

# Atmospheric Circulation

Newsletter of the University of Washington Atmospheric Sciences Department

## In Search of Soot in Snow in the Russian Arctic

by Tom Grenfell



Transportation in Vorkuta. A light Russian army tank.

Black carbon particles, or soot, produced by biomass and fossil fuel combustion are distributed throughout the atmosphere. These particles can travel thousands of miles allowing the soot to reach the most remote parts of the Arctic where they can be deposited on the surface, scavenged by snow or rainfall. Soot particles in the snowpack make the snow darker, acting to decrease the albedo most strongly at visible and near ultraviolet wavelengths where ice is most transparent. As an example, 25 parts-per-billion of soot can reduce the total reflectance of the snow pack by about 2%. This cannot be distinguished by eye but has significant implications for the regional climate. According to Hansen and Nazarenko (*Proceedings of the National Academy of Sciences*, **101**, 423–428, 2004), the effect of soot in snow on the earth's energy budget may be one-quarter as large as that due to the increase of greenhouse gases since pre-industrial times.

Snow is particularly important because the annual snowpack acts to amplify climate change. If the climate cools, the snow can cover a larger area, hiding dark underlying surfaces, reflecting more sunlight, and promoting further cooling. If the climate warms, the winter snow pack melts earlier, exposing darker underlying surfaces that absorb more sunlight leading to

accelerated snow melting and greater warming. The soot content of the snow modulates the melt rate and length of the melt season. Soot is especially effective because: (1) it is one of the blackest natural substances; (2) the peak of soot fallout occurs in the spring and coincides with onset of snowmelt; (3) melting spring snow has lower inherent albedo and larger grain size than cold snow enhancing the influence of the soot; and (4) soot may concentrate at the surface during melt more effectively decreasing the albedo.

In 1983/84 Tony Clarke and Kevin Noone, then in Civil Engineering, carried out a survey over the western Arctic to observe levels of the soot particles in the snowpack. The resulting paper (Clarke and Noone, *Atmos. Environment*, **19**, #12, 2045–2053, 1985) received wide recognition and raised questions about the role of contaminants in the radiative energy balance of snow-covered areas of the world. I was involved in the project as a volunteer to collect snow. Since that time Steve Warren and I have maintained a continuing interest in soot and its effects on the optical properties of snow. We obtained additional samples at various locations on the Antarctic Plateau and in the Arctic as opportunities arose on other field projects, but we never carried out a systematic wide-area survey similar in scope to the Clarke and Noone study.

A major gap in the 1983/84 survey was the area across northern Russia, spanning 11 time zones—almost half of the Arctic. In the 80s this region was not accessible to US scientists. Further it has become apparent from our work to date that the soot levels we have been finding are sufficiently low that there are a variety of serious problems with using satellite remote sensing to

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## Steve Domonkos: The Magician of the Machine Shop

by Dale Durran and Sarah Doherty

One thing in the UW Atmospheric Sciences Department that has hardly changed in 37 years is the enthusiasm and talent that Steven Domonkos brings to the design and construction of systems for use in scientific research or classroom demonstrations. Steve joined the UW in 1970, took partial retirement in 2002, and is still continuing to work half time as a Research Engineer. Steve was been nominated twice for the UW Distinguished Staff award. The number of nominations campus-wide greatly exceeds the number of awards, so since Steve is not known to have heroically saved anyone from a fiery death, he did not receive the award.

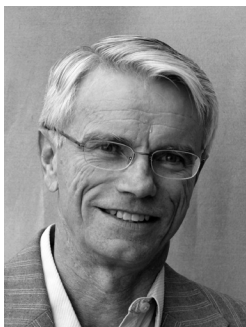


Steve Domonkos

Nevertheless, the comments many contributed to his nomination materials helps fill out the picture of Steve's unique services. As *Bonnie Light*, Physicist with the Applied Physics Laboratory and former graduate student, expressed: "Steve is more than a machinist. He is a problem-solver. He will often look over my plan for how to construct something, think about it, dig back into his vast experience, suggest a better way to do it, help me visualize this new approach, and know immediately how to build it. This is a skill set that is uncommon and hugely valuable.... He is incredibly flexible. This is enormously helpful when doing research-grade machining. Steve understands the quirks of research and works really well within this framework. He pretty much is always willing to find a way to

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## Chair's Column



Dennis Hartmann completed his term as chair at the end of June, after which I became the 9th chairman of the UW Atmospheric Sciences Department. I am honored to serve as chair of this department

with its excellent record of research, teaching and service. I, together with the rest of the faculty, congratulate and thank Dennis for his five years of distinguished service. Some of the highlights from Dennis' tenure as chair are reviewed in *Featured Professor: Dennis Hartmann* on p. 2.

