

Autumn 2015

# Atmospheric Circulation

Newsletter of the University of Washington Atmospheric Sciences Department

## How Does Natural Gas Fracking Contribute to Air Pollution? You Can't Blame It on the Snow

by

Professor Becky Alexander

Maria Zatko has completed her model calculations and has estimates of the role of snow in the recycling of reactive nitrogen in the Uintah Basin (Colorado). I wanted to share her main conclusions with you here.

The figure below shows her calculated fluxes of reactive nitrogen from the snow (y-axis) in the Uintah basin during the field campaign in January – February 2014 (dates are on the x-axis). To calculate these fluxes, she used her observations of the optical properties of the snow, and the model is constrained by her observations of nitrate concentrations and isotopes in the snow during the field campaign.

The fluxes of reactive nitrogen were highest at the beginning half of the campaign because that is when the nitrate concentrations in the very surface layer of the snow were highest. Remember that it is the breakdown of nitrate in the snow by sunlight that is the source of reactive

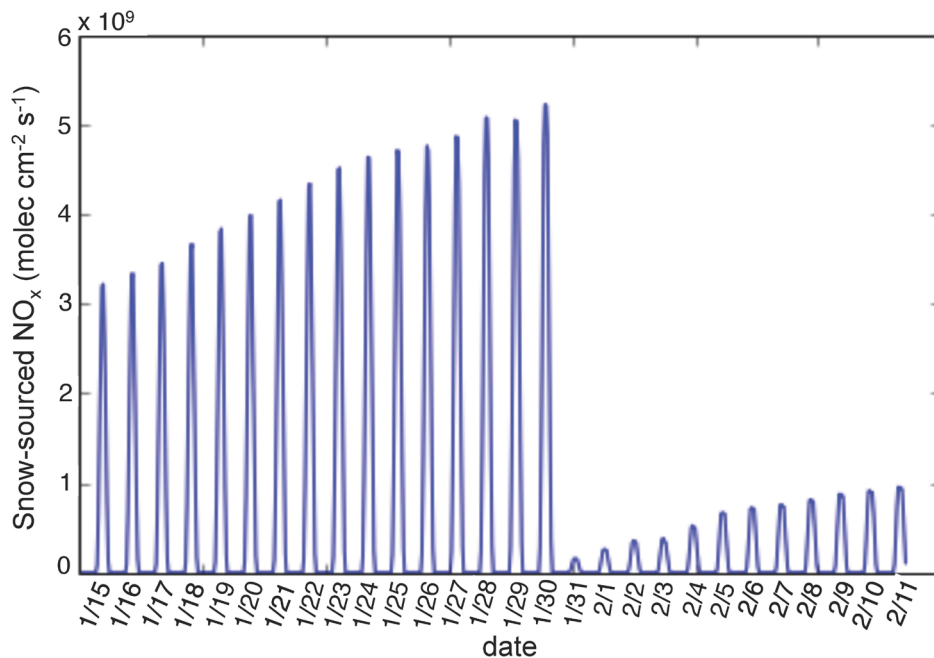
nitrogen from the snow to the atmosphere. Snow nitrate concentrations were highest at the beginning of the campaign because it hadn't snowed for over a month, and nitrate from the atmosphere was depositing to and accumulating on the surface of the snow during that time. You can see that the fluxes occur only during the daytime, because it requires sunlight. Fluxes decrease dramatically after the fresh snowfall event on January 31. The decrease occurred because the fresh snow diluted the nitrate concentrations in the surface of the snow.

We compare these calculated fluxes (on the order of  $10^9$  molecules/cm<sup>2</sup>/s at noon) with estimates of emissions of reactive nitrogen from oil and gas activities (on the order of  $10^{12}$  molecules/cm<sup>2</sup>/s day and night). The comparison reveals that fluxes from the snow are several orders of magnitude lower than emissions from human activities in the Uintah

basin. Although active recycling of reactive nitrogen is occurring in the snow during the entire field campaign, it is negligible compared to sources of reactive nitrogen derived from human activities. This means that recycling of reactive nitrogen in the snow can be safely ignored in air quality models designed to inform policy makers on the most effective strategy for reducing ground-level ozone concentrations in this region.

Since this article was written, Maria successfully defended her Ph.D. dissertation on August 10.

