constant routine of graduate school, her new schedule can be unpredictable, especially if inclement weather is in the forecast. Additionally, even though a typical day might only include a couple hours on air, her day is packed with meetings, show preparation, and helping out around the newsroom. Her on-air duties encompass everything from forecasts to in-depth yet accessible descriptions of meteorological concepts (e.g., orographic enhancement). While she determines how the science is communicated, Erika says she

"work[s] closely with other team members and weather producers to create a coherent story." Her experience in graduate school was great preparation for preparing forecasts, communicating uncertainty, and letting the science be interesting without exaggerating it. But the quick pace of television poses unique challenges. "Sometimes I think I'm going to be talking about one thing," Erika reveals, "but then either during the commercial break or ... in the middle of my segment, something changes." There is no time to dwell on mistakes and she has learned to trust her knowledge of synoptic meteorology.

Erika's work so far has brought her the admiration of colleagues and executives, but she says the messages from friends have been some of the most gratifying. "It's been incredibly rewarding to have seen a dream come true, and realize just how many people ... have helped me throughout the years," says Erika. "I can look back now and appreciate the difficulty and the struggle and enjoy where I am and what has been given to me."



## Undergraduate and Faculty Research

The following undergraduate students and faculty members worked together this year:

**Daniel Ahrens, Jacob Hendrickson** / Cliff Mass: High-Resolution Ensemble-Based Regional Climate Modeling

**Kallista Angeloff, Jonathan Chriest, Thomas Lamb** / Dargan Frierson: The effect of SST gradients on midlatitude storm intensity

**Daniel Barnes, Ben Celsi, Louis Dinh** / Dargan Frierson: EarthGames: Explaining environmental science concepts with interactive digital media

**David Bonan** / Dargan Frierson: The Role of Topography in Keeping Europe's Temperatures Warm

**Eliza Dawson** / Abigail Swann: Investigating the impact of land surface properties on the climate system / Dargan Frierson: Southern African orography impacts on low clouds and the Atlantic ITCZ in a coupled model

**Mason Friedman, Jamin Rader** / Dargan Frierson: Analysis of a Coupled Atmosphere-Ocean GCM

**Julia Goldblatt** / Lyatt Jaegle: Observed trends in acid wet deposition over the United States

**Jonathan Kuehn, Edward O'Brien** / Nicholas Bond: Solar Irradiance Monitoring: Measurements and Applications

**Eric John Page** / Daehyun Kim: Process-oriented diagnosis of tropical cyclones in high-resolution GCMs

**Thomas Schuldt, Kenneth Wohl** / Lynn McMurdie: The modification and enhancement of precipitation as midlatitude cyclones from the Pacific Ocean encountered the Olympic Mountains using precipitation and radar data collected during the Olympic Mountains Experiment (OLYMPEX)

## Consider joining "Huskies@Work"

You can help out a Husky student with Huskies@Work, UWAA's job shadowing program. Being part of Huskies@Work is easy, requiring just a few hours or a day of your time. Local and non-local alumni are invited; we'll match you with a student interested in your field, and together you'll find a time to connect in person or virtually.

You can give back — on your schedule and on your terms. Our next Huskies@Work opportunity is in May 2018; applications will be available in April. To learn more, visit: [www.washington.edu/alumni/future-alumni/huskiesatwork](http://www.washington.edu/alumni/future-alumni/huskiesatwork)

## First Year Student, Brian Zimmerman, receives Achievement Rewards for College Scientists (ARCS) Fellowship for 2017-2018 Academic Year

by

Lynn McMurdie

ARCS Foundation Seattle is part of a national, non-profit, volunteer, women's organization that supports the advancement of science and technology in the United States by providing financial awards to academically outstanding US citizens studying to complete degrees in science, technology, engineering, and mathematics (STEM). The Seattle Chapter of ARCS Foundation was founded in 1978, and to date has supported 1,167 fellows with awards totaling more than \$16.3 million. The UW Atmospheric Sciences department is proud that incoming student, Brian Zimmerman, is one of this year's recipients of an ARCS fellowship.

