

Daily Planet

WINTER 2008

The Department of
Atmospheric,
Oceanic and
Space
Sciences Newsletter

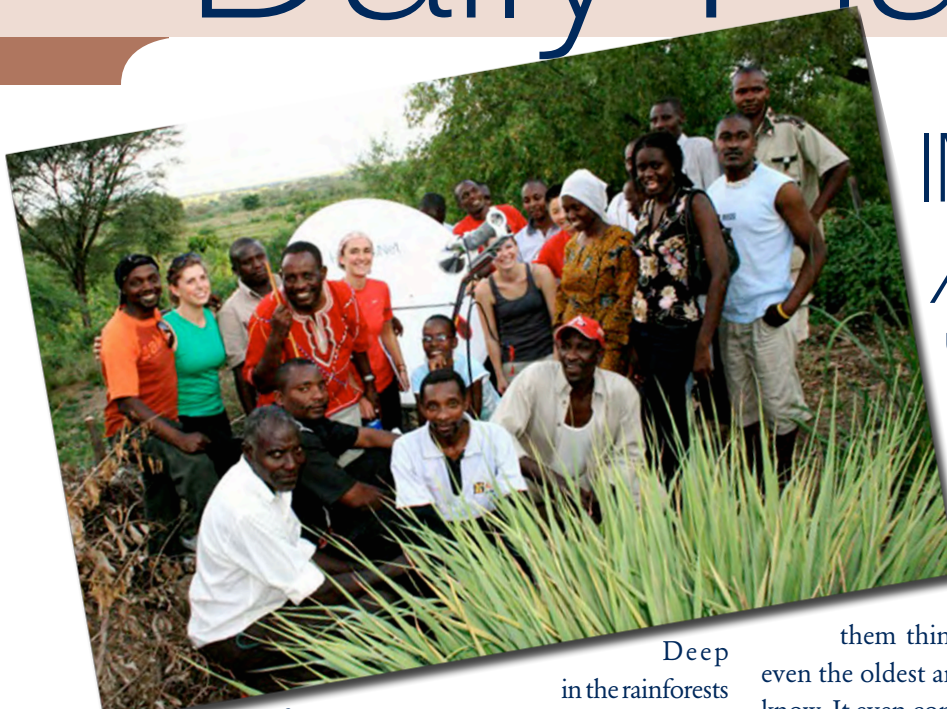


Photo by Job Mainye

Deep in the rainforests of Africa, a boy enters a clearing, gazes briefly, wonderingly deep into the blue sky above, then he hurries across to the low stone building. He enters, greets his father's father, and sits down at a computer.

The elder nods greeting to the youngster, then turns back to entering the many uses for the next plant on his list into the web page on tribal wisdom and lore he is preparing. He is developing a small business around this, funded by a microgrant: \$1000 to get off the ground. This is social entrepreneurship in action.

The boy, however, is eager to tell his friend in Ypsilanti, USA, how his father praised him this morning for scaring away the hyena that threatened their cattle. But he knows his friend is a late sleeper and may not be up yet on practically the other side of the world, so he doesn't wait for a response to his email. He has a report due, and, under the watchful eye of his elder, he turns to his studies.

The elder smiles at the boy's acceptance of the machine, and pauses to ponder his own. So many things have changed in his lifetime. But the

IMAGINE Africa:

U-M Students Bring the Internet to Africa

by Deborah K. Eddy

computer has already proven its worth: when the boy's mother was expecting his little sister, the machine told

them things about being with child that even the oldest and wisest of the women did not know. It even connected them to a telepharmacy in a neighboring village that provided an ultrasound and showed that all would be well with the upcoming birth. He shook his head wonderingly, and continued typing.

If the students in AOSS 582 have their way, this scenario, or one much like it, could become reality within the next few years. Over the past two terms (Winter 2008 and Fall 2008), the students have been involved in creating *IMAGINE Africa* (IMplementing A Global Internet Network in Africa), a project to bring Internet access to the rural population of Africa.

