2011 marks both the end and the beginning, as AOSS will be welcoming a new Chair. While the department has changed dramatically since 2003, academic and research excellence remains the foundation of AOSS and SPRL. This is very evident by the high level of recognition that AOSS faculty have attained.

In 2004, the undergraduate Earth System Science & Engineering program was instituted to give students the opportunity to develop a deeper understanding of and interactions among the system components while receiving in-depth training in a particular concentration. AOSS now offers concentrated study in Climate Impact Engineering, Climate Science, Meteorology and Space Weather to our more than 40 undergraduate students.
AOSS Faculty Accolades

Nilton Renno is 2011 recipient of the CoE Research Excellence Award for his many accomplishments as a multidisciplinary scientist that include being the leader of the Phoenix Mars Mission’s Atmospheric Science Theme Group that found liquid water on Mars; his work with dust devils that has led to the invention of miniature field sensors used in climate studies; and his outstanding work with both undergraduate and graduate students. Nilton’s Mars atmospheric research has brought him international recognition in both the theoretical and experimental communities.

Igor Sokolov received the 2011 CoE Kenneth M. Reese Outstanding Research Scientist Award for his versatility and numerical modeling solutions. He has successfully published in fields such as shock waves and particle acceleration, fluid dynamics, solar physics and numerical algorithm development. He is indispensable to the development of models for research in both CSEM and CRASH. The following quote from Igor typifies his work as a modeler. “It is better to say, following theoretical physicist Paul Dirac, that a vacuum, or nothing, is the combination of matter and antimatter – particles and antiparticles. Their density is tremendous, but we cannot perceive any of them because their observable effects entirely cancel each other out.”

Allison Steiner was this year’s recipient of the AOSS Faculty Award, which is given to the faculty member who has had a “high impact accomplishment in some meritorious area benefiting the Department and the College.” This past year, Allison received an NSF Faculty Early Career Development (CAREER) award, which is the NSF’s most prestigious award in support of junior faculty. She received the award for her project, “The Climatic Relevance of Pollen in the Atmosphere.” In addition, Allison is a cofounder and board member of the Earth Sciences Women’s Network (ESWN) and is a member of the AOSS Chair Search Advisory Committee.
Congratulations to three outstanding AOSS students

Dara Fisher, AOSS senior, is one of two recipients for this year’s Arlen Hellwarth Prize. This prestigious award is presented to two undergraduate student leaders who have made valuable contributions to the College, University and/or community. Dara has been active throughout her undergraduate career and is “In the Spotlight” (http://aoss.engin.umich.edu/pages/spotlight#darafisher), where you can learn more about her very busy years at U-M.

Kevin Reed is this year’s recipient of the AOSS Graduate Distinguished Achievement Award and Zhenfei Wang will receive the AOSS Undergraduate Distinguished Achievement Award. These awards are given to an undergraduate and graduate student in each degree program. Zhenfei and Kevin were chosen by AOSS to recognize their academic and personal excellence.

AOSS alumnus and cofounder of Weather Underground, Jeff Masters was profiled in the March/April 2011 issue of Weatherwise. Weatherwise articles and photographs showcase the power, beauty, and excitement of weather. Weatherwise articles present the latest discoveries and hottest issues in meteorology and climatology and focus on the relation of weather to technology, history, culture, art, and society. For more information visit them online at: http://www.weatherwise.org

Alumni Notes

AOSS alumnus and cofounder of Weather Underground, Jeff Masters was profiled in the March/April 2011 issue of Weatherwise. Weatherwise articles and photographs showcase the power, beauty, and excitement of weather. Weatherwise articles present the latest discoveries and hottest issues in meteorology and climatology and focus on the relation of weather to technology, history, culture, art, and society. For more information visit them online at: http://www.weatherwise.org

Stay Connected with AOSS and visit us:
On Facebook: http://www.facebook.com/umaoss
On Twitter: http://twitter.com/umaoss
On Flikr: http://www.flickr.com/photos/umaoss
On YouTube: http://www.youtube.com/umaoss
Margy Kivelson named an Honorary Fellow of the Royal Astronomical Society

by Sheila Pursglove

AOSS Research Professor Margy Kivelson might be forgiven for seeing stars after being named in January an Honorary Fellow of the Royal Astronomical Society. Established in 1820, it is one of the oldest and most prestigious scientific societies.

The RAS award is yet another feather in Kivelson’s astral cap. Her many accomplishments – including membership in the National Academy of Sciences, a rare achievement for a woman and even rarer for a woman in space physics – would fill the very solar system she’s spent years studying.

Kivelson, also Distinguished Professor Emerita in the Institute of Geophysics and Planetary Physics (IGPP) and Department of Earth and Space at UCLA, is an expert on fields and particles in the solar system. Her interests extend from Earth to Jupiter, Saturn and Jupiter’s Galilean moons. Not bad for a New York City native whose uncle advised her to become a dietitian. Instead, she turned to physics – a passion she inherited from her mother. She also studied coursework for medical school, but physics won out. She received her AB and master’s degree from Radcliffe and in 1957 received a PhD in physics from Harvard. She was rare in the physics world, where only about 2% of physics PhD’s were women.

“I love the rigor of mathematics, and found its applications to physical problems gave a purpose to its use,” she says. When her husband Daniel, a physical chemist, became a professor at UCLA, the couple crossed the country to Los Angeles in 1955, where they went on to raise their son and daughter.