Brian has already been involved in a diverse array of research and community projects. He joined Engineers Without Borders in his freshman year and by sophomore year was a project manager, working with a rural Kenyan community to improve their agricultural and water systems. He took several years off from

studies to pursue permaculture design and organic food production, living and working on several farms in Costa Rica, Canada and the United States. He returned to University of Wisconsin, Madison, to complete his BS in Civil Engineering, and continued on to earn two master's degrees: one in Civil Engineering (Water Resources) and one in Atmospheric and Oceanic Sciences. In his most recent project, he combined his love for sustainable agriculture and science through prototyping a low-cost, low power, open source microclimate monitoring system for a local Wisconsin orchard, with the long-term goal of creating a frost-potential map for the orchard. Here in Atmospheric Sciences at University of Washington, Seattle, Brian will be working with Prof. Lynn McMurdie and Dr. Angela Rowe on the Remote Sensing of Electrification, Lightning and Mesoscale/microscale Processes with Adaptive Ground Observations (RELAMPAGO) field campaign

- a large, multi-national project based in the Sierra de Cordoba mountains of Argentina to study convective initiation and upscale growth of mesoscale convective complexes - the most severe and damaging type of storms seen in the mid-latitudes.

The Seattle Chapter of the ARCS Foundation will celebrate 40 years of advancing science in 2018.

Several students in our graduate program have received ARCS fellowships; they include: 2016 Lucas Vargas Zeppetello (Advisor: Battisti) 2015 Casey Hilgenbrink (Advisor: Hartmann) 2014 Jessica Haskins (Advisors: Thornton & Jaeglé) 2013 Ana Ordonez (Advisor: Bitz) and Andre Perkins (Advisor: Hakim) 2011 Maximo Menchaca (recently received his PhD under Prof. Durran and is now working at Vaisala).

## A Learning Exchange on Climate Impacts in Pohnpei, Micronesia

by

Lauren Schmeisser

The plane started descending gently, and I glanced out my window to see if we were arriving. Minutes passed, and I still couldn't see anything but the deep blue Pacific reaching in every direction. The water was approaching quickly, with no land in sight, and my heart began to race. An impossibly thin strip of sand and trees eventually came into view, and, with a sigh of relief, we landed on a solid sliver wedged between infinite turquoise waters. Sitting there on the tarmac in Majuro, Marshall Islands, a mere 6 feet above sea level, the waves lapped at the runway and it was easy to see how this nation and others around it were so vulnerable to the impending rising waters associated with climate change. This was my first insight of the trip into the starkly urgent matters of climate impacts in the Pacific Islands.

Majuro was only one pit stop of many on the island hopper bound for our final destination- the island of Pohnpei in the Federated States of Micronesia. I was traveling with my fellow IGERT (NSF Integrative Graduate Education and Research Traineeship) fellowship cohort members- an interdisciplinary group of graduate students working together for months planning this trip. We had traveled this great distance from Seattle to learn from Pacific Islanders about the challenges they face due to impacts from climate variability. Additionally, in collaboration with the local NGO Pacific Resources for Education

and Learning (PREL), we were to lead an educational workshop on climate variability for highly motivated Pohnpeian teachers and community leaders.

The climate of the Pohnpeian islands is fascinating. Pohnpei (6.8N, 158.3E) experiences typical tropical heat, and is one of the rainiest places on Earth, receiving more than 160 inches of rain annually on average- some places on the islands receive upwards of 300 inches of rain a year. That is, until an El Niño shifts local rainfall patterns and the Pohnpeian islands experience drought conditions (typically defined by local meteorologists as monthly rainfall totals of less than 5 inches). El Niño creates difficult living conditions for the islanders, as the increased temperatures and decreased precipitation negatively impacts crop yields, decreases availability of drinking water, and diminishes fresh water quality which increases occurrence of waterborne diseases.

Local Pohnpeians told us stories of environmental stresses felt on the island due to anthropogenic climate change, and how these impacts were further compounded by El Niño-related droughts and La Niña-related floods. For these islands, internal and externally-forced climate variability is delivering a one-two punch of difficulties that are becoming extremely taxing to local economies and public health outcomes. It is one thing to read in IPCC reports about



*Landing in Majuro, Marshall Islands en route to Micronesia*

**Learning Exchange** — *Continued on page 8*

## Alumni News...continued

**Jack Herring** ('94 Ph.D.) is Dean of Fairhaven College of Interdisciplinary Studies at Western Washington University, and **Roxane Ronca** ('95 M.S.) is Project Director of NextGen STEM Teacher Preparation, an NSF-funded effort to improve K-12 teacher preparation in Science, Technology, Engineering and Math (STEM) throughout Washington State. They're still happily married, perhaps a little creakier, but overall doing well. Two teenagers keep them busy and humble.

**Aaron Hill** ('12 B.S.) continues graduate studies at Texas Tech under another UW alum, **Brian Ancell** ('06 Ph.D.) and Christopher Weiss. He is evaluating the usefulness of ensemble-based observation targeting methods for high-resolution simulations of severe storms for eventual applications in adaptive sampling with UAS aircraft. He has also jumped head first into the land of observations, taking on a maintenance/technician role of "StickNet" observing platforms in the Vortex-SE project. He aims to take his qualifying exam this summer and graduate by the end of 2018, with an eventual goal to join academia. On a personal note, he married his wife approximately 9 months ago and they bought a house, so life has been quite busy personally and academically!

