



# Making Waves

## Spring 2006



SSEC

## Greetings from the Chair

Jonathan Martin



Just a couple of weeks into astronomical spring I found myself with an anonymous quote I read long ago swirling around in my mind – “The first day of spring is one thing, the first spring day is quite another.” Despite this admonition, caution is not the mood that characterizes Spring – celebration is more accurate. In our department there is always something to celebrate in Spring; the last crystalline trickles of winter’s melted snow, newly minted graduates whose years of hard work have ripened to maturity, the coming summer when those of us who live in Madison reclaim our city from the intellectual transients, the end to another successful academic year.

This particular Spring we celebrated the esteemed career of our Prof. David Houghton at a two-day symposium punctuated by lively, engaging, and challenging debate in the signature Houghton style. We also celebrated the addition of a new member to our faculty, Dr. Ankur Desai, who will be joining us in August 2007 and whom we introduce to you in the following pages. More cause for celebration arrived when we learned that Prof. Emeritus John Kutzbach was both awarded the Revelle Medal from the AGU and elected to the National Academy of Sciences this spring!

Finally we celebrate our relationship with you, our alumni, many of whom we hope to see at our first Alumni Reunion party in many years to be held at the AMS Annual Meeting this coming January in San Antonio. We thank those who have supported the department in the past and encourage those who have not yet done so to make a contribution to our general fund. We are devising ambitious plans for our future and the success of those plans relies on your continued generous support, especially in these times during which the state struggles to adequately fund its exceptional university. This fall we will announce details of some new initiatives designed to extend and enhance the scholarly culture of our department. Along with the details of our vision, we will be establishing some fundraising targets to help us realize these goals.

So Happy Spring to you all, it will eventually settle in to stay, leaving as the solitary memory of this winter’s ice our two hockey national championships! Please do not hesitate to stop by the department if your summer travels bring you to Madison. As always, we are eager to hear from you.

### Features

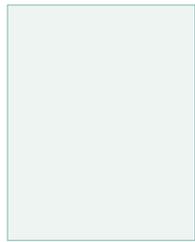
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## Faculty News

### Kutzbach Named 2006 Revelle Medalist



Professor John Kutzbach has been named the 2006 Roger Revelle Medalist by the AGU. This medal is awarded to an individual for “outstanding contributions in atmospheric sciences, atmosphere-ocean coupling, atmosphere-land coupling, biogeochemical cycles, climate, or related aspects of the Earth system” and is among the highest honors awarded by the AGU. John

will accept his medal at the AGU Annual Meeting in San Francisco in December 2006. In recognition of his distinguished and continuing achievements in original research, John was also elected a member of the National Academy of Sciences on April 24.

Kutzbach is Professor Emeritus in the UW-Madison’s Atmospheric and Oceanic Sciences Department and the Gaylord Nelson Institute for Environmental Studies, and was Plaerent-Bascom Professor of Liberal Arts. He was formerly the director of the Center for Climatic Research and continues to serve as Associate Director. His research uses computer-based models of earth’s climate to investigate the causes of climate change in the geologic past, as well as the role of humans in causing climate changes in the future. His studies have also helped clarify the interactions and feedback linkages between atmosphere, ocean, land and vegetation. For more information about the award visit <http://www.agu.org/inside/honors.html#Revelle>. Double congratulations, John!

### Foley Recognized by Nelson Institute



Professor Jonathan Foley, Director of the Center for Sustainability and the Global Environment, has been named the first Gaylord Nelson Distinguished Professor by the Nelson Institute in recognition of his outstanding research achievement, significant contributions to the Institute, interdisciplinary excellence, and career momentum. Foley will hold this honorary title

for the next four years and will receive approximately \$19,000 annually in flexible research support. Congratulations, Jon!

### Desai Joins AOS Faculty



We are happy to announce that Dr. Ankur Desai will be joining our faculty as an Assistant Professor in August 2007. Dr. Desai received his Ph.D. from Pennsylvania State University, under the direction of Dr. Kenneth Davis, in March 2006. His research involves regional-scale observations of the terrestrial carbon and water cycles, biogeochemical model data assimilation

and atmospheric boundary layer meteorology among other topics. He is involved in extensive field-observing work (some of it right here in Wisconsin). Dr. Desai will spend a one year post-doctoral appointment at NCAR through the Advanced Study Program before arriving in Madison

in August 2007. We are eager for his contributions to the intellectual growth of the department.

