

Daily Planet

WINTER 2007

*The Department of
Atmospheric,
Oceanic and Space
Sciences Newsletter*

First AOSS Hays and Weather Underground Scholarships Awarded



**Rachael Kroodsma, first recipient of the
Paul B. and Ruth A. Hays Scholarship**



**Ilissa Ocko, first recipient of the
Weather Underground Undergraduate Scholarship**

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AOSS is pleased to announce the first recipients of two new undergraduate scholarships. Rachael Kroodsma, received the Paul B. and Ruth A. Hays Scholarship and Ilissa Ocko was awarded the Weather Underground Undergraduate Scholarship. Rachael, who is from Zeeland, Michigan is a junior in the AOSS meteorology concentration while Ilissa, from Chappaqua, NY, is in the climate physics concentration.

"We are delighted that AOSS is able to make these two scholarship awards," said Tamas Gombosi, AOSS chair. "We're a small department with excellent students. It's a big boost for the department to have emeritus faculty, such as Paul Hays, and alumni, such as Jeff Masters who spearheaded the Weather Underground scholarship, recognize this excellence through their support of our students. We look forward to awarding many more of these scholarships in the future."

More information about Rachael, Ilissa and the two Scholarships is on page 10



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AOSS Accolades

Faculty

AOSS Professor **Guy Meadows** and Research Scientist **Natasha Andronova** contributed to the History Channel series, *Mega Disasters*. The episode, which aired in early October, was entitled "Methane Explosion."

AOSS' resident short story author, Professor Ricky Rood, has been published again in the *Bay Weekly*. His story, "The Cape Anne Pig and Me: An early autumn lesson in barbeque" is online at: http://www.bayweekly.com/year07/issuexv40/leadxv40_2.html.

SPRL Director and AOSS Professor **Christopher Ruf** was the keynote speaker at the Twelfth Annual Michigan Space Grant Consortium Conference held October 12. The title of his speech was, *The Next Generation of Climate and Weather Remote Sensing*.

Perry Samson, AOSS Associate Chair, was the subject of a story in the September 2007 online issue of *Michigan Today*. The emphasis of the story is Professor Samson's work at engaging students in science. As he says, "Science is a contact sport."

Correction

Joyce Penner, is the Ralph J. Cicerone Distinguished University Professor of Atmospheric Science, Department of Atmospheric, Oceanic and Space Sciences, College of Engineering (CoE).

Students

Graduate students **Jason Gilbert** and **Judy Yu** made the cover of the Michigan Ross School of Business publication 2006-2007 Michigan Entrepreneur Year-in-Review. Also in the picture, which was taken at the Michigan Business Challenge banquet, is Jason's wife, Vicki. Additional pictures of Judy and Jason are included in the MBC article about the competition in which they won the Williamson Award for Outstanding Business and Engineering Team for the service MSignS.



Judy Hu, Jason and Vicki Gilbert

On the Web

You can read the entire story about Perry Samson, "Science is about Doing," and view a slide show of the 2006 Greenland Camp online at:

<http://michigantoday.umich.edu/2007/Sep/samson.php>

New Grants

The Scarf Award Committee of the AGU Space Physics and Aeronomy Section unanimously selected AOSS alumna **Yingjuan Ma** as the 2007 recipient. Her PhD dissertation, 3D Multi-Species Global MHD Studies of the Solar Wind Interaction with Mars and Saturn's Magnetospheric Plasma Flow with Titan, was written under the guidance of AOSS Professor Andy Nagy. She has been invited to present a summary of her work at the Fall AGU meeting. The award recognizes an outstanding dissertation that contributes directly to solar-planetary science.

AOSS undergraduate student **Amanda Mims** entered the student poster competition at the Great Midwestern Regional Space Grant Meeting held at Purdue University in September and was awarded second prize. Her poster was WindSat Emissivity Sensitivity to Near Surface Wind Field in a Tropical Cyclone by Amanda Mims, Chris Ruf and Chris Hennon. Professor Hennon is a member of the faculty in the Department of Atmospheric Sciences, UNC-Ashville.

Graduate student **Dalal Najib's** proposal, "The interaction of fast flowing plasmas with non-magnetic solar system bodies," was selected for funding by the NASA Earth and Space Science Fellowship (NESSF) Program for the 2007-08 academic year. A total of 64 planetary science research applications were received; Dalad's was one of only 17 funded. The fellowship is eligible for an additional two years of support.

Meet Faye Ogasawara

Dr. Faye Ogasawara joined AOSS on September 10 as the new IT Manager. Faye has been at the University since 2001 when she was hired as a desktop support specialist in the School of Public Health. Since then, she rose to the position of SPH Director of Computing Services.

Faye received her BA in Chemistry from DePauw University in Indiana and her PhD in Chemistry from the University of Arkansas. She also did postdoc work in Chemistry at Michigan State University.

Faye is already gaining a reputation for the fastest fingers in AOSS as she carries her laptop everywhere, taking notes faster than a swirling tornado.