**Joanne Swanson Kagan (nee Bottoms)** ('84 B.S.) worked part time in the Cloud and Aerosol Research Group, and went on to a long and successful career in the National Weather Service. Starting in Seattle as an intern, she journeyed in Great Falls, MT, then moved to Camp Springs, MD to work at the National Meteorological Center (now the National Centers for Environmental Prediction). Then, she was program manager for various programs at NWS Headquarters, including NOAA Weather Radio, ASOS, and others. She then worked at NOAA Headquarters on a detail, before returning as the Chief of Staff (Executive Director) for NWS. Joanne transferred to the Strategic Planning and Policy Office in 2007, where she was heavily involved in the National Academy of Public Administration study of NWS operations, then guided the Operations and Workforce Study effort to a successful launch before retiring from public service late in 2015. Her husband and she now live in Santa Fe, NM, where she is looking at research of the North American Monsoon and hoping to become involved in local weather and climate studies. They are also busy establishing the Jack Kagan Foundation in honor of her father-in-law who passed away in 2014. She often ponders pursuing an advanced degree now that she has a little time, though they are purchasing horses and with the Foundation their time is filling up rapidly. She has been a member of AMS for decades, and has wonderful memories of working with and learning from Dr. Houze, Dr. Hobbs, Dr. Hegg, Dr. Mass, Dr. Reed, and so many others.

**Bailey Kilmer** ('15 B.S.) graduated UW atmos on the climate track. After he graduated he hiked 250 miles of the PCT with his dad in the Sierra Nevadas. He commissioned into the Air Force and is currently a pilot training in Enid, Oklahoma. He just finished Phase 2 flying the T-6A Texan and tracked to fly the T-1A Jayhawk for Phase 3 which will last just over six months, then he will be assigned a heavy aircraft. He

currently hopes to fly C-17s.

**William K. M. Lau** ('77, Cert.) worked for NASA for over 30 years. He has been retired since 2015 and moved to U. of Maryland, where he is senior scientist at ESSIC, and Adjunct Professor at the Department of Atmospheric Oceanic Sciences. His research is on climate dynamics, tropical convection, aerosol-monsoon climate interactions. He published a profile article on why there are more prolonged droughts and wildfires worldwide in the supposedly warmer and wetter climate in Scientia (UK equivalent of Scientific American): <http://www.scientia.global/professor-william-lau/>. He was also included in a manga (Japanese comic) book from NASA, which features a cartoon version of him talking to Mol (a popular idol for Japanese girls) and her robotic dog about Asian monsoon and climate change, which can be found at <https://science.gsfc.nasa.gov/610/manga.html>.

**Camille Li** ('07 Ph.D.) has been "settled" (more or less) in Bergen, Norway since 2011, first as an Assistant Research Scientist and now as an Associate Professor in atmospheric dynamics at the University of Bergen. She sits in the Geophysical Institute, which was the home of the Bergen School of Meteorology. Her areas of interest are large-scale midlatitude dynamics and climate variability; she still keeps a foot in the paleoclimate world and has expanded to the Arctic (an inevitable development when you live where she does).

**Jeremy MacDonough** ('16 B.S.) was hired by XOJET, a private jet charter company, in June of this year. He will be applying his knowledge of meteorology while flying the Challenger 300, a super midsize category business jet capable of flying at 45,000 feet at .83 mach with a range of 3000 nautical miles. It's a blast!

**Brian Magi** ('06 Ph.D.) was promoted to Associate Professor with tenure in the Department of Geography and Earth Sciences at the University of North Carolina at Charlotte.

**Socorro Medina** ('05 Ph.D.) currently works for Seattle Public Utilities managing one of Seattle's recycling education programs.

**Maximo Menchaca** ('17 Ph.D.) was recently hired as a software engineer at Vaisala in Seattle, WA.

**Philip Mote** ('94 Ph.D.) picked up additional responsibilities as Associate Dean for Strategic Initiatives in the College of Earth, Ocean, and Atmospheric Sciences, a half-time position. A highly respected researcher who works at the intersection of science and society, Dr. Mote is the current director of the Oregon Climate Change Research Institute and the Oregon Climate Service, and was recently elected as head of the American Geophysical Union's Global Environmental Change Section. Dr. Mote's considerable organizational and consensus-building talents will be dedicated to leading a strategic planning process that includes a self-study, external review, and development of a road-map for CEOAS' future.