The previous article on natural gas fracking "A Field Study on Winter-Time Ozone Pollution in Eastern Utah" can be found at <http://www.atmos.washington.edu/alumni.update/AtmosCirculation2014.pdf>.



## Department News

**Welcome to Assistant Professor Kyle Armour.** He holds a joint appointment in Oceanography and Atmospheric Sciences. His primary research interests are in climate dynamics, including sea ice, the general circulation of the atmosphere and oceans, and global climate change. He was a James S. McDonnell Foundation Postdoctoral Fellow in the Department of Earth, Atmospheric and Planetary Sciences at the Massachusetts Institute of Technology.

**Faculty Awards and Honors—Professors David Battisti and Qiang Fu** were inducted as American Geophysical Union Fellows at the annual meeting in December 2014. To be elected a Union Fellow is a tribute to those AGU members who have made exceptional contributions to Earth and space sciences as valued by their peers and vetted by section and focus group committees. Dr. Battisti was recognized for his work on climate variability and



*Professors David Battisti (L) and Qiang Fu (R) at the AGU Fellows induction.*

Dr. Fu was elected for his work on atmospheric radiation and climate change.

**Professor Cecilia Bitz** has been inducted into the Washington State Academy of Sciences in recognition of her outstanding record of scientific achievement.

**Professor Christopher Bretherton** has been elected as a Fellow of the American Geophysical Union. This is a tremendous honor, extended to only one in a thousand AGU members very year. He will be inducted in December 2015.

**Professor Robert Houze** was awarded the Symons Gold Medal by The Royal Meteorological Society (UK). The society awards this honor every two years to distinguished work in meteorology. It is considered one of the most prestigious awards in the field. Professor Houze



*Professor Robert Houze (R) and Jennie Campbell (L), President, Royal Meteorological Society, at the Symons Gold Medal Lecture.*

*Photo courtesy of Royal Meteorological Society ([www.rmets.org](http://www.rmets.org)), 2015.*

gave the Symons Gold Medal Lecture May 20, 2015 entitled “The many ways that mountains affect precipitation: A broader view of orographic precipitation.” The lecture is available online at <http://www.rmets.org/rmets-2015-agm-video>.

**Professor Clifford Mass** has been invited to become a CoMotion Presidential Innovation Fellow in recognition of his entrepreneurial thinking and significant contribution to the translational culture at UW.

**Professor Robert Wood** has been elected as a member of the new Atmospheric Radiation Measurement Climate Research Facility User Executive Committee (U.S. DOE).

**Promotion—Joel Thornton** was promoted to Professor of Atmospheric Sciences with tenure. Professor Thornton has developed a national and international reputation as a prominent, up-and-coming atmospheric chemist. His research focuses on the impact of energy generation on air quality and climate, specifically through analyzing the reactivity of organic particulates in the atmosphere and key chemical species that play an important role in the nitrogen cycle and oxidation capacity of the atmosphere. He has received several major national awards, including an NSF CAREER Award, a NASA New Investigator Award, and the Houghton Award from the American Meteorological Society. Dr. Thornton continually seeks innovative ways of teaching, aiming to “flip the classroom” and use his teaching to inform his research and vice versa, and is highly regarded as a strong mentor.

**Student Awards—Jen DeHart**, graduate student, received the NASA Earth and Space Sciences Fellowship for the 2015/16 academic year. **Weiming Ma**, undergraduate in Atmospheric Sciences, has been awarded a scholarship for the 2015-2016 academic year from the College of the Environment.

## Chair’s Column

As many of you know, the Department of Atmospheric Sciences at UW does world-leading research with facilities that are not up to our reputation. As much as we love the location of the ATG building, the fact is that it is too small for us and has outdated infrastructure. I am happy to report that there were some positive steps to improve that situation during the past year. First, an independent audit of space allocation in the College of the Environment revealed that Atmospheric Sciences is the densest academic unit in the college. Second, in partnership with one of our donors, we are starting to formulate a renovation plan for the building, and the ATG building has been listed as a future capital renovation project. And finally, the most tangible sign of progress: we have renovated room 310 into a large state-of-the-art room for instruction and seminars. This major renovation, which gives a room with flexible seating for a minimum of 75, involved a substantial financial investment in Atmospheric

Sciences by Dean Lisa Graumlich, and we are delighted by the results. Please come visit campus and check it out!

