FALL **2019**

DEPARTMENT OF

ATMOSPHERIC SCIENCES

Welcome to the Department of Atmospheric Sciences Newsletter

NEW FACES IN THE DEPARTMENT

We're happy to welcome two new members to our faculty:
Jessie Choate, who is our new instructor and academic advisor in atmospheric sciences, received her BS and MS (atmospheric sciences) from Illinois, and had been a research scientist at the Cooperative Institute for Mesoscale Meteorological Studies (CIMMS) in Norman, Oklahoma. ✦

Cristi Proistosescu, who is a new assistant professor in atmospheric sciences and geology, received his BA (physics) from Princeton and PhD (earth and planetary sciences) from Harvard. He is currently a postdoctoral fellow with the Joint Institute for the Study of the Atmosphere and the Ocean (JISAO), University of Washington. Cristi will begin his appointment in January 2020. ✦

FACULTY SPOTLIGHT:
Larry Di Girolamo, professor

In addition to his research on air quality in India, cloud properties over the globe, and remote sensing techniques for future satellite missions, **Professor Larry Di Girolamo** has spent a significant part of his time during the past few years building a relationship between NASA, NCSA, and DAS with an eye on center-building. His hard work is beginning to pay off. For example, he has led an effort to establish a cooperative agreement between NASA and the University of Illinois, with substantial involvement with NCSA, to provide large-scale satellite data analytics through the Blue Waters facility for the broader community. This essentially adds a community component to NASA's System of Systems for the scientific community to access and analyze NASA satellite datasets. Funding began as a $1 million two-year pilot project to demonstrate that the University of Illinois, in partnership with NASA, could substantially increase the utility and services for NASA satellite data. Several milestones have been reached, including the successful development of 2.4 PB of a Terra fusion dataset and associated advanced fusion software, secured hosting of this data in a NASA bucket on the AWS cloud, and the creation of movie clips from the Terra data that have already been featured in several cinematic productions. His team's next steps are under review by NASA and include the creation of an artificial intelligence (AI) gateway, comprised of software and hardware infrastructure, to further help develop the center and allow scientists to explore NASA satellite datasets at scale using AI.

These successes so far have initiated a high-level effort between Professor Di Girolamo and NCSA leadership to pursue a longer-term agreement for further development and maintenance, with the hope that this will lead to a new Illinois-NASA Cooperative Center. We look forward to hearing more about these efforts in the coming years! ✦

From Jeff Trapp, department head

After celebrating the return of the students with a SESE and then departmental BBQ (see photo below), the 2019-2020 academic year is now well underway. We've welcomed Jessie Choate, our new instructor and academic advisor, back to campus, and look forward to the arrival of Cristi Proistosescu, our new assistant professor, in January. We also started the year with three newly promoted full professors: Steve Nesbitt, Nicole Riemer, and Zhuo Wang, and a newly promoted Teaching Associate Professor, Jeff Frame.

During the Fall Semester, we will host the 3rd Midwest Student Conference on Atmospheric Research (MSCAR), celebrate the achievements of our 2019 Outstanding Alumna, Dr. Susan Avery, undergo an external program review, and begin tests of our new mobile, 915 MHz wind profiler. In the spring semester, we will hold our annual alumni and friends reception at the AMS Annual Meeting in Boston (see below for details), offer our first undergraduate course on weather and climate data science, and begin in earnest to develop graduate-level online courses in support of our proposed online MS. In addition, planning will commence for the department's 40th anniversary celebration, to be held in 2022. Stay tuned!

