

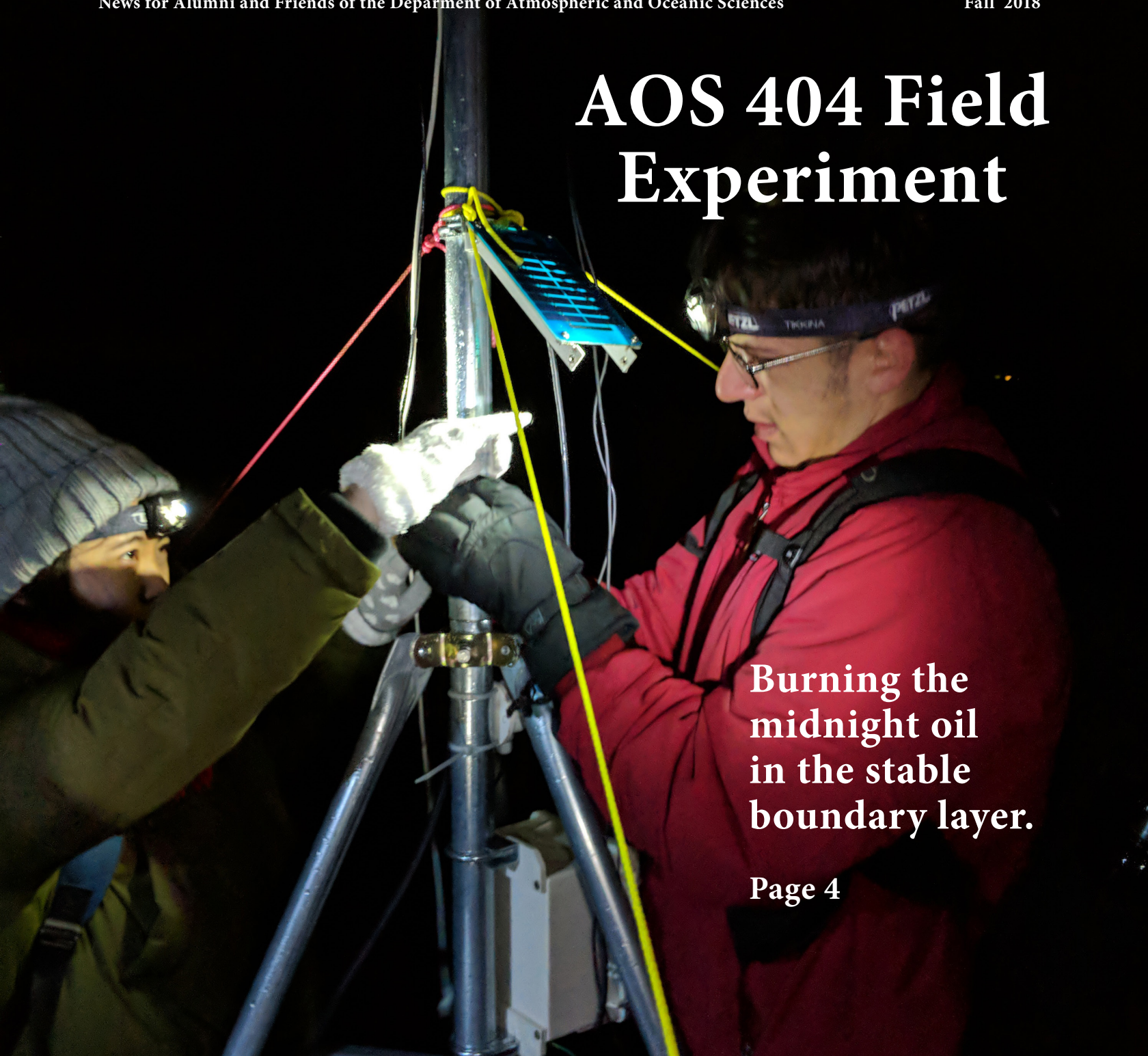


# MAKING WAVES

News for Alumni and Friends of the Department of Atmospheric and Oceanic Sciences

