TEXAS TECH UNIVERSITY
National Wind Institute™

March 2017—Issue 92

Letter from the Interim Director

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

March marks the beginning of the change of weather, new growth and life, and so it made perfect sense to have the Texas Weather Conference in Austin during this time of year. Invited as a keynote speaker, I discussed how interdisciplinary research and education help to bridge the gap between science and engineering and how it advances community resilience to disasters.

In addition to networking with other scientists, meteorologists, state officials, and another engineer (there was only one besides me), I was so pleased to visit with two of our wind Ph.D. program alumni in attendance – **Dr. Maribel Martinez** and **Dr. Becca Paulsen-Edwards**. Maribel, currently working at U.S. DOE Pantex Plant in Amarillo, also spoke about her experience with severe weather and other extreme events on a panel, while Becca introduced me to an amazing local restaurant called Tacodeli. Please be sure to go there when you are in Austin next time and order Delibelly (pork belly, avocado, cilantro, onion, Goodflow Honey tomatillo-serrano salsa)!

After all was done, **Dr. Brian Ancell** of Atmospheric Science should be applauded for his service on the conference program committee and both of us look forward to bringing it to Lubbock in the near future.

Since the beginning of this year, the academic committee (**Drs. Kishor Mehta**, **Delong Zuo**, **Brad Ewing**, **Brian Ancell**, and myself) has been reviewing applications to our wind Ph.D. program, conducting online interviews, and making funding decisions. Thanks to their efforts, one of applicants has been awarded the Presidential Graduate Fellowship, the most prestigious and competitive awards offered to incoming doctoral students by Texas Tech University. This speaks volumes about the quality of our program and allows us to continue attracting top students. Additionally, to further improve recruitment and advising, Kishor and I have begun to reach out to our 30+ alumni, seeking their feedback on the strengths and challenges associated with this interdisciplinary degree. In the meantime, we'd like to engage more faculty members, and do our best to meet their needs.

West Texas Mesonet (WTM), under the leadership of **Dr. John Schroeder** and **Wes Burgett**, are forging ahead with adding new stations and improving service. On March 21, a milestone was reached when an iOS app was launched in the Apple Store, giving users easy access to information on temperature, wind speed, wind direction, wind gusts, pressure, dew point, humidity and precipitation in plain language, along with weather maps based on the iPhone or iPad's GPS location. It's the culmination of almost one year and half of hard work by Yin Lu in programming and testing. Job well done!

I'd also like to express my appreciation to **Dr. Delong Zuo** for organizing the WISE Wednesday and Mehta McDonald Lecture Series for the past two and half years. He volunteered his time for this important task with diligence and enthusiasm, and as the result, attendance has been superb. Quite often, people had to sit on the floor if they came late. He should feel very proud of the solid foundation that the next person in charge can build upon.

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NWI INTERIM DIRECTOR'S LETTER *continued*

Anna and I were busy completing annual evaluations for all of our administrative and technical staff. It gives us the opportunity to do a 360-degree performance appraisal and offer constructive recommendations on future improvements. At the same time, we receive many feedback on how the NWI leadership can better support staff's work. And we are glad it's done and done on time!

Go Raiders!

Daan Liang, Interim Director

MCDONALD-MEHTA LECTURE SERIES: DR. SANJAY ARWADE

(*Above) - Dr. Sanjay Arwade, Professor at University of Massachusetts-Amherst and visiting speaker for the Spring McDonald-Mehta Lecture Series at NWI.*

Please save the date for the next McDonald-Mehta Lecture Series event with Dr. Sanjay Arwade from the University of Massachusetts at Amherst. Presentation title: "Extreme Events and the Reliability of Offshore Wind Energy Structures." The event will be at 3:30 p.m. on Wednesday, April 19 in Experimental Sciences room 120.

Dr. Arwade is a Professor and Graduate Program Director in the Department of Civil and Environmental Engineering at the University of Massachusetts at Amherst. He has a Ph.D. in Civil Engineering from Cornell University (2002), an M.S. in Civil Engineering from Cornell University (1999), and a B.S.E. in Civil Engineering from Princeton University (1996).