**Gretchen Mullendore** ('03 Ph.D.), currently Associate Professor of Atmospheric Sciences at the University of North Dakota, was honored this year with the 2017 UND Faculty Scholar Award, which recognizes outstanding achievement in all three areas of research, teaching, and service. Only one of these is given each year for the

whole university.

**Charanjit Pabla** ('12 B.S.) has acquired a job as a radar (research) meteorologist with NASA Wallops Flight Facility in Wallops Island, VA. After doing operational forecasting, he started to miss working with radar, radar data, and precipitation physics. So far, he is loving this job there.

**Kristen Rasmussen** ('14 Ph.D.) was an Advanced Study Program Postdoctoral Fellow at the National Center for Atmospheric Research (NCAR) from 2015-2016 and became an Assistant Professor at Colorado State University in the Department of Atmospheric Science in October 2016.

**Jack Scheff** ('14 Ph.D.) is starting a faculty job in the Department of Geography and Earth Sciences at UNC Charlotte this summer, where he joins **Brian Magi** ('06 Ph.D.) among other atmospheric scientists. Funding will be available for a couple of good M.S. students starting in 2018.

**Jim Steenburgh** ('95 Ph.D.) received the Charles L. Hosler Alumni Scholar Medal from the Penn State University College of Earth and Mineral Sciences for outstanding contributions to the development of science through research, teaching, and administrative leadership. He has been a Professor of Atmospheric Sciences at the University of Utah since 1995 and is author of the book *Secrets of the Greatest Snow on Earth*.

**Roland Stull's** ('75 Ph.D.) free book "Practical Meteorology: An Algebra-based Survey of Atmospheric Science," was updated in summer 2017 to be in color. In the year and a half that the original version has been available as free pdfs online, over 33,000 downloads of chapters were made by over 9,500 users in 121 countries (1,808 cities). You can find his book at [https://www.eoas.ubc.ca/books/Practical\\_Meteorology/](https://www.eoas.ubc.ca/books/Practical_Meteorology/).

**Ryan Torn** ('07 Ph.D.) is currently an Associate Professor in the Department of Atmospheric & Environmental Sciences at the University at Albany, SUNY (since September 2008). His primary research interests remain predictability and dynamics; however, his research interests have expanded into tropical cyclones and midlatitude convection. He has participated in three different field projects since 2010 (PREDICT, MPEX, and SHOUT), all of which each had a predictability component. He has been married to Heather since 2004 and they have three children, Makena (born 2009), Isabel (born 2011) and Isaac (born 2014).

**Reid Wolcott** ('10 M.S.) was promoted to Senior Meteorologist with the National Weather Service in Las Vegas, NV in October 2016. Now in his 7th year with the NWS, he serves as the Program Manager for the Decision Support Services, HAZMAT, and Web Services programs at the office. Reid and his wife Melissa ('06 B.S. ESS) welcomed their first child, Killian Pike Wolcott, to the world on August 9th, 2017.

## Congratulations to Graduates

### Doctor of Philosophy

- Pao Baylon**, *Impact of Stratospheric Intrusions, Regional Wildfires, and Long-Range Transport Events on Air Quality in the Western United States* (Jaffe)
- Cheng Dang**, *Effect of snow grain shape and impurities on snow albedo and its parameterization: China, North America and the Arctic* (Fu/Warren)
- Jennifer DeHart**, *Orographic Modification of Precipitation Processes in a Tropical Cyclone Moving over a Continental Mountain Range* (Houze)
- Karl E. Lapo**, *Constraining the Surface Energy Balance of Snow in Complex Terrain* (Lundquist)
- Maximo Menchaca**, *The Influence of an Orographic Feature on a Mid-Latitude Cyclone* (Durrant)
- Erika L. Navarro**, *Idealized Numerical Modeling Experiments of the Diurnal Cycle of Tropical Cyclones* (Hakim)
- Stephen Po-Chedley**, *On the structure of atmospheric warming in models and observations: Implications for the lapse rate feedback* (Fu)