AOSS 582 is a class in Space Technology, led by AOSS faculty members Thomas Zurbuchen and Darren McKague, where students don't just sit in a classroom and learn about the things that could be done to improve our world through space technology, they actually get their minds and hands engaged in trying to make a difference. The deep engineering knowledge gained during their undergraduate education, combined with their commitment to put great ideas to work,

INSIDE

AOSS Accolades.....	2
SPRL at 60.....	4
Alumni(ae)	4 & 5
Mark your Calendars.....	9
AOSS Outreach.....	10
Espresso anyone?	13

CONTINUED ON PAGE 8



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AOSS Accolades

Faculty

AOSS Professor **Lennard Fisk** garnered two additional awards this fall. In October, he received the NASA Exceptional Public Service medal. This award recognizes exceptional contributions to the mission of NASA by a non-governmental employee. In November, at the American Astronautical Society national meeting, where he was also the keynote speaker, Fisk received the Carl Sagan Memorial Award. The AAS award is presented annually to a person who has demonstrated leadership in research or policies advancing exploration of the Cosmos.

Anna Michalak, AOSS and CEE assistant professor, was one of three researchers who discussed the important role the “breathing” Earth plays in current and future levels of carbon dioxide in the atmosphere during a NASA webcast seminar in November. The seminar topic was the role the planet itself plays in the levels of carbon dioxide in the air. Michalak is also involved in NASA's Orbiting Carbon Observatory, a satellite designed to make global atmospheric carbon dioxide measurements with unprecedented precision that is scheduled for launch in early 2009.

AOSS Professor **Nilton Renno** and SPRL Senior Engineer in Research **Steve Rogacki** have caused a sensation in the gliding world with their “thermal sensor stick”. The Renno-Rogacki “Electric Sensor: The Search of Thermals” was presented at the International Scientific and Technical Soaring Organisation (OSTIV) conference and excited the attendees with its possibilities. Many glider pilots have wondered if thermals could be made visible and the first test trials of the thermal sensor stick show that it may be possible.

Thomas Zurbuchen was a featured speaker at the *Scientific Applications for Google Earth* Conference held October 22 on the University of Michigan campus. The meeting brought together scientists from across the country and members of the Google community to explore how to use Google Earth and related technology to enable rich, new data interaction. The popular web site *Tornadopath*s, developed by AOSS Associate Chair **Perry Samson** is an example of how researchers are making use of Google Earth and Google Maps.

On the Web

Check out Tornadopaths at:

<http://climate.engin.umich.edu/tornadopaths/>

SPRL at 60

by Nicole Casal Moore

As U-M's Space Physics Research Laboratory (SPRL) celebrated its 60th anniversary in October, its instruments were at work across the solar system.

Older than NASA, SPRL is the longest-standing independent University-based laboratory participating in the space program, said Tamas Gombosi, AOSS chair.

Its researchers have contributed to the development of instruments on board spacecraft that have been to five planets and the moons of others, said professor Christopher Ruf, SPRL director. The lab is involved in several high-profile missions underway right now: the Phoenix Lander on Mars, Cassini-Huygens at Saturn and its moons, Rosetta on its way to a comet, and MESSENGER, approaching planet Mercury.

The Mars Phoenix Lander is on the ground now in the arctic plains of the Red Planet, searching for organic materials and studying the history of water there. So far it has confirmed the existence of ice on the planet's surface, detected falling snow and has found salts in the soil, among other findings. The mission will continue through November.

On the Web

To watch the symposium discussions and see pictures from the SPRL at 60 banquet, visit:

<http://www.sprl.umich.edu/sprlat60/>

Cassini-Huygens consisted of the Cassini orbiter and the Huygens probe. SPRL contributed to instruments on Huygens, which descended to Saturn's moon Titan in 2005 and detected evidence

of water ice. Cassini flew within 16 miles of Saturn's moon Enceladus on Oct. 9. Four more flybys are planned in the next two years. Among Cassini's findings at Enceladus is evidence of geysers on the moon.

MESSENGER's mission is to study the planet Mercury's space environment and geological history. It has completed two of three scheduled flybys and will enter orbit in 2011. Onboard MESSENGER is the SPRL-built Fast Imaging Plasma Spectrometer, which measures the charged particles in the planet's magnetic field. FIPS enabled the first observations about the surface and atmospheric composition of Mercury.

The Rosetta spacecraft will reach comet 67 P/Churyumov-Gerasimenko in 2014. A portion of the craft is designed to land on the comet and gather data about its composition. Comets are made of the most primitive materials in the solar system, so they can help scientists understand the solar system's history and evolution.