Stephen Bougher, *Coupling of Mars Atmospheric Regions: Mars General Circulation Model (GCM) Investigations Using Mars Global Surveyor (MGS) and Odyssey Data*, \$210,000, NASA

Michael Combi, Tamas Gombosi, *Dynamics of Cometary Environments 2006*, \$316,595, NSF

R. Paul Drake, *Hydrodynamic Experiments and Framing Camera Improvements*, \$218,514, Defense Department of Navy

Brian Gilchrist, *Solar Energy Scavenging for SeaLandAire Buoy Projects*, \$120,846, SeaLandAire Technologies, Inc.

Tamas Gombosi, Aaron Ridley, *Global MHD Simulations in Support of the SMART Mission*, \$20,000, NASA

Michael Liemohn, Stephen Bougher, *Particle Precipitation Into and Particle Escape from the Mars Thermosphere and Exosphere*, \$299,658, NASA

Michael Liemohn, *Analysis of MGS and MEX Electron Observations to Quantify the Solar Wind-Ionosphere Interaction and Atmospheric Escape at Mars*, \$301,370, NASA; *Global Geospace Science GGS/POLAR Thermal Ion Dynamics Experiments (TIDE)*, \$150,000, NASA

Frank Marsik, *Fugitive Emissions of Mercury in Nevada*, \$43,750, University of Nevada; *Task #4 of Contract AQ198 Processes of Mercury Dry Deposition: Development and Refinement Deposition Methods to Quantify Mercury Deposition to Sensitive Ecosystems: Florida Everglades*, \$209,024, State of Florida

Andrew Nagy, *The Interaction of Fast Flowing Plasmas with Nonmagnetic Solar System Bodies*, \$24,000, NASA

Joyce Penner, Natalia Andronova, John Boyd, Christiane Jablonowski, *Development of an Atmospheric Climate Model with Self-Adapting Grid and Physics*, \$1,052,213, Department of Energy

Joyce Penner, *Global Modeling of Aerosol Dynamics in Support of the NASA GMI*, \$101,000, NASA

Nilton Renno, *A Miniaturized Sensor for Electrical Field Measurements in Dusty Environments*, \$552,037, NASA; *Plume-Ground-Soil Interaction Study Due to Pulse-Modulated Descent Engines at Low Ambient Pressure*, \$30,000, NASA

Thomas Zurbuchen, Lennard Fisk, *Heliospheric Signatures of the Evolution of the Solar Magnetic Field*, \$300,000, Defense Department of Navy

Thomas Zurbuchen, *Development of Novel MEMS-Based Technologies for Solar Physics Experiments*, \$30,000, NASA; *New Instruments for Exploring the Composition and Dynamics of Pickup Ions*, \$30,000, NASA; *Project Enhancement for Outreach and Research Coordination Effort*, \$105,078, NASA; *Spacecraft Optimization: Coupling Trajectory, Propulsion, and Power Systems*, \$30,000, NASA

Two AOSS faculty and two AOSS students part of IPCC, co-winner of '07 Nobel Peace Prize



AOSS faculty members **Joyce Penner** and **Natasha Andronova** and AOSS students **Minghuai Wang** and **Li Xu** are four of the eight U-M researchers who shared the 2007 Nobel Peace Prize on Friday with former Vice President Al Gore. Each contributed to the latest set of climate-change reports issued by the UN-sponsored Intergovernmental Panel on Climate Change (IPCC). The Nobel citation states that the IPCC, a global network of some 2,000 scientists, has produced two decades of scientific reports that have “created an ever broader informed consensus about the connection between human activities and global warming.”

Professor Penner was a coordinating lead author of a chapter in one of the 2001 IPCC reports and a lead author of the chapter Understanding and Attributing Climate Change in the 2007 reports. Dr. Andronova was a contributing author of the chapter; Minghuai Wang and Li Xu, both doctoral students of Professor Penner, also contributed to the latest round of reports.

Other U-M researchers contributing to the report were Rosina Bierbaum, dean of the School of Natural Resources and Environment, Henry Pollack, emeritus professor of geological sciences, Maria Carmen Lemos, associate professor at the School of Natural Resources and Environment, and Detlaf Sprinz, visiting professor of political science.

On the Web

Information about the IPCC and the Fourth Assessment Report is available at:
<http://www.ipcc.ch>

Atreya receives Distinguished Faculty Achievement Award

EDITOR'S NOTE: In the Spring 2007 issue of the Daily Planet it was noted that Professor Atreya had been awarded a University Distinguished Faculty Achievement Award. The following is what appeared in the October 8 issue of the University Record about Professor Atreya's achievements.

Sushil Atreya, professor of atmospheric and space science in CoE, has worked for 30 years to understand the formation of solar system bodies and the origin and evolution of their atmospheres.

Among Atreya's major accomplishments is the development of a model by which nitrogen on Titan (an Earth-like moon of Saturn) might have originated from the molecule ammonia.

As a key member of the Galileo probe mass spectrometer team, Atreya, together with other members, discovered an unexpected composition of Jupiter that has revolutionized ideas about the formation of the planet. His efforts translated directly into a successful proposal for a new mission to Jupiter, called Juno. He was a major participant on a team that discovered methane on Mars. His subsequent bio-geochemical research on the habitability and prospects

of past or present life on the planet was critical in designing experiments for the 2009 Mars Science Laboratory mission, of which he is a member. He also played a lead intellectual role in the development of the Cassini-Huygens Gas Chromatograph Mass Spectrometer that landed successfully on Titan. Atreya's research revealed that methane on Titan plays a role similar

to water on Earth, complete with lakes, evaporation, rain and rivers of methane.