### Master of Science

- Megan Chaplin**, *Microphysical Mechanisms in Stratiform Precipitation as Observed in OLYMPEx* (Houze)
- Lexie Goldberger**, *Reactive Nitrogen Multiphase Chemistry and Chlorine Activation on Authentic Biomass Burning Aerosol* (Thornton)
- Alex Haugstad**, *Investigating the dependence of radiative feedbacks on patterns of forcing and surface temperature change* (Armour/Battisti)
- Jessica Haskins**, *Inorganic chlorine budget and gas-particle partitioning in the winter lower troposphere over the northeast United States* (Jaegle/Thornton)
- Isabel L. McCoy**, *Identifying Meteorological Controls on Open and Closed Mesoscale Cellular Convection Associated with Marine Cold Air Outbreaks* (Wood)
- Jeremy James McGibbon**, *Skill of ship-following large-eddy simulations in reproducing MAGIC observations across the Northeast Pacific stratocumulus to cumulus transition region* (Bretherton)
- Conor J. McNicholas**, *Advanced Approaches for the Collection, Quality Control, and Bias Correction of Smartphone Pressure Observations and Their Application in Numerical Weather Prediction* (Mass)
- Johannes K. C. Mohrmann**, *Investigating Marine Boundary Layer Aerosol Budgets and Variability* (Wood)
- Pornampai "Ping Ping" Narenpitak**, *Cloud Feedbacks in Limited-Area and Near-Global Cloud-Resolving Simulations of an Aquaplanet in SAM* (Bretherton)
- Kuan-Ting "Andy" O**, *Ultraclean layers and optically thin clouds in the stratocumulus to cumulus transition: depletion of cloud*

- droplets and cloud condensation nuclei through collision-coalescence* (Wood)
- Stephanie S. Rushley**, *Examining changes to the Madden-Julian Oscillation in a warmer climate using CMIP5 models* (Kim)
- Ashly A. Spevacek**, *Dependence of tropical precipitation on changes in cross-equatorial atmosphere and ocean heat transport in global warming simulations* (Frierson)
- Hsiu-Hui "Shelly" Tseng**, *Tropical tropopause layer cirrus and its relation to tropopause* (Fu)
- P. Trent Vonich**, *Hurricane kinetic energy spectra from in situ aircraft observations* (Hakim)
- Nicholas J. Weber**, *Evaluating CFSv2 Subseasonal Forecast Skill with an Emphasis on Tropical Convection* (Mass)
- Jonathan A. Weyn-Vanhentenryck**, *Predictability of idealized deep convection: Influence of error scale and amplitude in various environments* (Durrant)
- Wei Zhao**, *The Diurnal Cycle of Clouds and Precipitation at the ARM SGP Site* (Fu/Marchand)

### Bachelor of Science

- Bentley Barker**  
**Daniel Burke**  
**Tasha Del Pozo**  
**Yusuke Ishiguro**  
**Austin Kleinert-Strand**  
**Jonathan Kuehn**  
**Mingyang Lee**  
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## Scholarships and Awards

- ARCS Fellowship:*  
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**Jefferson Donovan**
- DAAD Fellowship for research in Germany:*  
**Eliza Dawson**
- EPA Fellowship*  
**Jessica Haskins**
- Fulbright New Zealand Award:*  
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**Claire Buysse**  
**Andrew Pauling**

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**Eliza Dawson**

**Kelsie Knowles**

*Doctoral Fellowship Abroad from Peru:*

**Yakelyn Ramos Jauregui**

## Welcome to New Graduate Students for 2017–2018

- Ben Barr**, University of Texas, Austin (Chen)
- Stephanie Bradshaw**, Carthage College, Wisconsin (McMurdie/Rowe)
- Claire Buysse**, College of Saint Benedict and Saint John's University, Minnesota (Jaffe)
- Brittany Dygert**, Seattle Pacific University (Hartmann)
- Litai Kang**, Landzhou University, China (Marchand)
- Edoardo Mazza**, University of Edinburgh, Scotland (Chen)
- Brandon McClung**, Air Force Institute of Technology, Ohio (Mass)
- Yakelyn Ramos Jauregui**, Universidad Nacional Agraria la Molina, Peru (Chen/Zhang)
- Ajda Savarin**, University of Miami (Chen)
- Spencer Tangen**, University of Utah (Mass)
- Emily Tansey**, University of Bremen, Germany (Marchand)
- Andrew Pauling**, University of Otago, New Zealand (Bitz/Steig)
- Brian Zimmerman**, University of Wisconsin-Madison (McMurdie/Rowe)
- Shuting Zhai**, Peking University, China (Alexander)

## Learning Exchange...continued

reduced fishery yields, failing crops, sea level rise, coral bleaching, negative health impacts, and increasing heat waves in the Pacific Islands. It is an entirely more real experience to look into the concerned eyes of a fellow human being as they recount the struggles they feel trying to adjust their lifestyles and get by in the face of rapidly changing environmental conditions that are straining their natural resources. Climate change is making life in Pohnpei difficult, and ENSO-related extremes episodically add to that burden.

