



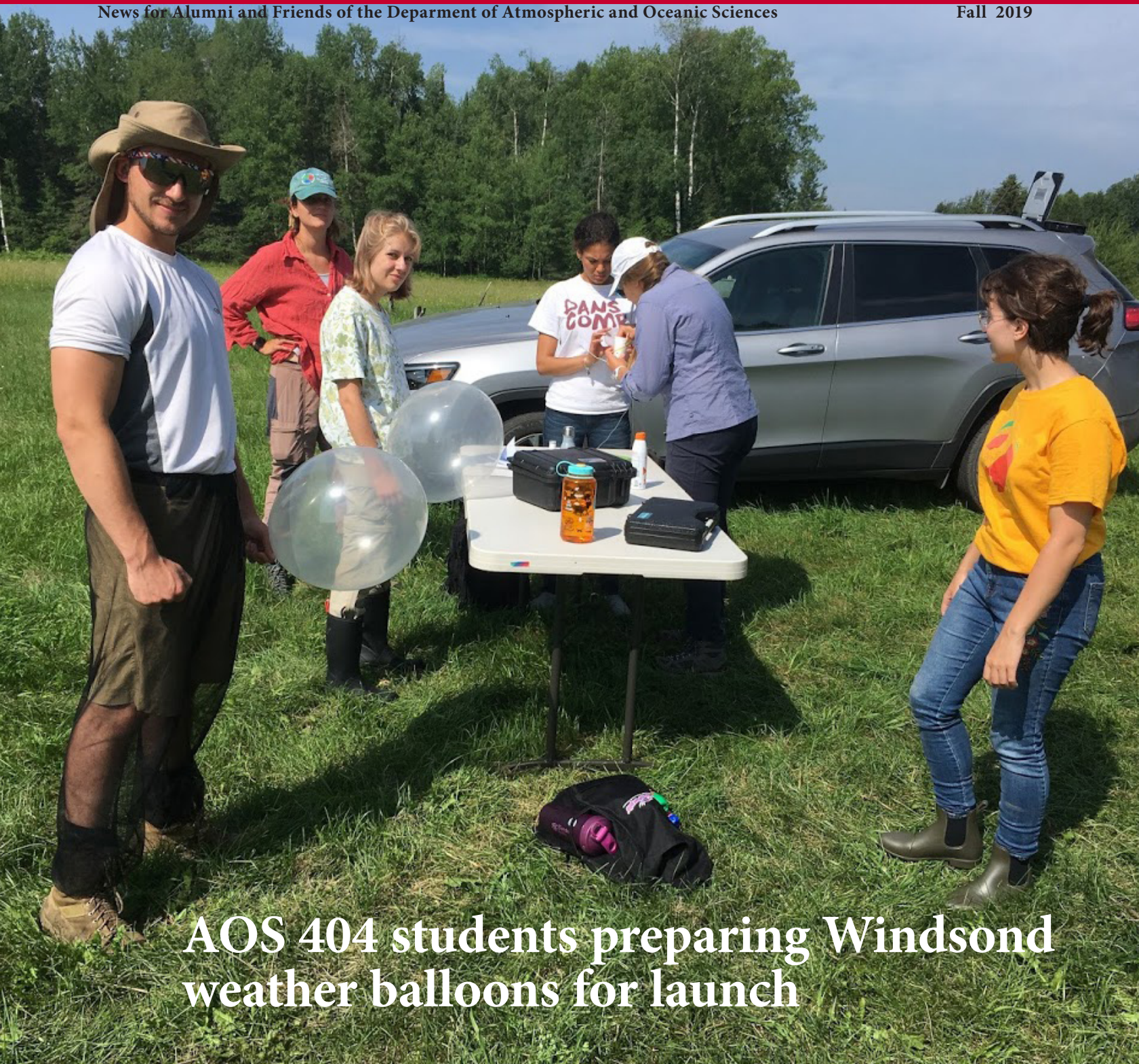
College of Letters & Science

UNIVERSITY OF WISCONSIN-MADISON

MAKING WAVES

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

Fall 2019



AOS 404 students preparing Windsound weather balloons for launch



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<http://aos.wisc.edu/>

Save the date

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

**Tuesday, January 14th
from 6-9pm,
in room Marina Ballroom 1
of the Westin Boston
Waterfront in Boston,
Massachusetts.**

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!