Among the most visible past missions involving SPRL researchers are the Pioneer mission to Venus in the late 1970s and the Galileo mission to Jupiter and its moons,

which arrived in 1995. In the past two decades alone, SPRL faculty and engineers have built more than 30 space instruments, instrumented numerous sounding



On the Web

The 2008 University of Michigan Annual Report for the Space Physics Research Laboratory is now available.

Download the 2008 Report [PDF 1.04MB] at:
http://www.sprl.umich.edu/pdfs/SPRL_annual_report_2008.pdf

rockets, balloons and aircraft, and developed ground-based instruments.

Many of the country's leading space scientists studied or worked in SPRL as students, scientists or post-doctoral researchers, Gombosi said. He listed a few: James Anderson, an atmospheric chemistry professor at Harvard University; Ralph Cicerone, president of the National Academy of Sciences; and Claudia Alexander, NASA project manager of the Rosetta mission.

"I think our greatest contribution to the space program is our former graduate students, post-docs, and past research principal investigators who have gone on to assume leadership roles in earth and space science and engineering research and administration. That community is the space program and our alumni are an important part of it," said Ruf, who is also a professor in the departments of Atmospheric, Oceanic and Space Sciences as well as Electrical Engineering and Computer Science.

'08 Alumni of the Year: Brian Heikes

On Friday, October 3, AOSS had the pleasure of honoring Brian Heikes as our Alumni of the Year. Brian, who is a professor in the University of Rhode Island Graduate School of Oceanography, delivered his lecture, Microphysics 2 chemistry 2 biochemistry 2 microphysics, to an auditorium full of faculty and staff. He described his lecture as:

"The trajectory of an AOS(S) graduate is followed from Ann Arbor to points around the world in pursuit of the linkages of meteorology, chemistry and climate."

Brian has been influential in both the classroom and the field. As a professor of Oceanography, he has helped shape the study of atmospheric and marine chemistry research. His extensive research focuses on the measurement and interpretation of photochemically reactive compounds that help define the lifetime of pollutants and natural compounds in the air, and characterize the exchange of material across air-land-ocean interfaces.

In the field, his research projects have included the study of acid rain, ozone, climate and cloud physics around the world. He readily points out that his education here has proved invaluable. As he once put it, "My University of Michigan engineering background has proven extremely useful in designing instruments for this work and more importantly in implementing repairs in the field where spare parts are often scarce. FedEx doesn't necessarily deliver at sea nor do they come to Kiritimati but once a week." Kiritimati is another name for Christmas Island.



Brian has received multiple NASA Group Achievement Awards for his outstanding work. However, perhaps his greatest achievement is listed on the title page of his dissertation, where Assistant Professor Perry Samson is listed as his co-chair. Those of us who know Perry, must congratulate Brian on surviving!

Judo Team Wins Big

Members of the Ann Arbor YMCA Judo Club from the University of Michigan had a great day at the 2008 Great Lakes Open (GLO) Judo Tournament held last month, including AOSS professor and SPRL director Chris Ruf, and graduate students Daniel Gersham and Shintaro Taniguchi. The GLO is the premier event in the area, with competitors from throughout the Midwest and eastern Canada.



Pairs kata competition silver medal winners Thomas Gomez and Shintaro Taniguchi next to gold medal winners Chris Ruf and Oscar Lahoud

In the individual competition, Jacqueline Tennis (LSA undergraduate student) and Daniel Gersham both medaled in their intermediate rank divisions, Jackie taking second and Dan third. Samir Malpathak ('99), competing in his intermediate rank division, placed sixth. In the black belt divisions, Leo Pando (Physics professor) and Patrick Trizila (AERO graduate student) placed fourth and fifth, respectively, in their weight classes. Sergio Duque (EECS visiting scholar), competing in both his own and the next heavier weight classes, took third place in one class and retired early with a shoulder injury. Oscar Lahoud (Med School grad student) also

Gutfeld both took first place in their respective divisions, while 13-year-old Daniela Gomez took third in hers. The Ann Arbor "Y" entry for the final team competition, consisting of Shintaro, Pat, Oscar (team captain), Leo and Matthew Keuten, with Chris as team coach, took on teams from MSU, EMU, two from the Kalamazoo area and one from Toronto, successfully reached the final round and faced the Snyder Dojo team from Kalamazoo, led by former US National Champion Chris Snyder. The Ann Arbor "Y" was victorious, taking first place in the team competition.

competing in his own and the next heavier weight classes in the black belt division, took first place in both. In pairs kata competition, Oscar and Chris Ruf took first place with Thomas Gomez and Shintaro Taniguchi taking second.