The sky – in more ways than one – was the limit. As America’s infant space program lifted off, so did Kivelson’s opportunities. She became a pioneer in space physics, studying data from NASA missions, at first studying Earth’s magnetosphere and then developing a special interest in the outer planets.

“That interested me in being named principal investigator for the magnetometer on the Galileo mission to Jupiter, a mission that was central to my activities for more than 25 years,” she says.

It wasn’t always easy being a trailblazer for women in science and leadership. “Probably the main problem was standing out at a stage of my career when I would have preferred to have been more anonymous,” she says. “I was always treated well by faculty, fellow students and colleagues.”

Kivelson still studies the outer planets as a member of the Cassini Magnetometer team and investigates the terrestrial magnetosphere as a Co-I on the NASA-ESA Cluster mission and the THEMIS mission. Last year, she served on the Steering Committee for the Decadal Survey of Planetary Science.
“I worry about US funding for continued exploration of the outer planets and their moons, and I’m hoping a modified Europa mission will be developed and implemented in the next decade. Fortunately, the European Ganymede mission is still a likely component of ESA’s program.”

A prolific author and editor, Kivelson lectures on space research to specialists in the field, as well as to K-12 students and general audiences. “I enjoy the chance to engage the interest of others in ideas that I find interesting,” she says.

A former co-chair of the UCLA Academic Faculty Senate Committee on Gender Equity Issues, Kivelson has spearheaded efforts to break down barriers facing women in science and has encouraged women to blaze new trails.

“There are more opportunities for all young people today, and fortunately, women can expect their fair share in most areas,” she says. “There are also many challenges – consider the problems with the job market, and the difficult economic situation facing the states and the country.”

The space physicist would love to go into space herself. “Near Earth is far enough, and have the experience of floating weightlessly and looking down on Earth – wouldn’t that be fun!”

---

**Stellar Career**

Professor Margaret Kivelson has served on:
- Decadal Survey of Planetary Science Steering Committee
- Harvard College Board of Overseers
- NASA Advisory Council
- NRC Committee on Solar-Terrestrial Research
- NSF Advisory Committee on Geosciences
- UCLA Academic Faculty Senate Committee on Gender Equity Issues

Member of:
- American Association for the Advancement of Science
- American Academy of Arts and Sciences
- American Philosophical Society
- American Physical Society
- International Academy of Astronautics
- National Academy of Sciences

Honors include:
- Guggenheim Fellowship
- American Geophysical Union Fleming Medal
- American Geophysical Union Fellow
- European Geophysical Union Alfvén Medal
- Harvard 350th Anniversary Alumni Medal
- Royal Astronomical Society Honorary Fellow

---

Never Stop Learning!

Connect with top-ranked faculty and expert U-M alumni

Enrich your life with our Lifelong Learning program. Get convenient access to the Leaders and Best by connecting with top-ranked faculty and expert U-M alumni—on campus, on location or online.

- **Leaders and Best Seminars** - Our marquee events focused on our themed semesters each fall and winter. Events are held on the Ann Arbor campus.
- **Quick Study Lectures** - Focused on popular, timely topics, breaking news, these Ann Arbor lectures are also streamed online.
- **Online Catalog** - We’ve compiled educational programs across the University. Find online or in-person programs that appeal to you.

Visit: http://umalumni.com/lifelonglearning
For the second year, a University of Michigan delegation attended the United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP). AOSS PhD student Kevin Reed was one of more than 20 U-M students, faculty and alumni who attended COP 16 in Cancun, Mexico, November 28 – December 10, 2010.

The atmosphere at COP 16, including the Caribbean climate, varied rather drastically from last year’s COP 15 in Copenhagen, Denmark. The Cancun conference garnered very little media coverage and attention. In addition, the number of governmental and non-governmental attendees, including the Michigan delegation, was smaller. However, these differences didn’t lessen the potential impact of COP 16. Kevin began his trip hoping that the reduced attention and pressure at COP 16 would result in a more meaningful outcome than COP 15. “I believed that the results might not end in a binding contract,” he said, “but at least COP 16 might be able to set the path for future negotiations — in and of itself a successful end to COP 16.”

The mood at the Conference was much more laid back, and the conference organization was much improved over COP 15. From 10:00 AM to 10:00 PM, the first week was packed with “side events” run by governmental and non-governmental organizations (NGOs). Topics covered all things related to climate change: from discussions on deforestation to energy efficiency; the economics of possible cap and trade policies to the climate change impact on Pacific island nations.

“I attended a panel discussion on geoengineering, a field that is often frowned upon by the general community at COP, but still had a place at the table. I think this is one of the most remarkable aspects of the UNFCCC. Often, the process is inefficient, but everyone has a place at the bargaining table. It’s important that every aspect of climate change and potential policies be discussed, which allows the UN delegates to make informed decisions,” Kevin stated. “If nothing else, attendees, like those in the Michigan delegation, can learn from these meetings and even make such topics, like geoengineering, the focus of future research.”

As COP 16 drew to its close, there was a growing concern that nothing would be agreed upon at this year’s conference. However, in the last hours, some significant agreements were made. One of the more controversial is the formation of a comprehensive mechanism to help developing nations throughout the world deal with climate change. According to Kevin, “This is a very important step in negotiations, as developing countries often have the most to lose, despite having little or no role in the rise of greenhouse gases. The agreement includes technology and capacity-building support, as well as financial support, to aid these countries in adapting to the changing climate.”