Upon becoming chair, there were lots of little surprises, like the need to get moving on this issue of *Atmospheric Circulation*. Fortunately Dennis had left me with a team of outstanding and highly capable people in the main office. Debra Wolf has played a particularly major role in creating this issue.

Those who have read the Chair's Column in previous editions of *Atmospheric Circulation* will know it often mentions the reality that state budgets for higher education do not provide the level of support that they did in the past. In addition, although our level of research funding has grown slightly, these funds can no longer directly support the facilities and administrative functions they could in the past. As a consequence we have become increasingly reliant on donations from our alumni and friends to support special events, distinguished lecturers, scholarships, and fellowships.

During Dennis' tenure we received several major gifts from those in an excellent position to understand the situation: namely our emeritus and current faculty and their spouses. Bob Fleagle established an endowment for a Visiting Faculty Fellowship in Atmospheric Sciences Policy (see *Inaugural Fleagle Lectures*, p. 3). In addition, Bob Fleagle, Joost Businger, Conway and Jan Leovy, Richard and Joan Reed, Jim Holton's spouse Margaret, and an anonymous donor all established endowed funds for student support, which were matched by the college. Many of Jim Holton's for-

mer students have made significant contributions to the Holton Endowed Graduate Fund. Peter Hobbs also bequeathed to the department his share of the royalties generated by the new second edition of the Wallace and Hobbs classic *Atmospheric Science, an Introductory Survey*.

Finally, I am very excited to announce that a new endowed lectureship was established this spring in memory of Peter Hobbs by his wife Sylvia and their three sons, Stephen, Julian and Rowland (see *Peter V. Hobbs Memorial Endowed Lectureship in Experimental Meteorology*, p. 5).

Let me close by thanking all those who have made contributions to the department (see *Donor Recognition*, p. 7), and also by thanking those who have sent updates about their activities (see *Alumni News*, p. 8). I urge all alums to send us news about their activities to share in the 2008 edition of *Atmospheric Circulation*.

Best wishes,  
Dale Durran

## Featured Professor: Dennis Hartmann



*Professor Dennis Hartmann*

Prof. Dennis Hartmann is returning to civilian life after serving for five years as chairman of the Atmospheric Sciences Department. It may be that no chair since Phil Church was confronted with so many challenges during his tenure. During Dennis' 5-year stint as chair roughly the same number of academic faculty were hired as during the previous 15 years. These six faculty: Joel Thornton (atmospheric chemistry), Rob Wood (cloud microphysics), Becky Alexander (atmospheric chemistry, paleoclimate), Cecilia Bitz (high latitude

climate), Tom Ackerman (radiation, remote sensing) and Dargan Frierson (atmospheric general circulation) are an impressive cohort who are well poised to continue the UW's tradition of leadership in the atmospheric sciences.

We also lost two beloved academic faculty and one emeritus professor during the last five years, whereas during the previous 15 years no faculty, active or emeritus, passed away. Dennis provided a steady hand at the helm in our time of grief.

Under Dennis' leadership, we have seen a modest increase in enrollment in our undergraduate major, a major expansion in the number of students served in our undergraduate classes for non-majors, and continued success in recruiting excellent graduate students. The department has maintained its extensive program of cutting-edge research despite the loss of two active distinguished faculty.

Dennis also greatly expanded on the effort begun by Jim Holton to stay in better contact with our alumni through receptions at the AMS Annual Meetings, and of course by editing editions two through six (2002–2006) of this newsletter. The need to attract charitable contributions to strengthen the department added a new dimension to the tasks faced by the chairman, and Dennis tackled this with notable success as discussed more fully in the Chair's Column (see page 2).

Dennis is eager to get back to his research on clouds and climate change, and on the low-frequency variability of the atmosphere. He is particularly excited about the suite of new satellite observations just becoming available that will give an unprecedented picture of cloud structure and distribution. In addition, he looks forward to completing a long overdue revision of his textbook *Global Physical Climatology*.

Although Dennis has stepped down from the chairmanship, he will continue to remain very active in his service to the department by overseeing our graduate program as Graduate Program Coordinator during the 2007–2008 Academic Year.



## New Faculty

We are excited to welcome two new faculty to our department this year: Dargan Frierson and Jérôme Patoux.

