Autumn 2014
Atmospheric Circulation
Newsletter of the University of Washington Atmospheric Sciences Department

A Field Study on Winter-Time Ozone Pollution in Eastern Utah

by
Professor Becky Alexander

In January and February of 2014, graduate student Maria Zatko and Associate Professor Becky Alexander participated in the 2014 Uintah Basin Winter Ozone Study (UBWOS) in eastern Utah, which was led by National Oceanic and Atmospheric Administration (NOAA) scientists in the Earth System Research Laboratory in Boulder, CO. Alexander and Zatko joined other research groups from around the United States and Canada to perform atmospheric chemistry measurements in this remote region of ubiquitous oil and gas drilling.

Ground-level ozone forms during chemical reactions in the atmosphere between volatile organic compounds (VOCs) and nitrogen oxides, both of which have large sources from human activities such as the burning of fossil fuels. Ozone formation also requires sunlight; thus, sunny, high-populated areas such as Los Angeles are best known for having unhealthy levels of ozone. So it was a surprise when extremely high concentrations of ground-level ozone were measured during the winter in remote locations of Wyoming, Utah, and Colorado. The current limit for ozone is set to 75 parts-per-billion (ppbv); however, ozone concentrations in the Uintah Basin frequently exceed the EPA limit during winter and can reach as high as twice this value. Designing policies that will result in the reduction of ozone concentrations down to healthier levels requires an understanding of where the ingredients for ozone formation (VOCs and nitrogen oxides) are coming from.

The previous UBWOS field campaigns of 2012 and 2013 revealed that high ozone amounts only occur when snow is on the ground. Snow can influence the formation of ground-level ozone formation in three ways. First, snow reflects most incoming ultra-violet radiation, which increases the amount of sunlight required for the formation of ozone. Second, the presence of snow on the ground can contribute to a strong temperature inversion, which acts to concentrate ozone close to the surface. Third, chemical reactions in the snow can act to recycle nitrogen oxides back to the atmosphere after their original deposition to the snow surface, increasing the formation rates of ground-level ozone. This third effect, snow chemistry, is highly uncertain, but was hypothesized to be an important contributor to the high concentrations of ground-level ozone observed during the 2013 UBWOS field campaign.

Graduate student Maria Zatko sampling from her snow pit. You can see in the picture a power plant and natural gas well in the background.

Professor Alexander's group has been studying the impacts of snow chemistry on polar ice core records, but very little is known about this chemistry in the seasonally snow-covered mid-latitudes. Prof. Alexander learned about the hypothesis of snow chemistry being an important contributor to the ozone problem in Utah during the Atmospheric Chemistry Gordon Conference in the summer of 2013. Alexander's group was poised to contribute to a better understanding of the importance of snow chemistry for ozone formation in Utah; however, it was unclear at that time if the UBWOS field campaign would take place in 2014. After NOAA gave the go-ahead for the field campaign in November 2013, Alexander and Zatko launched a crowdfunding campaign on what is now Experiment.com. Over the course of about 30 days they raised $12,000, enough to support Maria's travel to Utah and to cover the costs of sample analysis. A total of 155 people contributed to the project via Experiment.com with an average donation of about $75. Advertising of the crowdfunding campaign by Professor Cliff Mass on his popular weather blog proved to be very effective at getting the word out and was instrumental in the success of the crowdfunding campaign.

Once in Utah, Zatko collected around 200 snow samples over the course of the month-long campaign. She also collected daily aerosol samples with assistance from collaborators at NOAA's Pacific Marine Environmental Lab in Seattle. At the time of writing in the summer of 2014, Maria Zatko and UW undergraduate student Lauren Easley are busy measuring the optical properties of the snow samples and the isotopic composition of nitrate in the snow and aerosol samples. The latter is very sensitive to snow chemical reactions, and will be used to calculate the recycling rates of reactive nitrogen through the Utah snow pack. Their calculations will be used by air quality modelers in order to inform policymakers on the most effective strategy to improve air quality in eastern Utah. Updates on the progress of this project are being posted to: https://experiment.com/projects/how-does-natural-gas-fracking-contribute-to-air-pollution/updates.