Fall 2018

## AOS 404 Field Experiment



**Burning the midnight oil in the stable boundary layer.**

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## CHAIR'S LETTER



As we progress down the road of renewal we are excited to inform you of a few of the many changes

occurring in the Department and University as I write these words. The University has pushed forward on its commitment to a new era of unprecedented growth, by enthusiastically supporting at every turn our requests to hire new faculty and develop new programs. As you may have noticed, over the past year, we have made accepted offers to two new faculty, Dr. Stephanie Henderson (tropical-extratropical connections, beginning Fall, 2019) and Dr. Elizabeth Maroon (ocean-atmosphere processes, beginning Winter, 2020). Dr. Luke Madaus of Jupiter Inc, will also open up an office in AOS where he will work with students wanting to intern in the area of big data analysis. We are continuing our search this year for at least one additional faculty hire, for which we have received an impressive group of applications. We are planning to modernize the 8th floor class rooms over the next 1-2 years while we hold our place in the second group of Departments slated for an eventual new building, perhaps as soon as the next decade. We also are working hard to secure at least one of several proposed cluster hires of an additional faculty, using a new University program that encourages cross-Department collaboration of this type. We have also begun the process of creating a Professional Masters program, under the leadership of Professor Ankur Desai and with valuable guidance from the AOS Alumni board. If we can attain approval for our planned

implementation of the PM this Spring as we expect, we may begin reviewing student applications by this coming Fall for the 2020-2021 academic year. This exciting new program will create a 1-year applied Masters program, and be coupled to our Undergraduate degree in the form of a 5 year BS-MS program. We will split the current MS program into 2 named options, (1) the Professional Masters and (2) the Thesis Masters, (the traditional PhD track.). The PM will be based on a core sequence, required AOS classes and contributing classes from other departments (such as Business or Social Science) outside AOS, Jobs preparation classes and a summer internship will also be required. Undergraduates electing to pursue a PM (5-year Masters) would enter this program early by taking approved tracks of specialization in preparation for the PM. Market studies suggest that the PM could increase the AOS student numbers by as much as 50% or more within 4 years, sparking more growth of the AOS faculty and staff.

These are a few of the many ways our Department is growing under the new financial organization of Letters and Science and the commitment of the UW to a 21st century University.

On, Wisconsin!

Gregory Tripoli, Professor and Chair

Design: Sarah Morton, College of Letters & Science

ON THE COVER Middle of the night DustTrak deployment. Julia Shates.

### Save the date

The best social gathering at the annual American Meteorological Society meeting is scheduled for

**Tuesday, January 8th  
from 6-9pm,  
in room Encanto B  
of the Sheraton Grand Hotel in  
Phoenix, Arizona.**

As always, there will be great food and great conversation as we share memories and catch up on the news in each other's lives. We hope to see you there!

## AOS students lead popular atmospheric science class for the Wisconsin Center for Academically Talented Youth *by Andrew Dzambo, Brian Zimmerman, Luke Odell, Melissa Breeden, Zoe Brooke Zibton, Emma Sinclair*

For the last three summers, graduate and undergraduate students from the University of Wisconsin's Department of Atmospheric & Oceanic Sciences have led an Atmospheric Science class through the Wisconsin Center for Academically Talented Youth (WCATY) program. Since the inception of the class, this course has been ranked among the most enjoyable and challenging classes offered by WCATY's Advanced Learning Program (ALP).

The ALP is one of several summer camps offered through WCATY, with this particular camp geared toward advanced high school students. Brian Zimmerman, a 2017 AOS M.S. degree graduate, formed the class during the summer of 2016 after teaching a 'Science of Sustainability' class for ALP in 2015 with the idea that a math- and physics-based weather and climate class would be challenging yet enjoyable for a group of gifted students. "I asked if they (WCATY) would let me teach a class

in weather and satellite meteorology, and they said to submit a sample syllabus," Brian recalls. The class was approved shortly after. "The class went over really well – with the help of the department (providing a classroom in the building) and Pete Pokrandt (for setting up computer accounts for the kids)." During the 2016 class, Brian took his students to the SSEC data center, the rooftop (to see the various instruments), and utilized Professor Ankur Desai's instrument lab and McIDAS as further instructional tools – tools that other WCATY classes simply don't have comparable access to.

Along with Brian's class, Dr. Melissa Breeden (2017 instructor), Andrew Dzambo and Luke Odell (2018 co-instructors & current Ph.D. students) have taken students on a variety of field trips and incorporated guest lecturers from the AOS department, SSEC, CIMSS and Antarctic Research Center.