Though the observed climate change and ENSO-associated impacts on Pohnpei are grim, the local population is highly motivated to find solutions. The teachers and community leaders that attended our educational workshop on climate variability came eager to learn. Our IGERT team presented the best scientific knowledge we have on ENSO and climate change in the Pohnpei region, and provided the teachers with learning materials and hands-on demonstrations that they can take back to the classroom to share with their students. Most importantly, our team worked to connect the teachers and community with local resources, including the local offices of NOAA, EPA, USDA and the Pohnpei Conservation Society. These organizations, and many more, are actively progressing climate science in Pohnpei, and are developing attainable solutions for local families and schools. National initiatives are being launched on water conservation strategies during times of drought, coastline adaptation, sustainable fisheries practices,



*The IGERT Group with Pohnpeian teachers showcasing climate impacts posters made for local classrooms (Photo Credit: Z. Koehn)*

and robust agricultural techniques adapted for changes in climate. On a local scale, teachers are enthusiastically teaching students about the drivers of climate variability and what can be done to avoid the worst impacts.

The impetus and tenacity of the Pohnpeian people are inspiring to me. As our IGERT cohort continues to work with the group of Pohnpeian teachers, I hope we have provided a useful scientific

perspective to the impacts they feel on the island. As an aspiring climate scientist, I was certainly offered an intimate and compelling narrative to motivate my work in the climate sciences. Our ability to understand and predict the climate system is more important now than ever if we want to help avoid the worst climate impacts for our friends in the Pacific Islands.

## Hurricane Maria: a story from a Puerto Rican far away from home

by  
Ángel F. Adames-Corraliza

My interest in our planet's atmosphere started from a young age with old books that my dad used to buy at my hometown's flea market. Among those books was a 1950s weather book that described all sorts of weather phenomena. It described ice storms, tornadoes, blizzards, and more. For someone growing up in rural Puerto Rico, it was merely a dream to be able to experience anything other than an afternoon thunderstorm. As a kid, it is difficult to understand what extreme weather events mean for the people that live through it; you're just amazed at how beautiful mother nature is. A sobering reality came in 1998 when hurricane Georges made landfall on the island. A category 3 hurricane, it brought extensive wind damage and floods to the island. No book, TV show or internet article can fully describe what it is to be without power and drinking water for weeks. This event led me to pursue a career in atmospheric sciences, which ultimately led me to obtain a PhD from UW in 2016.

I have followed every Atlantic hurricane season since 1998, but 2017 was different. Not

only has it been an extremely active hurricane season, but it has also affected me at a personal level. A few months ago, a friend reached out to me suggesting I should create a page where I could communicate my knowledge of tropical weather to people on the island. Being Puerto Rican and having a PhD would be a welcomed resource with a familiar background. Most people can't distinguish the difference between official sources and amateur sites, so I could guide people towards official resources.

Within a week of creating the page hurricane Irma threatened the island, a category 5 hurricane on the Saffir-Simpson hurricane scale. Major weather prediction models were predicting possible impacts in Puerto Rico and the islands of the Lesser Antilles. In spite of this threat, major news networks were focusing on the potential threat to Florida instead. I denounced this on a post that quickly became popular on social networks. This eventually got into the hands of BBC news, which interviewed me about the hurricane threat.

A bigger threat came shortly afterwards: hurricane Maria. A rapidly intensifying storm, it

made headlines as it became the second category 5 hurricane of the season. Despite the National Hurricane Center (NHC) forecasting a threat for PR many days in advance, many people on the island were unaware of the threat, or ignoring it on the basis that "it wasn't coming." I started doing live feeds on Facebook and was baffled by the questions people had. I got asked "Should I leave a window open when the hurricane comes?", "When should I be back at my house?" and the seemingly obvious "When is this hurricane coming?" It's not that sources of information didn't exist, it's that people either didn't know about them or outright didn't trust them. These Q&A sessions eventually led to interviews from local radio stations and newspapers. I couldn't stress enough how dangerous this hurricane was, that this was going to be like nothing people currently living on the island have ever experienced. I wanted to be wrong, but knew I was right.

Hurricane Maria made landfall in PR on Wednesday, September 20, 2017 as a high-end category 4 hurricane. Saying that the hurricane devastated the island would be an understatement.



## UW WxChallenge Forecasting Team 2016-17 Recap

by  
Joe Zagrodnik

The 2016-17 UW forecasting team had another successful season competing in the WxChallenge national collegiate forecasting competition. The 22-member team consisted of a mix of undergraduates, graduate students, faculty, and alumni competing against atmospheric sciences programs across the US. The team finished in 11th place nationally after forecasting the high and low temperature, maximum sustained wind speed, and precipitation for 10 different cities over a 20-week period. Peter Brechner was the top individual forecaster on the team with an outstanding fourth place overall finish out of over individual 1,000 competitors (second place in the Junior/Senior category). Lynn McMurdie and Joe Zagrodnik also qualified for the postseason tournament for their excellent forecasting overall.