Dargan Frierson joins our faculty as an assistant professor. Dargan received his B.S. in Mathematics and Physics (with



*Assistant Professor Dargan Frierson*

minors in English and Italian) from North Carolina State University and proceeded to Princeton for graduate school. He completed his dissertation, entitled “Studies of the General Circulation of the Atmosphere with a Simplified Moist General Circulation Model” in 2005 under the guidance of Issac Held, and then spent two years as a postdoc at the University of Chicago working with Ray Pierrehumbert under support from a UCAR VSP Climate and Global Change Postdoctoral Fellowship.

Dargan’s research has focused on the roles played by moisture and latent heat release on the dynamics of the general circulation. Much of his work is motivated by a desire to understand how our planet’s dynamics may change with global warming. Dargan is looking forward to teaching at both the graduate and undergraduate levels.

Jérôme Patoux joins our faculty as a research assistant professor. Jérôme received an engineering degree from the Ecole Centrale de Lille, followed by an M.S. in Environmental Engineering from the University of Texas at Austin and a D.E.A. in Meteorology and Oceanography from the Université Paul Sabatier in Toulouse, France. In 2003 he completed a Ph.D. in Atmospheric Sciences from our department under the guidance of Bob Brown; his dissertation

was entitled “Frontal Wave Development over the Southern Ocean.”

Jérôme has studied boundary layer winds over the oceans using satellite scatterometer data. He has also been very active teaching atmospheric science to elementary and middle school science teachers and in developing curricula for such courses. Jérôme recently taught our non-majors “weather” course with excellent results.



*Research Professor Jérôme Patoux*

### *Domonkos, cont. from page 1*

make something work.”

*Sarah Doherty*, Research Engineer and former graduate student, notes, “I have twice worked with Steve to build systems for aircraft deployment. In both cases, the aircraft engineers were extremely impressed with his work. This past spring we had to build a new and complex package for a NOAA aircraft under a prohibitively short timeline. Steve not only got the job done, but when the lead NOAA aircraft engineer saw the package he asked, “Who DID this??”, then pulled over his colleagues to inspect and admire Steve’s work. This came from engineers that have worked for years on military and research aircraft. They literally asked me for his name, and could not believe what a single guy working in a machine shop had pulled off in a few short months.”

*Art Rangno*, former Research Scientist, recalls, “Steve Domonkos came to the Cloud and Aerosol Research (CAR) Group in the early 1980s as a crew member on our research aircraft.... He was tough and did his job even though he had problems with air sickness and was forced to take anti-air sickness drugs over a period of years.

Even with this problem, he always did his job superbly, whether fixing something that broke during a flight, or when he ran the whole aircraft computer system as Flight Engineer.”

In addition to supporting our research, Steve has made similar outstanding contributions to the educational mission of the department by enthusiastically and skillfully creating devices for classroom demonstrations. Out of necessity, the request for a new classroom demonstration arises as a sudden idea while one is thinking about next week’s lecture. This means that Steve has little time to bring a sometimes half-formed idea to fruition, but he repeatedly turned these ideas into inspirations by crafting an elegant teaching tool. Sometimes these are very simple devices; but they have ranged up to a very complex machine for illustrating the Coriolis force, which was ultimately the focus of an article in the *Bulletin of the American Meteorological Society*. Steve’s

*Continued on page 5*

## Inaugural Fleagle Lecture

Last May, Dr. Robert Watson gave the first lectures in the Fleagle Visiting Faculty Fellowship in Atmospheric Sciences Policy. Dr. Watson has served as the Chief Scientist and Director for Environmentally and Socially Sustainable Development for the World Bank since 1997. In addition to his lectures Dr. Watson met formally and informally with many graduate students and faculty. Both the students and the faculty found his visit extremely stimulating, and according to Dr. Watson, the feeling was mutual.

In his lectures Dr. Watson stressed that the science of global warming is robust and it is not realistic to expect the problem to simply go away. He argued that the future is in our hands: we can limit changes in the Earth’s climate, but the changes in policies, practices and technologies required are substantial and not currently underway. Powerpoint presentations of Dr. Watson’s lectures, “The science, economics, equity and politics of global warming” and “Living beyond our means: natural assets and human well-being” may be downloaded from our website at [www.atmos.washington.edu/events/Fleagle\\_Lectures/Fleagle\\_Lectures.html](http://www.atmos.washington.edu/events/Fleagle_Lectures/Fleagle_Lectures.html).

*Soot in Snow, cont. from page 1*

fill the gap. So two years ago, Steve was visiting Vladimir Radionov, a colleague and head of the Department of Meteorology at the Arctic and Antarctic Research Institute (AARI) in St. Petersburg, and they initiated plans to include Russian sites in a basin-wide field project over the next two to three years. Russia was planning to support a strong International Polar Year (IPY) program, and we saw a unique opportunity developing to cooperate with the Russians to get data from this critical area. Again we teamed up with Tony Clarke and were successful in obtaining funding from NSF for a new project under the auspices of IPY; however, there was a lot more fun in store for us.