Chair's Column

Greetings, friends! I recently completed my second year as chair, and although a sample size of two provides a sketchy basis for analysis, I feel like the health of the department is very good right now. Our undergraduate program is significantly larger than it was just 5 years ago (we graduated a class of 23 last June—among the biggest ever!) and we recently welcomed 15 first-year graduate students. We also welcomed new Assistant Professor Daehyun Kim this past winter from Columbia University. Professor Kim specializes in cumulus convection and the influence of convection on large-scale circulations like the Madden-Julian Oscillation.

Your gifts allow us to meet our mission and reach for our aspirations as a department. Specifically, your gifts support graduate student recruitment, undergraduate scholarships, visiting scholars, and social events. For example, to meet our goal of increasing diversity among atmospheric scientists, we hosted a visit this fall by SOARS scholars, with the goal of enhancing the application rate of these excellent students and increasing our visibility among underrepresented students. In the coming year, I hope to expand efforts to bring top scholars in the field to give seminars and meet with our faculty and students to increase collaborative opportunities.

Our social events bring our faculty, staff, and students together. Friends are always welcome at these events, **so please join us at our Winter Holiday Social on 4 December 2014**. You are also welcome to join us at our monthly "Second Friday" events, at a local pub, or in nice weather, kegs and barbecue behind our building. We would also love to see you at the AMS Annual Meeting, where we will host a gathering on 6 January at Pizzeria Bianco. For more information or to RSVP for any of these events, please contact Debbie at atmos@uw.edu / 206-543-4250.

As for undergraduate scholarships, I have good news and a request! The good news is that we endowed a new fund this year, the *Mindlin Endowed Fund for Undergraduate Student Support*, in order to recruit top undergraduate scholars.

Greg Hakim behind the Fleagle desk.

Now for the request: **we would like to establish an endowment in honor of the founder of the department, Phil Church**. We hear from early graduates of the department about Prof. Church and the enormous influence he had on establishing the culture of the department. We think it would be fitting to honor this legacy, and if you would like to help us reach our goal of establishing this fund, please contact Caroline Rosevear at rosevear@uw.edu / 206-221-0562.

That's all for this year. Best wishes for happy holidays, and stay in touch over the coming year.

Greg Hakim

Department News

Promotions—Robert Wood was promoted to Professor of Atmospheric Sciences with tenure. Kudos were given by Dean Graumlich for his "spectacular contributions to atmospheric sciences" in scholarship, teaching, and service. **Eric Salathé** was promoted to Adjunct Associate Professor.

Faculty Awards and Honors—Professors David Battisti and **Qiang Fu** have been elected as Fellows of the American Geophysical Union. This is a tremendous honor, extended to only one in a thousand AGU members very year.

Professor Cecilia Bitz has been awarded the first Francis Bretherton Climate and Global Dynamics Visitorship at the National Center for Atmospheric Research.

Professor Christopher Bretherton has been elected to the University Corporation for Atmospheric Research Board of Trustees.

Professor Daniel Jaffe is the recipient of the 2014 UW Bothell Distinguished Research, Scholarship, and Creative Activity Award.

Bradley Colman, Affiliate Associate Professor, was elected to the Washington State Academy of Sciences. Brad is currently Principal Program Manager at Microsoft, and formerly the Meteorologist in Charge at the National Weather Service headquarters in Seattle.

Congratulations to **Professor Cliff Mass** and **Kristen Rasmussen**. They have each won a 2013-2014 College of the Environment Award for Outstanding Community Impact. Kristen won the student award and Cliff won the faculty award.

Student Technology Fee Award—The department received an award for 2014. Thanks to the students' and chair's endorsements, and Harry Edmon's proposal. The award will fund 18 HP workstations with additional memory, and 5 displays.