While no international binding contract on greenhouse gases was agreed upon, at Michigan, students and faculty are in the process of creating a climate group focused on more than attending future COPs. Rather, it is a group interested in being a part of the climate change solution — no matter how small a part.

“Perhaps, it isn’t a waiting game until the next COP later this year in Durbin, South Africa, but time to step forward with consensus building on an international and local scale. We will find out this December during the safari to South Africa.”
Shrinking snow and ice cover intensify global warming

by Nicole Casal Moore

The decreases in Earth’s snow and ice cover over the past 30 years have exacerbated global warming more than models predict they should have, on average, new research from AOSS Assistant Professor Mark Flanner, who analyzed satellite data showing snow and ice during the past three decades in the Northern Hemisphere, which holds the majority of the planet’s frozen surface area.

Snow and ice reflect the sun’s light and heat back to space, causing an atmospheric cooling effect. But as the planet warms, more ice melts and in some cases, less snow falls, exposing additional ground and water that absorb more heat, amplifying the effects of warmer temperatures. This change in reflectance contributes to what’s called “albedo feedback,” one of the main positive feedback mechanisms adding fuel to the planet’s warming trend.

“If the Earth were just a static rock, we could calculate precisely what the level of warming would be, given a perturbation to the system. But because of these feedback mechanisms we don’t know exactly how the climate will respond to increases in atmospheric carbon dioxide,” Flanner said.

“Our analysis of snow and sea ice changes over the last 30 years indicates that this cryospheric feedback is almost twice as strong as what models have simulated. The implication is that Earth’s climate may be more sensitive to increases in atmospheric carbon dioxide and other perturbations than models predict.”

In the Northern Hemisphere since 1979, the average temperature rose by about 0.7 degrees Celsius, whereas the global average temperature rose by about 0.45 degrees, Flanner said. For every 1 degree Celsius rise in the Northern Hemisphere, Flanner and his colleagues calculated an average of 0.6 fewer watts of solar radiation reflected to space per square meter because of reduced snow and sea ice cover. In the 18 models taken into consideration by the International Panel on Climate Change, the average was 0.25 watts per square meter per degree Celsius over the same time period.

Flanner points out that the models typically calculate this feedback over 100 years—significantly longer than this study, which could account for some of the discrepancy. Satellite data only goes back 30 years.

To further put the results in context, each square meter of Earth absorbs an average of 240 watts of solar radiation. These new calculations show that the Northern Hemisphere cryosphere is reflecting 0.45 watts less per square meter now than it did in 1979, due mostly to reduced spring snow cover and summer sea ice.

“The cryospheric albedo feedback is a relatively small player globally, but it’s been a surprisingly strong feedback mechanism over the past 30 years,” Flanner said. “A feedback of this magnitude would translate into roughly 15 percent more warming, given current understanding of other feedback mechanisms.”

To avoid the worst effects of climate change, the scientific consensus is that the global average temperature should stay within 2 degrees Celsius, or 3.6 degrees Fahrenheit, of pre-industrial levels. Scientists are still trying to quantify the extent to which the planet will warm as greenhouse gases accumulate in the atmosphere.

“People sometimes criticize models for being too sensitive to climate perturbations” Flanner said. “With respect to cryospheric changes, however, observations suggest the models are a bit sluggish.”

The paper is called Radiative forcing and albedo feedback from the Northern Hemisphere cryosphere between 1979 and 2008. Other contributors are: Karen Shell, assistant professor in the College of Oceanic and Atmospheric Sciences at Oregon State University; and Don Perovich, a research geophysicist at U.S. Army Corps of Engineers’ Cold Regions Research and Engineering Laboratory. This research is funded by the National Science Foundation.
Microbial life on Mars: Could saltwater make it possible?

by Nicole Casal Moore

How common are droplets of saltwater on Mars? Could microbial life survive and reproduce in them? A new million dollar NASA project led by AOSS Professor Nilton Renno aims to answer that question two years after beads of liquid brine were first photographed on a spacecraft’s leg on Mars.

“On Earth, everywhere there’s liquid water, there is microbial life,” said Renno, principal investigator on the project. Researchers from NASA, the University of Texas at Dallas, the University of Georgia and the Centro de Astrobiologia in Madrid will contribute.

Scientists in the United States will create Mars conditions in lab chambers and study how and when brines form. These shoe-box-sized modules will have wispy carbon dioxide and water vapor atmospheres with 99 percent lower air pressure than the average pressure on Earth at sea level. Temperatures will range from -100 to -80 Fahrenheit and will be adjusted to mimic daily and seasonal cycles. Instruments will alert the researchers to the formation of brine pockets, which could potentially be habitable by certain forms of microbial life.

Their colleagues overseas will seed similar chambers with salt-loving “extremophile” microorganisms from deep in Antarctic lakes and the Gulf of Mexico. They will observe whether these organisms survive, grow and reproduce in brines just below the surface of the soil. All life needs liquid water to live, but microbes don’t need much. A droplet or a thin film could suffice, researchers say.

“If we find microbes that can survive and replicate in brines at Mars conditions, we would have demonstrated that microbes could exist on Mars today. We could potentially show, for the first time, that life could exist beyond Earth,” Renno said.