To carry out a project in Russia, we had to submit a proposal to and obtain formal permission from the Russian Hydrometeorological Service for Environmental Monitoring (Roshydromet). We also had to have permission from the local authorities at each location, all of which are in the northern border zone, a politically sensitive area. Vladimir spent most of last winter writing letters and contacting the proper people. Fortunately he was able to enlist the aid of Victor Boyarsky, director of the Russian State Arctic and Antarctic Museum, a seasoned polar explorer and an expert on polar logistics. Between them, they were able to get the permissions we needed and get the project set up. So in late March, Steve Hudson and I flew to St. Petersburg on the first leg of the journey to join the rest of the field team (Dr. Michael Lamakin and Mr. Valery Ippolitov).

The areas we were to visit this year were in the vicinity of Nar'yan Mar, Vorkuta, Dikson, and Khatanga covering the western part of the country. Our strategy was to

fly by commercial aircraft to each of the cities and obtain local transportation out into the countryside several tens of kilometers away to avoid the influence of local sources. Each location is in the tundra zone north of the boreal forests (taiga) and located on major rivers flowing north to the Arctic Ocean. The climate is similar to northern Alaska and the people similarly friendly. Many of them had never seen an

American and were very curious about our project. Unfortunately my abilities at Russian were limited to surviving, so Michael and Valery often had to explain things for us.

One particularly interesting aspect of our experiment was the local transportation. At northern sites in Alaska and Canada, we were able to rent or borrow snow mobiles with ease and drive ourselves out into the wilds. In Russia this wasn't possible. Not only were snow mobiles uncommon and unreliable, the authorities didn't want to have us roaming around by ourselves. Fortunately, Valery was able to provide creative solutions that served the purpose. In Vorkuta, for example, we drove out in a light Russian army tank with the armament removed that had been taken over by the Russian Geological Survey for field use.

In Khatanga, we had a more modern conveyance, a Bronto. This is a modern jeep-like vehicle with giant tires for cross country travel. One of my career ambitions has been to drive north along a Siberian river, as the Russian truckers do to deliver local products to the coast for shipment to the rest of the country, and in the Bronto I finally go to do it.

After a grueling six weeks on the road, we returned to St. Petersburg, wrote up our project report for *Новости МПГ* (IPY News Bulletin), had a small celebration for the success of our project and headed home. Upon reflection, the most remarkable aspect of the experiment was that we managed to carry out the field program essentially as planned. Our Russian hosts put in a large amount of effort and managed to circumvent all the obstacles. Steve Warren and I plan to return to Russia next



*Steve Hudson and Valery posing in front of the Bronto, near Khatanga.*

year to cover the eastern sector, and we hope that the cooperation we managed will be contagious and open opportunities for similar research in the future. Meanwhile, if you find yourself in St. Petersburg, be sure to visit the Arctic and Antarctic Museum at 24 Marata Street.

## In Memoriam

**Edward LaChapelle**, Professor Emeritus of Atmospheric Sciences and Earth & Space Sciences, passed away on February 1, 2007. Professor LaChapelle was skiing at Monarch Mountain in Colorado when he suffered a heart attack. He was 80.

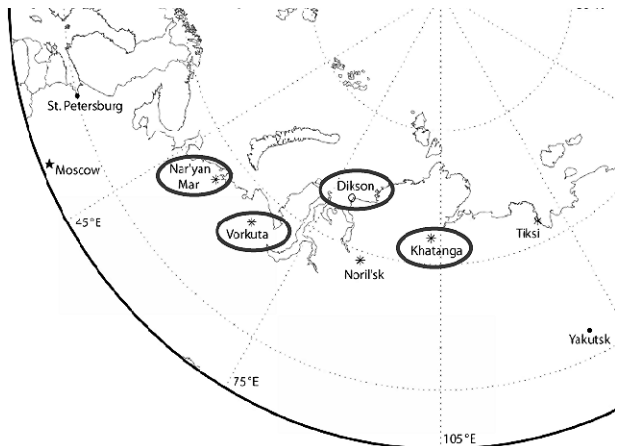


*Ed LaChapelle is holding one of the stainless steel rings they put into the Blue Glacier back in 1963.*

*(Photo: Dennis Hartmann, 2006)*

Prof. LaChapelle authored *The ABC of Avalanche Safety*, as well as authoring and co-authoring several other books. He developed a beacon to locate buried skiers and helped found the Northwest Weather and Avalanche Center in Seattle. He was a pioneer in the field of avalanche forecasting and research in North America.