Continued on page 7



Group photo of the WCATY ALP 2018 instructional staff and students. Photo by Pete Pokrandt

## Alumni Engagement Board

This past October, the AOS Department opened its doors to alumni for the first annual 'Open House'. This was an initiative of the Alumni Engagement Board to encourage networking between alumni, current students, and former professors. Alumni were invited to spend the Friday of Homecoming Week catching up with friends, sitting in on classes, roaming the halls, and of course, dropping by the Friday afternoon weather watch. Many local alumni and a handful of out-of-towners shared stories over morning coffee and got to hear from Dr. Greg Tripoli on the latest happenings within the Department. Following weather watch, and after all of the Ian's Pizza was finished, a couple dozen undergraduate students had a question and answer session with alumni from various job sectors. Students asked several questions to the alumni as they offered career advice. As the day concluded, many attendees spread throughout campus enjoying the fall weather and Homecoming activities, such as the parade down State Street. The Alumni Engagement Board hopes to build on the event next Homecoming, so stay tuned for future invites.

- Co-Chairs: Dan Hartung (BS '07; MS '09) and Dr. Matt Sitkowski (PhD '12)
- Members: Dr. Tim Wagner (MS '06; PhD '11), Alex Kubicek (MS '13), Brian Miretzky (BS '06; MS '09), Tom Skilling



# Burning the midnight oil in the stable boundary layer

*As told by the UW AOS 404 Meteorological Measurements Fall 2018 students: Libby Carson, Andrew Kieckhefer, Vijit Maithel, Leo Mikula, Jacob Pozezinski, Claire Rubbelke, Monica Samsin, Julia Shates, and Madankui Tao.*

Under the light of the moon, stars and headlamps, a group of AOS undergraduate majors and graduate students trekked around a shallow gully and a gentle sloping cut-down cornfield to measure carbon dioxide, prepare aerosol monitoring instruments, and at sunrise, launch low-altitude weather balloons. The intense sleep-deprivation was all in the name of science as this fall semester's AOS404 Meteorological Measurements Class field experiment! The class had an opportunity to participate in the National Science Foundation (NSF) funded Stable Atmospheric Variability And Transport (SAVANT) field campaign in Mahomet, Illinois. The nine students, under guidance of instructors Prof. Ankur Desai, Prof. Grant Petty, and teaching assistant Ammara Talib, with support from NSF, the department, and alumni donations, spent a week in the field deploying their own instruments to study the nocturnal boundary layer and in particular, how it dissipates at sunrise and transitions to convection. The AOS group gained experience in planning and running experiments in the field all while having the opportunity to see how an intensive field campaign is run by the SAVANT Principal Investigators April Hiscox at University of South Carolina, David Kristovich of the Illinois Water Survey, and Junming Wang at University of Illinois along with their students and post-docs and staff from the National Center for Atmospheric Research (NCAR) Earth Observing Lab. During SAVANT, on calm stable nights, gully flow was

simulated with neutrally-buoyant smoke releases. The SAVANT team then monitored the atmospheric response by a series of towers with turbulence instrumentation, numerous atmospheric profiling instruments, and several scanning aerosol LiDARs. The AOS student wrote a supplemental experimental design and bought their own instruments down to complement SAVANT's main experiment, including aerosol monitors, meteorological tripods, weather balloons, portable gas sensors, and a new temperature mapping drone. Below are some reflections of various instrumentation teams.

## Watching aerosols flow

Our aerosol team (Fig. 1), composed of two undergraduate students, Madankui Tao (left) and Andrew Kieckhefer (right), woke up at 4 AM each day of the trip to collect fine particulate matter (PM<sub>2.5</sub>) measurements before, during, and after sunrise using an optical instrument called a Dusttrak (TSI, inc.). Both students are undergraduate researcher studying air quality.

One DustTrak was staged inside of a gully while the other rested on top of a hill. They collected PM<sub>2.5</sub> measurements at these two sites in order to compare the impacts of sunrise on air quality in regions with shallow topography.

## Chasing balloons around farms

To capture boundary-layer transition, undergraduate AOS students Libby Carso, Leo Mikula and Jacob Pozezinski

launched small weather balloons designed for high-resolution vertical profiles of the boundary layer called Windsonds (Sparv Embedded AB). These were launched every half an hour, beginning at 6:30 AM and concluding at 8:30 AM. The instrument measured temperature, wind speed and direction, dewpoint and relative humidity. The group aimed to see how the lower atmospheric conditions changed throughout the morning as the sun began to warm the surface. The instruments, housed in a Styrofoam cup, can be dropped from the balloon by hot-wire while it telemetries GPS coordinates. A mad chase then ensues to find these cups spread out across central Illinois. Though a few were lost during the trip (one travelled over 18 miles), the group got some wonderful data and look forward to sharing the results.