With his colleagues on the Mars Phoenix mission in 2008, Renno theorized that globules that moved and coalesced on the lander’s leg were liquid saltwater. Independent physical and thermodynamic evidence and follow-up experiments have confirmed that the drops were liquid and not frost or ice. The Phoenix photos are believed to be the first pictures of liquid water outside the Earth.

The median temperature at the Phoenix landing site was -70 degrees Fahrenheit during the mission — too cold for liquid fresh water. But “perchlorate” salts found in the site’s soils could lower water’s freezing point dramatically, so that it could exist as liquid brine. The salts are also capable of absorbing water from the atmosphere in a process called deliquescence.

Subsequent studies by Renno and his graduate student Manish Mehta have demonstrated that liquid saltwater could be stable on Mars today and could form seasonally in Mars’ polar regions.

Also contributing to this new project at U-M are Bruce Block, a senior engineer in the Space Physics Research Lab, and Gregory Dick, an assistant professor in the Department of Geological Sciences.
MESSENGER enters Mercury orbit

by Jim Raines

History was made on March 17, 2011, at approximately 9:10 PM EDT when, after almost seven years in space, NASA’s MESSENGER became the first spacecraft ever to orbit Mercury (at least of terrestrial origin).

A group of AOSS folks, along with family and friends, gathered in the auditorium to watch this historic event live – or as live as possible when there were no cameras watching the spacecraft and the travel time for radio waves was around eight minutes. Fortunately, the MESSENGER team at the Johns Hopkins University Applied Physics Lab provided a webcast of the event, including background, live updates from MESSENGER Mission Operations, and descriptions of the spacecraft’s ground-based radar tracking data. Everyone held their collective breath during the nearly 14 minute main engine burn (total delta-V of 862 m/s for those who like details). A cheer rocked the hall as word came through that orbit had been achieved.

The AOSS/SPRL-built Fast Imaging Plasma Spectrometer (FIPS) was turned on and began collecting data in Mercury orbit on March 26. As of this writing, FIPS has collected data through over 30 orbits.

FIPS’ main role on MESSENGER is to measure the composition of heavy ions coming from Mercury’s exosphere and to improve our understanding of their role in Mercury’s space environment. Even from the very preliminary analysis that’s been carried out since MESSENGER gained orbit, it is clear that FIPS has managed to sample many heavy ions. Substantially more heavy ions were sampled in some orbits than were captured during any of the spacecraft’s three flybys of Mercury as it positioned itself for orbit insertion.

FIPS also detects protons, which are much more numerous than heavy ions and are excellent tracers for magnetospheric structure. In these measurements, the main regions in the magnetosphere are already evident, along with many other interesting signatures, ripe for investigation. FIPS measurements have shown very good correlations with the MESSENGER magnetometer data, which is a good sanity check and will facilitate interpretation of both data sets.

Data analysis is now underway in earnest. Early results will be presented at the MESSENGER Science Team meeting in May, then the exciting news – along with puzzles that may appear, just to keep the scientists interested, and employed – will go out to the broader scientific community over the summer and fall.

Data from its first three days in orbit about Mercury have confirmed the initial assessment of the spacecraft team that MESSENGER is in its intended orbit and operating nominally. Artist’s concept courtesy of NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institute of Washington.

On the Web

Read more about MESSENGER’s mission to Mercury at:

AOSS Scientist advances beyond the Solar System

by Nicole Casal Moore

Under just the right conditions — which involve an ultra-high-intensity laser beam and a two-mile-long particle accelerator — it could be possible to create something out of nothing, according to University of Michigan researchers, including AOSS Research Scientist Igor Sokolov.

The scientists and engineers have developed new equations that show how a high-energy electron beam combined with an intense laser pulse could rip apart a vacuum into its fundamental matter and antimatter components, and set off a cascade of events that generates additional pairs of particles and antiparticles.

“We can now calculate how, from a single electron, several hundred particles can be produced. We believe this happens in nature near pulsars and neutron stars,” said Igor, who conducted this research along with associate research scientist John Nees, emeritus electrical engineering professor Gerard Mourou, and their colleagues in France.

At the heart of this work is the idea that a vacuum is not exactly nothing.

“It is better to say, following theoretical physicist Paul Dirac, that a vacuum, or nothing, is the combination of matter and antimatter—particles and antiparticles. Their density is tremendous, but we cannot perceive any of them because their observable effects entirely cancel each other out,” Sokolov said.

Matter and antimatter destroy each other when they come into contact under normal conditions.

“But in a strong electromagnetic field, this annihilation, which is typically a sink mechanism, can be the source of new particles,” Nees said, “In the course of the annihilation, gamma photons appear, which can produce additional electrons and positrons.”

A gamma photon is a high-energy particle of light. A positron is an anti-electron, a mirror-image particle with the same properties as an electron, but an opposite, positive charge.

The researchers describe this work as a theoretical breakthrough, and a “qualitative jump in theory.”

An experiment in the late ’90s managed to generate from a vacuum gamma photons and an occasional electron-positron pair. These new equations take this work a step farther to model how

On the Web

Track the air flow at:
http://japan.sharedair.org
A strong laser field could promote the creation of more particles than were initially injected into an experiment through a particle accelerator.