Student Awards—Luke Madaus received an award from the AMS WAF/NWP committee

(Dept. News—Continued on page 8)

East Asia and Pacific Summer Institute Fellowship Program

by Crystal McClure, Graduate Student

There are many reasons to go abroad: meeting new people, learning about another culture, developing international research projects, enjoying new foods, etc. I was lucky enough to be able to experience all of these things in China this summer during the East Asia and Pacific Summer Institute (EAPSI) fellowship program funded by NSF. This program funds U.S. graduate students for an 8-10 week summer internship in various countries such as: China, Japan, New Zealand, Australia, and South Korea.

Forty students participated in the China program this year, making it one of the biggest groups in the entire EAPSI Program. Each person applying for this funding had to find a host adviser in their destination country and write a proposal for a summer project that could be completed in the time period of the fellowship.

My work this summer was with Dr. Shuxiao Wang at Tsinghua University in Beijing, China. Along with her graduate student, Fengyang Wang, we studied oxidized mercury species emitted from coal-fired power plants by using their drop-tube furnace (which simulates a coal-fired power plant on a small scale). We were even granted access to take samples inside an operating coal-fired power plant outside of Beijing! China is currently investing heavily in science and technology and is an excellent place for the development of international research projects. My work in Dr. Wang's group this summer has provided me with contacts that I will use the rest of my graduate and professional career.

Along with work, I also traveled with 39 other amazing U.S. scientists who are really making a difference in each of their fields. Our group of U.S. students in Beijing went on weekend trips to many parts of China including Zhangjiajie (pictured below). Getting to spend time in China and learn both scientifically and culturally was an opportunity of a lifetime.

Applications for this fellowship through NSF are due by November 13, 2014 and annually thereafter on the second Thursday in November.

A group of U.S. students visiting Zhangjiajie National Forest Park, which is located in the Hunan Province in south-central China.

Video Making Group: A Year in Review

by Maximo Menchaca, Graduate Student

"Rifaugheljerjy…Ready?" I am sitting in the back seat of a car piloted by Chris driving north on I-5, and Bryce, sitting in Liz's car with Ana, sounds like he's gargling. We are trying to coordinate a shot for our latest outreach video and trying to use our phones as walkie-talkies. It isn't working very well.

This latest film, about the Coriolis effect, has been over a year in the making. It has gone through numerous iterations, cuts, detours, and intermissions. This all started after the filming of our "Ocean Acidification" video in May 2012, when the outreach video group began to look for a new topic. We decided to next try our hand at the Coriolis effect, but this posed a challenging pedagogical problem. Our first drafting of script ideas produced some creative but difficult outlines, ranging from intercontinental games of catch and Coriolis influenced games of Battleship to a vendetta snuff film. (The scientific value of these stories varied.) We weren't happy with any of these as frame stories. All of our previous videos concerned topics people could see in everyday life—everyone has seen clouds or experienced the power of pressure. But the Coriolis effect takes place over very large time and length scales—and toilets and merry-go-rounds, the two phenomena people most commonly associate with the Coriolis effect, aren't even correct applications! Not only would our video on the Coriolis effect have to be instructive, it also had to be destructive to remove these misconceptions.

Weekly outreach meeting ideas coalesced into a trilogy of films. For the first video, we decided to try a demo similar to the one used by hoodwinkers at the equator armed with a small basin, some water, and a gullible audience. They show that water in the basin drains counterclockwise in the Northern hemisphere and clockwise in the Southern, and then attribute this to the Coriolis effect, not the angular momentum created by moving the basin. We hoped to recreate this demo out on Red Square, crowdsourcing our footage to dispel this myth perpetuated by these equator equivocators. Our second video would be geared towards ATMS 101 students, further using the angular momentum explanation to provide a non-mathematical treatment for confused students. The final video would build further on this by using Dale's Coriolis machine.

The writing of each video would require different approaches. For the first video, we would need to formulate questions that would cull the responses we wanted out of the general public, while the latter two required stories and scripts. Our ideas kept shifting as we reorganized the concepts we hoped to convey. We couldn't remember hearing about the Coriolis effect before taking our own introductory atmospheric science courses, so what could we expect from an average undergrad walking through Red Square? And for our second video, trying to use the angular momentum concept in a way that wasn't just following current merry-go-round videos was proving difficult.

Bryce and Ana plan a shot at Cowan Park.