Dean Lisa Graumlich is also helping our students by making a terrific case for scholarship support. She recently sent a letter to many of you, encouraging our past donors to support the Richard and Joan Reed Undergraduate Endowed Scholarship. The featured story about Atmospheric Sciences alumna Bonnie Brown describes her work as a post-doc at the University of Hawaii and her recent work with the NOAA Hurricane Hunters, dropping sensors as they flew through Hurricane Guillermo and tracking the storm as it approached Hawaii. I am particularly proud of Bonnie, who obtained a BS in Atmospheric Sciences in 2005 and then became one of my graduate students for her MS and PhD (2014). Bonnie credits the Reed scholarship as essential to her ability to engage in research as an undergraduate. By allowing her to focus on her studies, independent research, and internships, scholarship support motivated her to apply for

graduate school, and propelled Bonnie into her career as a scientist. I think Dick Reed would be especially proud to know that his name is associated with such a valuable and inspiring resource for talented students like Bonnie.

As always, we look forward to hearing from you with the latest news on your career and family, and wish you all the best in the coming year.

*Greg Hakim*



*Greg Hakim behind the Fleagle desk.*

## AMS Student Chapter Highlights (2014/15)

by

*Jennifer DeHart and Matt Rogers*



*Back row L-R: Brian Smoliak, Matt Rogers, Lee Picard, Jon Raymond, Isaac Renfrow, Virginia Rux, Rick Russotto, Jen DeHart, Andre Perkins, Valliappa Lakshmana, Holly Dail, Matt Garvert.  
Front Row L-R: Tessa Vollrath, Emily Ramnarine, Stephanie Rushley, Matthew Woelfle*

Each year, the American Meteorological Society Student Chapter highlights speakers and field trips that expose both undergraduate and graduate students to a variety of careers. The club frequently visits KING 5 Television to learn about broadcast meteorology and invited speakers from 3TIER to discuss current opportunities in weather forecasting for alternative energy sources. Additionally, the club continues to raise funds to provide travel grants to undergraduate students to the AMS Annual Meeting each year, where they learn about graduate school and other career avenues. The club found a new activity this past spring, when approximately ten members from the club headed to the new downtown Seattle office of The Climate Corporation (TCC) to learn about private sector opportunities.

Thanks to the efforts of Matt Garvert ('05 PhD) and Brian Smoliak ('13 PhD), club members got to interact with several TCC scientists, both informally over refreshments

and formally through a panel. After learning about TCC's business and the paths that brought each scientist there, the floor was opened to student questions. Since our group had minimal exposure to jobs at a private company, most questions centered on the specific skills needed to succeed at TCC and the differences between academia and the private sector. Undergraduate members learned what classes, internships and other experiences would be useful, while graduate members learned how to supplement the skills gained during graduate school. In addition to the scientists, the panel of speakers included TCC's recruiting manager, who provided the perspective of someone hiring applicants. Specifically, he discussed ways in which students can stand out in the application process to be attractive to future employers. This was particularly helpful as resume building and interview skills are not formally taught in an academic setting.

Club members, regardless of their stage, all agreed that they learned a great deal about

private sector employment and ways to succeed in the job application process from the event. We are fortunate to have a number of companies in our backyard that provide potential job opportunities and a great network of alumni that are willing and happy to give back to current students. In the future, we hope to maintain our relationships with these organizations and continue to search for additional activities for our members.

For more information on the UW student chapter of the AMS, see [http://www.atmos.washington.edu/uw\\_ams/UW\\_AMS\\_Student\\_Chapter/Welcome.html](http://www.atmos.washington.edu/uw_ams/UW_AMS_Student_Chapter/Welcome.html).



## School's out for the Summer: Time for a Classroom Remodel

by Neal Johnson



Before and After: (a) The classroom had a capacity of 48 prior to renovation. Graduate student Jack Scheff leading a K-12 Outreach event (2013).  
 (b) The renovated classroom has a capacity of 75 occupants with tables and 100 without the tables (2015).  
 Michael Diamond and Andre Perkins leading an event in the newly renovated classroom.

After several meetings between interior design professionals, sharp-minded HVAC specialists, eager representatives from all ranks of Atmospheric Sciences and the indefatigably self-proclaimed heteronomous\* UW Capital Projects Office, a general plan for the finished product was agreed upon that was feasible within both time (open for business autumn quarter) and money (\$300-400K) constraints.