Several team members were awarded trophies for excellent individual forecasting at various cities. Peter Brechner won three individual trophies: first place in the Junior/Senior category at Kodiak, AK and Nashville, TN and second place in the Junior/Senior category at Harrisburg, PA. Jonathan Weyn finished in first place in the graduate student category at Kodiak, AK. Kevin Tu finished third in the alumni category at Dallas/Fort Worth, TX. The 2017-18 season is currently underway with our largest and most experienced team to date. The team is open to all members of the department. Contact Joe Zagrodnik (jzagrod@uw.edu) to join for the spring 2018 season.



## Hurricane Maria...continued

Electric power, communication and drinking water was lost throughout the island. Many major rivers experienced historic levels of flooding. Many historic sites were severely damaged. The Arcibo Observatory, a landmark of the island, was heavily damaged. El Yunque, the U.S.'s only tropical rainforest, was completely defoliated. Roads and landslides made passage to many towns impossible. And more important, many people perished, and many more are missing.

While millions were struggling to put their lives back together, some were emphasizing on the economic crisis the island had prior to the hurricane. Many were commenting on how lucky the island was for having such a small death toll, ignoring the fact that many were without food, drinking water, medical attention, or just hanging on to dear life. I kept asking myself: "Would this catastrophe be covered differently had it occurred on the mainland?" Because of this it was more important than ever to continue communicating about the crisis. This led to a second interview with BBC, where I talked about not knowing about the whereabouts of my family and stressed that the island was desperate for immediate help.

After nearly two weeks without knowing about my family, I heard from my brother. He told me the immediate family was safe and they were working on cleaning up. My parents' house suffered some minor damage, although the yard was completely decimated. Trees that had been there for generations were uprooted and even the mighty mango trees were left in shambles. My hometown was declared a disaster zone and the pictures that I've seen of it are almost

unrecognizable. In spite of this, I think we were lucky, we were all alive and safe.

As the weeks passed I was left to wonder "Did I make any difference?" All this stress along with several sleepless nights felt like a futile attempt at being heard. Shortly afterwards I started getting messages from individuals. Many said they wouldn't have known what to do had I (and many others) informed them. So I *did* make a difference, small as it may have been. It comes to show you that accurate forecasts are essential but not sufficient for public safety. Informing the public also requires adequate communication

and this is a much bigger problem than what we realize. There are many groups, particularly underrepresented minorities, which do not have the resources or the knowledge to prepare for mother nature's deadliest forces. Local and national news networks are not enough when it comes to this. More often than not, providing the proper information will be in the hands of individuals that communities trust. Out of the many lessons we can learn from hurricane Maria is that there is a need for increased and improved communication, outreach and the need for a more diverse science workforce.



Picture from outside the author's parents' house during the passage of hurricane Maria. Picture courtesy of Angel R. Adames-Corraliza (Angel R. is the author's younger brother)

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The Department of Atmospheric Sciences gratefully acknowledges the donors who have generously supported us during the past fiscal year July 1, 2016 through June 30, 2017.

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## Department News

Welcome to **Professor Shuyi Chen**. Her research interests include understanding extreme weather events (e.g., hurricanes and winter storms) and sub-seasonal variability such as the Madden-Julian Oscillation (MJO) that affects the global weather and climate system, and on improving their prediction.

Also welcome **Research Associate Professor Lynn McMurdie**. Her research interests include the structure, predictability, and observations of synoptic-scale mid-latitude storm systems with a primary interest in oceanic and North America west coast cyclones, as well as west coast weather analysis and forecasting.

**Faculty Awards and Honors**—Professor **Cecilia Bitz** was recognized for being a significant contributor to the success of the UW Astrobiology Program, especially for her efforts with the program and in helping to support interdisciplinary research within the College of the Environment and across the UW campus. The UW Astrobiology Program, founded in 1998, is the longest running astrobiology graduate program and is considered to be the most rigorous and best of its kind in the world.

**Student Awards**—Undergraduate **Jacob Hendrickson** was awarded a UW McNair Fellowship. This program fosters the transition of undergraduates from underrepresented minorities into Ph.D. programs.

Undergraduate **Eliza Dawson** won an

Outstanding Student Paper Award from the AGU Fall Meeting in December. This is a prestigious award granted to the top 5% of student participants (graduate and undergraduate) for quality research in the geophysical sciences.

Graduate Student **Judy Twedt** won a Husky Green Award, recognizing sustainability leadership at the University of Washington. Judy also won this year's College of the Environment Award for Outstanding Community Impact.

Graduate student **Marysa Laguë** was selected as one of the Husky 100 this year. The annual Husky 100 recognizes 100 UW undergraduate and graduate students from Bothell, Seattle and Tacoma in all areas of study who are making the most of their time at the UW.