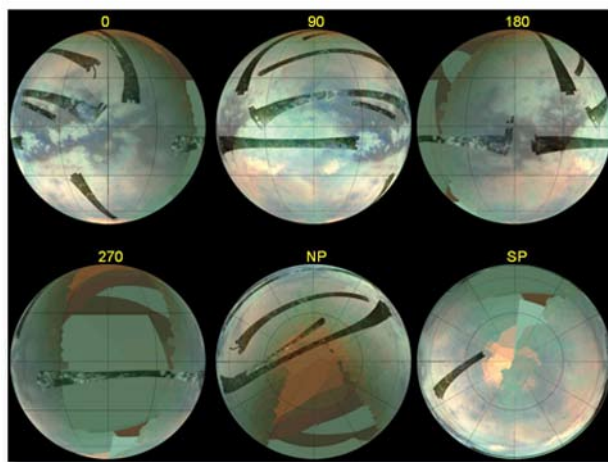
Atreya has published a book on the atmospheres and ionospheres of the outer planets and satellites, as well as 16 book chapters and numerous refereed research articles; he also edited four books.

Whether engaged with colleagues or with students



in the classroom, Atreya is respected and admired not only for his knowledge, but for his ability to make the complex understandable. He is a firm believer in integrating research findings with teaching at all levels. He encourages his students to participate in major conferences and to publish first-authored papers. Through his training and advice, his students have gone on to play prominent roles as leaders on instrument teams, and in mission science planning.

Atreya's dedication to the field of planetary science also is demonstrated by his service to the science community. He assists in editing two journals, and serves as chair and steering committee member of two planetary analysis groups. He also is heavily engaged in shaping the future of planetary exploration through his advocacy for and design of multiprobe missions to the giant planets.



**Infrared and Radar Views of Titan, one area of Professor Atreya's recent research, December 12, 2006
Photo courtesy of NASA**

Greg Jenkins AOSS '07 Alumni of the Year



On Friday, October 12, AOSS welcomed back alumnus Greg Jenkins, '91 as this year's Alumni of the year. Following AOSS tradition, Greg delivered a lecture on Friday afternoon in the department. U S - A M M A : A d d r e s s i n g W e a t h e r ,

Chemistry and Climate Challenges in West Africa, chronicled the successful 2006 African Monsoon Multidisciplinary Analysis (AMMA) campaign that "holds the possibility of understanding important science problems that have regional/global implications."

That evening, Greg was honored with other CoE alumni at a formal banquet, at which time AOSS Chair Tamas Gombosi introduced him with the following remarks:

"Following receipt of his doctoral degree in 1991, Dr. Jenkins received a fellowship to study at the National Center

for Atmospheric Research in the Advanced Studies Program. Greg's earliest research efforts were in what we might call 'safe science' – when it's hard to prove you are wrong. He spent many research hours modeling what the Earth's climate was like – billions of years ago! We believe his climate research has moved ahead a few years and is more relevant to today's concerns.

"Following seven years at Penn State, Dr. Jenkins rejoined the Howard University faculty in 2004 as an associate professor in Physics and Astronomy. Most recently, he was named chair of Howard's Department of Physics and Astronomy. Congratulations Greg. I would like to note that upon his appointment, he called his AOSS advisor, Bill Kuhn, asking for advice on the 'Michigan' way of chairing a department!

"He has published more than 30 papers



AOSS Alumni of the Year, Professor Gregory Jenkins, delivers his lecture in the SRB Auditorium

Research. Greg's role coordinating the NASA-African Monsoon Multidisciplinary Analysis is helping to integrate U.S. and



international research efforts, which hold the promise of new insight into the processes that govern hurricane growth and evolution. He has received a National Science

Foundation Career Award and was named Technical Achiever of the Year by the National Technical Association."



For the second year, the College celebrated Halloween with a parade from the Lurie Engineering Center to Pierpont Commons. Dean Munson, in honor of his endowed chair, was again the Vlasic Pickle. AOSS revelers joined the crowd in appropriate garb. A complete album of pictures is online at:

<http://aoss.engin.umich.edu/pages/Halloween2007>.

Where are they now?

This summer, recent AOSS graduates received an email from Sandee Hicks, AOSS Communications Assistant, to find out where they are. Here are some of the responses:

Yang Chen, PhD, '06

Hi Sandee, Nice to hear from you again! I'm now working in the Earth Science Section at the Jet Propulsion laboratory as a Postdoctoral Scholar. The main work I'm doing is to combine the model and satellite observations (particularly the MISR (Multi-angle Imaging SpectroRadiometer)) together to better quantify the aerosol effects on climate.

Ann-Drea Hensley, BSE, '06

I'm currently a graduate student in the Institute of Environmental Science at Miami University of Ohio (Oxford, OH). I am also the Commuter Adviser Graduate Assistant, which is part of the Office of Residence Life. I miss U of M and hope everyone is having a great start to their year!