Actual demolition of the rooms began on Monday, June 15, with the installation of barriers to contain dust. The drop-down ceiling had been removed well in advance to assess and avoid possible snags during the pre-construction phase. The classroom was enlarged (from 40 to 75 occupants) by reclaiming the former graduate student spaces of 310AB, moving the long-edge front of the class to abut the hallway and impinging into part of Qiang Fu's faculty office (308). A tiny closet to house UWIT/Classroom whizzbangs and another fairly small general use storage closet were also created. While not all faculty requests could be met, we certainly hope that the upticks in size, modernization of technology and new amenities are universally agreed to have been taxpayer dollars well spent. It is now September 10 and we are making the final turn for the home stretch with some last minute fixes to window treatments, lighting and touch-ups still TBD. Scott is hammering out the final furniture delivery to allow (fingers crossed) the bubbly to be broken over the bow of our flagship classroom in advance of Wednesday, September 30's, first use. Also, while Melissa (student services coordinator) is still wrangling some classes into rooms for autumn quarter, the current time schedule makes Prof. Thornton's *Air Pollution Chemistry* the maiden voyage.

What does it look like through the Looking Glass? Well, the short answer is pretty much what you'd expect, Alice, vastly improved. Once Scott and I were properly suited up (helmets were required, though after mine was absconded with, the construction crew was dismayingly receptive to my, "not to worry I'm of Norwegian extraction"), we were allowed weekly sneak peeks, post demolition. Scott took these snaps for general consumption as well as insurance purposes lest I break anything by banging my head into it.

\* Thank you Roget's for leading me to the one family friendly English language word that best describes UW CPO's proclamations of innocence in all instantiations of Murphy's Law.



Requirement of a second access door to ATG 310 reduced the size of ATG 308 and extended the hallway.



Equipment testing.

Photos courtesy of Scott Sipes.

## Congratulations to Graduates

### Doctor of Philosophy

- Brewer, Matthew C.**, *Warm-Season Diurnal Circulations and Heat Extremes over the Northwest U.S.* (Mass)
- Ceppi, Paulo**, *Interactions between Clouds and Atmospheric Circulation in the Extratropics* (Hartmann)
- Lopez-Hilfiker, Felipe D.**, *A Molecular Characterization of Biogenic Secondary Organic Aerosol by High-Resolution Time-of-Flight Mass Spectrometry: Composition and Volatility* (Thornton)
- Rasmussen, Kristen L.**, *On the Nature of Severe Orographic Thunderstorms near the Andes in Subtropical South America* (Houze)
- Shi, Xiaoming**, *Studies of Climate Dynamics with Innovative Global-Model Simulations* (Durran)
- Siler, Nicholas T.**, *Dynamic and Thermodynamic Mechanisms Controlling the Amount and Distribution of Orographic Precipitation* (Roe/Durran)
- Singh, Hansi A.**, *Moisture Transport, Energetics, and Teleconnections in the Global Climate System* (Bitz)
- Thorsen, Tyler J.**, *Observations of Tropical Cirrus by Elastic Backscatter Lidars and the Development of a Cloud and Aerosol Retrieval Algorithm for Raman Lidars* (Fu)
- Warner, Michael D.**, *Winter Extreme Precipitation along the North American West Coast* (Mass)
- Zatko, Maria C.**, *Snow Nitrate Photolysis in Polar Regions and the Mid-Latitudes: Impact on Boundary Layer Chemistry and Implications for Ice Core Records* (Alexander/Warren)

### Master of Science

- Liu, Xiaojuan**, *The Influence of Orbital Forcing of Tropical Insolation on the Climate and Isotopic Composition of Precipitation in South America* (Battisti)
- Quetin, Gregory R.**, *Empirically Derived Sensitivity of Vegetation to Climate across the Globe* (Swann)
- Russotto, Rick D.**, *The Effects of Ice Crystal Shape on the Evolution of Optically Thin Cirrus Clouds in the Tropics* (Durran/Ackerman)
- Shah, Viral P.**, *Examining the Chemistry of Atmospheric Mercury Using Aircraft Based Measurements and a Global Chemical Transport Model* (Jaeglé)
- Woelfle, Matthew D.**, *An Investigation of the Time Scales of Development of the Double-ITCZ Bias* (Bretherton)