One of the positive feedbacks we consistently receive from our graduating students is how well the department fosters a family environment. We hope that you, our meteorological family members who continue to make us proud with your careers and many accomplishments, will remember to "write home" and come back for a visit! ✦

Departmental BBQ

Save the Dates

SESE Reception at the Fall AGU Meeting

When: Monday, December 9, 2019, from 6-8 p.m.
Where: Tabletop Tap House
175 4th St.
San Francisco, CA 94103 ✦

ATMS Reception at the AMS Annual Meeting

When: Tuesday, January 14, 2020, from 6-8 p.m.
Where: Westin Boston Waterfront
425 Summer St.
Boston, MA 02210 ✦

Congratulations to the graduating senior class of 2019

Tyler Allensworth
Brian Chung
Brent Conklin
Adam Dwyer
Stephanie Eilts
Alexandra Escobar
Shayna Fever
Hannah Fogle
Rylan Housenga
Kevin Iwatsuki
Thomas Meyer
Joel Porcaro
Alexander Salazar
Lucas Stehlik
Thomas Surleta
Sarah Thunberg
Paul Tisch
Allison Whitfield
Tyler Young

Congratulations to the graduate degree recipients in 2019

Jeffrey Henry Curtis	PHD
Dongwei Fu	MS
David Raymond King	MS
Rose Marie Miller	MS
Jake Patrick Mulholland	PHD
Swarnali Sanyal	PHD
Emma Lee Scott	MS
Daniel M. Stechman	PHD
Zachary T. Zobel	PHD

PROMOTIONS

Congratulations to **Professors Steve Nesbitt**, **Nicole Riemer**, and **Zhuo Wang**, who have been promoted to full professor.
Congratulations to **Professor Jeff Frame**, who has been promoted to teaching associate professor.

How much pollution do you inhale while riding your bike through Urbana-Champaign?

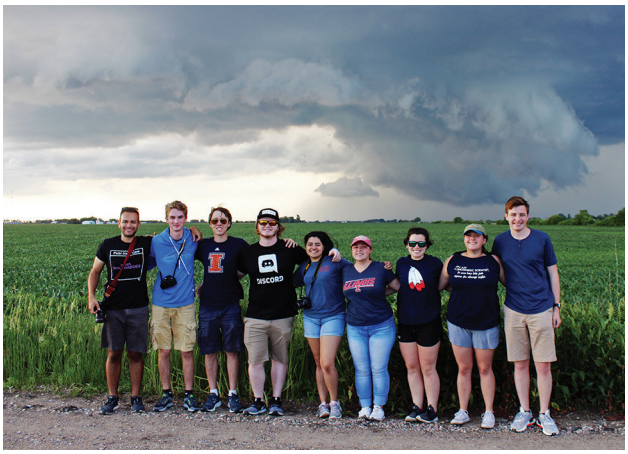
In summer 2018, the department acquired a highly-portable air-quality sensor, ARISense, which is small enough to be mounted on a bicycle for mobile monitoring air quality. Two of our undergraduate students, **Marley Majetic** and **Alex Bruchhauser**, working with **Professor Nicole Riemer**, conducted a pilot study to map air quality in Urbana-Champaign, one ride at a time. The motivation for this research is that quantifying people's exposure to air pollution requires knowledge of the spatial and temporal distribution of the pollutants. It is especially important to understand these patterns in urban environments because more than 50 percent of the global population now lives in urban areas, and this number will only increase in the future.

The ARISense system contains electrolytic sensors that measure several gas phase pollutants, such as nitric oxide, nitrogen dioxide, carbon monoxide, and total oxidants. It also measures particulate matter – a key culprit in the air pollution soup that we inhale on a daily basis. The system is housed in a small weatherproof enclosure and is mounted to the front basket of the bicycle. It is powered by a battery pack attached to the rear rack. Data are stored on an internal flash drive at an acquisition rate of one sample every 5 to 30 seconds, which translates to a spatial resolution of 20 to 120 meters during a bike ride. This is fine enough to provide a highly-detailed picture of local point sources that may impact air quality. The project integrates with the department's mission to provide research experiences for undergraduate students, and it provides opportunities for authentic learning in the classroom. ✦