MORNING WINDSOND LAUNCH

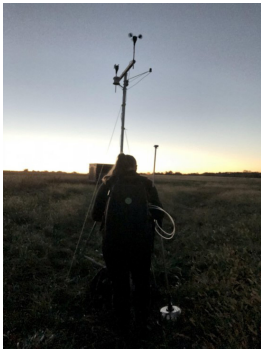
PHOTO: JACOB POZEZINSKI

## Ghostbuster or Gas Scouter?

Claire Rubbelke and Monica Samsin, accompanied by the class TA Ammara Talib, used two devices to collect carbon dioxide (CO<sub>2</sub>) concentrations in the gully: a CO<sub>2</sub> handheld probe (CO<sub>2</sub>meter, Inc.) and a high-end laser based portable sensor, the GasScouter (Picarro, Inc). Overnight, the students attached the CO<sub>2</sub> probe onto a weather

station located at the end of the gully and collected data from 12:00am to 2:30am. The following day, they used the GasScouter to collect CO<sub>2</sub> data down the gully. They walked from the start of the gully to the weather station at the end, with Claire carrying the instrument, during the same hours as the night before. On the last day of the campaign, Claire and Monica joined the DustTrak team and awoke at 4:00am, wanting to collect CO<sub>2</sub> concentrations at a different time for comparison. Again, using the Gas Scouter they walked back and forth until sunrise.

PHOTO BY MONICA SAMSON



CLAIRE WEARS THE GASSCOUNTER TO CAPTURE SUNRISE CO<sub>2</sub> CONCENTRATIONS

## By the light of the day

The experiment exposed students to experimental design, conventional and high-tech atmospheric instrumentation, teamwork, and scientific collaboration. Back on campus and back to a daytime schedule, the students are rapidly analyzing these real-world observations using Python computer code, and will write and present these results as the semester closes. Even when everything goes wrong, and when heroic efforts and strong coffee are needed for middle of the night troubleshooting, the course can be viewed as a success. The department thanks all the donors who provides support so that it can continue to provide high-quality, high-impact learning experiences to our majors like this course.

## Faculty Q&A Spot Light

### New Faculty and Visitors

After a large recruitment exercise last year, the department is pleased to announce the hiring of two new assistant professors.

Joining the department in Fall 2019 will be Dr. Stephanie Henderson,



who received her PhD at Colorado State University in 2017 under the advisorship

of Professor Eric Maloney. Dr. Henderson's research interests are in climate, tropical and tropical-extratropical interactions and global telecommunications, focusing on subseasonal timescales. She is currently an NSF Post-Doctoral Research Fellow at the Center for Climate Research here at the UW where she has already begun to develop collaborations.

Joining the department in January of 2020 will be Dr. Elizabeth Maroon,



who received her PhD from the University of Washington under the

advisorship of Professors Dargan Frierson and David Battisti. Dr. Maroon's research interests are oceanography and the understanding of ocean-atmosphere processes. She has a well-thought out ocean-atmosphere research track planned for the future, broad expertise in other areas, and has a research driven diversity and outreach agenda.

Dr. Luke Madaus, a graduate of the University of Washington, will also be joining the Department in January 2020 as a visiting scientist. Dr. Madaus is a private sector Weather Scientist, working with Jupiter Inc. in Boulder, CO, focusing on "big data", numerical weather prediction and climate analysis. He will be working with undergraduate and graduate student interns seeking to attain experience with private sector atmospheric science applications.

We have extended our recruitment exercise into a second phase, ongoing this year. We look forward to bringing at least one additional faculty member to the department under this exercise.

### Faculty Awards

**Michael Morgan**, Professor, Fellow of the American Meteorological Society

**Emeritus Professor Pao Wang** elected as an Academician of the Academia Sinica. Academia Sinica is Taiwan's equivalent of the US Academy of Sciences. An Academician is equivalent to a member of the NAS or a Fellow of the Royal Society of the U. K. Academicians of the AS include 8 Nobel laureates as well as a few Wolf Prizes, field Medal and Turing Prize, NAS and NAE members.

