



Letter from the Interim Director



Daan Liang, Ph.D., P.E., Interim Director, NWI.

As the summer quickly approaches an end, all of us are wrapping things up and gearing for the fall semester. Since the fiscal year also closes on August 31, **Angela Beikmann**, our Senior Accountant, has been working long hours to monitor fund balances and to make sure that every dollar can be put to good use. This is not to mention the many appointments of NWI's researchers, staff, and students to be processed so that we can be paid on time! I can't thank her enough for her dedication and attention to detail.

One of the things I'm most excited about the new semester is our NWI Wednesday Seminar Series. **Dr. Delong Zuo** has managed to produce the best lineup of speakers, including three renowned researchers as the part of Fall 2016 McDonald- Mehta Lecture Series. The seminars are also a great opportunity to showcase our own research and spur collaboration, so appreciate the ones who will present this semester and encourage others to sign up for the next one.

As I reported earlier, the NWI staff has been revamping our website to not only conform to the university's new layout requirements, but also make it more accessible and useful. At the beginning of September, we turned on the light switch and made it live! We are both excited and nervous at the same time,

keeping our fingers crossed and hoping for a smooth transition. Because the website is intended to serve all of you, we would like you to look it over and provide feedback on future improvement.

Since its inception, NWI's field site at Reese Technology Center, has played a critical role in the full-scale study of atmospheric conditions and wind-structure interaction. A crown jewel on the site is a 200m meteorological tower with its unmatched capability and instrumentation, providing baseline data for research and engineering communities across the world as well as attracting over \$1m of external funding. While continuing to maintain the tower and making data more accessible, we commissioned a study this summer with DNV-GL to evaluate the feasibility of upgrading it to comply with IEC standards. The goal is to further expand the use of the tower for wind energy research and to strengthen our partnerships with national laboratories and with industry. In addition, it would open up commercial opportunities in product prototyping, testing and certification.

As you may know, the Department of Labor (DOL) recently finalized the new overtime regulations under the Fair Labor Standards Act (FLSA). Under the FLSA, the minimum salary an exempt employee must be paid to be increases from \$23,660 per year to \$47,476 per year. While the FLSA changes won't become effective until December 1, 2016, the Texas Tech University System component institutions have chosen to implement a minimum exempt salary of \$48,000 beginning November 1, 2106, and will proactively increase the minimum exempt salary by \$1,000 every year. These changes could have an adverse impact on NWI's budget and the way we operate so we are assessing the situation intensively. The priority is to maintain a professional staff providing first-rate service and support to our affiliates while putting NWI on the path towards growth and financial sustainability. If you have ideas on how we can do our job better and more efficiently, I would like to hear them.

Go Raiders!

Daan Liang, Interim Director

Doctoral Student Awarded Pulsed Power Student Award



Shelby Lacouture, a doctoral student studying under **Dr. Stephen Bayne** (Electrical and Computer Engineering), was awarded the 2016 Arthur H. Guenther Pulsed Power Student Award by the IEEE's Pulsed Power Science and Technology Committee.

Shelby, from Atlanta, Georgia, was one of two co-winners, given (as the committee reports) due to the "very high quality" of the applicants. The award is to recognize and honor the outstanding contributions that students have made to the future of pulsed power science and technology.

Shelby received the award for his contributions in developing a coupled hardware and software short pulse test bed for the analysis of semiconductor devices. The award will be presented at the 2017 Pulsed Power Conference to be held in Brighton, England, next June.

Shelby will be presented with a Citation recognizing his achievements and a \$1,000 honorarium.

(Left) - Shelby Lacouture, Ph.D. student working under Dr. Stephen Bayne (EE).

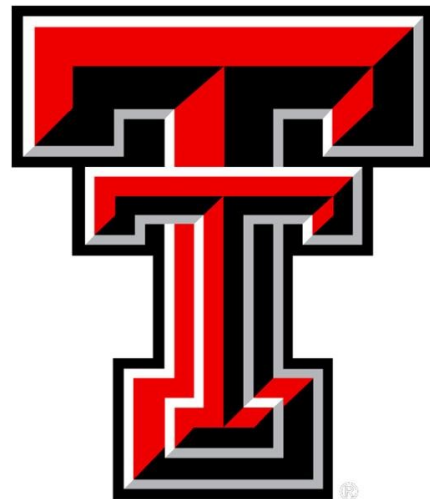
NWI Website Revisions—What are your thoughts?