According to the UMass-Amherst faculty website, Dr. Arwade's research includes probabilistic mechanics, materials mechanics, historic structures, structural reliability, computational solid mechanics, structural aspects of wind energy development, and the structural design of green buildings.

The McDonald-Mehta Lecture Series is named after and funded with the endowment of **Dr. Kishor C. Mehta** and **Dr. James McDonald**, founding faculty members of the former Wind Science and Engineering Research Center (WiSE) now the National Wind Institute (NWI). The lecture series invites nationally-known scientists and experts in wind-related industries to campus for presentations in their area of academic excellence.

The McDonald-Mehta Lecture Series event is on Wednesday, April 19, at 3:30 p.m. in Experimental Sciences Building room 120. Everyone is invited to attend. Reception to follow.

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).

I-CORPS PROGRAM AIMED AT INCREASING ECONOMIC IMPACT OF NSF RESEARCH

*(Above) - The I-Corps team: **Qihong Cui** (top right) and **ChengJun Zhu** (bottom right) working with representatives from the USDA and a senior crop insurance agent. (Not pictured is Dr. **Yin Lu**, Research Associate with NWI.)*

NWI Research Associate **Dr. Yin Lu** and his team are working to understand the economic impact of NSF-funded research through an innovative new program to design a unique risk model on the hurricane resiliency index which could help people prepare better for reconstruction and recovery after such a severe weather event. The TTU team is researching the potential market value of this index through the program.

Called I-Corps, this is an intensive program to enable scientists and engineers to extend their focus beyond the laboratory, and is currently the model for innovation programs across the country and the globe.

This project requires a customer development team to spend significant amounts of time talking to customers and testing hypotheses about what they would want in products and services should the event occur.

Through March 6th to March 22nd, the NWI team - **ChengJun Zhu** [Entrepreneur Lead], **Qihong Cui** [Entrepreneur Lead], and **Yin Lu** [Principal Investigator] actively participated in the customer interview efforts.

"We strived for a minimum of 10 interviews per week and twenty-six customers in total were interviewed within the two-week period," reported Dr. Lu.

ChengJun Zhu added, "The real-world, hands-on learning experience with talking to customers, and combining our research product with real business are the most valuable things to us."

According to Dr. Lu, Customer Discovery is an iterative process of physically getting out of the building to interview potential customers and stakeholders to understand their problems and pain points.

"We first interviewed with the West Texas Farmers Association and with the All-State Insurance company to validate our customer segment," explained Dr. Lu. "After convincing a couple more insurance companies to participate, the team narrowed down the target population to a more accurate customer segment and the project proceeded from there."

After the team had spent time engaged with customers and the ecosystem stakeholders and learned their concerns, they were in a position to better transfer knowledge into the products and process that could then benefit the company. As a result of the team's hard work, they were recognized with the "Most Improved Team Award", which is a great honor as well as a positive affirmation of their work.

"Technology transfer and commercialization is identified as one of NWI's strategic goals, added **Dr. Daan Liang**, NWI Interim Director. "So I'm pleased to see the effort this I-Corps team has put in and wish them the best when moving to the national level."

*(Above) - **Dr. Yin Lu**, Research Associate with NWI and Principal Investigator of the I-Corps project.*

WEST TEXAS MESONET LAUNCHES FREE APP

Text by Glenys Young, TTU Marketing and Communications.

It's an old joke that if you don't like the weather in Texas, just wait a few minutes and it'll change. Of course, if you want accurate weather information, the technology at your fingertips has to change that quickly as well.

(Above) - Wes Burgett, Operations Manager for the West Texas Mesonet.

Texas Tech University's West Texas Mesonet launched its new app last month, available to download for free in the App Store. The app's data is updated every five minutes from the weather stations in the mesonet's extensive coverage area.