## Alumni Award to Terry Kelly

The Department is pleased to announce that Mr. Terry Kelly is the recipient of the 2019 Alumni Award for Outstanding Achievement. Terry received his Meteorology degree from the UW Meteorology Department in 1971 before working as a Staff Meteorologist with SSEC from 1971-1973. In 1974, he brought McIDAS inspired electronic color weather display and animation technology to television for the first time, revolutionizing how weather information was brought into homes. He co-founded Weather Central, a weather forecasting company based in Madison, that became the vehicle through which he disseminated his newly developed technology to media outlets around the world. Terry also brought numerical model prediction and 3D display technology to the broadcast industry in the middle 1990's, providing software to bring locally executed mesoscale and microscale numerical model prediction

and display systems to television stations around the world. Weather Central grew to become one of the top 4 private weather companies in the world, providing weather display technology to over 500 million viewers daily. Recently, Weather Central was acquired by IBM's "Weather Company", where it continues to thrive today. He has been named the inventor of 12 current and an additional 12 pending U.S. patents. Terry is well known for his extensive community service in Madison. He co-founded the Aldo Leopold Nature Center in 1994 and the Madison Fireworks Fund in 1992 which annually put on the Rhythm and Booms Fireworks show, which was the largest single day entertainment event in Wisconsin. The alumni award will be presented to Mr. Kelly at the annual AMS meeting in January 2019. The Colloquium Seminar and public lecture will be presented by Mr. Kelly at the UW on Monday, February 4th and Tuesday, February 5th respectively.

## Congratulations

**David J. Stensrud**, (BA '83), The Charles Franklin Brooks Award for Outstanding Service to the Society

**Tim Schmit**, (BS '85, MS '87), Fellow of the American Meteorological Society

**Kuniaki Inoue**, (PhD '16), The NASA Postdoctoral Program Fellow for his Assessment of Relationships between Subgrid-scale Convection and Large-scale Environment in the Gross Moist Stability Plane.

**Kelton Halbert**, AOS Graduate Student, Advisor, Steve Ackerman, Best Poster Presentation winner for the 29th Conference on Severe Local Storms, for your poster presentation entitled "Cold Pool Horizontal Streamwise Vorticity During Tornadogenesis and Maintenance in a Simulated Supercell Thunderstorm".

**Peidong Wang**, AOS Undergraduate was awarded two travel scholarships; one to attend the AGU meeting (funded by WHOI), the other to attend the Isaac Held Symposium at Princeton University.

## Ed Hopkins' Historical Corner

### A memorable November storm

As many as a half a dozen early winter storms have battered the western Great Lakes during the second week of November since the early 20th century. These storms typically have traveled eastward across the Plains before curving toward the northeast and intensifying as they approached the relatively warm waters of Lakes Michigan and Superior. These storms often have been accompanied by strong winds, dramatic temperature falls and rain changing to snow.

A very strong low pressure system traveled northeastward across central Wisconsin on Saturday 11 November 1911, accompanied by a rapidly-moving cold front that swept across the mid and upper Mississippi Valleys. This

front, which represented the leading edge of an arctic air mass pushing over the northern Plains, resulted in 24-hour drops in temperature that were as large as 70-Fahrenheit degrees across the region. In Wisconsin, the temperature at Madison fell from 70 degrees to 20 degrees over the course of the day. Milwaukee had a record high temperature of 73 degrees prior to the frontal passage, before falling to 30 degrees. Other locations across the Midwest and Plains had daily record high temperatures followed by record lows all in the same day. Hence, the storm has been called the "11/11/11 Blue Norther."

The powerful cold front help produce tornadic thunderstorms in Iowa,

Illinois, Indiana, Wisconsin, and Michigan as the warm and humid air in the warm sector to the southeast of the storm was sufficiently unstable. One of the strongest tornadoes in the outbreak traveled to the north-northeast across southern Wisconsin's Rock County from Janesville to Milton during the afternoon as an estimated F4 tornado (on the Fujita Scale), killing nine people and injuring 50 as it caused extensive damage to several farms. The citizens of Janesville reported blizzard conditions with subfreezing temperatures within an hour after the tornado. Strong northwest winds with speeds between 20 and 35 mph followed behind a cold frontal passage.