## Faculty Book Announcements

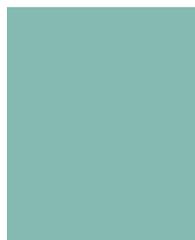
### Meteorology: Understanding the Atmosphere by Steven Ackerman and John Knox



The second edition of Steven Ackerman and John Knox’s Meteorology: Understanding the Atmosphere was published in March 2006. The textbook emphasizes how we observe the atmosphere and then uses those observations to explain atmospheric phenomena. Meteorology: Understanding the Atmosphere received the William Henry Fox Talbot Prize from the Society of

Academic Authors in 2003 for visual excellence. Along with excellent graphics, the book uses vivid photographs and compelling real-life stories to present the subject of weather. For example, extratropical cyclones and anticyclones are presented in the compelling contexts of the stories of the Edmund Fitzgerald shipwreck and the John F. Kennedy Jr. plane crash. The second edition also includes an up-to-date and in-depth discussion of the 2005 hurricane season, including a detailed analysis of the forecasting of Hurricane Katrina. You can order this book at <http://www.thomsonedu.com/earthscience/>.

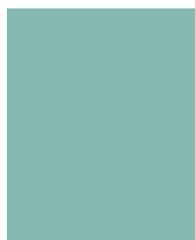
### A First Course in Atmospheric Radiation, Second Edition by Grant W. Petty



A First Course in Atmospheric Radiation, Second Edition by Grant W. Petty has recently been published by Sundog Publishing. This textbook is written for meteorology and climatology students who require an introduction to the principles and practical consequences of atmospheric radiation but who do not necessarily intend to become specialists in radiation or remote sensing. New

material is introduced in a progressive, logical sequence, starting with simple real-world problems in radiative transfer and adding depth and sophistication with each subsequent chapter. Wherever possible, radiative transfer concepts are illustrated with examples taken from everyday experience. The Second Edition corrects all known errors in the First Edition and adds a number of new or improved exercises and figures, a Table of Symbols, and some new subject matter. The book can be ordered on-line from the publisher at <http://www.sundogpublishing.com/AtmosRadOrdering.html>.

### Mid-Latitude Atmospheric Dynamics: A First Course by Prof. Jonathan Martin



Mid-Latitude Atmospheric Dynamics: A First Course by Prof. Jonathan Martin will be published by John Wiley and Sons in late May 2006. This book presents an introduction to atmospheric dynamics and its application to the understanding of mid-latitude weather systems in a penetrating conceptual and detailed mathematical fashion.

It is written in a conversational tone with the hope that this will increase the likelihood that the book will serve as a genuine study guide for students as they navigate through first courses

in these subjects. There will be both hardcover and paperback versions of the book. Orders can be placed at <http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470864656.html>

### Ice Microdynamics, by Pao K. Wang

Ice Microdynamics, by Pao K. Wang, represents a summary of Pao's research on the microdynamical behavior of ice particles and its impacts on the cirrus cloud development and aerosol particles. Unlike cloud droplets which can be assumed to be perfect spheres, other cloud and precipitation particles have complicated shapes that render the mathematical treatments of them difficult. But Pao was undeterred by such difficulties and opted to tackle these problems head-on. More information about the book can be found in the following web site: [http://www.amazon.com/gp/product/0127346031/ref=sr\\_11\\_1/102-2614529-5643337?%5Fencoding=UTF8](http://www.amazon.com/gp/product/0127346031/ref=sr_11_1/102-2614529-5643337?%5Fencoding=UTF8)