PHOTO BY JEFF MILLER

CHAIR'S LETTER



It is the end of another year and what a year it has been! The University has been rapidly

expanding as the result of an initiative to bring in more out of state students and develop the infrastructure of faculty, staff and facilities to accommodate the expansion. As of this year, UW has so far increased the size of freshman class by over 1000 students compared to earlier numbers. We at the Department of Atmospheric and Oceanic Sciences have been responding with new growth of our own.

A major development this year has been the unveiling of our new Professional Master's Program, now taking applications for next year (Fall 2020). It is expected that this will significantly expand our student base and the range of opportunities we provide to our students. Professor Ankur Desai will describe more on this exciting development in this newsletter.

Our recent expansion began this Fall semester, when we welcomed Assistant Professor Stephanie Henderson (CSU PhD), as the first new Assistant level faculty member in almost a decade. Her research is focused on subseasonal and seasonal climate variability and tropical-extratropical interactions.

Assistant Professor Elizabeth Maroon (PhD, U. Wash), will join AOS this Spring semester. As an AOS professor, she will continue also as an affiliate member of the NCAR CESM team (where she is currently), and so open up new opportunities for AOS-NCAR collaboration. Joining Dr. Maroon at

AOS will be Dr. Luke Madaus of the Boulder office of "Jupiter Intelligence". As an honorary member of the AOS team, Dr. Madaus will mentor students in data science, further creating invaluable opportunities for AOS students.

This Spring we further welcome Assistant Professor Angela Rowe (PhD, CSU) to AOS. Currently a staff Research Scientist with the U. Wash, she will be adding a state-of-the-art mobile X Band Doppler radar to the list of Department facilities and employ this instrument in field campaigns around the globe.

To complete this year's expansion, we welcomed SSEC director and AOS alumni Dr. Brad Pierce to the tenured ranks of the AOS faculty.

Finally, we congratulate Dr. Edwin Eloranta, for being awarded the "Distinguished" title by the School of Letters and Science. And last, but not least, we are pleased to announce that Emeritus Professor John Kutzbach is the recipient of this year's AOS Alumni Award. Thank you John for all you have done and still mean to our Department. Next year, promises to be another year of substantial growth in AOS, on several "fronts". I will see you at the Alumni Reception in Boston this January where I will fill you in.

On, Wisconsin!

Gregory Tripoli, Professor and Chair

Design: Sarah Morton, College of Letters & Science

ON THE COVER AOS students preparing Windsong weather balloons for launch by Ankur Desai

The Qualifying Exam *by James Anheuser*

I arrived on campus, bright eyed and bushy tailed, in fall of 2018 to begin my graduate studies in Atmospheric and Oceanic Sciences at UW-Madison. Shortly thereafter, I became aware of a presence lurking the halls, class and server rooms. At first it was difficult to put a finger on. Occasionally, I caught whispers and rumors- but alas could not pinpoint the source. I began my own investigation and learned that somewhere, hidden along my path to a Ph.D., a creature lie in wait. Over the course of a few weeks the picture sharpened and by winter I knew the name of the mythical beast- The Qualifying Exam.

This beast has a few affectionate nicknames, “the Qual” or “the QEs” (not the Kiwis) but don’t let these cute monikers fool you. As the reader may be aware, successful completion of The Qualifying Exam will propel a student’s career and is required prior to the formation of a Ph.D. committee. Fortunately, student’s are allowed two attempts at the test if needed.

To tackle The Qualifying Exam, our cohort formed a weekly Wednesday morning study group this summer to plot and plan our offensive. We started by spending a week on each of the following topics- radiation, dynamics, climate and physics. Next, we spent a week on each of the previous tests we were provided as study guides. In the weeks leading up to the test, we covered any last remaining odds and ends. At the solstice, morale and confidence were low. How could we possibly succeed? But as the equinox drew near, through the cooperation and individual talents of the six of us, our spirits grew. We were ready. Our general knowledge was likely the highest it had been or ever will be in our careers. We were ready to answer questions on any and all things atmospheric science- from hydrostatic to hydrometeor, Rossby number to Rayleigh number, incoming shortwave to outgoing gravity wave.