## WCATY con't

“With such a wealth of fascinating research being undertaken right here in our own AOS department, we had the opportunity to have several speakers come and present some research to the class including Margaret Mooney, Dr. Leigh Orf, Prof. Gregory Tripoli, Dr. Melissa Breeden, Dr. Alex Goldstein and Marian Mateling” Luke recalls from his experience teaching the 2018 class. “The students were very stimulated by the different avenues that could be taken in the science.” The variety of guest speakers and field trips, in addition to the lecture material and coursework, translated into great course ratings each year. “My students were interested in air quality, so I invited a fellow classmate from the Nelson Institute of Environmental Studies, David Abel (Ph.D. Candidate) to come speak about the political context of air pollution, specifically in Asia, where my students were from that year. Taking advantage of the vast array of research performed on this campus greatly enhanced the class,” recalls Dr. Breeden. While students taking the class have greatly enjoyed it, instructors of the class have benefitted just as much. “Participating in WCATY was a special

change to create my own curriculum for passionate students, as well as a chance for me to learn from their diverse perspective,” notes Dr. Breeden, “watching the students grow over three weeks was exciting and rewarding”. After the 2016 class, Zoe Brooke Zibton (2017 AOS B.S. graduate) and Emma Sinclair (AOS senior) participated as Educational Assistants (EAs), which were responsible for leading evening study hall sessions, grading and evaluating student performance throughout the course. “It was especially fun to work with curious minds with similar backgrounds in different areas of the world” notes Zoe, who was the EA the 2017 class where the entire enrollment was students from South Korea’s KAIST Academy. Emma, the 2018 EA, recalled a conversation where “a student at the beginning of the class told me how much he wanted to become a chemical engineer, but by the end of the course, this class has him thinking about a career in atmospheric science instead.” Since the first WCATY ALP Atmospheric Science class in 2016, the course has provided both instructors and students with a very enjoyable and unique

teaching experience. “Students appreciate the course because of the excitement instructors bring to the class – they clearly tell how much the instructional teams love the topic and how much they love to share and geek out with the students” notes Katie Effertz, the Outreach Specialist for WCATY. It should come as no surprise that this course will be offered again next year, from June 30 – July 20, 2019. “I am looking forward to teaching this class again and building on the existing framework for the class,” Andrew says. “I especially enjoyed the co-instructor dynamic this year, where Luke and I were able to exploit our academic strengths into giving the students thorough instruction on both weather and climate.” Everyone involved with the WCATY ALP Atmospheric Science course, from instructors and EAs to students and WCATY administrative staff, is looking forward to continued success next year and beyond.

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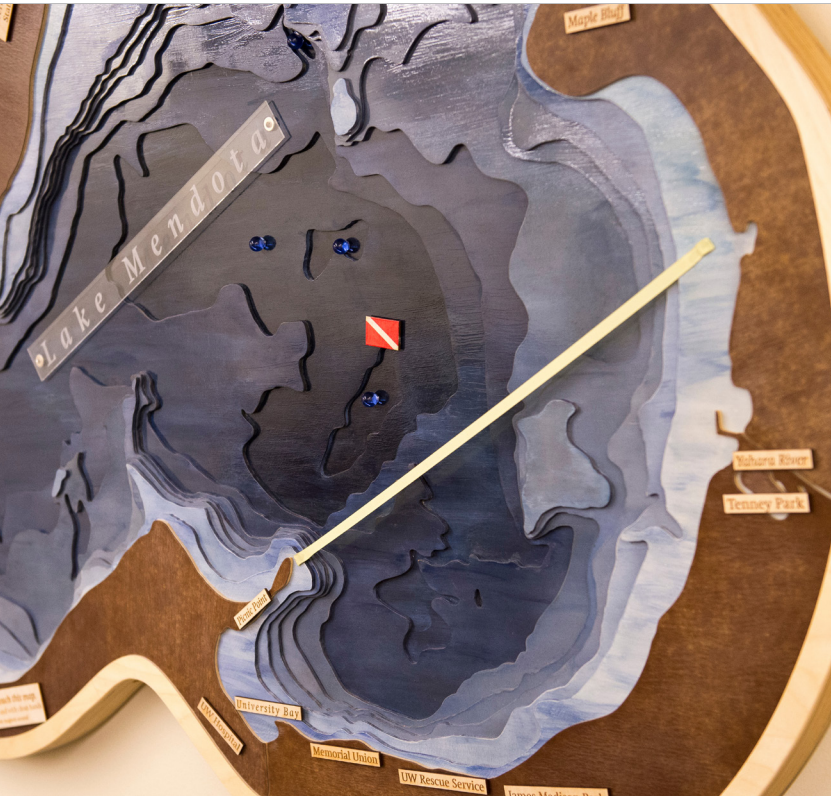




Department of Atmospheric  
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# Making Waves

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## Weather Word Search

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 C R W K H P M F G A L M E S M E P L W H  
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