Several young members of the club from the Ann Arbor community also competed, with the elite U-M adult team serving as their instructors and coaches. 10-year-old Gabriela Gomez and 14-year-old Shaked



Alumnae Meets Students

Last month, AOSS alumna Virginia Bigler-Engler (AB '69, MS, '70) visited the College and spent an afternoon meeting with current and prospective students. Virginia, whose daughter attends U-M, spoke with the U-M American Meteorological Society Student Chapter. Later

that afternoon, she was part of the AOSS Fall Undergraduate Recruiting Event held to interest undeclared College of Engineering freshmen and sophomores in the AOSS program. It was a packed house, with more than 35 prospective AOSS students in attendance.

During both sessions, Virginia shared some of her experiences as one of the first women who graduated from the University of Michigan with a master's degree in meteorology as well as being on of the first women TV meteorologists. In addition to her background in broadcast meteorology, she spoke of what it was like working for the San Diego Air Pollution Control District.

On the Web

Virginia was featured in the 2006-2007 Rackham Alumni Magazine:

http://www.rackham.umich.edu/downloads/publications/2006-07_alumnimag.pdf

Obituaries

Edward S. Epstein

Edward S. Epstein, former chair of the Department of Atmospheric, Oceanic and Space Sciences, died October 14. He was 77. He was a pioneer in the field of meteorological modeling who left U-M to join the National Oceanic and Atmospheric Administration in 1973.

His research career began in the mid-1950s when he worked at the Air Force Cambridge Research Center, Arizona State University, and the Pennsylvania State University. Dr. Epstein came to the University in the 1960s as a professor of meteorology. During this time, his work focused on probability forecasting, quality control, and forecast utility. In 1968, he was a visiting scientist at the University of Stockholm where he developed the ranked probability score that is now widely used in forecast verification.

Dr. Epstein was an associate administrator of NOAA before becoming the director of NOAA's National Climate Program Office in 1978. In 1981 he was named the chief of NOAA's Climate and Earth Sciences Laboratory. In 1983 he returned to research when he was appointed the chief scientist of the Climate Analysis Center of the US National Weather Service's National Meteorological Center, a position he held until his retirement in 1993. He was an elected Fellow of the American Meteorological Society for his outstanding contributions to atmospheric sciences.

He is survived by his wife of 54 years, Alice, his four children and their spouses and eight grandchildren.

Brian "Oscar" Grimm

"Oscar", as he liked to be called, was a graduate of the Michigan School of Art and Design. He started Cardinal Design, LLC, a small company focused on visualizing complicated things, such as science or engineering. With his partner, Tanja Andrews, he also co-founded Freshtopia.net, an award-winning web site and video-blog dealing with food, sustainability and the environment.

In 1998, Oscar began working with AOSS Associate Chair Perry Samson and Professor Thomas Zurbuchen. Since that time, he worked with many AOSS faculty, staff and students on many visualization projects.

"He would start his designs only once he knew how each piece worked, and how they interrelated. His designs were stunning: His animations were shown on TV, his images became title pages of magazines, and his movies stunned amateurs and professional alike," said Thomas Zurbuchen. "His online videos (also known as 'vodcasts') earned him two Vloggies, the Oscar equivalent for this art-form."

Brian David Grimm, 34, of Midland, our loving son, grandson, brother and uncle, passed away Wednesday afternoon, Oct. 1, 2008, surrounded by his family at his home. He was born the son of Oscar R. and Doris A. (Ziehmer) Grimm Aug. 23, 1974, and had resided in this area all his life. He created and ran Freshtopia, a web site where he blogged about healthy eating and living. In addition to his parents he is survived by a sister, Deena L. (Kevin) Ensing; his grandma, Charlotte "Mimi"; one nephew; four nieces; one great niece; and one great nephew.