In mid-September, the time arrived to settle the score with the Qual. The two-day test began on Saturday morning at 9am. Day one was a nervous struggle but feeling more comfortable, day two was a more deliberate campaign. By Sunday at 4pm, we had spent 12 hours answering a total of 8 questions in long form. We were exhausted but emerged victorious. We felt strong enough to enjoy a celebratory round (or two) at The Sett at Union South. The taste of victory is sweet.



Sarah, See Andersen - Tumblr.com

Studying for the QEs

CARTOON BY sarahseeandersen@tumblr.com

Alumni Engagement Board

The Alumni Engagement Board of Atmospheric and Oceanic Sciences continues to work on meeting its mission to serve as a network for current students, our widespread and successful graduate and undergraduate alumni, and friends of the department, as well as facilitate career development opportunities. The board also continues to work to promote fundraising efforts across the department’s extensive alumni network to help fund scholarships and strengthen the foundation of the department to insure the best academic experiences for future generations.

Some recent activities include our second annual Open House during Homecoming weekend in October, our recently approved bylaws and rotating on new board members last summer. We also look forward to helping locate and provide the internships required as part of the new Professional Masters, and having a presence at the Robock AOS Alumni Reception at the AMS annual meeting in Boston in January, 2020.

We encourage everyone to learn more about the board at <https://aos.wisc.edu/alumni/board/> and to please register with the AOS alumni database at <https://aos.wisc.edu/alumni/database/>.

- Chair: Brian Miretzky
- Members: Bette Otto-Bliesner, Kris Craven, Brett Hoover, Daniel Knuth, Kaitlyn Krzyzaniak, Pete Pokrandt, Alan Robock, Rebecca Schultz, and Jennifer Zeltwanger.

The RELAMPAGO field campaign in Córdoba, Argentina

By Anthony Crespo.

Recently I was part of a group of graduate students that had the opportunity to participate in the RELAMPAGO field campaign in Córdoba, Argentina, where there were several research groups in which we could practically apply the knowledge gained during lessons from faculty. I had the opportunity to participate in radiosonde deployments, storm chasing and hail pads deployments among other responsibilities in the campaign. Thanks to this unique opportunity I had the pleasure of meeting Dr. Lucia Arena, who was the leader of the hail group that was later implemented into the campaign. In conjunction with Matthew Kumjian, Brunno Ribeiro and Dr. Arena, I had various experiences in collecting, storing and processing hail in a cold chamber at the Laboratory of Atmospheric Physics at the National University of Cordoba (UNC), where we were able to put together a small project about the information that the internal crystalline structure of the hail could provide. This was the key step to develop what is now my forthcoming master's thesis at the University of Wisconsin in Madison and my eventual Ph.D.

dissertation on improving predictive model of hail properties (size, shape, rate of development). My M.S. project is based on a case study of a convective storm event during RELAMPAGO with intense precipitation of hail and rain in the Sierras of Cordoba. I am evaluating this case through analysis of satellite images, analysis of radar images and experimental study of the hailstones collected in the sub-zero lab. Preliminary data at the moment is allowing us to develop algorithms to use the satellite and radar data for identifying convective and orographic cells that produced the collected hailstones. This summer, under the direction of Dr. Arena, I had the necessary training to cut and characterize the hailstones collected to finally compare the radar and satellite data already studied. The objective of my thesis is to correlate the satellite and radar data with the data of the internal structure of the hailstones of said storm, as this is essential information to be

able to model severe convective storms. Future PhD work will be focusing on the characterization of hail growth rates as a function of the aerosol structure and apply these to a forecast model benchmarking study.



Anthony Crespo working in Argentina

Photo by Anthony Crespo

Alumni Awards

John A. Knox, The Edward N. Lorenz Teaching Excellence Award for innovative and engaging approaches to teaching and mentoring, and tireless efforts in support of life-long student learning and Fellow of the American Meteorological Society.