“If an electron has a capability to become three particles within a very short time, this means it’s not an electron any longer,” Sokolov said. “The theory of the electron is based on the fact that it will be an electron forever. But in our calculations, each of the charged particles becomes a combination of three particles plus some number of photons.”

The researchers have developed a tool to put their equations into practice in the future on a very small scale using the HERCULES laser at U-M. To test the full potential of the theory, a HERCULES-type laser would have to be built at a particle accelerator such as the SLAC National Accelerator Laboratory at Stanford University. Such infrastructure is not currently planned.

This work could potentially have applications in inertial confinement fusion, which could produce cleaner energy from nuclear fusion reactions, the researchers say.

To Sokolov, it’s fascinating from a philosophical perspective.

“The basic question of what is a vacuum, and what is nothing, goes beyond science,” he said. “It’s embedded deeply in the base not only of theoretical physics, but of our philosophical perception of everything—of reality, of life, even the religious question of could the world have come from nothing.”

Tracking Wind Flow over Japan

AOSS Professor and Associate Chair Perry Samson has launched a new web site that is tracking wind flow over Japan. It’s an interactive site for people to “see where their air comes from”. Trajectory lines represent calculated estimates of air paths to a location on a selected day. At this time, only March has been calculated. Yellow overlay represents probability of an upwind region’s potential to influence air quality at this location on selected day.

EXAMPLE: The group estimates that Tokyo on March 15 was downwind of the affected power plant some of the day (which does not necessarily mean radiation levels were elevated in Tokyo as the material will disperse and deposit en route).
Jerry Keeler, professor of environmental health sciences and of atmospheric, oceanic and space sciences, died April 12, 2011, after a long, courageous battle with cancer. He was 51. An environmental researcher and teacher who had global impact, Jerry’s work focused on the sources and fate of trace elements and other pollutants and their impacts on human health and the environment, and the development of new measurement and analytical tools. He was a leading expert on air pollution and mercury issues, working with a range of state, federal, and international agencies.

“Jerry was an extremely important voice in the national debate over mercury in the environment,” said Perry Samson, AOSS Professor and chair of Jerry’s dissertation committee. “The United States EPA has proposed the first national standard for emissions of mercury from coal-burning power plants. Few would deny that this is a part of Jerry’s legacy. His work has done so much to identify sources of mercury in the atmosphere, and helped to lead to pollution controls that will improve health for many people. His work will live on, in part because of the high quality of the work itself and in part because of the quality of the students he has prepared.”

A native of Troy, New York, Jerry attended Boston College, where he played collegiate basketball, receiving his BS degree in physics in 1982. He continued his studies at the University of Michigan, receiving his MS degree in 1983 and his PhD in 1987, both in atmospheric sciences. He returned to Boston in 1987 as a research associate at the Harvard School of Public Health, during which time he also served as visiting scientist at the MIT Nuclear Reactor Laboratory in Cambridge.

In 1990, Professor Keeler returned to U-M as an assistant professor in the Department of Environmental Health Sciences, School of Public Health, and as director of the U-M Air Quality Laboratory. An enthusiastic teacher and rigorous scientist, he took on a variety of responsibilities. From 1990 to 2000, he served as director of the EPA Air Pollution Training Center at U-M, overlapping with another position he held as a research scientist with the Center for Great Lakes and Aquatic Sciences. He became associate professor in the U-M Schools of Public Health and Engineering in 1996, and was promoted to professor in 2003, with appointments in the School of Public Health, AOSS and Geological Sciences.

Jerry’s research was global. He went to the Arctic to study mercury, to the Florida Everglades to study the ecosystem, and to Lake Michigan to study the travel patterns of airborne particulates. He was a member of the Michigan Mercury Electric Utility Workgroup, the Michigan Governor’s Relative Risk Task Force on Air Quality, the Environmental Advisory Council of the Michigan DEQ, and the Michigan Environmental Science Board. He also provided expertise to the states of Florida, Illinois, Massachusetts, Tennessee, Virginia, Vermont and Wisconsin. Not long before his death, he contributed to a report by the United Nations Environment Program’s global partnership on atmospheric mercury transport and fate research.

“Jerry personified scholarship and interdisciplinarity at the University of Michigan,” said his colleague Martin Philbert, dean of the School of Public Health. “He was passionate about his teaching, his students, and his research. As a collaborator, he was exceptional and his work stands as a testament to Jerry’s dedication to the proposition of excellence in science in the service of public health.”

Jerry was an advisor to a variety of national and international organizations, programs and journals. He received numerous awards, including the Research Partnership Award from the Rackham School of Graduate Studies and the Excellence in Research Award and Alumni Merit Award from the College of Engineering. He served on numerous national committees and was a member of the American Chemical Society, the American Meteorological Society, the International Society of Exposure Analysis, the American Geophysical Union, and the American Association for Aerosol Research.

Jerry is survived by his wife of 27 years, Joanne, and his children Ryan, Kevin and Meghan. A memorial service was held April 17, 2011. Contributions in his memory may be made to Arbor Hospice.
Reaching underserved students

by Kristin Thomas, University Record intern

contributions by Jillian Bogater

As a student at Saginaw High School in the mid-1960s, Philip Bowman was an exceptional athlete who excelled in basketball, football, and track and field – but academically he grossly underachieved.