NWI has been diligently working over the summer months to improve the website experience for on-line visitors. With the recent university-wide switch to new software, NWI staffers have been able to strengthen the website by making the process more intuitive, more comprehensive, and easier than ever.

With new pages, updated information, and our new approach, NWI is excited to announce that the new website (same address: www.wind.ttu.edu or www.nwi.ttu.edu) launched at the end of August.

We look forward to hearing your suggestions and comments on your new and improved on-line experience so please let us know your thoughts.

We are happy to continue to strive for the next level of excellence with your help.



Wonder Where Wind Comes From? Interactive Exhibit Opening at Museum

By Heidi Toth

***How Weather Works* invites visitors to learn how weather patterns are formed and examine how human activity affects weather.**

For everyone who wonders why Lubbock is so windy in the spring, how it can be shorts weather in February and parka weather in March or what causes tornadoes, hurricanes and blizzards to hit where they do, come to the Museum of Texas Tech University. Visitors will find these answers and more in a fun, interactive new exhibit that explains how weather begins and how it all works.

Hint: It all starts with the sun and the rotation of the Earth. *How Weather Works: Understanding Our Place Between the Sun and a Storm* opens Sunday (June 26) and allows visitors of all ages to start at the sun, create atmospheric pressure, explore the Earth's spin and the jet stream and learn about the many powerful aspects of storms such as tornadoes, haboobs, hail and lightning. The exhibit includes a section on how chaos, or altering one or many components of the atmosphere, can affect weather.

The exhibit showcases research led by **Brian Ancell**, an Assistant Professor in the Department of Geosciences, Atmospheric Science Group, who received an Early CAREER grant from the National Science Foundation. In addition to educator resource kits for local teachers and weather summer camps for middle school-age children, he coordinated with the museum to create this exhibit, which brings weather down to eye level and highlights how human activity can affect weather patterns.



(Above) - Dr. Brian Ancell, Assistant Professor in Atmospheric Sciences at TTU.

"The driving research focuses on inadvertent weather modification, or how human activities such as irrigation, wind farms and urban heat islands can change the weather non-locally, or far away from the source," Ancell said.

The exhibit is split into two sections. The first covers the basic atmospheric principles that create weather, starting from the sun and the rotation of the Earth and ending with small-scale weather features like thunderstorms. Visitors will get to stand between the Earth and the sun and take temperature readings with an infrared gun, then learn how the uneven heating of the tilted Earth creates atmospheric pressure, which then creates wind. They also will explore the Coriolis Effect, which explains how the Earth's rotation leads to the jet stream and how weather systems work.

Visitors then move into a simulated immersive storm experience and learn about the formation of tornadoes, thunder, lightning, hail and dust storms, with a weather alert broadcast in the background and motion-activated thunderstorm above.

The second part of the exhibit discusses chaos and inadvertent weather modification, which is the focus of Ancell's research. Visitors will use a Plinko board representing the Texas-Louisiana coastline to show how minute variations can alter the path of pucks representing hurricanes.

"Chaos is the reason why small changes to the atmosphere, such as those resulting from irrigation or wind farms, can grow to be large, modifying larger scale weather features well away from the changes in the first place," Ancell said.

Courtesy of the Office of Communications and Marketing, Texas Tech University.

Researchers Complete Study of South-Eastern Tornado Development

By Cara Vandergriff

Three atmospheric science researchers participated in the VORTEX-SE project earlier this year to learn more about tornado development in the Southeast.



In order to improve our understanding of how tornadoes develop, travel and intensify in the southeastern United States, three Texas Tech University researchers participated last spring in the Verification of the Origin of Rotation in Tornadoes Experiment-Southeast (VORTEX-SE), a two-month study investigating tornado activity in the Central and Southern Plains regions.

Chris Weiss, a Texas Tech Associate Professor of atmospheric science specializing in severe storm dynamics and tornadogenesis, said the intention of the VORTEX-SE study was to explore how landscape and the near-storm environment in the southeastern region contribute to tornado development.