Undergraduate students Marley Majetic and Alex Bruchhauser prepare for a bike ride to measure air quality with ARISense in Urbana-Champaign

ATMS 324: Field Studies of Convection

In spring 2019, two Field Studies of Convection trips returned to the Great Plains for an active storm season. In May, students observed storms on 11 of 14 possible days during one of the largest multi-day outbreaks of severe weather in several years. Although fast-moving storms and haze from wildfire smoke presented a challenge at times, the students witnessed three tornadoes, including a beautiful elephant-trunk tornado near McCook, Nebraska, multiple supercells, and a photogenic shelf cloud. The students also had the opportunity to tour the National Weather Center in Norman, Oklahoma, and chase storms on a rare Storm Prediction Center High Risk day. The weather pattern calmed somewhat by mid-June, but students still chased on an astonishing 12 of 14 possible days, witnessing numerous supercells and wall clouds. Their trip was capped off by observing storms in Texas, Kansas, Iowa, Colorado, Texas, and Kansas on consecutive days. ✦



Students pose in front of a supercell and wall cloud near Onawa, Iowa, on June 20, 2019. Pictured from left-to-right are Cameron Miller (graduate TA), Zach Chalmers, Drew Reiser, Jarod White, Jasmine Lara, Brooke Witkins, Bridgette Mason, Alli Whitfield, and David Roegner.

RELAMPAGO: Collecting data on intense thunderstorms in Argentina

Graduate students Carolina Bieri and Sujan Pal help with the installation of a flux tower in Argentina.

Thunderstorms in Argentina are among the most intense and deepest in the world, are prolific hail producers, and often are accompanied by extreme rainfall and lightning activity. The impact of these storms, as well as their incomplete understanding, helped motivate the Remote sensing of Electrification, Lightning, And Mesoscale/microscale Processes with Adaptive Ground Observations (RELAMPAGO) field program. RELAMPAGO was mostly conducted in and downwind of the Sierras de Córdoba mountains in Argentina, and funded primarily by the National Science Foundation. The $30 million RELAMPAGO project was led by Professor Steve Nesbitt, who first conceived the idea in 2012. His six years of planning and hard work culminated in a field phase held from November 1 - December 16, 2018.

During the field phase, ground-based instrumentation such as the Doppler on Wheels (DOW) radars and mobile radiosondes was deployed over 19 Intensive Observational Periods (IOPs) to sample the local mesoscale environment as well as internal convective-storm processes. A total of nine graduate students, one postdoc, and seven undergraduate students from ATMS served on various instrumentation, weather forecasting, and hydrological teams. Four of our faculty members (Professors Nesbitt, Dominguez, Hence, and Trapp) led the data collection efforts as well as served as science and operations directors. Analyses of the data are already well underway, and will be a focus of our research efforts and discovery for many years to come. ✦

My RELAMPAGO experience as an undergraduate student: Alli Whitfield

During the week of Thanksgiving break in 2018, several DAS students and I traveled over 5,000 miles to Villa Carlos Paz in Cordoba, Argentina, to participate in the RELAMPAGO-CACTI field campaign. Throughout the week, the group sat in on RELAMPAGO-CACTI forecast briefings as well as learned about the various instrumentation and logistical procedures involved in data collection. Our group also participated in two IOPs to gather data on convective initiation and upscale growth. During the IOPs, the students dispersed into different teams, which included the DOW team, the U of I sounding team, and the Mesonet team, each of which had different roles in collecting the data. Being able to participate in a field campaign is something that not many undergraduate students get to experience, not to mention being able to take part in an international campaign conducted on a different continent. Considering that I had never left the 48 states of the contiguous U.S. before this trip, it was a completely new experience for me to witness the culture of another country, and to study my passion for atmospheric science on the other side of the world. The RELAMPAGO course allowed me an unforgettable experience; I am so appreciative that I was able to be a part of such an influential campaign – one that will serve to be an important and unique source of data used in research for the next few decades. ✦