Deanna Henc, BSAOS, '04

I'm currently a graduate student at the University of Washington Dept. of Atmospheric Sciences, about to complete my masters and continuing on for my PhD. Since I've been here I've participated in the Hurricane Rainbands and Intensity Change Experiment (RAINEX) of 2005, and got to fly with the airborne Doppler radars into Katrina and Rita ... getting ready to publish a paper on this work to Monthly Weather Review, and have presented the work at the AMS Hurricanes and Tropical Meteorology conference and two RAINEX workshops. My PhD will involve working with the TRMM Precipitation Radar to do a statistical analysis of the vertical structure within all tropical cyclones since TRMM has been up, starting with the Atlantic Basin and (hopefully) expanding to the other TC basins. A really preliminary bit of this work was presented at the NASA Precipitation Measurement Mission Science Team meeting. I got my first field and airborne Doppler radar experience during my involvement in the Significant Opportunities in Atmospheric Research and Science, getting to go on the Bow Echo and MCV Experiment (BAMEX) with Wen-Chau Lee (I actually did this while I was still at U-M) and working at NCAR for two summers (2003 and 2004), so I have a lot to thank them for (like wanting to go to graduate school in the first place). Please send my best wishes to Dr. Samson!

Jichun Zhang, PhD, '06

Postdoctoral Research Associate, Physics & Astronomy Department, Rice University, Houston, TX
Advisors: Profs. Richard A. Wolf and Frank R. Toffoletto
Projects: Rice Convection Model (RCM): Code Improvement and Applications, Plasma Bubble Injections, Inner Magnetospheric Model-Model Comparisons, Geomagnetic Storm Simulations

North Campus from a Cessna C172SP G1000

SPRL Electronics Technician Dave Boprie, took this picture in September. Dave, a member of the University of Michigan Flyers, was trying to get a picture of the W8UM amateur radio club's new HF antenna. Here's what he has to say about trying to capture the antenna on film — while flying:

This is the best I could do with FAA limitations on altitude and for safety. The antenna is barely viewable about the center of the EECS roof and slightly right. You can see part of the base and some of the antenna. Regardless of the picture, the W8UM club has been updated and remodeled into a great

amateur radio club by several hard working members, alum and other supporters. It's great fun. With a radio signal you can make friends on the other side of this little planet of ours in nearly the speed of light ... not so in my little Cessna. Time to get a better telephoto lens.



Meet Hobnob

Residing next to the Space Research Building

We came to work one morning and there it was! A new sculpture on the grounds next to the Space Research Building (southwest corner). It's called "Hobnob."



**Hobnob before painting and placement (top)
Hobnob after painting and placement (bottom)**



Alumni Notes



From left to right: Eric Wilson, Scott Edgington, Mike Barlage

We also thought it was worth running the picture again!

In the last issue of the Daily Planet, we carried a story about Professor Bill Kuhn's retirement as well as a "Where are they now" column. AOSS alumnus Michael Barlage sent the following comments about both.

You know Mary, my experience with these "retired" professors is that they have too much time on their hands, they are cranky, and they are always looking for an argument whilst they wander the halls. However, I will say Happy Retirement Dr. Kuhn! Although it's not really a happy moment for those of us who respected your advice so much while we were at UM to see you retire. It not only means that you will not be giving that advice to future students, but also that I am getting older. I wish I could have been there for the party, but when I finally get back to Ann Arbor, I hope to see you, whilst you are wandering the halls, of course.


Michael Barlage, PhD
Project Scientist
Research Applications Laboratory
National Center for Atmospheric Research

Then ... And Now



Before and after pictures of the Rollin M. Gerstacker Professor of Engineering and AOSS Chair, Tamas Gombosi (with Professor Andy Nagy – before).





The Departments of
 Atmospheric, Oceanic & Space Sciences
 and
 Geological Sciences

Invite You
 to

An Alumni Reception
 at
**The American Geophysical Union
 Fall Meeting**

Wednesday, December 12, 2007
 6:00 — 8:00 PM

Westin St. Francis Hotel, Tower Salon
 San Francisco, California

AOSS will be at the AGU Fall Meeting again this year – in Booths 15-16 in the Academic Showcase, which is next to the posters this year. Please stop by, say hello and pick up a new AOSS goodie!



Zurbuchen to direct new CoE Entrepreneurship Center

by Nicole Casal Moore

Young inventors can help stoke the state's economy and the new Center for Entrepreneurial Programs at the College of Engineering will help make that happen.

"When we have an economic crisis in the state like we do now, we also have opportunities," says David Munson, the Robert J. Vlasic Dean of Engineering. "Our new center will promote an entrepreneurial economy and it will enrich our students.

"It's not that we think every student needs a start-up, but there's a creativity and innovative spirit that's associated with the start-up mentality and we'd like to weave that thread through our curriculum."

Thomas Zurbuchen, associate professor in the Departments of Atmospheric, Oceanic and Space Sciences and Aerospace Engineering, will direct the new center.

"We've never needed this more in the state of Michigan," Zurbuchen says. "In the College of Engineering, we have some of the best faculty and students, many of whom are innovators. We will enable them to become entrepreneurs."

The center will focus on:

- Advising the new entrepreneurship-focused CoE student group MPowered. The group has hundreds of members already;
- Connecting CoE alumni who work in the start-up community with current students;
- Providing grants for students to pursue their own ideas for companies and products;
- Simplifying and clarifying student intellectual property transfer processes; and
- Developing an entrepreneurship certificate program so engineering students can take courses in innovation and business from U-M professors or members of the broader entrepreneurial community.