### Bachelor of Science

- Isaac Thomas Anderson**  
**Isaac Prescott Chamberlain**  
**Ryan Clark**  
**Martin Gyasi Griesse-Nascimento**  
**Samantha Hing**  
**Taylor Jackson**  
**Bailey Kilmer**  
**Alex Kubiniec**  
**Jeff Kuhn**  
**Parker Malek**  
**Wanicha Mueangcharoen**  
**Mitwa Priyavadan Patel**  
**Charlie Phillips**  
**Justin Clark Rees**  
**Jon Charles Tenbusch**  
**Jeffrey Dale Thayer**  
**Anthony Wayne Trask, Jr.**  
**Lauren Whybrew**

*Takenaka Fellowship:*

**Tsubasa Kohyama**

*Top Scholar Award:*

**Sara Berry**

**Alexander Haugstad**

## Undergraduate and Faculty Research

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

- Kallista Angeloff** / Emily Coleman (South Seattle CC): Project Arson: Accelerant Identification.
- Lauren Easley** / Becky Alexander & Maria Zatko: The Impact of Snow Photochemistry on Ozone Precursors (Nitrogen Oxides) in the Uintah Basin.
- Martin Griesse-Nascimento** / Joel Thornton & Cassandra Gaston: An Examination of Aerosol Acidity Trends in the United States and Its Relation to the Production of Secondary Organic Aerosols (SOA).
- Samantha Hing** / Ashley Maloney & Julian Sachs (Ocean): Lipid Biomarker Changes in a Tropical Crater Lake over the Last Millennium.
- Lauren Whybrew** / Joel Thornton & Cassandra Gaston: Seasonal Variations and Regional Sources of Ultrafine Particulate Matter at a Semi-Rural Site on the Olympic Peninsula.

## Scholarships and Awards

*American Meteorology Society:*

**Michael Diamond**  
**Casey Hilgenbrink**  
**Johnathan Metz**

*ARCS Fellowship:*

**Casey Hilgenbrink**

*College of the Environment Scholarship:*

**Weiming Ma**

*Mary Gates Scholar:*

**Lauren Whybrew**

*Graduate Opportunity Program Award:*

**Kelly Balmes**

*Hollings Scholarship:*

**Eliza Dawson**

*IGERT Fellowship:*

**Lauren Schmeisser**

*NASA ESS Fellowship:*

**Jennifer DeHart**

*National Science Foundation:*

**Andre Perkins**  
**P. Trent Vonich**

*Program on Climate Change Fellowship:*

**Michael Diamond**

*Reed-Caldwell Endowed Fellowship:*

**Weiming Ma**  
**Jamin Rader**

*Royal Thai Government Fellowship:*

**Pornampai Narenpitak**

*Stroum Endowed Minority Fellowship:*

**Ángel Adames**

## Welcome to New Graduate Students for 2015–2016

- Kelly A. Balmes**, Pennsylvania State University
- Sara E. Berry**, North Carolina State University
- Wei-Yi Cheng**, National Taiwan University
- Robert J.C. Conrick**, Indiana University at Bloomington
- Michael S. Diamond**, Vanderbilt University (TN)
- Alexander D. Haugstad**, University of Wisconsin at Madison
- Casey C. Hilgenbrink**, Massachusetts Institute of Technology
- Kelsey E. Larson**, Valparaiso University (IN)
- Johnathan J. Metz**, University of North Dakota
- Samuel R. Pennypacker**, University of California at Berkeley
- John W. Robinson**, Harvey Mudd College (CA)
- Lauren N. Schmeisser**, Universiteit van Amsterdam
- P. Trent Vonich**, U.S. Air Force Academy (CO)

## Donor Recognition

The Department of Atmospheric Sciences gratefully acknowledges the donors who have generously supported us during the past fiscal year July 1, 2014 through June 30, 2015.