My RELAMPAGO experience as a graduate student: Holly Mallinson

During November and December 2018, I had the opportunity to participate in the RELAMPAGO field campaign based in Córdoba, Argentina. I was a part of one of the two U of I teams that launched radiosondes to gather high spatial and temporal resolution data on severe thunderstorm environments. Additionally, I attended daily forecast briefings that included discussions on deployment logistics. RELAMPAGO provided a tremendous opportunity for collaboration with other students and scientists across the U.S. and world, and my participation in the project was invaluable as an early-career scientist. I look forward to analyzing data from the project to expand our understanding of severe thunderstorms. ✦

Alumni in the spotlight:
Glen Romine, MS 2002, PhD 2008

What have you been up to since your time at DAS?

After finishing my degrees at DAS, I briefly stayed on as a postdoctoral researcher until June 2009 when my family and I moved to Colorado to begin working at NCAR. I'm still working at NCAR where I have a joint appointment with the Mesoscale and Microscale Meteorology and the Computational and Information Sciences laboratories. I am in engaged in activities that revolve around ensemble-based data assimilation and probabilistic prediction challenges. My research has a broad aim to improve the prediction of high-impact weather systems, especially those associated with severe local storms. These days, I'm managing and mentoring more often, but I still enjoy conducting research as well. Outside of work, I enjoy time with my family and the wonderful year-round outdoor activities that are enabled by living in the Colorado Front Range.

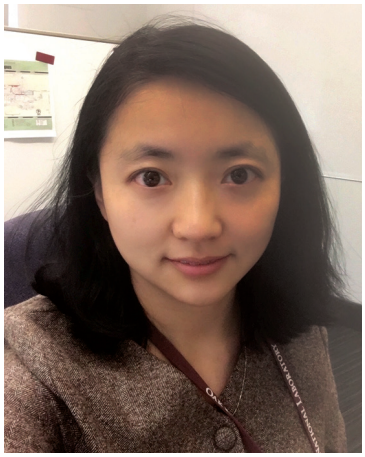
How have you benefited from your degree in atmospheric sciences from the University of Illinois?

It was a wonderful educational experience that pushed me to view atmospheric science from a new lens (my undergraduate degree was in meteorology from the University of Oklahoma). I particularly benefited from access to some of the best computational resources in the world. My research advisor (Bob Wilhelmson) and his team provided me with the tools and methods to develop research projects, and I continue to use those skills. I also made many friends, and met my (now) wife at DAS, so it was a wonderful experience on many levels. Of particular value to me, I gained invaluable experience on how to develop successful proposals. I now have the opportunity to help and share those skills with others. Thanks, Bob!

What's next for you?

I plan to continue working at NCAR pursuing challenges in weather prediction and predictability, modeling forecast error reduction, and improving the usability of forecast uncertainty information. I hope to get more involved in field research again as I'm starting to miss it. And, outside of work, I'll be enjoying the next few years with my girls before they start leaving the nest. I'll also continue to explore the West. There is so much to see and do! ✦

Alumni in the spotlight:
Yang Song, PhD 2015



What have you been up to since your time at DAS?

After receiving my PhD degree in 2015 from DAS, I stayed at DAS as a post-doc for eight months. In April 2016, I moved to Oak Ridge, Tennessee, and joined Oak Ridge National Lab (ORNL) as a post-doc and then as an associated research scientist. My research at ORNL allowed me to explore an cutting-edge research topic: the application of gene science in climate science. I have developed an omics-informed soil biogeochemical model that is able to apply microbial gene data to identify microbial functional diversity and its implication for soil carbon emission. In July 2019, I accepted an assistant professor position from the Department of Hydrology and Atmospheric Sciences and the Ecosystem Genomics Institute, University of Arizona.

How have you benefited from your degree in Atmospheric Sciences from the University of Illinois?