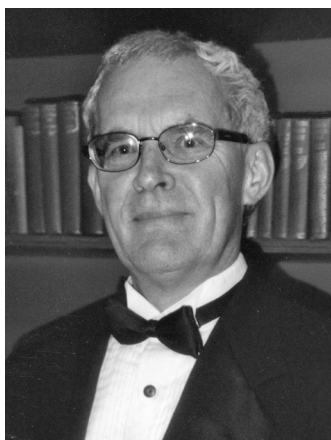
LaChapelle travelled extensively to do research on glaciers and snowfall in Alaska, Greenland, and the Blue Glacier on Mount Olympus in Washington.



*Locations we visited this spring are circled.*

## Peter V. Hobbs Memorial Endowed Lectureship in Experimental Meteorology

Peter Hobbs felt strongly that the advancement of science must be nurtured through the open exchange of ideas. He was deeply involved in experimental meteorology, conducting research ranging from the microscale, through the mesoscale, up to the global scale, and including both the physics and chemistry of the atmosphere. The common threads in his work were the ubiquitous roles played by aerosols, clouds and precipitation in the atmosphere. Before his death, Peter laid plans for a lectureship to foster the open exchange of ideas amongst scientists working on a wide range of problems connected by these threads.



Peter V. Hobbs

Peter Hobbs was born in London, England on May 31, 1936. While attending secondary school he had shown an interest in meteorology and built his own weather station. After leaving school he spent a mandatory two years in the Royal Air Force doing meteorological work before studying at the Imperial College of Science and Technology, University of London, where he earned a B.Sc. in Physics and a Ph.D. in Cloud Physics, studying under Professor B.J. Mason. After graduating in 1963 Peter was offered a position in the Atmospheric Sciences Department of the University of Washington, Seattle, where he became a Professor of Atmospheric Sciences and the Director of the Cloud and Aerosol Research Group (CARG).

Peter Hobbs began his research by studying the formation of ice-crystal populations in supercooled clouds at 8,000 feet on Mt. Olympus, Washington. He did some of the first studies of the effects of industrial pollution on the atmosphere and some of the earliest research on acid rain, participating in several large projects to study the meso-

and synoptic-scale structures, the micro-physical constitution and the development of precipitation in clouds in widely separated locations in middle latitudes, the tropics and the Arctic. His Research Group flew through smoke from burning oil wells in Kuwait after the Gulf War and from burning jungle vegetation in the Amazon River Basin and in Africa, and through ash spewing from volcanoes such as Mount St. Helens in Washington and Redoubt in Alaska. Peter Hobbs also researched the dispersion and chemical changes in aerosols emitted from ships. To conduct his research, Hobbs used three airplanes, beginning with a World War II-vintage Douglas B-23 previously owned by Howard Hughes, which is now housed at the McCord Air Museum in Tacoma. He also used a Convair C-131A and later a Convair 580 (dubbed “Husky One”).

During his career, Peter Hobbs authored more than 350 peer-reviewed papers and over 200 conference reports, served as an editor of four major scientific journals, was an editor of three books, and the author of four books: *Ice Physics* (Oxford University Press, 1974), *Atmospheric Science: An Introductory Survey*, co-authored with J. M. Wallace (Academic Press, 1977), *Basic Physical Chemistry for the Atmospheric Sciences* (Cambridge University Press, 1995, 2000), and *Introduction to Atmospheric Chemistry* (Cambridge University Press, 2000) and the 2nd edition of *Atmospheric Science: An Introductory Survey* with J. M. Wallace (Elsevier, 2006). He served on numerous national and international committees concerned with the planning and implementation of major programs in cloud physics and weather modification and was president of the International Commission on Clouds and Precipitation between 1984 and 1992. Along with teaching, doing research and writing, Peter Hobbs had 29 students who gained Ph.D.s and 34 who received Master’s degrees under his supervision.

Peter Hobbs received many honors during his lifetime including awards from the American Meteorological Society: Editor’s Award (1970), Fellow of the Society (1982), the Jule G. Charney Award (1984) for his research on cloud physics, cloud and aerosol chemistry and meso-scale meteorology, and an honorary membership (2006). Other honors and awards Peter Hobbs received

were a Senior Alexander von Humboldt Award for research in Germany (1984), Fellow of the American Geophysical Union (1993), University of Washington College of Arts and Sciences Dean’s Recognition Award (1994), The Sackler Distinguished Lecturer in Planetary and Space Sciences, Tel Aviv University, Israel, (2000), Guinness Book of Records for measurement of the largest raindrop (shared) (1994) and the United Arab Emirates Prize for Excellence in Weather Modification (shared with Art Rangno) (2005).