The center grew out of the college's Committee on Entrepreneurial Environment and Programs, a group of faculty that was formed in January and released recommendations in May in the report "Empowering Entrepreneurial Students."

The center is supported by an anonymous gift of nearly \$1 million.

This is the newest effort to enable entrepreneurship at U-M focused on the CoE. The Zell-Lurie Institute for Entrepreneurial Studies is part of the Stephen M. Ross School of Business. Across the University, other programs are seeking to include business courses in their curricula, says Stephen Forrest, vice president for research and the William Gould Dow Collegiate Professor of Electrical Engineering, professor of materials science and engineering and professor of physics.

"We have to bridge the gap between inventor and venture capitalist," Forrest says. "This is an excellent topic for the College of Engineering to be taking a lead in."

NOTE: Since this story was released, the center has been renamed to the Center for Entrepreneurship.

On the Web

To read the entire "Empowering Entrepreneurial Students" report, go to:
<http://www-personal.umich.edu/~ashwinl/CEEPS-FinalReport.pdf>

Hays Scholarship

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Rachael Kroodsmas was “matched” to meteorology over and over in the “career matching” tests students take during middle and high school. “Meteorology kept showing up on those tests; I decided to find out more about it, and it sounded really interesting to me. I have always loved math and science but never knew before what major I could go into that would incorporate both those subjects.”

"My favorite thing about AOSS is that it is a small department, so I can get to know the people in my class ..."

It was after deciding on meteorology as her area of study that Rachael looked at the University of Michigan and then after looking at engineering decided meteorology in an engineering school was the right fit for her. Now, after reaching junior status, Rachael's glad she took the tests and found a meteorology program within an engineering school – especially at Michigan.

“I love the opportunities that U-M offers as a university and I have a lot of options to get involved with various activities. I've found that I enjoy doing computer programming, so I liked my AOSS 323 class last semester as it combined math with programming and how to relate to real-life applications with meteorology.”

In her spare time, Rachael is involved in the Campus Crusade for Christ, leading a weekly bible study in her dorm and planning other activities throughout the year. She has also traveled with the Alternative Spring Break (ASB) program. This will be her third year and her second as a site leader. Rachael is also a member of the Arts Chorale, comprised mainly of non-music majors.

Like most juniors, Rachael is still deciding what she wants to do after graduation in April 2009 – perhaps graduate school, perhaps not. “I'm still learning what I can do with my degree.”

Weather Underground Scholarship

continued from page 1

Ilissa Ocko always wanted to go into engineering and the outstanding program at the University of Michigan appealed to her competitive nature. Coupled with her self-proclaimed “obsession” with atmospheric phenomena, it was an easy decision to select AOSS as her engineering department.

“Everything that I have been introduced to in the AOSS department has helped reaffirm my passion for atmospheric science, and more specifically, climate physics. The passion that I feel for this field of study only continues to grow with each new task I complete, and each new event I attend – whether it's learning in a classroom, participating in research projects, listening to guest lecturers, or participating in SUESSE and AMS activities.”

"I am so thankful for the opportunities that our department gives its students."

“My favorite class is Atmospheric Physics II (Atmospheric Radiation), taught by Professor Kuhn. He has been a huge encouragement to me both academically and personally. I am so grateful for all that he has taught me, in and out of the classroom.”

Ilissa is active in many activities inside AOSS, where she is president of the Society of Undergraduate Earth Systems Scientists and Engineers (SUESSE) and a member of the U-M American Meteorological Society student chapter. When she leaves the Space Research Building, Ilissa participates in competitive games. “This includes anything from WxChallenge, to playing sports, to video games. If there is a competition involved in anything, count me in!”

Having found her passion, Ilissa knows what she wants upon graduation this coming April. “I am planning on going to graduate school, and entering a PhD program to obtain my doctorate degree in atmospheric science. I am incredibly interested in climate modeling, a field of study that encompasses my three favorite disciplines: computer programming, mathematics, and atmospheric science.”

AOSS Family News

Graduate student Jason Gilbert and his wife Victoria welcomed new daughter, Claire Victoria Gilbert, born September 10, 2007. Claire joined at 6 lbs 8 oz and 19 inches.



Riley Scott Hovater, born August 8, 2007, weighing 8 lbs and 4 oz, 21 inches. Cheri says, "Riley's big brothers, Colin and Theo, just love him. His mom Kayla is a nurse at U-M hospital and works nights so dad, Ryan Hovater, takes care of Riley quite a bit. I haven't had him overnight yet, but I hear he is already sleeping through the night so I might get the chance soon."



On May 26, 2007, beautiful Harbor Springs, MI, was outshone by the beaming faces of Erika Roesler and Eric Harding as they became husband and wife. Erika, an AOSS graduate student under the tutelage of Professor R. Paul Drake, and Eric, a nine-year veteran of AOSS's halls, first as a UROP student, then as a student research assistant in Paul's group, exchanged vows before a plethora of family and friends, then



everyone danced the night away, including Professor Drake and his wife Professor Joyce Penner..



Paul B. and Ruth Hays Scholarship

In 2006 Paul and Ruth Hays began the process of establishing a scholarship for AOSS undergraduates. Professor Hays, who retired in 2000, is the Dwight F. Benton Professor of Advanced Technology. He and his wife Ruth used remaining funds from the Benton professorship to support the scholarship.