My PhD training in DAS has equipped me with solid knowledge and professional skills in climate science. Most importantly, diverse curriculum design and cross-campus collaborations in research projects have cultivated me with the ability to absorb and combine multi-disciplinary knowledge in a short time. With the flying of time, all my study experiences in DAS have become my treasure. They not only allowed me to complete the inter-disciplinary research in ORNL but also provided me large flexibility when planning my future career development and research direction.

What's next for you?

I will start to build my research group in the Department of Hydrology and Atmospheric Science and the Ecosystem Genomics Institute, University of Arizona, in Spring 2020. In this new career journey, I will continue linking gene to ecosystem functions towards developing the genetically-informed prediction of vegetative and microbial functions in the earth system models. I will work on applying this research to mitigate the effects of climate change. I will train students with knowledge and skills to further explore this interesting research topic: gene to earth-system modeling and application. ✦

Alumni Sightings

Conor Haney, Alexandra Jones, Melissa Peterson, and Michael Wilson with Bob Rauber at the 2018 AGU Annual Meeting in Washington D.C.

Lusheng Liang and Marile Colon Robles with Larry Di Girolamo at the 2018 AGU Annual Meeting in Washington D.C.

Jason Tackett, Jason Keeler, Kim Reed, Wendi Flynn, and Hilary Minor at the 2019 AMS Annual Meeting in Phoenix

Distinguished Alumnus for 2018

Professor Long Cao was named the 2018 Distinguished Alumnus in the Department of Atmospheric Sciences.

Professor Cao is a Professor of atmospheric science in the School of Earth Sciences at Zhejiang University, China. He received his PhD in atmospheric sciences at the University of Illinois in 2007, under the mentorship of Professor Atul Jain.

After completing his PhD, he worked at the Department of Global Ecology at the Carnegie Institution for Science as a post-doctoral research fellow and then as a senior research associate. Long then joined the School of Earth Sciences at Zhejiang University in 2012.

He has published a significant number of high-impact papers on climate forcings and their responses. **In fact, in 2014, one of his papers was recognized with a WMO (World Meterological Organization) Norbert Gerbier-MUMM International award.** This rewards an original scientific paper on the influence of meteorology on the physical, natural or human sciences, or conversely, to stimulate research on the influence of these sciences upon meteorology, thereby contributing to WMO programs and activities.

He is a member of the editorial board of the journals *Climatic Change and Atmospheric* and *Oceanic Science Letters.* Long served as a contributing author of the IPCC (Intergovernmental Panel on Climate Change) fifth assessment report, and is serving as a lead author of the upcoming IPCC sixth assessment report. ✦

Ogura Awards for 2019

Ogura Outstanding Teaching Award
Javier Villegas-Bravo

Ogura Student Research Award
Alexandra Jones

Ogura Student Research Paper Award honorable mentions
Huancui Hu

Ogura Award for Outstanding Senior
Tyler Young

Ogura Outstanding Undergraduate Research Awards
Brent Conklin
Stephanie Eilts
Shayna Fever
Joel Porcaro
Sarah Thunberg
Tyler Young