As a youth Peter Hobbs was a boxing and swimming champion and an avid athlete, and he never lost his interest in physical fitness, jogging almost daily around campus with departmental colleagues. Another passion for Peter was music in all forms but, in particular, he enjoyed opera. Peter Hobbs died from pancreatic cancer on July 25, 2005.

The gift to establish this endowed lectureship was made in loving memory of Peter by his wife, Sylvia, and their three sons Stephen, Julian and Rowland. The first Peter Hobbs Memorial Lecture should occur next spring.

### *Domonkos, cont. from page 3*

capabilities, resourcefulness, and friendly can-do attitude stimulate us to constantly think of how we can improve the tools we use in our teaching.

In addition to his exceptional ability to think creatively and build high quality instruments, Steve is resourceful, and thankfully in these days of tight budgets, economical. Steve makes copious use of University Surplus, and he keeps left over supplies from a project around for future use—which he is able to in fact do because “Steve is the best organized person I have ever met; someone who can find anything from a critical photo of his work to an odd-sized nut and bolt.” [Art Rangno]. In this way, Steve has saved research grants and the department innumerable dollars by opting for a simple, elegant, “reuse/recycle” approach to each project. We are not quite sure what we will do if Steve ever completely retires.



## Congratulations to Graduates

### Doctor of Philosophy

- Brian Ancell**, *The Nature of Adjoint Sensitivity with Respect to Model Parameters and its Use in Adaptive Data Assimilation* (Mass)
- Kathleen Crahan**, *The Thermodynamic and Kinetic Impacts of Organics on Marine Aerosols* (Hegg)
- Robert Elleman**, *Aerosol Size Distribution Modeling for the Pacific Northwest* (Covert/Mass)
- Camille Li**, *A General Circulation Modeling Perspective on Abrupt Climate Change During Glacial Times* (Battisti)
- Qing Liang**, *The Thermodynamic and Kinetic Impacts of Organics on Marine Aerosols* (Jaeglé)
- Brian Magi**, *Optical Properties and Radiative Forcing of Southern African Biomass Burning Aerosols* (Hobbs/Fu)
- William Roberts**, *An Investigation into the Causes for the Reduction in the Variability of the El Niño Southern Oscillation in the Early Holocene in a Global Climate Model* (Battisti)
- Ken Takahashi**, *Processes Controlling the Mean Tropical Pacific Precipitation Pattern* (Battisti)
- Ryan Torn**, *Using Ensemble Data Assimilation for Predictability and Dynamics* (Hakim)
- Christopher Woods**, *The Study of Snow Particles in Pacific Northwest Winter Precipitation: Observations and Mesoscale Modeling* (Hobbs/Stoelinga)

### Master of Science

- James Booth**, *Investigating the Role of Mesoscale Variability, Using a Passive Tracer in an Eddy Resolving Model of the North Atlantic Ocean* (Kamenkovich)
- Steven Cavallo**, *Life Cycles of Tropopause Polar Vortices* (Hakim)
- Lucas Harris**, *The Effect of Directional Wind Shear and Evolving Synoptic-Scale Flow on Vortex Shedding* (Durrán)
- Mario Lopez**, *Convective Cloud Distribution in a Cloud Resolving Model* (Hartmann)
- Patrick Zahn**, *An MM5-based Regional Climate Model for the Pacific Northwest* (Mass)

### Bachelor of Science

- Amor Alcobendas** (AFROTC)
- Alfredo Arroyo**
- Kathryn Boyd**
- Brett Carlson**
- Katherine Condit**
- Thomas Dinneen**
- Kyle Durch** (AFROTC)
- Jannel Emery** (AFROTC)
- William Foster**
- Nicholas Irving**
- Matthew Jeglum**

- Bryce Land**
- Ryan McKinsey** (AFROTC)
- Kevin Placido**
- Stewart Renz** (AFROTC)
- Ryan Roberts** (AFROTC)
- Charles Smeltzer**
- Michael Warner**
- Matthew White**

## Undergraduate and Faculty Research

The following undergraduate students and faculty members worked together during the past year:

- Alfredo Arroyo/Joel Thornton**: Development of a 1-D Forest Canopy Chemistry Model
- Katherine Condit/Theodore Anderson**: Downloading and organizing data from a lidar satellite (the ICESat mission) for global analysis of aerosol/cloud properties
- Bonnie Brown/Greg Hakim**: Analysis of radiosonde profiles of arctic vortex cores
- Kathryn Boyd/Greg Hakim**: Forecast error statistics from an ensemble Kalman filter
- Brett Carlson/Dennis Hartmann**: The wave-number-frequency spectrum of heat transport across high latitudes
- Michael Soltow/Robert Wood**: Website design for laboratory-based teaching in the Atmospheric Sciences
- David Weir/Robert Wood**: Satellite and ship observation of microphysical properties over the SE Pacific ocean
- Michael Warner/Cliff Mass**: Westerly Wind Surges through the Strait of Juan de Fuca

## Welcome to New Graduate Students for 2007–2008

- Elizabeth Barnes**, University of Minnesota–Minneapolis
- Edward Blanchard-Wrigglesworth**, University of Cambridge, UK
- Stuart Evans**, Haverford College
- Sara Harrold**, University of Colorado–Boulder
- Yen-Ting Hwang**, National Taiwan University
- Kelly McCusker**, Providence College
- Kristen Rasmussen**, University of Miami
- Eric Sofen**, Bowdoin University
- Michael Warner**, University of Washington
- Reid Wolcott**, University of Washington



## Scholarships and Awards

*NCAR ASP Post-doctoral Fellowship:*

**Ryan Torn**

*NOAA Climate and Global Change Postdoctoral Fellowship:*

**Larissa Back**

*Department of Energy Graduate Research Environmental Fellow:*

**Emily Fischer**

*AMS Summer Policy Colloquium Participant:*

**Rei Ueyama**

*NASA ESS Grad Student Fellow:*

**Reddy Yatavelli**

*PCC Fellows:*

**Kelly McCusker and Eric Sofen**

*AMS Fellow:*

**Kristen Rasmussen**

*Phi Beta Kappa Initiate:*

**Bonnie Brown**

*Reed Scholarship Recipients:*

**Bonnie Brown, Michael Goss, David Weir**

*Phil Church Award:*

**Kathryn Boyd**

The Phil Church Award is given to the graduating senior in the Department of Atmospheric Sciences with the most outstanding record of scholarship, leadership and service. Professor Phil Church was the founder and first Chair of the Department of Atmospheric Sciences.

*Atmospheric Sciences Achievement Awards:*

**Kathryn Boyd**      **Brett Carlson**  
**Thomas Dinneen**   **Matthew Jeglum**  
**Bryce Land**         **Ryan Roberts**  
**Michael Warner**

The Atmospheric Sciences Achievement Award is given to graduating seniors in the Department of Atmospheric Sciences who have achieved a GPA of 3.25 or higher in Atmospheric Sciences courses.

## Donor Recognition

The Department of Atmospheric Sciences gratefully acknowledges the donors who have generously supported us during the past fiscal year July 1, 2006 through June 30, 2007.

Thomas & Linda Ackerman	Dean & Shervin Churchill	Edward E. Hindman Peter V. Hobbs	Gyu-Ho Lim & Ae-Sook Suh	Steven & Barbara Rutledge
Allegra & Roger Andersen	Todd C. Dankers Paul A. Davis	Sylvia H. Hobbs & Family	William H. Lipscomb David B. Mechem	Bentley & Elizabeth Sayler
Anonymous	Clara Deser Jean M. Dewart	James & Alma Holcomb, Jr.	Steven L. Mullen Peter & Wendy Mullen	Jennifer Sims & Ethan Patashnik
Robert G. Baughman Robert S. Berkovitz	Timothy A. Dietrich Dale Durran & Janice Tervonen	Joshua & Sandra Holland	Gretchen Mullendore & Gregory Ostermeier	Catherine A. Smith Hui Su
Harold Bernard, Jr. & Christina Hilland-Bernard	Frederick & Taeko Eckel	Margaret P. Holton Charlotte J. Hopper	James R. Murphy Frederick & Judith Murray	Ronald & Mary Surface
Michael & Diana Biggerstaff	Mickey & Jeanne Eisenberg	Huang H. Hsu Roy L. Jenne	Thomas R. Newbauer Frank & Irene Nishimoto	Robert M. Thompson, Jr.
Cecilia M. Bitz Thomas and Carol Borda	Charles & Mary Elderkin	Richard & LaVonne Johnson	Janice Obuchowski & Albert Halprin	John & Ann Thompson James E. Tillman
Mark D. Borges Lance & Helen Bosart	Brad S. Ferrier Judith Gray	John & Vivian Karamanian	Rajul Pandya & Amy Alter-Pandya	Norman & Barbara Wagner
Mr. & Mrs. S. Edward Boselly III	Thomas Grenfell & Sue Schauss	Michael & Kristina Katsaros	Clayton A. Paulson Leonhard Pfister	Richard & Jean Weick James A. Weinman
Richard & Suzanne Brintzenhofe	Eric P. Gritmit Gregory & Lynne	Stephen A. Klein Kevin & Sheri Kodama	Richard and Joan Reed Robert & Britt Reeves	Michael Winton & Gretel LaVieri
Charles & Mary Brock Joost Businger & Marianne Kooiman	Halstead & Lynne Harrison	Dennis Lamb & Patricia Skrentny-Lamb	Steven E. Rolfe Thomas E. Rosmond	Debra Wolf Jin Y. Yu
David Butterfield & Janice DeCosmo	Dennis & Lorraine Hartmann	Margaret Le Mone & Peter Gilman		Xiaoli Zhu & Juan Liang
		Conway B. Leovy		Xun Zhu & Wei Liu