Pete Pokrandt, The Russell L. DeSouza Award whose energy, expertise, and active involvement enable the Unidata Program to better serve geoscience.

Honorees personify Unidata's ideal of a community that shares data, software, and ideas through computing and networking technologies.

Louis Uccellini was inducted into the 2019 class of Fellows at the National Academy of Public Administration.

Faculty Awards

Ed Eloranta, for being awarded the title prefix of: "Distinguished" by the College of Letters and Science.

Student Awards

Horn Scholarship Award: Claire Rubbelke
Sunkel Award: Douglas Schumacher
Johnson Scholarship Award: Ketzell Levens
Lettau-Wahl Scholarship Award: Andrew Quigley
Lettau Award: Charles White
Schwerdtfeger Award: James Anheuser and Sreenath Paleri
Wahl Award: Kate Abbott
Department Student Service Award: Juliet Pilewskie and Julia Shates

A new graduate program in AOS

By Ankur Desai, Graduate Program Chair.

Each year, our graduate program graduates up to a dozen bright and capable Master's of Science (M.S.) and Doctor of Philosophy (Ph.D.) students, who go on to do wonderful things afterwards, in academia, federal agencies, non-profits, and industry. All of these students conduct intensive research and write theses and dissertations under guidance of a faculty advisor. However, is this the best model for all of students, especially those eyeing careers in the operational side of our field?

In particular, our M.S. graduates are finding jobs in a variety of fields, and employers we surveyed noted they are seeking employees with strong training in communication, programming, data analysis, ethics, in addition to fundamentals of the discipline.

Enter the new Atmospheric and Oceanic Sciences (AOS) Master's of Science: Professional Program: <https://www.aos.wisc.edu/academics/profms/>

Starting Fall 2020, we will have a new cohort of students earning an M.S. in AOS, but in a different way. Instead of

writing a thesis, students will spend 1-year in an intensive 30-credit course sequence that covers the core graduate sequence for AOS, but also specialization pathways in Forecasting and Modeling, Satellite Meteorology, Climate Change Science and Communication, and Air Quality Science and Regulation, and technical electives in programming, data analysis, and risk management.

The following summer, enrolled students will participate in 8-10 week internships, hosted by agencies and, hopefully, some of you, all over the world. In conjunction, the students will take an online professional development course focused on communication, ethics, and development of an internship portfolio. The course will also prepare students to be successful in the American Meteorological Society Certified Consulting Meteorologist (CCM) certification.

Admissions will open up later this fall and we are hoping for our first cohort of around 10-15 students. Tuition discounts via transfer credits are available

for students who graduate from UW-Madison, and additional scholarships will be available to all students depending on need and merit.

We are also in process of hiring a program coordinator who can manage the usual aspects of student services, but also help develop and support internship partners, enhance our professional development curriculum offerings, and recruit students globally.

In some ways, the new program continues what we do the best here. But it also opens doors to new connections to the broader community, including all of you. Stay tuned for more news as the program gets underway. In the meantime, visit the website, reach out to us with questions and ideas, and encourage students you know to apply!



YOU MAKE THE DIFFERENCE

To mail a donation to the Department of Atmospheric and Oceanic Sciences, please make checks payable to the

University of Wisconsin Foundation.

Mail check to: UW Foundation

US Bank Lockbox

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Milwaukee, WI 53278-0807

To make a gift online, please visit: <http://aos.wisc.edu/alumni/giving.htm>

THANK YOU!

Ed Hopkins' Historical Corner

A major tornado outbreak hit Wisconsin in 2005

Although Wisconsin is not located in the traditional Tornado Alley, the Badger State does get hit by an average of approximately 24 tornadoes each year over the last several decades. However, Thursday, 18 August 2005, will be remembered as the day with the largest tornado outbreak in state history to date when 27 tornadoes tore across the southern half of Wisconsin, exceeding the annual average. This record outbreak surpassed the previous record of 24 tornadoes set on 8 May 1988. While 24 of the tornadoes in the August 2005 outbreak were rated as weak (F0 or F1 on the Fujita Scale), the three other tornadoes were labeled strong with two F2 tornadoes and one F3 tornado. This F3 tornado tore across southern Dane County, smashing into Stoughton, causing one fatality, 23 injuries and \$34.3 million in damage. When adjusted for inflation to 2019 dollars, this Dane County tornado was the third costliest tornado in modern state history with a cost of \$44 million, ranking behind the F5 Barneveld tornado of June 1984 (\$99 million) and the F5 Oakfield tornado in July 1996 (\$65 million).