"The project was a success all around in terms of our Texas Tech component," Weiss said. "We had two or three big storm events occur that we were able to gather some useful samples from, so I think we were definitely able to meet the criteria for the project in a number of ways."



(Above right) - **Dr. Chris Weiss**, Associate Professor, Atmospheric Science, answers questions from a TV crew during the VORTEX-SE project funded by the National Oceanic and Atmospheric Administration (NOAA).

(Left) - One of the vehicles mounted with instruments and used during the mobile atmospheric project.

Credit: Office of Marketing and Communications, Texas Tech University.

NWI faculty supports U. S. Army Education Outreach Project



Introducing and supporting high school students from historically under-represented and under-served groups in science, technology, engineering and math (or STEM) is very important for NWI and TTU, and NWI faculty affiliate and **Professor Stephen Bayne** (Electrical Engineering) is addressing that very need through the U. S. Army's Research and Engineering Apprenticeship Program (REAP). Focused on developing STEM competencies, REAP is a paid summer internship program that provides students exposure to the world of research, gain valuable mentorships, and learn about education and career opportunities, all experiences that are not readily available to high school students.

According to their website, the Army [via AEOP] "continues its long tradition and strong commitment to the advancement of STEM education and literacy." The text continues, "Leveraging its most valuable assets – world-class scientists and engineers and research facilities – AEOP offers our nation's youth and teachers... opportunities that effectively engage future workforce generations in real-world STEM experiences."

Funded by the U.S. Army Education Outreach Program (AEOP), each student selected must spend a minimum of 170 hours (spread over the summer months) working closely under the direct supervision of a senior Army-sponsored university scientist or engineer on a hands-on research project. All students are placed in a laboratory within commuting distance of their residences and receive a stipend for participation and applications are accepted year-round.

"We are giving students the opportunity to work in the labs and learn hands-on about science and engineering. They get really excited about research, development, and engineering," said **Dr. Stephen Bayne**, Associate Chair of Graduate Studies and Professor in TTU's Electrical and Computer Engineering department. REAP mentors also include **Dr. Ren Beibei** and **Dr. Argenis Bilbao**, Senior Research Associate.

Started at TTU in 2010, REAP has had 18 students enrolled in the program, with 89% of the participants going on to attend college, the majority in the engineering-related fields. A total of ten students completed the program this summer with students from Estacado High School, Frenship High School, Harmony Science Academy, Monterey High School, and Talkington School for Young Women Leaders.

According to **Janet McKelvey**, the TTU REAP Administrator, this program "is having great success in attracting bright young women to the program and we hope that they will continue their education here at Texas Tech."

REAP OBJECTIVES:

- Provide high school students from groups historically under-served and under-represented in STEM (including alumni of AEOP's UNITE program) with an authentic science and engineering research experience.
- Introduce students to the Army's interest in science and engineering research and the associated opportunities offered through the AEOP.
- Provide participants with mentorship from a scientist or engineer for professional and academic development purposes.
- Develop participants' skills to prepare them for competitive entry into science and engineering undergraduate programs.

** UNITE is a similar U. S. Army-focused academic and enrichment summer opportunity reaching 9th-12th grades to promote college majors and careers in engineering. For more information, please check <http://www.usaeop.com/programs/apprenticeships/reap/>.*

NWI GRANTS AND CONTRACTS — AUGUST 2016

There were none to report.

RECENT PUBLICATIONS (as reported by Web of Science)

Schrock, J. A., E. A. Hirsch, **S. Lacouture**, M. D. Kelley, **A. V. Bilbao**, W. B. Ray, **S. B. Bayne**, **M. Giesselmann**, H. O'Brien, and A. Oggunniyi (2016). "Failure Modes of 15-kV SiC SGTO Thyristors During Repetitive Extreme Pulsed Overcurrent Conditions." *IEEE Transactions on Power Electronics* 31.12: 8058-8062; 10.1109/TPEL.2016.2574625 DEC 2016.

Nejat, A., Z. Cong, and **D. Liang** (2016). "Family Structures, Relationships, and Housing Recovery Decisions after Hurricane Sandy." *Buildings*, 6.2: 10.3390/buildings6020014 JUN 2016.