The scholarship will be awarded annually to a declared AOSS undergraduate student who maintains at least a 3.0 GPA and is a U.S. citizen or resident alien.

The Weather Underground Scholarship

Last November, AOSS Alumni Jeff Masters, co-founder and director of meteorology of the Weather Underground, expressed a need in the industry for graduates who understand key climate change issues and can communicate with the general public — especially via the Internet. With that, the Weather Underground Undergraduate Scholarship was established.

The scholarship will be awarded annually to a declared AOSS undergraduate student who maintains at least a 3.0 GPA and is a U.S. citizen or resident alien. To be eligible for the scholarship, the student must create and submit an HTML document that discusses a topic in weather or climate change as well as a personal statement reflecting career interests and objectives. Applications are due in the spring.



Chance Encounter with Comet Nets Surprising Results

By Nicole Casal Moore

Comets are made of the most primitive stuff in the solar system. As hunks of rock and ice that never coalesced into more planets, they give researchers clues to the evolution of solar systems.

So a chance encounter between spacecraft Ulysses and Comet McNaught's ion tail has scientists in the University of Michigan's College of Engineering marveling at a stroke of luck and some surprising data.

The NASA/European Space Agency spacecraft is on a mission to study the sun's polar regions, and it carries an instrument run by U-M professors. In February, it flew through McNaught's ion tail 160 million miles from the comet's core.

Instrument readings showed there was "complex chemistry" at play, said U-M space science professor **George Gloeckler**, second author of a paper on the findings published Oct. 1 [2007] in *Astrophysical Journal*.

Gloeckler is the principal investigator on the Solar Wind Ion Composition Spectrometer (SWICS) aboard Ulysses, which measured the composition and speed of the comet tail and solar wind. The solar wind consists of high-speed streams of plasma that emanate from the sun's outer atmosphere. Not only did SWICS detect unexpected ions in the comet tail, it found that the tail had a major impact on the surrounding solar wind.

For the first time at a comet, researchers detected O³⁺ oxygen ions (atoms of oxygen with a positive charge because they have five electrons instead of eight). This suggests that the solar wind ions, originally

missing most of their electrons, picked up some of their missing electrons when they passed through McNaught's atmosphere. The comet served as a source of electrons, said **Michael Combi**, a U-M space science professor who is an author of the paper.

SWICS also found that even at 160 million miles from the comet's nucleus, the tail had slowed the solar wind to half its normal speed. The solar wind would usually be about 435 miles per second at that distance from the sun, but inside the comet's ion tail, it was less than 249 miles per second.

"This was very surprising to me," Combi said. "Way past the orbit of Mars, the solar wind felt the disturbance of this little comet. It will be a serious challenge for us theoreticians and computer modelers to figure out the physics."

In 1996, Ulysses passed through the tail of comet Hyakutake and measurements indicated its tail didn't slow the solar wind at all.

The interaction between comets' tails and the solar wind has been studied for decades. A comet's ion tail always points away from the sun, whether the body is traveling toward or away from the sun along the comet's elliptical orbit. It was this finding that eventually led in 1958 to the discovery of solar wind. The magnetism and velocity of the solar wind are so strong it pushes the comet's tail forward.

Solar wind is blamed for the lack of an atmosphere on Mars and for geomagnetic storms that can cut out power on Earth. It is a major component of space weather, which

scientists study because it affects satellites and humans in space.

As for what these observations say about the origins of the solar system, scientists don't know just yet.

"The composition of comets tells us about conditions approximately 4.5 billion years ago when the solar system was formed," Gloeckler said. "Here we got a direct sample of this ancient material which gives us the best information on cometary composition."

"We're still in the process of figuring out what it tells us," he said. "We're contributing part of the whole puzzle."

Space science professor **Thomas Zurbuchen**, a U-M author of the paper, likened Ulysses' pass to putting your hand in the waters of Lake Michigan and pulling out a fish.

"That's a pretty unlikely thing," Zurbuchen said. "And that is a lot like what happened when we caught the tail of a comet that happened to pass very near the sun. The benefits of such an observation are important. They constrain the interactions of such comets with the sun, including how the comets lose mass. They also examine the question of how a sudden injection of neutral and cold material interacts with hot solar-like plasmas. That occurs in other places of the universe and we were able to study it right here."

The paper is called "Encounter of the Ulysses Spacecraft with the Ion Tail of Comet McNaught." *Astrophysical Journal* is the same journal that published Eugene Parker's paper on the discovery of solar wind in 1958.