### Individual Donors

Gerhard Achtelek Jr. & Lauren Achitelik  
 Andrew Ackerman  
 Thomas & Linda Ackerman  
 Sheal & Phyllis Anderson  
 Anonymous  
 Gifford Asher  
 Henry & Linda Baddley Jr.  
 David Battisti & Lynn McMurdie  
 Robert Baughman  
 Lois Bauman  
 Mark Beaufait & Andrea Slayton  
 Christopher Beck  
 Dan Becker  
 Robert Berkovitz  
 Harold Bernard Jr. & Christina Hilland-Bernard  
 Thomas & Carol Borda  
 Mark & Diana Borges  
 Cornelius & Catherine Borman  
 Shirley & Janet Boselly III  
 Ann & Douglas Bostrom  
 Carolyn Bowman  
 Margaret & Bart Brashers  
 Christopher Bretherton & Alison Cullen  
 Richard & Suzanne Brintzenhofe  
 Charles & Mary Brock  
 Frank Bryan & Katharine Noll  
 Sally & Thomas Cahill  
 Edward & Terry Carr  
 John Carrier  
 Dean & Shervin Churchill  
 William Clugston  
 Eric da Rosa  
 Todd & Tamara Dankers  
 Clara Deser  
 Dale Durran & Janice Tervonen  
 Imke Durre  
 Anthony & Taeko Eckel  
 Charles & Mary Elderkin  
 Charles Erwin  
 William & Barbara Evans  
 Brad Ferrier & Linda Carter-Ferrier  
 Jennifer & Peter Francis  
 Thomas & June Frey  
 Qiang Fu & Muyin Wang  
 Ann Gaponoff  
 Mark Gaponoff  
 Marcus Gillette  
 Arthur Grunbaum  
 Christopher & Amy Gulick  
 Gregory & Lynne Hakim  
 Halstead & Lynne Harrison  
 Lorraine & Dennis Hartmann  
 Robert Henry  
 Edward Hindman  
 Peter Hobbs (D)  
 Sylvia Hobbs  
 James & Alma Holcomb  
 Margaret Holton

Donald & Lisa Immerwahr  
 Nicolas Irving  
 Marc Islam  
 Lyatt Jaeglé  
 Roy Jenne  
 Stuart Jennings  
 Michael Johnson  
 Neal Johnson  
 Richard & LaVonne Johnson  
 Jeffrey Johnston  
 Ansuman Kar  
 John & Vivian Karamanian  
 Kristina Katsaros  
 Michael Katsaros (D)  
 Liz & Ronald Keeshan  
 Larry Kingsbury  
 Thomas & Laura Kleespies  
 Stephen Klein  
 Kevin & Sheri Kodama  
 Eileen Koven & John Leen  
 Terence Kubar  
 Walter Kuciej  
 Lois & Richard Lamb  
 Robert & Bonnie Landen  
 Margaret Le Mone & Peter Gilman  
 John Leathers  
 Jonell & Christopher Lee  
 Martha Lentz & Jonathan Noll  
 William Levering III & Susan Hert  
 Hang Li & Yun Kao  
 Karin Link  
 William Lipscomb  
 Janet & Lincoln Loehr  
 Mario Lopez  
 Janet Lowry  
 Mark Lutz  
 Caroline & Clifford Mass  
 Michael McClintock  
 Joanna Muench & Craig Lee  
 Wendy & Peter Mullen  
 Steven Mullen & Rita Jackson-Mullen  
 Gretchen Mullendore & Gregory Ostermeier  
 James Mullins & Alice Boatwright  
 Louisa Nance  
 Frank & Irene Nishimoto  
 Michael O'Connell  
 Charles Orwig  
 Hua Ouyang  
 Rajul Pandya & Amy Alter-Pandya  
 David Perkel  
 Leonhard Pfister  
 Alexander Polsky  
 Arthur Rangno & Judy Rossman  
 Vernon & Laurel Redecker  
 Robert & Britt Reeves  
 John Rehr  
 Lee & Katherine Reinleitner  
 Jeffrey & Susan Renner  
 Kermit Ritland

Dale Rogers  
 Steven Rolfe  
 Karen Rosenlof  
 David Sarver  
 Janet & Donald Schmitt  
 Sally Schoenberg & William Poteet  
 Eric & Anna Schoening  
 David Sellers  
 Judith Shoshana  
 Amanda & Parikhith Sinha  
 Ann Slutsky & James Comfort  
 David Smith  
 James & Sonja Staley  
 Raymond Staley  
 Jordan Sutton  
 Steve Upton  
 Al Vaskas  
 George & Sarah Vassiliou  
 Kimberly Viebrock & Michael Nesteroff  
 Carol & William Viertel  
 Norman & Barbara Wagner  
 Susan & John Wallace  
 Patricia & Walter Warden  
 Jean & Richard Weick  
 Jonathan Weil  
 Albert Werner  
 William & Carole Wieland  
 Michael Winton & Gretel LaVieri  
 Frank Wirtz & Jessica Thompson  
 Debra Wolf  
 Stephen Worthington  
 Lixin Zeng  
 Xiaoli Zhu & Juan Liang  
 Xun Zhu & Wei Liu