Jarnevich, C. S., T. R. Holcombe, B. A. Grisham, J. Timmer, **C. W. Boal**, M. J. Butler, J. Pitman, S. C. Kyle, D. Klute, G. M. Beauprez, A. Janus, and W. E. Van Pelt (2016). "Assessing Range-Wide Habitat Suitability for the Lesser Prairie-Chicken." *Avian Conservation and Ecology* 11.1: 10.5751/ACE-00807-110102 JUN 2016.

Ancell, B. (2016). "Improving High-Impact Forecasts through Sensitivity-Based Ensemble Subsets: Demonstration and Initial Tests." *Weather and Forecasting* 31.3 (www.journals.ametsoc.org).

West Texas Mesonet Begins Work on Station #99



(Left) - John Lipe (National Weather Service/Lubbock) and WTM Manager Wes Burgett lift the structural support of the new Fort Lewis station #99 in the ever-burgeoning West Texas Mesonet system. (Photo credit: Dr. Charles Hakes, Fort Lewis College.)

The West Texas Mesonet (WTM) system recently starting construction on station #99 in Fort Lewis, Colorado, recently.

The WTM system is part of a nation-wide group of other similar meteorological networks, all of whom provide a wide range of meteorological-related data via the various instrumentation platforms based at each station. Initiated in 1999 to provide free real-time weather and agricultural information for all, the WTM is part of the National Wind Institute (NWI), and is preparing to open the 100th station in the early months of fall.

According to **Wes Burgett**, the WTM Manager, the WTM's first station came online at Reese Center, 12 miles west of Lubbock, in June of 2000.

"Since that time, our network has grown to 99 mesonet stations and seven boundary layer SODAR units covering 66 counties in the Texas Panhandle, South Plains, Rolling Plains, Permian Basin, Trans Pecos, far West Texas, Concho Valley, Big Country, Edwards Plateau, Hill Country, eastern New Mexico and southwest Colorado," Wes added.

Please look out for future details about the upcoming 100th station (currently under construction) in New Home (Lynn County) this autumn.

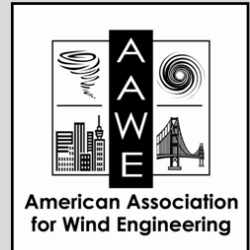
NWI MOVERS & SHAKERS



- NWI alumna **Dr. Andrea Jackman** (Ph.D., 2008) recently had an article published by the United Nation's Office for Disaster Risk Reduction. The full report (including Dr. Jackman's paper under Chapter 2) may be viewed at this link:

http://www.unisdr.org/campaign/resilientcities/home/manage_private_pages

The recent accreditation for NWI's Debris Impact Facility (DIF) was recently featured in the July 08 edition of The Wind Engineer, AAWE's newsletter. Congratulations to Assistant Research Professor **Larry Tanner**, **Tammy Pitzer**, and the rest of the team.



REMINDER: Now's the time to send in abstracts for WINDPOWER 2017, scheduled for May 22-25, 2017 in Anaheim, CA. Organizers state that "they want to hear from the experts and thought leaders who aren't solely talking wind energy—they're putting it to work." The deadline for abstracts is September 12.

Welcome Wind Energy Students!



NWI's Education team welcomed new and returning students back to campus for the Fall 2016 semester last week. Pizza and ice cream was provided to all, and students and faculty were able to meet each other to put faces with names.



Drs. John L. Schroeder, along with Research Professors **Dr. Brian Hirth** and **Jerry Guynes** recently were the focus of *North American WindPower's* website (www.nawindpower.com) when they featured an article covering their research with a new radar prototype to help lower energy costs.

Funded by a \$1.4 million grant from the U. S. Department of Energy (DOE), the system is designed to make relevant measurements of complex wind flows in the lower atmosphere, particularly with intra- and inter-wind plant flow fields.

For more details, please check out the on-line article: <http://nawindpower.com/texas-tech-teams-new-radar-prototype-could-help-lower-energy-costs>.

If you are interested in having your latest scholarly endeavors featured in the next NWI newsletter, please forward your information (publications, proceedings, conference/workshop attendance, or other news etc.) to Liz Inskip-Paulk (email: Elizabeth.paulk@ttu.edu). Go Red Raiders!