The record tornado outbreak on this August afternoon and evening was associated with a low pressure system that tracked from northeastern Iowa eastward across central Wisconsin during the late afternoon passing near Fond du Lac by late evening and then reaching northern Lake Michigan by the following morning. A warm front extended to the east of the surface low, while a cold front trailed to the southwest of the low. The warm front moved to the northeast into southern Wisconsin during the afternoon. The air in the warm sector between the warm and cold fronts became muggy across southern Wisconsin during the afternoon. Surface air temperatures were in the low to mid 80s (Fahrenheit), while dew point temperatures reached at least 70 degrees in several locations. With cooler air aloft, the lower troposphere was conditionally

unstable. Near-surface winds across southern Wisconsin ahead of the cold front during the afternoon were from the south, but veered with altitude to a westerly direction above 10,000 feet, which resulted in directional wind shear needed for supercell and tornado development.

The advancing cold front provided the lifting mechanism to help generate the tornadic thunderstorms. A line of thunderstorms had developed during the afternoon over northeastern Iowa and southeastern Minnesota ahead of the eastward moving cold front. Reaching southwestern Wisconsin, the first supercell resulted in the formation of nine weak tornadoes in Vernon and Richland Counties, followed by one F2 tornado that injured 2 people near Viola (Richland County) and another F2 tornado in Sauk and Columbia Counties.



Stoughton Tornado 18 Aug 2005 Photo: Colin McDermott

Later in the afternoon, a second supercell formed over Dane County in south central Wisconsin, spawning the F3 Stoughton tornado, which began over the southeastern corner of the city of Fitchburg near CTH MM and Schneider Road at about 6:15 PM CDT. This tornado headed eastward, traveling near the southern end of Lake Kegonsa and then passing through the residential sections on the northern side of Stoughton, where it reached maximum intensity with winds estimated at nearly 200 mph, along with a maximum damage path of 600 yards. Eventually, this tornado dissipated in western

Jefferson County, after remaining on the ground for 53 minutes and traveling nearly 19 miles. The updraft from the tornadic thunderstorm carried debris as far east as lakeshore communities near Milwaukee. In addition to the F3 tornado, the parent supercell also spawned seven weak tornadoes in Dane and Jefferson Counties, produced up to golf ball size hail (1.75 inches in diameter) and generated straight-line thunderstorm winds reaching 75-mph.



Stoughton Tornado 18 Aug 2005 Photo: Mike Devries

Five weak (F0, F1) tornadoes were reported across east central Wisconsin from Wautoma to near Manitowoc during the early to midevening. These tornadoes were on the ground for less than ten minutes and had a path length of no more than four miles. Most of the damage was to trees, farm buildings and equipment. Torrential rains accompanying the tornadic thunderstorms caused minor flooding near Green Bay and Manitowoc.



Stoughton Tornado 18 Aug 2005 Photo: Mike Dunn

The Emerging Polar Regions cluster hire

By Dan Vimont.