In the end, we decided to combine the first and second videos into one, scrapping the Red Square demonstration for a video geared towards the general public that would convey two main concepts: different frames of reference and length/time scales. Hopefully, this would be an effective introduction to many of the troublesome concepts of the Coriolis effect. Our other video would still focus on the limitations of the angular momentum explanation of the Coriolis effect. Since we viewed the merry-go-round videos already available with disdain, the script began to take on an investigative reporter feel, uncovering the shortcomings of other Coriolis videos. Dale and his machine would come to the rescue of those students/victims confused by these other videos.

This scripting process has taken us over a year, but we have also been busy with other projects. Last March, Dale and Dargan submitted a paper to *Physics Today* explaining the power of latent heat. They already had a demo ready to go, so the outreach group quickly wrote up a script to supply a video as supplemental material. The paper was geared towards keeping your drinks cool on a hot day, and we revised this idea to warming up a frozen drink quickly. The article was quickly picked up in media all over the world, and the video rode the coattails of this viral wave, quickly becoming our most popular outreach film. While the film was overall praised for its ability to relate the concept of latent heat, some reviewers were unhappy with the quality of acting present therein. True art is rarely appreciated in its own time.

Our second project also happened completely by chance. Connect4Climate, a global coalition sponsored by the World Bank, hosted a competition for 30-second videos to "inspire" climate change awareness in the viewer. We came up with the idea of a "Save the Coal" video in the style of celebrity "Save the World" songs. We already had our actor—the Cole/Coal puppet, but lacked a set. Perhaps we could provide a striking background, something like the Mauna Loa CO_2 concentration graph. But would a viewer be able to focus on the song and simultaneously understand the graph? Our first solution was to actually prepare some yarn and pull it through pegs to represent the graph, to show the time progression of rising greenhouse gas concentrations. But then—why a graph at all? We decided upward pointing arrows could convey rising greenhouse gas concentrations AND rising sea levels.

Connect4Climate appreciated our end result. They even added a post on their website, commending it as a featured video in the competition and claiming it was a creative "stop motion" film. The reality may not have been as impressive, but still required preparation and painful takes. Chris and I scrambled to make a "SAVE THE COAL" sign and the arrows before the actual filming in Dargan's dining room the next day. Chris controlled the arrows by pulling strings, Liz was ready to drop the sign at the specified time, Bryce operated Cole, and I both held up the poster board and made sure everything was timed correctly with the music. And we were all standing in a space 3 foot square.

While the video did not make the top 5 (guaranteeing a trip to Italy), it was picked among the final 25 finalists. We also received another, odder consolation prize. Connect4Climate sent us release waivers, informing us that our video would soon be shown on MTV Italy. Science outreach can crop up in many different places, and sometimes nothing quite hits the spot like climate change inspiration after you've finished watching the Italian version of "Punk'd."

But for now, we are trying to line up our filming on the highway. Chris and Liz are trying to drive at a constant speed, let alone avoid ambient traffic that is unaware of the movie magic happening here. We'll then have all the footage we need for our first Coriolis video—all that is left to do is record the narration. And we've been trying to line up some high-profile talent to star as our investigative reporter in the second video. There are still many hours of filming, discussion, and editing ahead before our duology is ready, but the payoff, of both relating science to the public as well as sarcastic YouTube comments, is well worth it.

Consultation, Inspiration, Cast and Crew for Our Video Provided by Professors Dale Durran and Dargan Frierson, and Graduate Students Bryce Harrop, Elizabeth Maroon, Maximo Menchaca, Ana Ordonez, and Chris Terai

John M. Wallace
Emeritus Professor Professional Biography

by Daniel T. McCoy, Graduate Student

Jim Holton, Richard J. Reed, and Mike Wallace at the University of Washington in 1969.

Even at a young age Mike Wallace was drawn to the weather. He recalls growing up in western Massachusetts listening to meteorologists on the radio station WBZ from Boston. Amusingly enough, this was also the station that Richard J. Reed was associated with before taking a position at University of Washington, where they later met in person.