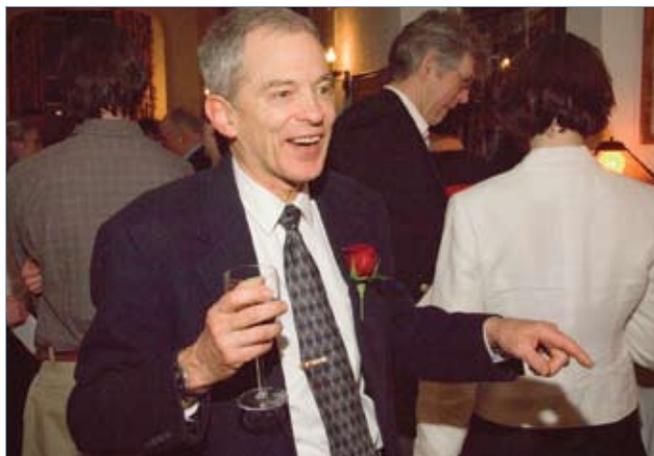


## Department Events

### David D. Houghton Symposium

On March 31 and April 1, 2006 the department hosted a Symposium honoring the career of Emeritus Professor David D. Houghton and his many contributions to the field of atmospheric science. The Friday afternoon program was devoted to education and outreach, two areas where Prof. Houghton has a special interest. Dr. Joseph Moran gave a history of the AMS Education Program, the evolution of the Datastreme Project for K-12 teachers, and new initiatives to help increase minority participation in science. Dr. Sandra Henderson presented an overview of UCAR's Education and Outreach activities for K-12 from local audiences up to the Global Learning and Observations to Benefit the Environment (GLOBE) program. Dr. Mohan Ramamurthy, Director of UNIDATA, explained the UNIDATA program, a data and teaching resource for earth system education and research, and gave a view of the cyber-infrastructure needed to manage the huge data stream planned for the future. Dr. Steven Ackerman presented a talk on his philosophy of teaching undergraduate non-science majors as an exercise in improvisational acting. Dr. David Houghton ended the session with his presentation on climate change and the outreach work he does to bring understanding of this topic to the public. Dr. Scott Lindstrom organized an informal dinner on Friday night for Dr. Houghton and his friends and former students.

The Symposium continued on Saturday with a full day of presentations chosen to reflect Dr. Houghton's career in research beginning with a morning session on Climate Research. Dr. Bette Otto-Bliesner presented her research on the reconstruction of the climate of the last interglacial period (130,000 years ago) when the climate was 5°C warmer than it is today. She then compared current and predicted warming to conditions found in that period. Dr. Galen McKinley reported on her research using modeling to understand air-sea CO<sub>2</sub> flux response to climate variability. The modeled variability mechanisms such as temperature impacts are well captured but the biological activity and mixing mechanisms are underestimated. Dr. Arne Winguth used the MPI/UW Earth System Model to examine the CO<sub>2</sub> uptake of the marine and land biosphere in response to future climate change.



*Professor David Houghton at the Houghton Symposium Banquet*



*Professor David and Barbara Houghton at the Houghton Symposium banquet.*



*Professor David Houghton with several of his former graduate students (l-r Jae-Kung Schemm, Bette Otto-Bliesner, Nathaniel Reynolds, Dong K. Lee, Scott Lindstrom) at the Houghton Symposium banquet.*

The next session focused on Large-Scale Dynamics. Dr. Eric DeWeaver explored the simulation of atmospheric circulation and climate in the Arctic. Dr. Robert Black examined the dynamic coupling of the stratosphere and troposphere during stratospheric final warming events as-

sociated with the onset of spring. Dr. Daniel Vimont presented work on modeling the influence of the mid-latitude atmosphere on the tropical Pacific decadal climate variability. The Wind/Evaporation/SST (WES) feedback in the transition seasons helps to generate the Tropical Pacific Meridional Mode which plays a role in initiating ENSO variability.

After lunch the Symposium turned to Numerical Modeling. Dr. Ralph Petersen presented a history of the development of numerical modeling. He also spoke about the role of researchers and visiting scientists who bring new ideas to NCEP as well as help address relevant problems such as data assimilation. Dr. Louis Uccellini looked at the current configuration of NCEP models and what is planned for the future. Some of the main shifts will include multi-model ensembles and the use of climate test beds to accelerate the transition of scientific advances from the research community to NOAA climate forecasts and products. Mr. Daryl Kleist finished this session with a presentation on GSI - the next generation, unified data assimilation system at NCEP. The GSI system uses 3D variational assimilation with new methods of estimating background errors, improved specification of observational errors, and improved efficiency.