His goal was to earn an athletic scholarship and become the first person in his working-class family to attend college. Bowman recently shared his story with students at Saginaw High School as part of the Wolverine Express program, a new initiative through the Center for Educational Outreach (CEO) that takes a college-visit experience to students without the resources to visit colleges themselves.

“In the mid-60s, there was much more support for an African American male who was an exceptional athlete than for one who had exceptional academic potential but was under-achieving,” says Bowman, now director of the National Center for Institutional Diversity and a professor with the Center for the Study of Higher and Postsecondary Education at U-M.

“Hopefully, the Center for Educational Outreach and other innovative higher education pipeline interventions can help to reverse this historical bias in the opportunity structure, especially in low-income, urban communities such as Saginaw.”

In its inaugural year, Wolverine Express planned eight site visits to underserved schools across the state. With each visit the Wolverine Express volunteers execute a program that helps underserved students see that, despite the obstacles facing them on the path to a college education, there are people with a vested interest in supporting them and guiding them to success.

Coming into these schools, the Wolverine Express staff and volunteers work in partnership with the school-based college advisers to connect students with information and resources about academic success and college access. They take input from principals and teachers to outline the needs of each group and provide a presentation tailored to meet them.

“Wolverine Express provides an opportunity to better translate some of my own research on social psychological factors that impede and promote college success among students from diverse backgrounds,” Bowman says. “Similar to others in the Wolverine Express delegation, I have a very strong personal commitment to innovative activities to expand college access, opportunity and success for talented students from diverse backgrounds.”

To help AOSS encourage and support high school science students, please consider making a donation to the AOSS Undergraduate Student Fund. Contact Sandee Hicks (sandee@umich.edu) or Mark Moldwin (mmoldwin@umich.edu) for more information.

On the Web

To learn more about Wolverine Express visit:

http://ceo.umich.edu/wolverine%20express/wolverine.html
Michigan Night in San Francisco

by Brandi DAmore

Where were you on the night of December 13, 2010? If you were one of 235 U-M students, alumni and faculty of AOSS and Geological Science attending the American Geophysical Union (AGU) Fall Meeting in San Francisco, you were enjoying an evening at the Annual Alumni and Friends Reception, also known as “Michigan Night”; a welcome respite during a week where thousands of students and researchers converge to hear and disseminate information on all topics of Earth, planetary and space sciences. Michigan Night serves as a way for the U-M contingency to get together in a relaxed and fun atmosphere.

Previously held at the St. Francis Hotel, the event moved to a new venue, the Grand Hyatt, a building on the perimeter of Union Square. An elevator ride climbing several stories brought participants to the elegant Bayview Room, a well-appointed room aglow with golden light and beautiful decorations, and furnished with linened tables and chairs for intimate socializing.

Waiting for wine and food (exotic amuses bouches of Italian and Asian tastes, meats and cheeses, and bite-size desserts that were quickly enjoyed) was not an issue as it became apparent that the room is aptly named. One was immediately transfixed by what the room afforded: 180-degree, nighttime panoramic views of the city, the bay and bridge. As graduate student Catherine Walker put it, “I thought the venue was great, very fancy! I spent most of my time looking down at Union Square. You could see all the Christmas lights, and ice skaters, and all—it was quite a happy view.”

Amanda Brecht, PhD Candidate (now successful graduate), echoed this sentiment saying, “The new venue had a spectacular view.” Amanda also pointed out that the “AGU U-M reception is a great place to make connections for future work possibilities and to reunite with graduates and graduate students.”

Associate Professor Mike Liemohn, agreed that it is “fun to meet several former students and other former Michigan people at the reception.” He also illuminated how much this event is needed with a conference as large as AGU: “The AGU meeting is too big to track these people down at the Moscone Center, but we could easily find each other at the Michigan-Only event.”

The cozy space provided an environment that seemed more festive and buoyant than in previous years, abuzz with (re)connecting. “I very much enjoyed the Michigan Night 2010 … One only wishes that there would be more time to chat and catch up with the many individuals attending, and I would suggest that we keep the Hyatt for future events,” said Andy Nagy, Professor Emeritus.

Maybe it was the new venue, maybe not, but as Catherine noted, “It was quite something … I even talked to a few people I hadn’t spoken to before — after such a relaxed and celebratory evening, I find a lot of the folks in the department fairly humorous, it turns out! I actually got the chance to see bits of people’s real personalities outside of research.”

All in all, a successful event and fun evening for all!
Key to Solving Climate Change?

codyenterprise.com

“Rood has a great blog called ‘Climate Change’ that is archived at wunderground.com and it’s really refreshing to read the breadth and depth of his research...

“The goal, he says, is to take climate discourse out of the political arena and return it to a problem-solving public policy issue. Interestingly, he thinks the best answer for doing so is an ‘open-source’ answer. Rather than waiting for scientists to get their sound-bytes right so they can compete against short-sighted political desires, he thinks it’s going to be community-based problem solving with regard to climate impacts that will turn the tables.”