In the late 1950s there was little professional call for atmospheric scientists. The mailman had informed his father that the Webb Institute of Naval Architecture provided a good education with free tuition, room, and board, and so, in 1958 Mike enrolled in the Webb Institute. While perfectly capable of excelling in his classes, in which he earned A's, his heart was not in the creation of sea-worthy vessels. Indeed, Mike's interest in weather continued unabated. The night before his boiler design final, a blizzard descended over the Webb Institute's home in Glen Cove, New York. The excitement of nature expending itself around him kept him from sleeping the entire night. Despite this distraction, he completed boiler design and graduated from the Webb Institute in 1962.

At this time luminaries of the atmospheric sciences had gathered at MIT, and Mike entered the PhD program there studying with Reginald Newell. As he did at the Webb Institute, Mike was to excel at his studies and was awarded A's in most of his classes, except linear algebra, in which he scored a D. He reflects that this might be due to mild dyslexia on his part more than any other factor. This was to prove somewhat ironic given that one his many contributions to atmospheric science was the study of teleconnections (the relation at long distance of anomalies in the climate system) utilizing linear algebra techniques.

During the 1960s atmospheric sciences was undergoing a transition away from analyzing isolated case studies and toward a more systematic and objective analysis of atmospheric phenomena; along with techniques such as compositing, the use of the so-called empirical orthogonal functions was a significant component of this movement. Early visionaries such as Mike with their use of objective analytical tools to study atmospheric phenomena helped form some of the staple techniques of atmospheric sciences.

In 1966 Mike joined the University of Washington as an assistant professor. He rapidly advanced from an associate position on to full professorship in 1975. At the University of Washington Mike has published prolifically and with great success. He notes that one of the aids to his work was the savvy adoption of quantum leaps in computational and observational technology. For instance, advances such as those in coverage in both simulated and observed data allowed study of longer range interactions between atmospheric anomalies at much greater range than had been hitherto possible.

The 1970s also saw the writing and publication of *Atmospheric Sciences, An Introductory Survey*, which was a joint project between Mike and Peter Hobbs. The text was originally envisioned by Hobbs to serve as an overall introduction to atmospheric sciences. Hobbs wrote the sections on physics and chemistry and Mike wrote the sections on dynamics, radiation, and meteorology. The first publication of *Atmospheric Sciences, An Introductory Survey* was in 1977, and it is currently in its second edition and serves as the seminal introductory graduate text in the atmospheric sciences.

Careful and insightful research has won Mike the recognition of peers and professional organizations. He is the recipient of numerous awards from the American Meteorological Society and American Geophysical Union; the Alfred P. Sloan fellowship; and the National Science Foundation creativity award. In addition to recognition from the wider academic community, the University of Washington has singularly shown their appreciation for his contributions in making the atmospheric sciences department a central player in the scientific community. In 2010 the building housing the Joint Institute for the Study of the Atmosphere and Ocean, which Mike had been director of from 1982–1987 and again from 2003–2006, was named in his honor. Although flattered, he was taken aback by having a building named after him.

Asked about what some of his favorite problems to work on have been, Mike says that, of course, like many other scientists, he tends to think that the research he is doing right at the moment is the most interesting. He reflects that one of the more exciting periods of research in his career was in the 1980s when he was studying teleconnection patterns with Dave Gutzler and the signature of the El Niño Southern Oscillation with John Horel. He recalls thinking to himself at the time 'This is really the best I have seen of my career so far; this could very well be the high point.'

Having contributed so extensively to our understanding of the climate and Earth system, it seems reasonable to ask Mike's opinion on the outlook of the atmospheric sciences. "We are so lucky to have a field with a cohesive core to it that we can all contribute to it in different ways." His hope is that the field can maintain this momentum and focus given that it has been such a productive mode for the field in the past. He also notes that the science of weather prediction has been a very important component of the atmospheric sciences in the past and that he views the research to be done in this area as far from over. "There are still some frontiers in the future as we continue to try to extend the range and to predict on smaller scales and to deal with the issues of uncertainty and probability through the ensemble forecast; to understand the modes in which forecasts fail and to confront chaos; and that can also be a focus for a lot of the physical meteorology."