The final session of the day was devoted to Mesoscale/ Gravity Waves/ Convection. Ms. Kate LaCasse presented work on the impact of high resolution (MODIS) SSTs on mesoscale forecasts. The MODIS SSTs provided greater detail in the marine boundary layer where mesoscale features are observed along SST gradients. Dr. Akira Kasahara presented his remembrances of Dr. Houghton when he was at NCAR in the mid-1960s. He also presented his current research on the effect of rotation on internal gravity waves. Dr. Dong Lee described his work with mesoscale and regional models to predict mesoscale convective systems and their accompanying heavy rainfall. Dr. Gregory Tripoli presented some results from his NMS modeling of tropical cyclones. The tropical cyclone structure showed internal gravity waves due to convective regions in the eyewall extending into the stratosphere.

The final event of the Symposium was a banquet at the University Club. Dr. Houghton's wife, children, and grandchildren joined the gathering of friends and colleagues for the dinner. A slide show ran continuously during dinner, depicting scenes of Dr. Houghton's research life as well as many activities he shared with faculty and students. Dr. John Young served as emcee for the banquet and after dinner presented his thoughts and remembrances of recruiting Dr. Houghton to come here and their long association in the department. Other faculty and staff also shared stories, many of which seemed to include tales of racquetball games. Special thanks are due to Prof. Michael Morgan, Linda Keller, Betty Rhyner, and Toni Sumner-Beebe for organizing the Houghton Symposium. All of the talks presented at the Symposium will soon be available at the Symposium Web site : <http://www.aos.wisc.edu/~houghtonsymp>.

## Student Awards Day – April, 2006

Our annual Department Student Awards day was held on Wednesday April 26. We gathered to honor excellence in both our undergraduate and graduate student's performances. Professor Jon Martin presented the awards. **Gijs deBoer** receives the Colloquium Service (top right). **Val Benesh** receives the Schwertfeger Award, for best performance as a first year graduate student, from (second from top right). **Amanda Kts** receives the Horn Award for comprehensive excellence as a junior undergraduate (second from bottom right). **Michelle Buerger** receives the inaugural Lettau-Wahl Award for excellence as a junior undergraduate (bottom right).



Unable to attend that day were award winners Will Lewis (Colloquium Service Award), Amato Evan (Lettau Award for best M.S. thesis) and Pedro Mulero (Wahl Award to our best Teaching Assistant). Congratulations to all of our award winners.



## Graduate Program Report

### Masters Degrees

**Cyganowski, Claudia J.**, (Nonthesis Master's), May 2006. (Petty)

**Richards, Michael S.**, "Volcanic Ash Cloud Heights Using the MODIS CO<sub>2</sub>-Slicing Algorithm," May 2006. (Ackerman)

### PhD Degrees

**Holz, Robert E.**, "Remote Sensing of Arctic Cloud Top Altitudes Using High Spectral Resolution Measurements," December 2005. (Ackerman)

### Student Announcement

**Steven G. Decker**, a Ph. D. student in our department, has accepted an offer to become Assistant Professor of Meteorology in the Department of Environmental Sciences at Rutgers University. Steve will be completing his Ph. D. this summer and is working on morphological data assimilation. He will begin his new position in August 2006. Congratulations to you, Steve!

### Student Awards

Graduate student **Brent Maddux** received the 4th place award for his poster "Cloud Variability and Climate Signatures in MODIS Level 1-3 Data" in the student poster presentation competition as part of the 14th Conference on Satellite Meteorology.



## Undergraduate Program Report

### Varable to Attend NCAR Workshop

**Adam Variable**, an undergraduate major in our department, will be attending the 5th annual NCAR Summer Undergraduate Leadership Workshop. Adam will be at least the third member of our department to attend this workshop (all in different years) so he will uphold a rather constant Wisconsin presence at this event. To learn more about the program visit [http://www.ucar.edu/educ\\_outreach/ulw/](http://www.ucar.edu/educ_outreach/ulw/).