"The app provides precise weather and agricultural information right to your phone from more than 100 mesonet sites across West Texas, eastern New Mexico and southwest Colorado," said **Wes Burgett**, operations manager for the West Texas Mesonet. "It provides current data along with 24-hour plots. The app also provides daily and weekly weather forecasts from the National Weather Service."

The app gives users easy access to information on temperature, wind speed, wind direction, wind gusts, pressure, dew point, humidity and precipitation in plain language, along with weather maps based on the iPhone or iPad's GPS location.

The app can be found here or by searching "West Texas Mesonet" in the App Store.

NWI FACULTY AFFLIATES: PUBLICATIONS FOR MARCH 2017

Zhang, X., and **X. Chen** (2017). "Refined Process Upcrossing Rate Approach for Estimating Probabilistic Wind Load Effects with Consideration of Directionality." *Journal Of Structural Engineering* 143 (1):10.1061/(ASCE) ST.1943-541X.0001625. January.

Pushpakaran, B. N., **S. B. Bayne**, and A. A. Ogunniyi (2017). "Electrothermal Simulation-Based Comparison of 4H -SiC p-i-n, Schottky, and JBS Diodes Under High Current Density Pulsed Operation." *IEEE Transactions on Plasma Science*, 45 (1):68-75; 10.1109/TPS.2016.2636214. January.

NWI STUDENT SPOTLIGHT: JAMES DUNCAN

Mr. James Duncan is one of NWI's Wind Science and Engineering doctoral students studying under **Dr. John Schroeder**, Professor in Geosciences, and **Dr. Brian Hirth**, a Research Professor within the National Wind Institute. His main area of academic focus is on the observation and characterization of the local wind field within wind farms, particularly in reference to how an enhanced knowledge of wind plant complex flows can be used for improved wind farm performance (i.e. Smart Wind Farms).

James earned both his Bachelor's of Science and Master's of Science degrees in meteorology from Florida State University, and entered the National Wind Institute's Wind Science and Engineering (WiSE) doctoral program in the Fall of 2013.

(Above) - James Duncan, one of the students in the Wind Science and Engineering Ph.D. program here at Texas Tech University.

"I was interested in working in the field of renewable energy, and so when I applied for (and was accepted to) the WiSE program, I knew that I would be studying wind, in particular," said James. "The multidisciplinary nature of the WiSE program provided an exceptional opportunity for me to be able to apply my expertise in the atmospheric sciences to a relatively lacking discipline within the wind energy industry."

Working with Dr. Schroeder and his team, James has been able to conduct multiple observational campaigns using Texas Tech University's Ka-band (TTUKa) Doppler radars, which allow for wind plant complex flows to be resolved with exceptional spatiotemporal resolution. James is currently examining how the structure and variability of these complex flow fields varies as a function of atmospheric stability, and further how the radar-measured wind fields can be used for both proactive and cooperative wind turbine control strategies.

A popular field of research within the wind energy industry focuses on mitigating the adverse effects of turbine-to-turbine interaction through the implementation of specific cooperative wind turbine control strategies. James reports that there are two common ways to address this issue, one through altering the pitch of the turbine blade to decrease the magnitude of the wake deficit, and the other through inducing yaw error into the turbine to purposefully steer the downstream wake. Often ignored in this research is how the stability of the atmosphere and the resultant changes in flow structure impact the efficacy of the proposed cooperative wind turbine control strategy. James has found that the stability of the atmosphere can help to determine when the implementation of these control strategies is most beneficial.

James is also examining how radar-measured wind fields can be leveraged as a source for proactive wind turbine control, which will allow for wind turbines to properly adapt their control settings to incoming disturbances in order to optimize individual performance as well as more effectively institute the desired cooperative wind turbine control strategy.

James is planning on completing his doctoral program this fall, and then moving on to industry in a research role upon graduation.