### Corporate, Foundation, Organization Donors

AT&T Foundation  
 Bank of America Foundation  
 Bill & Melinda Gates Foundation  
 Greater Hansville Community Center  
 Intel Corporation  
 Microsoft Corporation  
 Network for Good  
 Jeff Renner, Inc.  
 Research Now  
 Salesforce.com Foundation  
 Sky Guide



**Alumni News**

**David Bauman** ('47, B.S.) passed away on April 8, 2014. He worked as a meteorological hydrologist for NOAA, retiring in 1980.

**Bob Berkovitz** ('69, B.S.) worked for the National Weather Service starting in 1969 and retired in 2005. He had worked for the NWS starting in Seattle in 1969, then transfer to Yuma, AZ in 1973, and finished the remainder of his time with the NWS in Phoenix, AZ from 1977 until he retired in 2005. During his time in Phoenix, he was the IMET (Incident Meteorologist) where he would go out to forest fires, mainly in western states, and give weather support and info to the fire teams. Since retiring, he volunteers at the Arizona Science Center 1 day a week and he is also the program chair for the Tempe, AZ chapter of NARFE (National Active and Retired Federal Employee Association).

**H. W. "Buzz" Bernard** ('75, B.S.) is a retired meteorologist and writer. His fourth novel, *Blizzard*, was released in late February. *Supercell*, his third novel, won the 2015 EPIC eBook Award in the suspense/thriller category. He's working on his fifth novel (working title *Tsunami*) set against the rupture of the Cascadia subduction zone in the Pacific Northwest. His books are available on Amazon and Barnes & Noble.

**Brad Carl** ('11, B.S.) is now a meteorologist/reporter at 40/29 News (ABC affiliate) in Fayetteville, Arkansas.

**Joe Casola** ('09 Ph.D.) has returned to the UW as the Deputy Director of the Climate Impacts Group.

**John Elliff** ('62, B.S.) sent a brief summary of his Air Force career. Thank you, John, for your service to our country.

"Enlisted in USAF 1953. Began flight training in 1954 and received a commission and pilot wings in 1955. I flew various aircraft and helicopters thereafter. Since I only had 3 semesters of college, I applied for training and was selected to go to the University of Washington in 1960 to get a degree in Meteorology. Graduating in 1962, I was assigned to Tokyo, Japan to work in an analysis and forecast center preparing weather products for all US military weather units throughout Asia. In 1965 I was chosen to command a weather unit in Sioux City, Iowa supporting a NORAD Division. After 1 year I was reassigned to flying combat rescue helicopters in Vietnam. Subsequent rescue assignments to Texas and Incirlik, Turkey followed. In 1972 I was assigned back to Weather in support of the III Army Corps and two Army Divisions at Fort Hood, Texas. I flew Army helicopters while there. In 1974 I was assigned as Director of Operations of 29th Weather Squadron at Randolph AFB, TX, providing support to all Air Training Command bases. In 1976 I was assigned as Chief Met Officer to the Commanding General, US Army Europe and the Central Army Group (NATO). I was also commander of all Weather Units supporting various Army commands throughout Europe. In 1979 I was assigned as Vice Commander of the 7th Weather Wing at Scott AFB, Illinois, providing weather support to Military Air-lift Command and three other major commands.

In 1980 I became the Commander of 7th Weather Wing and retired in 1983 as a Colonel with over 30 years service.

I did not work in any weather capacity after retirement. I thoroughly enjoyed my military career. I entered with a little college and obtained a BS and Masters degree through AF programs. I was lucky and commanded 7 different units, from Detachments to a Wing. I am a Command Pilot with over 3500 flying hours. My military decorations include a Good Conduct Medal, 2 AF Commendation Medals, 3 Meritorious Service Medals, 6 Air Medals, 2 Distinguished Flying Crosses and 2 Legions of Merit. I have now, at age 81, been retired longer than I served."

**Kristin Larson** ('02, Ph.D.) reported that she attended the *3rd International Energy and Meteorology Conference* in Boulder CO at the end of June. Also attending the conference was **Tomislav Maric** ('05, Ph.D.). Tomislav works at Vestas in Denmark, Kristin works at the Global Weather Corporation in Boulder CO. They both work on wind energy forecasting.