New Grants

June – September 2008

- Sushil Atreya**, *Scientific Exploration of Jupiter with Juno-Jupiter Polar Orbiter Phase B/C/D Activities*, \$12,483, SwRI
- Michael Combi**, *Cometary Hydrogen Observations with SOHO SWAN*, \$306,469, NASA; *The Structure and Dynamics of the Dusty-Gas Enceladus Plume and Local Atmosphere*, \$203,947, NASA
- Charles Edmonson Jr.**, *Cassini Ion and Neutral Mass Spectrometer Support Supplement*, \$50,000, SwRI
- Xianglei Huang**, *Collaborative Research: Climate Testing Models by Feedback Analysis using AIRS and GPS Radio Occultation Data*, \$243,796, NSF
- Michael Liemohn, Janet Kozyra, Aaron Ridley**, *Auroral Oval Signatures During Extreme Space Weather: Evidence for New Features in Geospace System Coupling*, \$56,036, NASA
- Michael Liemohn, Janet Kozyra**, *Integrated Assessment of Radiation Belt Drivers*, \$451,478, NASA
- Frank Marsik**, *Mercury Dry Deposition Measurement Intercomparison and Workshop*, \$94,996, Great Lakes Commission
- Joyce Penner**, *Participation in Glory Science Advisory Group*, \$150,000, NASA
- Nilton Renno**, *Plume-Ground-Soil Interaction Study Due to Pulse-Modulated Descent Engines at Low Ambient Pressure - Year 3*, \$84,000, NASA
- Aaron Ridley, Tamas Gombosi**, *Global MHD Simulations in Support of the SMART Mission*, \$100,000, NASA
- Richard Rood**, *Reducing Social Disparities of Heatwave Impacts in a Changing Climate*, \$1,317,447, CDC
- Christopher Ruf**, *Development of Radio Frequency Interference Mitigation Algorithms for the Aquarius and SMAP Spaceborne Radiometers*, \$30,000, NASA; *GeoSTAR ASIC Correlator Technology Development and Risk Reduction for PATH*, \$279,130, NASA-JPL; *NPOESS Microwave Imager Sounder Sensor Development and Requirement Specification*, \$1,277,505, NOAA
- Perry Samson**, *Statistical Analysis of Weather Conditions Around the World*, \$1,216, Ford Motor Company
- Allison Steiner, Sanford Sillman**, *Chemistry-climate Feedbacks on Egypt and Nile River Basin*, \$90,000, NSF
- Gabor Toth**, *A Comprehensive Self-Consistent Inner Magnetosphere Model*, \$70,384, Los Alamos National Laboratory
- Thomas Zurbuchen**, *3-Dimensional Interchange Reconnection: Theory and Applications in Solar Heliospheric Physics*, \$30,000, NASA; *IMAGINE Africa*, \$45,000, Google, Inc.; *New Operational Mode for Space-Borne Quadrupole Mass Spectrometers*, \$255,161, NASA
- Thomas Zurbuchen, Lennard Fisk**, *MHD Processes in the Solar Atmosphere*, \$300,000, NASA
- Thomas Zurbuchen, Lennard Fisk, George Gloeckler**, *SWICS and SWIMS Instruments for the Advanced Composition Explorer (ACE): Mission Operations and Data Analysis*, \$1,414,996, NASA-CIT

Halloween on IT Street

by Debbie Eddy and Bobbi Walunas

On October 31, 2008, Melissa Terwilliger (AOSS Data Security Analyst and MAC guru) and Joel Bollinger were victims of a most terrifying ritual: they **GOT MARRIED**. It was a quiet, family affair: An Addams Family affair, that is. In true Melissa style, the members of the wedding party were attired as that infamous clan; Melissa as Wendy, her parents as Gomez and Morticia Addams, her sister as Uncle Fester, and Joel as Uncle Sam. Attending were Pugsley (aka Melissa's nephew) and Audrey of the Little Shop of Horrors (aka Thing). The reception was also graced with the presence of Lancelot and Guinevere, a gunslinger, the Spider Queen, and a robed and slippersed Casual Friday friend. A trick-or-treat pumpkin loaded with sweets and geeky-swell toys was presented to each guest as a memento of the occasion. Regrettably, Cousin ITT didn't make it to IT Street.