Fellow AOSS Professor Ricky Rood’s climate change blog at:
http://www.wunderground.com/blog/RickyRood

And his climate policy blog at:
http://www.climatepolicy.org

New Grants

October 2010 - January 2011
Principal Investigators are listed first followed by Co-Is

Jeremy Bassis, An Investigation Into the Stochastic Physics of Iceberg Calving and the Development of Universal Calving Laws, $199,269, NSF

Paul Drake, Collaborative Research in Hydrodynamics and Radiation Hydrodynamics at High Energy Density, $350,000, University of Rochester

Paul Drake, Carolyn Kuranz, Experimental Astrophysics on the Omega Laser, $400,000, DOE

Charles Edmonson Jr, Mars Organic Molecule Analyzer (MOMA) Electrical/Electronic Subsystem Development, $85,000, NASA

Lennard Fisk, Predicting the Heliosphere, $296,784, NSF

Tamas Gombosi, Kenneth Hansen, Xianzhe Jia, Interdisciplinary Scientist (IDS) for the Cassini Interdisciplinary Magnetosphere and Plasma Investigation: MO & DA Efforts, Solstice Mission, $130,000, NASA-JPL

Enrico Landi, Characterizing the Origin and Nature of Slow Wind Sources During Solar Cycle 23 and 24, $212,314, Smithsonian Institution; Solar Cycle Variations of the Background Solar Corona, $366,938, NASA

Michael Liemohn, Andrew Nagy, Gabor Toth, Investigating Processes of Atmospheric Loss at Venus and Mars, $390,000, NASA

Christopher Parkinson, Michael Liemohn, Particle Precipitation and Upper Atmospheric Energy Deposition at Mars and Venus, $405,000, NASA

Christopher Ruf, Collaborative R & D Initiative for the Gulf of Mexico – Phase 3 HIRAD Support during GRIP, $61,324, NOAA – VCSI

Allison Steiner, Surface Measurements and One-Dimensional Modeling Related to Ozone Formation in the Suburban Dallas-Fort Worth Area, $86,441, U of T – Austin

Valeriy Tenishev, Kenneth Hansen, Michael Combi, The Lunar Exosphere and its Interaction with the Solar Wind and Earth’s Magnetosphere, $284,923, NASA

The first standalone satellite built by Michigan Engineering students to orbit the Earth and perform a science mission was successfully launched on November 19, 2010. The Radio Aurora Explorer (or RAX) is the first CubeSat mission sponsored by the National Science Foundation to study space weather.

The primary mission of RAX, the size of a loaf of bread and weighing in at 6.5 pounds, is to study how plasma instabilities in the highest layers of the atmosphere disrupt communication and navigation signals between Earth and orbiting satellites. Working with scientists, students will use the data from RAX to build models to forecast when these anomalies will occur, enabling satellite operators to plan communications and operations around these disruptions.

“People rely on satellites on a daily basis for weather information, communications systems and defense. If the operators can’t get their commands up, then the satellites can’t perform their intended functions,” says Matt Bennett, RAX team leader and AOSS alumnus.

“RAX is a project that involves undergraduate to graduate students from AOSS, AERO and EECS. Many of these students are part of the Student Space Systems Fabrication Lab, or S3FL, an organization dedicated to providing students with practical space systems design and fabrication experience.”

While this will be the first standalone spacecraft built by students to go into orbit, it is part of a long history of space research at U-M. University researchers have built or are involved with instruments currently aboard spacecraft on 14 missions across the solar system. A host of other additional suborbital remote sensing and mass spectrometry spacecraft and satellite projects are under way through the Space Physics Research Laboratory (SPRL).

“The space weather anomalies that RAX will study are called magnetic field-aligned plasma irregularities,” Bennett says. “When these irregularities occur, signals from the ground are scattered and the satellite doesn’t receive them. They can form anywhere around the globe, but are a major problem at northern latitudes where we see other space weather phenomena such as the aurora borealis, or the Northern Lights.”

Bennett, who graduated in ’10 with an MEng in Space Engineering and now works at JPL, led a team of approximately 20 students from across the College who designed, built and tested RAX. Since the successful launch, the students have been in charge of spacecraft operations, sending commands, conducting science experiments, studying the performance of spacecraft components, and analyzing the science data collected by a network of communication stations on the ground.

“There is a growing interest in CubeSats, especially for student projects, as they offer relatively inexpensive and simple access to space,” says team adviser James Cutler, an assistant professor in AOSS and AERO.
The total number of AOSS graduate students in Fall ‘04 was 44. In Fall ‘10, this had increased to 111 and the Fall ‘11 projection is 134. The number of doctoral students increased from 36 to 72 and the number of MS/MEng students has risen from 8 to 62. This growth is a direct result of junior faculty joining the department and the Fall ‘05 introduction of the MEng in Space Engineering program. Added to the degree programs this fall is the MEng in Applied Climate, which is designed for students whose interests lie in applying a basic understanding of climate science to engineered solutions.

For all of the changes, some things do remain the same. As Chair Gombosi stated in 2006, AOSS faculty members are “determined not to live in our past, but to build upon our stellar reputation as we move through today into a robust and exciting future. A future where AOSS graduates will continue to impact science and engineering, whether it’s the complex systems of the Earth or the complex systems of the Universe.”

Stay tuned for the next chapter.

2011 AOSS/SPRL Staff Anniversaries

This year eight staff members are celebrating significant length of service anniversaries.

Facilities Manager Marti Moon will celebrate her 45th anniversary at the University on September 12.

Six staff members began their U-M careers in 1991. Assistant Editor and Admin Assistant Debbie Eddy began on March 18, followed by Lead Research Engineer Steve Musko on March 25. July 15 was the start date of Electronics Engineer Ken Arnett and Electronics Design Engineer, Curt Cooper began on September 9. The last staff members beginning in 1991 are Research Administrator Cheri Johnson on October 28 and SPRL Assistant Director Charles Edmonson on December 9, 1991.