Mankin Mak Scholarship
Britta Sindelar

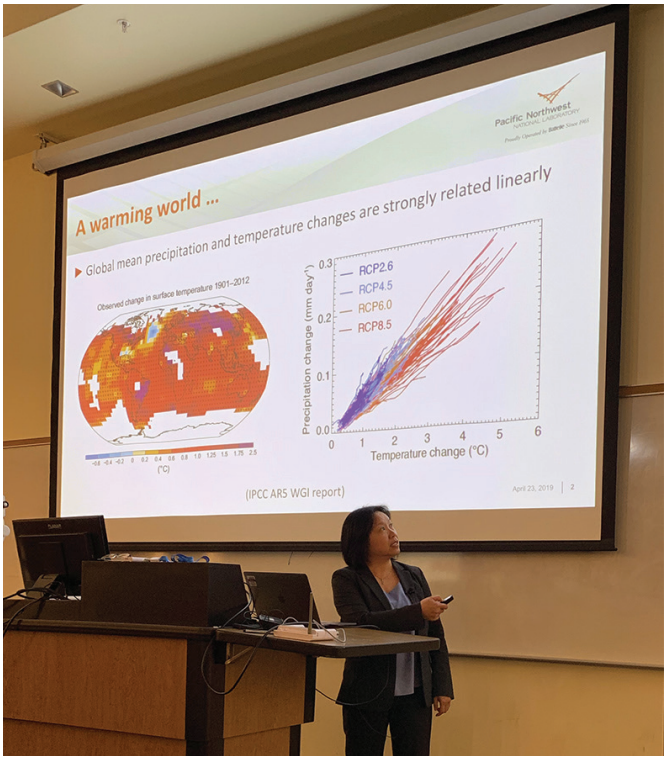
2019 Ogura Lecture

The 2019 Ogura Lecture was given by **Dr. Ruby Leung**. She is a Battelle Fellow at the Pacific Northwest National Laboratory and an Affiliate Scientist at the National Center for Atmospheric Research. She is also the chief scientist of Energy Exascale Earth System Model (E3SM) supported by the Department of Energy.

Dr. Leung has a PhD and MS in atmospheric sciences from Texas A&M University. She also has a BS in physics and statistics at Chinese University of Hong Kong.

Her research crosses multiple areas in modeling and analysis of climate and the hydrological cycle including land-atmosphere interactions, orographic processes, monsoon climate, climate extremes, land surface processes, and aerosol-cloud interactions. She has published over 250 peer-reviewed journal articles in these areas. Her research on climate change impacts has been featured in *Science, Popular Science, Wall Street Journal*, National Public Radio, and many major newspapers.

Dr. Leung has a number of accolades, including membership in the National Academy of Engineering, member of the Washington State Academy of Sciences, Fellow of the American Association for the Advancement of Sciences, Fellow of the American Meteorological Society, and Fellow of the American Geophysical Union. Her Ogura Lecture was entitled: "Observation and Modeling of Mesoscale Convective Systems and their Large-scale Environments." ✦



2019 Ogura Banquet

In 2019, the department began a new tradition of holding an Ogura Banquet in conjunction with the Ogura Lecture and presentation of the Ogura Awards. The keynote speaker during the banquet was **Professor Emeritus Robert Wilhelmson**. Bob received his BS degree in mathematics from Wheaton College, Wheaton, Illinois. He then completed his MS (1969) and PhD (1972) degrees in computer science from Illinois in the areas of computer software and numerical analysis, respectively. In 1970, he was one of the first scientists to use the internet (e.g., ARPANET) to carry our research from the University of Illinois using an IBM computer in California. He joined the Laboratory for Atmospheric Research & Center for Advanced Computation as a research assistant professor, became an assistant professor in 1974, and was promoted to full professor in 1983 in what is now the Department of Atmospheric Sciences. Bob served as department head from 1993-94, and then again from 1996-99. He also served as assistant and then associate director of the National Center for Supercomputing Applications from 1985-87.

Wilhelmson's first peer-reviewed article was published in 1972 in the *Journal of the Atmospheric Sciences* with Yoshi Ogura: The pressure perturbation and numerical modeling of a cloud.

His numerical modeling interests continued with the development of the Klemp-Wilhelmson model, which was published in the *Journal of the Atmospheric Sciences* in 1978. This model facilitated more than two decades of research on severe convective storms using the idealized modeling approach, and led to some of the seminal findings on convective dynamics. In 1979, he and Joe Klemp received the Outstanding Publication Award from the National Center for Atmospheric Research, which is a highly prestigious and highly competitive award. In 1983 both were presented with the Meisinger Award from the American Meteorological Society. Wilhelmson is also an AMS Fellow. ✦

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