NWI GRANTS AND CONTRACTS — MARCH 2017

Awarded:

NWI: TTU/SNL Wind Farm 01/01/2017-12/31/17
DOE Sandia National Laboratories

John Schroeder (Geosciences)	45%	$13,500
Anna Young (Thomas) (NWI)	45%	$13,500
Daan Liang (Civil, Environmental, and Construction Engineering)	10%	$13,500

ATMO GRADUATE STUDENT RECOGNIZED FOR ACADEMIC EXCELLENCE

NWI is proud to recognize **Vanna Chmielewski**, a graduate student in Geosciences and who is studying under the direction of Dr. **Eric Bruning** in Atmospheric Sciences.

Vanna was recently awarded the TTU Horn Professors Graduate Research Achievement Award which recognizes and rewards outstanding research or creative activity performed by graduate students while at Texas Tech University. She will receive an award check and certificate at the Faculty Honors Convocation.

Vanna is studying the West Texas Lightning Mapping Array, and is researching how dry air above the surface can influence the polarity of charge within thunderstorms under the direction of Dr. Eric Bruning. These differences in charge polarity can then affect how many and what type of lightning flashes strike the ground.

Vanna earned her M.S. in Atmospheric Science at TTU, and her B.S. in Meteorology at the University of South Alabama.

NWI is proud to have such outstanding graduate students. Congratulations!

(Above) - Vanna Chmielewski, doctoral student under Dr. Eric Bruning (ATMO).

NWI STAFF SPOTLIGHT: ROBERT RAMIREZ

NWI would like to thank **Robert Ramirez**, who works in Custodial Services, for doing a great job out in our research facility buildings at Reese Technology Center.

Robert has been working at our facilities for five months, and does an excellent job keeping everything bright and shiny.

Thank you, Robert. We appreciate all that you do.

(Left) - Mr. Robert Ramirez, Custodial Services, at NWI research facilities at Reese.

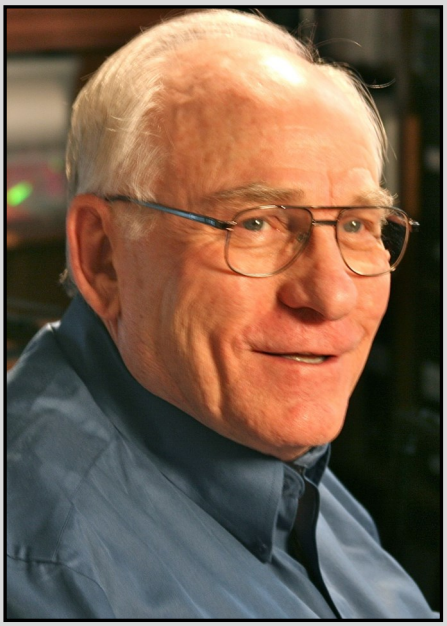
ECE Ph.D. STUDENT VISITS LIDAR WIND SENSOR RESEARCH PARTNER IN DENMARK

Ph.D. student **Ricardo Castillo** (right), researching wake-sensing-and-control methodology assisted by nacelle-mounted Lidar, traveled to Denmark from March 6-10 to visit Lidar wind sensor developer and research partner Windar Photonics, where he received advanced training on Lidar operation and data processing. This training will assist in the development of the test plan to deploy the Lidars at the SWiFT facility where Ricardo's wake-sensing-and-control methodology will be validated.

In an effort to explore future research collaborations, Ricardo also visited the Technical University of Denmark (DTU), where he presented his research at a seminar organized by the department of Wind Energy. He also visited current Lidar installations at the DTU Riso National Laboratory for Sustainable Energy.

NWI faculty affiliates **Dr. Carsten Westergaard** and **Dr. Stephen Bayne** are the academic supervisors on the project, and the project is sponsored at Texas Tech University by Windar Photonics.

NSSA EXECUTIVE DIRECTOR RECOGNIZED IN FLASH NEWSLETTER



(*Above) - Dr. Ernst Kiesling, Executive Director of the National Storm Shelter Association, and NWI Research Professor.*

The Executive Director of the National Storm Shelter Association (NSSA), **Dr. Ernst Kiesling**, was recently recognized in the latest issue of Partners in Prevention, the official newsletter of the Federal Alliance for Safe Homes (or FLASH).