More Traditionally Speaking

On August 20, 2008, AOSS graduate student David Applbaum and Elisabeth Jerome were married in Dallas, TX. David is a third year student of Chip Manchester and Tamas Gombosi.

continued from page 1

makes for a class that creates exciting new products.

As part of this class, the students have collaborated with a series of partners from the US and beyond to identify a need, secure funding, design a system, build a deployable ground station, and are currently on their way to Africa to give it a try.

In the beginning, the students learned that about 22 percent of the world's population currently has access to the Internet. About 74 percent of North American's have it, but only 5 percent of the residents of Africa can connect, and they pay a lot more than we do for the privilege. They found out that the Internet could improve not only one's gaming ability, but also one's education, economic development, quality of health care, and many other areas of life. The need was obvious.

So the team investigated the costs and likelihood of success from a financial standpoint. It was decided that a phased approach would be the wisest way to go, starting with pilot user stations and leased capacity on existing satellites, which, the class learned, currently have excess capacity. If the users came, and stayed, then the facilities could

be expanded and dedicated satellites acquired.

Now they came to the engineering part. The IMAGINE ground stations would have to deal with deserts,



IMAGINE ground station's first prototype, deployed in Ann Arbor, MI

mountains, and rainforests, usually with no convenient outlets to plug into. Focusing on durability, serviceability, and deployability, a system was designed with three key components: a communication system (modem/transmitter, Wi-Fi router, and laptop); a power generation system (solar panel and battery); and a physical enclosure for the interfaces and systems. All the

elements were created to be easily set up and maintained.

Having built the system – with lessons on procurement, budgeting, shipping, and Customs hurdles, as well as electronics and real world survivability along the way – they now needed to prove that what they had dreamed up would actually work. We'll let you know how that goes.

If IMAGINE does work as hoped,

the University of Michigan has undertaken the challenge of making key elements of their classes available for free. Information like this, delivered in the right format, and in partnership with the right people, can change the world – literally.

As always in these cases, the benefits are not one-sided. A project like this can also open up the possibility of people from all parts of the world getting to know each other better. Access to the internet could give rural Africans not only a way to receive information, but a voice with which to share the knowledge they have, until now, only been able to pass down to their own children.

The vision of the Internet is to connect the world as one global community. These steps by U-M students to invite a vast and largely silent area of a major continent into that global community should certainly be applauded.



Solar panel placement

Photo by Joyce Okuta

it could open up the world to a lot of people who currently have little or no access to a vast amount of educational, medical, and economic information. For example,

On the Web

To view a presentation of the IMAGINE Africa system on YouTube, go to:

<http://www.youtube.com/watch?v=ordGzTC1Fzg>

In a recent address to the U-M Academic Senate, President Mary Sue Coleman highlighted the class. Her remarks are found at:

<http://annarborchronicle.com/2008/10/27/coleman-advancing-our-academic-excellence/>

MARK YOUR CALENDARS

Monday, February 16, 2009: Distinguished University Professorship Lecture

Joyce E. Penner

Ralph J. Cicerone Distinguished University Professor of Atmospheric Science

Location: Rackham Amphitheatre

Time: 4:00 p.m.

Reception immediately following — Rackham Assembly Hall

Tuesday, March 10, 2009: Henry Russel Lecture

Lennard A. Fisk

Thomas M. Donahue Distinguished University Professor of Space Science

Location: Rackham Amphitheatre

Time: 4:00 p.m.

Reception immediately following — Rackham Assembly Hall

Friday, March 20, 2009: Endowed Professorship Lecture

Tamas I. Gombosi

Rollin M. Gerstaecker Professor of Engineering

Location: TBD

Time: TBD

Reception immediately following

Tuesday, April 7, 2009: AOSS Annual Nelson W. Spencer Lecture

Louis Uccellini

Director, National Centers for Environmental Predictions
NOAA

Location: Boeing Auditorium, FXB Building

Time: TBD

Reception immediately following

This Fall, Michigan Governor Jennifer Granholm visited campus, and presented citations to the University of Michigan researchers who were members of the United Nations Intergovernmental Panel on Climate Change. The IPCC, with former Vice President Al Gore, received the 2007 Nobel Peace Prize. AOSS is proud to say that of the eight U-M members of the IPCC, four are within our department.