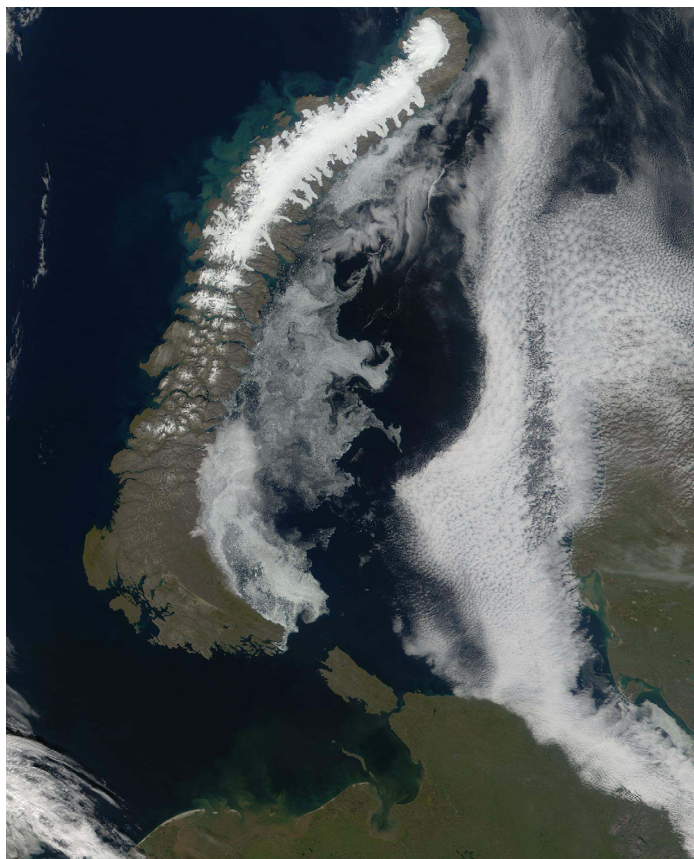
The Atmospheric and Oceanic Sciences Department is excited to announce that we will be hiring a new faculty member focused on polar climate modeling, as part of a University-wide cluster hire focused on “The Emerging Polar Regions” that is being led by AOS!

Earth’s polar regions are at the frontier of profound global change. As our planet continues to warm, the polar cryosphere (land and sea ice), ocean and atmosphere, and ecosystems face accelerated changes that are unprecedented in human, and even geologic history. In order to advance understanding and address critical problems in polar regions the University of Wisconsin – Madison has approved an interdisciplinary cluster hire focused on “The Emerging Polar Regions”. We at AOS are excited to lead this process!

The Emerging Polar Regions aims to hire three individuals focusing on (i) polar climate modeling (AOS), (ii) glaciology / ice sheet modeling (Geoscience), and (iii) polar ecology. These three individuals will join a landscape of existing and historical strengths in diverse aspects of polar research at UW-Madison, including work in AOS, CCR, CIMSS, and SSEC. The Emerging Polar Regions cluster will provide new research opportunities for a variety of interdisciplinary groups at UW Madison, address educational priorities in transferable skills for students, and advance the Wisconsin Idea by furthering environmental understanding in the emerging polar frontier. AOS is looking forward to helping catalyze new research and educational opportunities related to polar climate. We recognize that students are looking for integrative learning experiences that cross interdisciplinary boundaries. We know that students are also looking for opportunities to apply

their research and learning to address real problems. And, we understand the importance of working together – across disciplines and cultures – in order to advance the Wisconsin Idea.

AOS is very excited to be leading this important effort!



Phytoplankton bloom along the coast of Novaya Zemlya, Russia

Photo: Jacques Descloitres

Alumni Colloquium

By Jon Martin.

We strongly desire the participation of our Alumni in the intellectual culture of our Department. In light of this desire we are hoping to initiate a program of regular involvement of alums in our Department Colloquium. The idea would be to have alumni come to campus for a couple of days (Monday and Tuesday or Friday and Monday) during an academic term to meet with faculty, staff and especially students. During the visit we would hope the alum could present some recent results or issues on his/her work. This needn't be restricted to academics or research scientists!! We are envisioning perhaps two alumni presentations in each semester, Fall and Spring, in coming years. If you are interested, please begin to consider what you might present. The department would be funding these trips and so would choose from among those interested, which topics would best meet our colloquium needs. We hope to generate a lively tradition in this way.



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AOS Word Scramble, QE Terminology

OIRDNLEMAI UENMOMMT FXLU

DLEAHY LLEC

LTPTANIOE VTIIYCTOR

XSEVEPLOI ISECOCYNELG

TSNIOUSUYI

ATEDAIIVR FSRRENAT

LNTAET HATE EGYERN

LTUTBNUER DISDEE

ERULPGA PIRCALET

MERHALT DOIRATIAN