Mike also points to the dangers of political pressure and the struggle to obtain research funding as potentially leading to a decrease in diversity in atmospheric sciences research and a retreat from the strengths of the field. "This can lead to a large number of people studying esoteric pieces of the global warming problem." Such a decline in research diversity runs the risk of building too extensively in a direction that is not necessarily very robust and that relies on a large amount of funding for this type of research, which might prove relatively transient. "If we retain the integrity of the field so that the science is good, then it is much more robust and it builds on our strength."

At the Wallace Symposium in 2009.

Congratulations to Graduates

Doctor of Philosophy

Berner, Andrew H., *Exploring Aerosol-Cloud-Precipitation Feedbacks on Marine Low Cloud Induced by Natural and Anthropogenic Perturbations in a Cloud Resolving Model* (Bretherton & Wood)

Brown, Bonnie Rachel, *An Ensemble Numerical Modeling Study of Atlantic Basin Hurricane Intensification* (Hakim)

Evans, Stuart M., *Atmospheric Classification as a Cloud and Precipitation Evaluation Tool in Models and Observations* (Ackerman)

Friedman, Beth J., *Field and Laboratory Perspectives on the Cloud Nucleating Abilities of Aerosol Particles* (Thornton)

Hills, Matthew O. G., *The Downstream Decay of Trapped Lee Waves* (Durran)

McCusker, Kelly E., *Investigations of the Climate System Response to Climate Engineering in a Hierarchy of Models* (Bitz & Battisti)

Pendergrass, Angeline G., *Time-Averaged Data Assimilation for Midlatitude Climates: Towards Paleoclimate Applications* (Hartmann)

Scheff, Jacob S., *Understanding the Responses of Precipitation, Evaporative Demand, and Terrestrial Water Availability to Planetary Temperature in Climate Models* (Frierson)

Sofen, Eric D., *Isotopic Investigation of Anthropogenic- and Climate-Driven Changes in Sulfate and Nitrate Aerosol Production* (Alexander)

Terai, Christopher R., *Using VOCALS REx C-130 Aircraft Measurements to Understand Aerosol-Cloud-Precipitation Interactions in Marine Stratocumulus* (Bretherton & Wood)

Wigder, Nicole Lynn, *Influence of Baseline Air Masses and Wildland Fires on Air Quality in the Western United States* (Jaffe)

Master of Science

Adames, Angel F., *The Global Scale Structure of the MJO* (Wallace)

Baughman, Eowyn C., *Exploring Meteorological and Biomass Burning Aerosol Influences on Marine Stratocumulus in the Southeast Atlantic using WRF-Chem* (Wood)

Baylon, Leo Miguel Paolo M., *Ozone Enhancement in Western U.S. Wildfire Plumes at the Mt. Bachelor Observatory: The Role of NOx* (Jaffe)

Dang, Cheng, *Light-Absorbing Particulates in Seasonal Snow in Western North America* (Fu & Wallace)

DeHart, Jennifer C., *Quadrant Distribution of Tropical Cyclone Inner-Core Kinematics in Relation to Environmental Shear* (Houze)

Dixon, Kenneth, *Assimilation of Lightning Data by Nudging Tropospheric Water Vapor and Applications to Numerical Forecasts of Convective Events* (Mass)

Hryniw, Natalia, *Scalar and Multivariate Approaches for Optimal Network Design in Antarctica* (Hakim)

Lapo, Karl E., *Understanding How Uncertainty in the Forcing Irradiances Impacts Simulations of Snow* (Lundquist)

Maroon, Elizabeth A., *The Location of Tropical Precipitation in Idealized Atmospheric General Circulation Models Forced with Andes Topography and Surface Heat Fluxes* (Frierson & Battisti)

McClure, Crystal D., *Evaluation of the KCl Denuder Method for Gaseous Oxidized Mercury using HgBr2 at an In-Service AMNet Site* (Jaffe)

Menchaca, Maximo Q., *Modeling a Midlatitude Cyclone Impinging on Localized Orography* (Durran)

Tetreault-Pinard, Etienne, *Linking Soil Moisture and Summertime Surface Temperature Variability* (Battisti)