First Annual URC Report Available

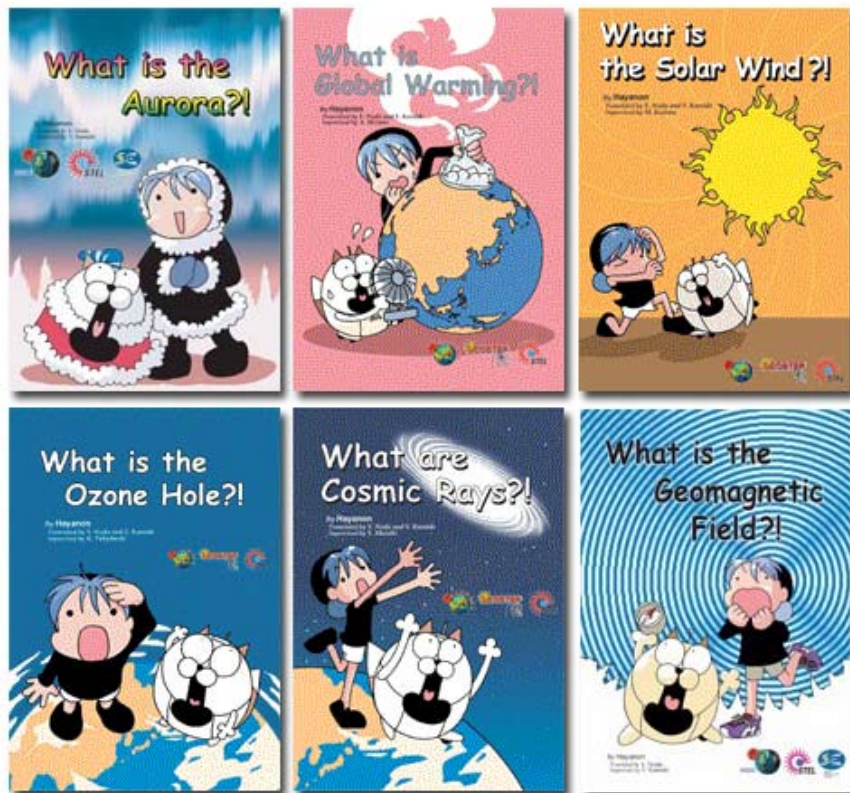


At the "Rising Above the Gathering Storm," a two-day conference organized by the U-M vice president for research and sponsored by the University Research Corridor to address the role of the research university in economic development, the first annual report of the University Research Corridor was distributed, and it's now posted online.

The University Research Corridor is an alliance of Michigan's three leading research institutions: Michigan State University, the University of Michigan and Wayne State University. The URC vision is to unite and lead, playing a key role in creating a vibrant Michigan economy that leverages the intellectual capital of its three public research universities, to work proactively to attract the knowledge economy businesses that can fund the research activity that feeds new enterprise, educates the workforce and plants the seeds for the new industries of tomorrow.

On the Web

For more information about the URC, go to:
<http://www.urcmich.org>



EDUCATIONAL COMIC BOOKS AVAILABLE ONLINE

A series of educational comic books have been produced under the supervision and guidance of Prof. Y. Kamide and the technical support of Ms. Y. Noda. It is a collaborative project between the Solar-Terrestrial Environment Laboratory (STEL) at Nagoya University in Japan and the Climate and Weather of the Sun-Earth System (CAWSES) program. These comic books can be downloaded from the following websites:

<http://www.scostep.ucar.edu/>
<http://www.bu.edu/cawses/capacity.html>

The titles of the six comic books are:

- What is the Aurora?
- What is the Geomagnetic Field?
- What is the Ozone Hole?
- What is the Solar Wind?
- What is Global Warming?
- What are Cosmic Rays?

These books are made available in English as well as in a blank "balloon" version so they can be readily translated into other languages. The comic books are free of charge. Please follow the instructions listed on the above websites to download the electronic files.

What exactly is Soaring?

AOSS Associate Professor Nilton Renno is an avid plane glider. This past year, he came back from soaring in the Swiss Alps and shared some pictures. We asked him to tell us more about this seemingly serene sport. Here, in his own words, is a story of soaring – with some science thrown in of course.



Soaring is the art and technique of using a motorless airplane to travel using only air currents. Three types of air currents are used for soaring:

1. Thermals or convective lift. These are upward air currents due to warm air rising, we commonly see soaring birds riding on them.
2. Ridge lift. These are air currents due to wind being deflected upward and upwind of a ridge. Distances of more than 1,000 miles have been flown along the Allegheny Mountains from Pennsylvania to Tennessee.
3. Waves. These waves form downwind of mountains such as the Sierra Nevada. Good waves usually form after a cold front. Sailplanes flying in mountain waves have achieved altitudes of more than 60,000 ft. Distances of more than about 2,000 miles have been flown non-stop in sailplanes at average speeds of more than 100 mph. These record flights have been made in lee waves downwind of the Andes.

I have flown in all three types of lifts. My altitude record is 32,000 ft. I have never tried to fly more than 600 km of distance because I like race-closed circuits of between 100 and 500 km. The focus in these races is speed not altitude or distance. However, I am planning to fly 1,000 km in Pennsylvania next year.

I started gliding when I was 14 years old. I became a flight instructor before I got my driver's (car) license. I try to fly in almost every country that I visit. I have flown all over Brazil and the US. My favorite place in the US is the Owens Valley (CA) and the Lake Tahoe Area. I have also flown in Hawaii and various places in Europe, including the French and Swiss Alps and Central Spain – the best place in Europe for thermals. My favorites places in Europe are the Swiss Alps and the Wasserkuppe in Germany (where soaring was born).

Soaring is like having your own wings. My sailplane is the best in the world in its class. It is small, so getting in it is like dressing up on your rigid and aerodynamically efficient wings. It is amazing to see that we can fly so efficiently in a machine that feels like an extension of your body. To complete the feelings, the view from the cockpit is unobstructed and the cloud formation and landscapes that



Professor Renno and his glider after a flight in the Wasserkuppe

we see are amazing. I frequently dream that I am flying just using my own arms as wings, especially after a wonderful glider flight at the beginning of the soaring season. Needless to say this is my favorite dream!