## Giving to the Department of Atmospheric Sciences

Please consider supporting the activities of the Department of Atmospheric Sciences. Your gift strengthens the core of the UW through recruitment and retention of world-class students and faculty. Your support of undergraduate and graduate students helps to create the next generation of scientific leaders. Help us to ensure that the department continues to be a leader in weather, climate and quality.

Yes, I want to support the Department of Atmospheric Sciences!

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 Department of Atmospheric Sciences  
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## Susan Solomon to Give Course Spring Quarter

We are very excited that Dr. Susan Solomon will spend spring quarter 2008 in residence at UW, where she will give a seminar course "Science and Policy of Ozone Depletion and Climate Change." As the title suggests this course will be devoted to the two major environmental-science issues of the 20th century that have most captured the attention of the public, policymakers, and industry.

Dr. Solomon, who needs no introduction to most of our readers, is a research scientist at the NOAA Earth System Research Laboratory in Boulder, Colorado. Her scientific papers have provided not only key measurements but also theoretical understanding regarding ozone destruction, especially the role of surface chemistry. In 1986 and 1987, she served as the Head Project Scientist of the National Ozone Expedition at McMurdo Station, Antarctica and made some of the first measurements there that pointed towards chlorofluorocarbons as the cause of the ozone hole. She has received numerous awards and prizes, including the National Medal of Science, the United States' highest scientific honor, for "key insights in explaining the cause of the

Antarctic ozone hole." Most recently, she served as co-chair of the Working Group 1 of the Intergovernmental Panel on Climate Change (IPCC).

## Alumni and Department News

The UW Atmospheric Sciences Alumni Reunion Reception will be held in New Orleans in conjunction with the AMS Annual Meeting (Jan. 20–24). Watch our home page for updates on date and time.

Alumnus Ed Rappaport has been made interim director of the National Hurricane Center.

Eric Maloney (Ph.D. 2002) will move from Oregon State University to Colorado State University where he will become an associate professor in the Atmospheric Sciences Department.

Ka Ming William Lau (Ph.D. 1977) was elected a Fellow of the American Geophysical Union.

Becky Alexander and Dave Suess became parents with the birth of their daughter Dayna on January 22.

Jerome Patoux and Caroline Planque became parents with the birth of their son Gaspard on July 20.

Professors David Battisti and Dale Durran were elected Fellows of the American Meteorological Society.

Assist. Prof. Joel Thornton received a Camille and Henry Dreyfus Environmental Chemistry Postdoctoral Fellowship Award.

Prof. Thomas Ackerman became Director of the Joint Institute for the Study of the Atmosphere and Ocean (JISAO).

Prof. Christopher Bretherton became Director of the Program on Climate Change.

The James R. Holton Endowed Graduate Support Fund was established with gifts from his family and friends.

Prof. Robert Houze was the Thompson Lecturer for the Advanced Study Program of the National Center for Atmospheric Research for 2007.

Prof. Steve Warren was awarded private funding through the Clean Air Task Force for his work on soot in snow and its role in climate change.

Assist. Prof. Rob Wood is lead PI for the upcoming VAMOS Ocean Cloud Atmosphere Land Study (VOCALS) Regional Experiment.

Shirley Joaquin retired at the end of February after working for the department for 15 years.

Igor Kamenkovich has left the department for a position as Associate Professor at the Rosenstiel School of Marine and Atmospheric Sciences at the University of Miami. We wish him great success.

## Contact Us

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Please send alumni news, comments, questions, corrections and address updates to [alumni@atmos.washington.edu](mailto:alumni@atmos.washington.edu) or call (206) 543-4250.