Bachelor of Science

Jonathan D. Acker
Kevin Robert Bartelt
Kelley Jo Bayern
Ashleigh Avalon Benedetti-Saputo
Jessica Mae Caubre
Megan Michelle Chaplin
Robert Duane Dascenzo
Dylan James Flynn
Alexandria Charlotte Gingrey
Joseph Andrew Hayman
Benjamin Michael Hedwall
Nathan John Iannuccillo
Shane Anthony Phillips
Gabriel Leo Ratener
Jacob Mitchell Rissberger
Anthony William Rodriguez
Adam James Silver
Spencer Jordan Tack
Jonathan Linh Tam Tran
Nghi Dinh Tran

Undergraduate and Faculty Research

The following undergraduate students and faculty members worked together during the past year:

Russell Barton / Robert Wood: Low Clouds over Oceans.

Ryan Barton / Robert Wood: Stratocumulus Sim.

Megan Chaplin / Robert Houze: Precip Cloud Systems, Global Precipitation & Orographic Effects.

Alexandria Gingrey / Robert Houze: Precip Cloud Systems, Global Precipitation, Dynamo, Orographic Effects & Amie Cloud Processes.

Malek Parker / Robert Houze: Global Precipitation.

Malek Parker / Abigail Swann: Determining a Relationship between Soil Moisture and Maximum Temperatures.

Joncharles Tenbusch / Dennis Hartmann: Climate Variability 4.

Lauren Whybrew / Joel Thornton: An Examination of Ultrafine Particulate Matter in Port Angeles, Washington.

Elynn Wu / Dargan Frierson: Career Hadley Circulation. Last Millennium Climate Change in CMIP5 Models.

Welcome to New Graduate Students for 2014–2015

Megan Chaplin (Houze)
Lexie Goldberger (Thornton)
Jessica Haskins (Thornton)
Isabel McCoy (Wood)
Jeremy McGibbon (Bretherton)
Conor McNicolas (Mass)
Ping-Ping Narenpitak (Bretherton)
Kuan-Ting O (Wood)
Stephanie Rushley (Kim)
Ashly Spevacek (Frierson)
Hsiu-Hui Tseng (Fu)
Nicholas Weber (Mass)
Jonathan Weyn-Vanhentenryck (Durran)
Wei Zhao (Fu & Marchand)

Scholarships and Awards

2014 ARCS Fellowship:

Jessica Haskins

2014 National Science Foundation (NSF) Graduate Research Fellowship:

Isabel McCoy

2014 Program on Climate Change (PCC) Fellowship:

Ashley Spevacek

American Meteorology Society:

Jessica Haskins
Isabel McCoy

IGERT Program on Climate Change:

Stephen Po-Chedley

Reed-Caldwell Undergraduate Scholarship:

Lauren Whybrew

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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, 2013 through June 30, 2014.

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Alumni News

Elizabeth Barnes ('12, Ph.D.) has been selected to receive the 2014 James R. Holton Junior Scientist Award, Atmospheric Sciences Section of the American Geophysical Union. The award will be presented at the AGU Fall Meeting in San Francisco.

H. W. "Buzz" Bernard ('75, B.S.) is a retired meteorologist and writer. His third novel, *Supercell*, set against tornado chasing on the Great Plains, was released in November 2013. This spring it reach #4 on Amazon's Kindle best-seller list. The book was a semifinalist in the Georgia Author of the Year competition. His debut novel, *Eyewall*, about a Cat 5 hurricane that strikes the Georgia coast, was a Kindle #1 best seller in 2011. He just completed the first draft of *Blizzard*, which will complete his "weather thriller trilogy." He didn't set out to write a trilogy, it just worked out that way. There's no timetable yet for the release of *Blizzard*. His books are available on Amazon and Barnes & Noble.

Tami Bond ('00, Ph.D.) has received a 2014 MacArthur Fellowship. She is a Professor at the University of Illinois at Urbana-Champaign.