One last staff member celebrates her 10th anniversary. IT Manager Faye Ogasawara started September 10, 2001.

AOSS Happenings

10/10/10 became an extra magical day in Kansas City, Missouri, as AOSS graduate students Ahmed Tawfik and Kristen Mihalka became husband and wife. “We couldn’t pass up the date,” Kristen says. “My mom pointed out the fact that it was binary for 42, which was an added bonus (though only a true nerd would get that).”
Riding off into the Sunrise

by Deborah K. Eddy

There must be something special about the Department of Atmospheric, Oceanic and Space Sciences that makes people want to stay around year-after-year-after-year. When the question comes up as to what that might be, a favorite answer heard over and over again is “the people.” One of those special people is Barbara Walunas, known within (and without) these hallowed halls as Bobbi.

On March 31, 2011, Bobbi retired from the University of Michigan after nearly 40 years of dedicated service.

In 1965, she began working at AOSS, which was located on central campus in the East Engineering Building, and Axel Wiin-Nielsen was the chair. It was a two-woman academic office located on the second and third floor. “Marge Greenfield was up on the roof,” Bobbi recalls with a chuckle. A small auxiliary building on the roof contained a classroom where Nelson (Bud) Dingle taught. Behind that classroom was another building where Wendell Hewson and Gerald Gill had space, while a few select researchers occupied yet a third building on the roof.

In 1968 Bobbi accompanied her husband to New York, where Jim worked for one of the airline companies for five years and Bobbi and Jim started a family. They returned to Ann Arbor in 1973 and Bobbi found life with two little kids incredibly fulfilling, but “I needed to talk to some adults.”

In 1975 she was offered a temporary part-time position in AOSS, which by that time had moved to North Campus. Many who leave come back to U-M, and Bobbi thinks it’s because “This is a great place to work. The atmosphere here encourages you to improve yourself … to grow. And that is important to keep a healthy work ethic going. You feel better if you … can take possession of your job.”

When a department secretary had a serious car accident, Bobbi was asked to move to the SRB and fill her position. Soon, realizing that the researchers had very little control over their projects, she explained to them what was missing in the day-to-day care of their awards, and pretty much created the position of research administrator at the department level. “I don’t think,” Bobbi says, “that kind of position existed anywhere” outside of DRDA.

As time progressed, the department took on more people. Bobbi mentored Rick Baker when he started, before he moved to SPRL. Kathy Norris came into the group, and Bobbi ended up sharing an office — a tiny office — with Sue Griffin and Cheri Johnson. “It was so crowded, we had all the files out in the hall. Every time we needed something we had to go out to get it.”

Over the 35+ years, Bobbi had the opportunity to shepherd many millions of research grant dollars, including the funding for HRDI, the High-Resolution Doppler Imager, which topped off at $38 million. She looks back fondly on the many unique contributions by faculty, “because of the uniqueness of stringing a vehicle on a 20-mile piece of string, and the things that came back.” “The fact that you can collect energy from space with a piece of string. The excitement of the research — that’s what makes it worth coming in each day.”

She watched Perry Samson move from environmental problems to creating the electronic tools to make learning an invigorating and exciting experience for kids.

Yes, Bobbi has had the privilege, as she puts it, of working with many special people. “As far as I’m concerned, this is just another family. When they move on to bigger and better things you’re proud of them. I’ve watched our students take off and do just wonderful things. I think about Claudia Alexander, watching her grow and become a big part of JPL. Our kids are spread all over the world,” she says with a big smile. “I’ve had a great bunch of faculty to work for, to support.”

AOSS Chair Tamas Gombosi reflected her feelings back to her. “Your dedication over the years has helped shape AOSS and SPRL,” he said at her retirement celebration. “Bobbi, you’ve been here for all of these changes and your presence will be missed.”

Now Bobbi will shift her focus to supporting her family, watching her garden grow and blossom, and maybe touching base with some of the widespread AOSS family as she and Jim hit the road. We wish her smooth roads, as few potholes as possible, and many years to enjoy it all.
On March 31, 2011, Bobbi (Barbara) Walunas, A0SS Research Administrator par excellence, retired. We will miss her, but we wish her all the best in her future of family, gardening, and travel.

Photos courtesy of Jason Daida, Sue Griffin and Sandee Hicks
Three AOSS Students: Three AGU Awards

Two current PhD students, Kevin Reed and Ahmed Tawfik, and one newly “minted” alumnus, Dr. Paul Ullrich, are recipients of AGU Outstanding Student Paper Awards for their presentations at the 2010 Fall Meeting. AOSS Assistant Professor Christiane Jablonowski is the advisor for Kevin and Paul; Ahmed’s advisor is Assistant Professor Allison Steiner.

Kevin and Ahmed were recognized for their posters, Assessing the Significance of Varying AGCM Physics Packages on Idealized Tropical Cyclone Simulations and Soil moisture controls on inter-annual variability of biogenic isoprene emissions and ozone, respectively. Dr. Ullrich’s talk was titled, High-Order Finite-Volume Schemes for Simulating Atmospheric Flows.

The three brought distinction to AOSS as the top recognized department at AGU for atmospheric sciences — UC-Boulder and Harvard followed with two student winners each.