The following graduate students earned student prizes at the 2017 American Meteorological Society (AMS) Annual meeting for poster or oral presentations: **Michael Diamond, Karl Lapo, Hans Mohrmann, Kuan-Ting (Andy) O,** and **Stephanie Rushley.**

**Outreach**—The Outreach Video Group completed several more UW Atmos Outreach videos, including its four-part film noir series about El Niño addressing why, if hot air rises, it is cold at the top of a mountain. To watch this and other videos, visit their channel at <https://www.youtube.com/channel/UCbEmigxpSICZlscdtX46KMw>.

**Staff news**—Welcome to **Alice Cheung**, who started as our Budget Fiscal Analyst in January, 2017.

## Public Lectures

**Prof. Inez Fung** from the University of California, Berkeley visited the department as the **Graduate Students' Distinguished Visiting Lecturer**. Prof. Fung gave a public lecture on April 6, 2017 entitled "Trust but Verify: the Science of Climate Treaty Verification."

The sixth **Peter V. Hobbs Memorial Endowed Lecture in Experimental Meteorology** will be given on February 15, 2018 by **Prof. Bart Geerts** from the University of Wyoming, at 7:30 p.m. in Kane 220.

For more information on our lectures, please visit our lecture website at <http://www.atmos.washington.edu/alumni.update/lectures.shtml>.

## Alumni Event at the AMS

Plans have been made for a department alumni reception during the 2018 Annual Meeting of the American Meteorological Society, taking place in Austin, TX. The reception will take place at the Residence Inn by Marriott Austin Downtown/Convention Center, 300 E. 4th Street, on Monday, January 8 from 6:30-8:30 in the Gatehouse Lounge by the lobby. To ensure your email invitation is sent to your current address, you can update your contact information by going to [www.washington.edu/alumni/subscribe/address-change.html](http://www.washington.edu/alumni/subscribe/address-change.html) or contacting the department at [atmos@uw.edu](mailto:atmos@uw.edu).

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Please send alumni news, comments, questions, corrections and address updates to [atmos@uw.edu](mailto:atmos@uw.edu) or call (206) 543-4250.

Giving questions can also be referred to:  
Gerald S. Cournoyer  
Assistant Director for Advancement  
College of the Environment  
206.221.0562 / [gcourn@uw.edu](mailto:gcourn@uw.edu)

## ORACLES...Continued

can interact directly with solar radiation, scattering some of the solar energy back to space, thus providing a cooling effect. Second, because agricultural burning tends to be rather inefficient, fires do not fully combust biomass all the way to carbon dioxide but instead emit considerable amounts of elemental carbon (also known as “black” carbon), which absorbs solar radiation in addition to scattering it. This absorption warms the atmosphere and the regional heating pattern can drive changes in cloud cover. Finally, aerosol particles from fires also serve as effective nuclei for the formation of cloud droplets, thereby increasing the number of droplets in the extensive marine stratocumulus clouds in the region. This can brighten the cloud, resulting in more solar radiation being reflected to space, but it can

also lead to changes in cloud structure and can suppress precipitation formation.

Two NASA research aircraft participated in ORACLES in 2016. A P-3 Orion aircraft collected comprehensive data by flying in the aerosol plume and clouds, while the NASA ER-2 aircraft flew at 20 km (60,000 ft) altitude and served as a remote sensing platform, in essence a steerable satellite.

“We still have a lot of pretty fundamental questions unanswered, such as whether the smoke and cloud layers are clearly separated, or, alternatively, if smoke particles end up mixing into the cloud deck and changing the clouds’ properties,” said Michael Diamond, a graduate student in Wood’s group who is participating in the campaign.

Observations could help understand, for example, how forest fires burning inland affect the coastal cloud layer in other parts of

the world, and how changes in air quality and global warming will act together on regional weather patterns.

Roughly 100 scientists are involved in ORACLES, including the Namibia University of Science and Technology and Namibia’s Gobabeb Research & Training Centre. “This is a fantastic opportunity to interact with and learn from scientists not only from across the United States, but also from Namibia and South Africa,” Diamond said.

In August 2017, the P-3 research aircraft travels to São Tomé and Príncipe, a small island nation off the west coast of equatorial Africa. Together with the Namibian sampling, this will allow scientists to survey the entire cross section of the smoke plume over the southeastern Atlantic.



NASA’s P-3 research aircraft, here pictured at Walvis Bay in Namibia, collected in-situ and remote sensing observations of aerosol and cloud particles during the month-long effort in Namibia. Photo: Robert Wood/University of Washington.