### Chavas Named Goldwater Scholar

**Mr. Daniel R. Chavas**, one of our undergraduate majors, has been named a Barry M. Goldwater Scholar by the Barry M. Goldwater Excellence

in Education Program, established by Congress in 1986. The program seeks to honor outstanding young students who intend to pursue careers in the fields of science, mathematics, and engineering. This year 323 young people were so honored out of nearly 1200 who applied. Dan is currently working in Prof. Michael Morgan's research group studying the relationship between tropical cyclones

and African easterly waves. He intends to pursue a Ph. D. in Atmospheric Science and become the director of the National Hurricane Center at some point in his research career. A Goldwater Scholar is eligible for one or two years of support covering tuition, fees, books, and room and board up to a maximum of \$7,500 per year. Congratulations to you, Dan!

### Daniels Drafted by Houston Texans

**Owen Daniels**, a recent AOS major, was drafted by the Houston Texans with the 98th overall pick in the 2006 National Football League draft. We are very proud of Owen and look forward to hearing from him as his career develops. Owen was recruited to UW as a highly rated quarterback but made the transition to tight end – a not-so-straightforward transformation. Good luck to you, Owen!

### Anomalously Warm Lake Mendota Temperatures

The students in Prof. Arne Winguth's AOS/GEO 105 undertook a survey of Lake Mendota with RV "Limnos" between April 20-28, 2006. We carried out a transect from the Center of Limnology to Picnic Point and further on to Maple Bluff. The weather was favorable (almost no cloud cover) and so students and instructors enjoyed the trip. The primary objective was an investigation of the strong narrow currents along the tip of Picnic Point and the overall heat content of the lake.



38 students measured physical and biogeochemical properties of the lake. A high-precision Seabird Conductivity Temperature Depth (CTD) instrument, suitable for an ocean cruise, was used to measure the potential temperature, salinity, and oxygen of the lake. Two additional temperature/oxygen YSI instruments were used for quality control of the data. Measurements were taken on 14 stations with each taking about 15-45 minutes for the downcast of the instruments.

Temperature measurements on April 27 of about 9.4°C in the center of the lake are about 2.5°C warmer than the corresponding historic measurements 20 years ago. This increased temperature agrees reasonably well with the positive Dane County climate anomaly over the last month. Strong currents were evident by significant temperature and oxygen gradients particularly in areas with steep topographic changes. Sediment probes were taken at various locations with weed near Picnic Point.

Water samples were investigated under the microscope and abundant populations of zooplankton (daphnia and copepods) were detected. The water clarity was still good. Secchi disk measurements yielded a reduction of radiation to 1% of its surface value in 14 m depth. The ambitious attempt to measure the lake properties near Picnic Point resulted in the loss of one anchor. Dave Harring, the captain of the vessel and very familiar with the lake, stated "This was the first time in eight years that we lost an anchor".

Data from the field trips can be found at <http://ginsea.meteor.wisc.edu/labs/mendota/index.htm>.

## Undergraduate Degrees

### December 2005

*Daniel J. Allman, Andrew R. Domask, Samuel J. Dunaiski, Jason P. Gillis, Alex J. Harrington, Theron J. Hodel, Elizabeth A. Klusinske, Matthew A. Lunde, Melissa A. Owens, Christin M. Scott, Sara A. Skellenger*

### May 2006

*Zachary A. Ballweg, Laura A. Betker, Aaron M. Carls, Andrea L. Collies, Bridgette A. Eagan, Jason S. Harder, Timothy J. Hollfelder, Claire E. Hruska, James R. Jelinek, Lynn M. Kjernes, Elizabeth P. Konop, Brian J. Miretzky, Dianna N. Nelson, Emily L. Nieubur, Aaron N. Shaffer, Gordon R. Stephenson, Amanda R. Wood, Nicholas A. Zachar*



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Undergraduate Financial Support - Specific

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## ☆ Alumni Contributors ☆

☆ Received November 1, 2005 through March 31, 2006:

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*Thank You!*



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