As the focus of the newsletter's "Partner Spotlight", the newsletter was highly complimentary of Dr. Kiesling's achievements, saying that he has a "wealth of knowledge and experience in engineering safer outcomes for vulnerable populations," and that his professional accomplishments in mitigation engineering are "remarkable" especially in relation to the conception, design, and development of tornado safe rooms.

Dr. Kiesling has a Ph.D. in Engineering from Michigan State University, and has dedicated 50 years of service to the field and to teaching, with a long association with FLASH.

With the idea of above-ground storm shelters germinating in the early 1970's, it wasn't until the Oklahoma City, OK, tornado of 1999 that the first shelter incentive grant was implemented. The need for quality standards for shelters led to the start of the NSSA, and Dr. Kiesling has held the post of Executive Director since 2000.

Dr. Kiesling's research has been instrumental in the development of ICC-500 Standard (2000) which (along with its revisions) remains the only consensus standard available for the design and construction of storm shelters.

NWI is proud to have Dr. Kiesling and other such world-renowned researchers who make the world a safer place in which to live.

NWI MOVERS AND SHAKERS

(Above) - Dr. Kiesling (right) stands at the NSSA informational booth at the National Tornado Summit last month. With Dr. Kiesling stands his wife, Nita Kiesling.

Dr. Ernst Kiesling (left) recently attended the National Tornado Summit and Disaster Symposium in Oklahoma City, OK, last month. WiSE Ph.D, alumnus **Dr. Tanya Brown-Giammanco** also presented at one of the Breakout Sessions with her lecture, "New Insights and Technology for Hail Research." Dr. Brown-Giammanco presented with **Dr. Matthew Kumjian**, who is faculty at Penn State University.

Other speakers with a TTU connection included **Dr. Mark Levitan** (former Managing Director of the Wind Engineering Research Field Laboratory and now Acting Director of the National Windstorm Impact Reduction Program (NWIRP) at the National Institute of Standards and Technology), **Tim Marshall**, P.E., who earned his B.S. and his M.S. from TTU, and **Dr. Arn Womble (**a WiSE alumnus), who is now with West Texas A&M University.

As part of the Spring Engineering Recruitment Job Fair, NWI was proud to host **Shelby Maloy** (image on right), an alumna of the BSWE program, who is now working for Denton Municipal Electric (DME), part of the City of Denton near Dallas. According to the website, DME is owned by the residents of Denton, and has been in operation since 1905.

(*Left L-R) -* ***Alexandria (Lexie) Herdt, Shelby Robertson****, and* ***Matthew Brothers****, Geosciences undergraduate students show big smiles during the Severe Weather Awareness event.*

Atmospheric science undergraduate students (above) recently staffed educational booths at Lubbock's Science Spectrum as part of an outreach effort to help families and communities stay safe this Spring. The event attracted hundreds of people, young and old, from across the region interested in learning more about tornadoes and other severe weather events this Spring.

Thank you to all who were involved in this project!

CALENDAR—April 2017

WiSE WEDNESDAY SCHEDULE:

- Wednesday, April 26 Dr. Delong Zuo, Associate Professor of Civil Engineering

ATMO SEMINARS:

- Monday, April 24 Mark Conder (NWS Lubbock) - “The 2015 Blizzard”
- Monday, May 01 Jason Jordan (NWS Lubbock) - “GOES-16, from Launch to Live”
- Monday, May 08 Kelley Murphy

FINALS:

- Thursday, May 11 through Tuesday, May 16

GRADUATION for SPRING 2017:

- Friday, May 19 and Saturday, May 20

UPCOMING NEWS:

- Students will be attending the 2017 Americas conference on Wind Engineering and WINDPOWER. Story to come.

Photo Credit: The Daily Telegraph.