Jeff Castle ('94, B.S.) was recently promoted to Chief Meteorologist at KSLA-TV in Shreveport, LA (see http://www.ksla.com/story/25891211/chief-meteorologist-jeff-castle).

David Dempsey ('85, Ph.D.) has been on the faculty in the Department of Geosciences at San Francisco State University since 1989. He started

(Alumni News—Continued on page 8)

President Barack Obama conducts a "Weather from the White House" interview with Jeff Renner, Seattle-NBC, to discuss the findings in the third U.S. National Climate Assessment, in the Rose Garden of the White House, May 6, 2014. (Official White House Photo by Lawrence Jackson)

Giving to the Department of Atmospheric Sciences

Please consider supporting the activities of the Department of Atmospheric Sciences. Your gift strengthens the core of the UW through recruitment and retention of world-class students and faculty. Your support of undergraduate and graduate students helps to create the next generation of scientific leaders. Help us to ensure that the department continues to be a leader in weather, climate and quality.

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Debra Wolf, Editor

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

***Alumni News**, cont. from page 7*

serving as Chair of the Department (recently renamed to Department of Earth & Climate Sciences) this fall semester.

Aaron Hill ('12, B.S.) has been accepted in a Ph.D. track at Texas Tech University, extending his current M.S. track.

Joel ('97, Ph.D.) and **Brittany Norris**, are pleased to announce the birth of their fifth child, James Lanning Norris, on July 19.

Jeff Renner ('88, B.S.), Chief Meteorologist at KING TV in Seattle, was one of eight broadcast meteorologists invited to the White House in May to interview President Obama and administration advisors and cabinet officials regarding the new National Climate Assessment. Photo on page 7.

Josh Smith ('12, B.S.) began working as an entry level forecaster for the National Weather Service in Pendleton OR in July 2012. Last year, he transferred to the Seattle NWS office and currently forecasts for western WA. Josh enjoys participating in weather-related community outreach events in the NW. In his spare time, he likes to participate in outdoor activities and travel.

Alumni Event at the AMS

Plans are in the works for a department alumni dinner in Phoenix AZ during the week of the 95th American Meteorological Society Meeting. Keep tuned for more information on the department's home page *News* sidebar or http://www.atmos.washington.edu/outreach/news.shtml. 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 or contacting the department at atmos@uw.edu.

Public Lectures

The fourth **Peter V. Hobbs Memorial Endowed Lecture in Experimental Meteorology** was given on January 23, 2014. The speaker was Prof. Paul Markowski (Pennsylvania State University). The lecture was entitled *Storm Chasing: What I've Learned.*

Dr. Richard Rotunno (National Center for Atmospheric Research) was invited to visit the department as the **Graduate Students' Distinguished Visiting Lecturer**. He gave a public lecture on June 5 entitled *Tornadoes in Observations and Theory*.

For upcoming public lectures, please check our Department's front page *News* feed at atmos.washington.edu or under *Events & Outreach*.

***Dept. News**, cont. from page 2*

for his "outstanding oral presentation" on *Rapid, Short-Term Forecast Adjustment Through Offline Ensemble Data Assimilation* (Feb. 2014). **Nick Siler** won best student presentation at the AMS Mountain Meteorology Conference in San Diego (August 2014). **Lauren Whybrew** received a Mary Gates Research Scholarship (May 2014). **Nicole Wigder** won first place for her student oral presentation at the AMS 16th Conference on Atmospheric Chemistry.

Brandon Ray was accepted into the inaugural 2013–2014 Arctic Research Fellows program. The program at the UW is designed "to foster innovative research projects that strengthen area studies at the UW and build research linkages across disciplines, particularly between the natural and social sciences and the humanities."

Welcome to **Assistant Professor Daehyun Kim**. His research interests are in climate dynamics, climate modeling, cloud physics and cumulus parameterization. He was a research professor at Lamont-Doherty Earth Observatory of Columbia University and a recipient of the American Geophysical Union James R. Holton Junior Scientist Award.

Professor Stephen Warren retired in June and was honored with the position of Emeritus Professor.

Baby News—Prof. Dargan Frierson and Julie Bannester welcomed Eleanor Bannester Frierson on August 1.