**James Renwick** ('95, Ph.D.) was promoted to Professor in the School of Geography, Environment and Earth Sciences at Victoria University of Wellington, from 1 Jan 2015. James gave his "inaugural professorial lecture" to a large audience in the VUW Memorial Theatre on 30 June—a great occasion to show off his UW robes. The lecture was recorded and may be viewed on YouTube at <https://www.youtube.com/watch?v=YjZlc3BhaXE>.

**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.

Yes, I want to support the Department of Atmospheric Sciences!

I have enclosed \$ \_\_\_\_\_ to support

- Friends of Atmospheric Sciences Fund
- Atmospheric Sciences Graduate Education Fund
- Richard and Joan Reed Atmospheric Sciences Endowed Undergraduate Scholarship Fund
- James Holton Endowed Graduate Support Fund
- Visa  Mastercard  American Express

Card Number \_\_\_\_\_

Expiration Date (mm/yyyy) \_\_\_\_\_

Signature \_\_\_\_\_

Name (First, Last) \_\_\_\_\_

Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Home Phone No. \_\_\_\_\_ Work Phone No. \_\_\_\_\_

This is a matching gift (Enclose matching form)

This is a joint gift

Your gift is tax-deductible as specified in IRS regulations. Pursuant to RCW 19.09, the University of Washington is registered as a charitable organization with the Secretary of State, state of Washington. To make your gift by phone, please call 1-877-UW-GIFTS (1-877-894-4387).

Please send your check, payable to the "University of Washington" to:

Debra Wolf, Assistant to the Chair, Department of Atmospheric Sciences, University of Washington, Box 351640, Seattle, WA 98195-1640

To make your gift online, log onto [www.atmos.washington.edu/about/support.shtml](http://www.atmos.washington.edu/about/support.shtml) or [www.washington.edu/giving/make-a-gift](http://www.washington.edu/giving/make-a-gift).

Appeal Code: ASN15

## Contact Us

Department of Atmospheric Sciences  
University of Washington  
Box 351640  
Seattle, Washington 98195-1640  
Phone (206) 543-4250  
Fax (206) 543-0308  
<http://www.atmos.washington.edu>

Gregory J. Hakim, Chair  
Debra Wolf, Editor

Atmospheric Circulation is published annually for alumni, friends, and members of the University of Washington Department of Atmospheric Sciences. This is the fifteenth issue.

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

## UW WxChallenge Forecasting Team Completes a Successful Season

*by Joe Zagrodnik, Graduate Student*

The 2014-15 UW WxChallenge forecasting team was our most successful team to date. The 28-member team consisted of a mix of undergraduates, graduate students, and faculty competing against atmospheric science programs across the US. The team finished in 7th place out of 47 eligible institutions after forecasting the high and low temperature, maximum sustained wind speed, and precipitation for 10 different cities over a 20 week period. We would like to acknowledge 8 forecasters who advanced to the “postseason” wild card tournament: Maximo Menchaca, Nick Weber, Virginia Rux, Lynn McMurdie, Luke Madaus, Elizabeth Maroon, Jonathan Weyn, and Joe Zagrodnik. Additionally, two team members were awarded trophies for their performances at individual cities. Kevin Tu was the national winner at Phoenix, Arizona and Elizabeth Maroon was the graduate student winner (3rd place overall) at Laramie, Wyoming. The 2015-16 season begins in September, all UW faculty, students, and staff are eligible to join. Contact Joe Zagrodnik ([jzagrod@uw.edu](mailto:jzagrod@uw.edu)) for more info.



## Public Lectures

The fifth **Peter V. Hobbs Memorial Endowed Lecture in Experimental Meteorology** will be given on January 19, 2016. The speaker will be Prof. Ulricke Lohmann from ETH Zürich (Swiss Federal Institute of Technology Zürich). For more information and to register for the lecture, please visit our lecture website at <http://www.atmos.washington.edu/alumni.update/lectures.shtml> in late December.

Professor Daniel Jacob, School of Engineering and Applied Science at Harvard University, visited the department as the Graduate Students’ Distinguished Visiting Lecturer. Jacob gave a public lecture on May 21, 2015 entitled “Mercury in the Global Environment—Where Does It Come from, Where Does It Go?”



*Halloween Tea 2015.  
Cake courtesy of Scott Sipes.*