The fact that to soar well, I have to think about air currents and form a good picture of them in my mind helps with my research. I got interested in atmospheric convection and dust devils because I watch them when I glide. I think that soaring is like space exploration; like in a space mission, to soar well we have to plan everything well in advance and be well prepared for the uncertainties of flying without an engine. The variety of unfamiliar landscape and changing atmosphere adds to the excitement – just like in space.



Picture from glider at 17,000 ft over Owens Valley, overlooking the Sierra Nevada

Wind Power in Michigan

Though it's been predicted that this will be a relatively mild winter in Michigan, most people will still complain that energy prices are too high. But what alternative do we have but to pay or freeze? Students of the Wind Energy Class run by **AOSS Professor Jerry Keeler** and **Associate Research Scientist Dr. Frank Marsik** are trying to find out.

Governor Granholm, in her speech to the Wind Energy Conference at Michigan State University, has said that investing in wind energy will spur our economy and create much-needed jobs. Senate Bill 385 would mandate that 20 percent of electricity used in Michigan come from renewable resources, such as wind, biomass from agriculture, hydro, or solar power, by the year 2020. Closer to home, Washtenaw County and the City of Ann Arbor have each passed resolutions to obtain a certain percentage of their power usage from green energy. And the Department of Atmospheric, Oceanic and Space Sciences of the University of Michigan is going to help:

On the Web

More about the City and County resolutions is at:
http://www.ewashtenaw.org/government/departments/finance/purchasing/online_bids/assets_2007/rfp6339.pdf

“The Washtenaw County Board of Commissioners passed a resolution in April of 2006 which instructed the Department of Planning and Environment to study the potential of wind power generation in Washtenaw County. ...

“The Department hired a consultant for pre-study analysis and counseling in December. During our preliminary analysis, it became clear that there are potentially

greater wind speeds in the Midwest than originally thought due to wind shear at greater heights. Newer utility scale turbines ... have the potential to tap into this resource. With this knowledge, the County's consultant produced a report that recommended the best potential sites for testing the wind-energy power production potential based on many criteria including proximity to power lines, openness of land, elevation, state wind maps, environmental and wildlife sensitivity and FAA restrictions. A copy of that report can be obtained on the project website at <http://www.ewashtenaw.org/wind>. In addition, the County has been working with faculty from the University of Michigan and staff from the City of Ann Arbor to help reduce costs and increase project resources. A wind energy class within the Department of Atmospheric, Oceanic and Space Sciences is being conducted at the University of Michigan in conjunction with our efforts.”

As part of the county's effort to determine the feasibility of wind energy production in Washtenaw County, an 80m meteorological

tower will be erected for the purpose of collecting wind and temperature data for a one-year period. Students in the AOSS wind energy class will have access to the data collected from the tower to analyze as part of class activities.

On the Web

Read more on Wind Power Washtenaw at:
http://ewashtenaw.org/government/departments/planning_environment/planning/wind_power/Information%20Brochure



Additionally, the contractor overseeing the feasibility study for the county will speak with the students about the nature of wind energy development. Drs. Keeler and Marsik are currently working with the U-M Plant Department to find a site on university property, which might host a “tall tower” to be used in further studies on wind energy feasibility both on campus and within the county.

It's a win-win situation as the U-M gets involved in the community, while the university itself moves toward greener power, and the students get hands-on experience in areas beyond weather forecasting, they develop marketable skills in wind energy – a growing field of interest.

So, when can you expect to see a windmill on the roof of your neighbor's house? If you're a student, why not sign up for the class and find out, or better yet, make it happen. If you aren't a student, stay tuned, keep an eye on the sky, and have another reason to enjoy the wind on your face just contemplating the possibility of seeing those energy bills going down for a change.

Make a Michigan Difference Today



Your tax-deductible gift to AOSS will provide opportunities for students and keep our programs strong. AOSS strives to offer our students the best possible educational and research opportunities. Your gift to the Department will enable us to make awards to AOSS students who have financial need, are outstanding students or have exemplified exceptional leadership and character. The Department has been working hard to make the recently established Thomas M. Donahue Memorial Student Fund an endowment that will benefit AOSS students for years to come. We are very close to the goal and would encourage you to be a part of a long-lasting endeavor to assist others in their academic endeavors.

Please use the form below to make a Michigan Difference today.

Thomas M. Donahue Memorial Student Fund

Enclosed is my gift of \$ _____ for the Thomas M. Donahue Memorial Student Fund.

Name(s) _____

Address _____

City _____ State _____ Zip Code _____

Daytime Phone () _____ Email _____

Please do not send acknowledgment note to the Thomas M. Donahue Family.

(The amount of your gift will remain confidential.)

Make check payable to: University of Michigan

Send your donations to:

Thomas M. Donahue Memorial Student Fund
Department of Atmospheric, Oceanic and Space Sciences
Room 1521C SRB
2455 Hayward Street
Ann Arbor, MI 48109-2143

Questions? Contact Mary Nehls-Frumkin at maryln@umich.edu