Pictured above from left: Maria Lemos, SNRE assoc. professor; Natasha Andronova, AOSS research scientist; Governor Granholm; Ted Parson, SNRE and Law professor; Henry Pollak, Geology professor; Li Xu, AOSS graduate student; and Minghuai Wang, AOSS graduate student. Missing: Joyce Penner, AOSS professor and Rosina Bierbaum, SNRE dean, on leave to the World Health Organization.



Pictured left: AOSS Nobel recipients Joyce and Natasha enjoy some conversation and nibbles.

AOSS Outreach



AOSS Research Scientist Natasha Andronova has spent many hours driving around the state of Michigan talking to classes and community organizations about climate change. This fall, Natasha, who was a member of the Nobel Prize winning IPCC group of scientists, spent time working with a science class in White Lake Township, Michigan. On November 7 the two Huron Valley Oxbow Elementary science teams, their teachers and parents visited AOSS, giving their presentations to an enthusiastic group of faculty, students and staff. The following day, the two student teams, led by their

teacher Mr. Chris McAuliffe, participated in the regional science fair, taking first and second place.

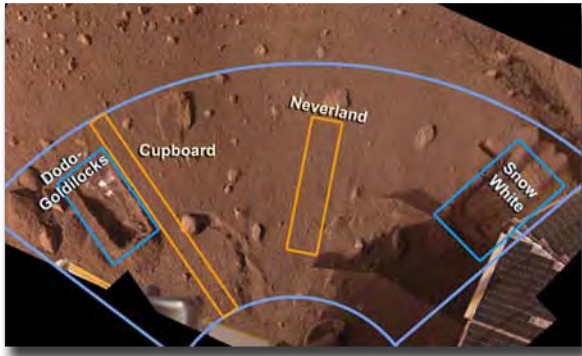
Way to go girls!

In addition to the expert assistance from Natasha, Mr. McAuliffe is a first place winner of the Walter P. Chrysler "Closing the Technology Gap in Education" award. He received a \$15,000 check to use at Oxbow Elementary to energize and engage students in the fields of science, technology, engineering and math (STEM).



"We are so excited to tell you how we did at our tournament over the weekend. We competed against 30 other teams, most of them were 8th graders. The team that did the presentation on the lakes took first place and the ski lodge team took second place. We could not have done this without you. Please tell everyone thank you. We now get to compete at the State Tournament on December 6th. We will send you pics as soon as we get a chance."

Chris McAuliffe White Lake



NASA's Phoenix Mars Lander Surface Stereo Imager shows four trenches dug by robotic arm where definite H₂O ice has been discovered. Image courtesy NASA

Though signals from NASA's Phoenix Mars Lander have stopped because of dust storms and limited sunlight, University researchers who contributed to the mission are continuing their search for conditions favorable to life on the Red Planet by analyzing the data sent back by the lander.

Launched by [the] National Aeronautics [and] Space Administration on Aug. 4, 2007, the Phoenix lander reached the northern region of Mars in May [2008] and has studied the planet's water history, climate and the different layers of its surface.

AOSS graduate student Manish Mehta was one of the University researchers who contributed to the lander's mission to Mars. Prior to the launch date, Mehta spent three years working on the mission – five minutes of the mission, to be precise.

"It was the most important five minutes of the mission," he said.

Mehta's group, led by Nilton Renno, a professor in the Atmospheric, Oceanic and Space Sciences Department, worked on the spacecraft's landing on the planet's surface. The landing was considered especially important because NASA had previously lost contact with a previous rover because of complications during the landing in 1998.

Team Scans Mars Data for Conditions for Life

by Elaine LaFay Originally printed in the *Michigan Daily*

"Not only was I involved, but there were 60 (or) 70 engineers who analyzed all aspects of what could go wrong," Mehta said.

One of NASA's main goals for the project is the search for life outside of Earth. Experts agree that for life to exist, there must be a source of energy, carbon-based compounds and liquid water.

"The goal was to look for water on Mars, but to really think about liquid water, because that's one of the requirements for life to develop," Renno said.

From experimentation and data collection on the atmosphere of Mars, Renno predicted that the rover would land on surface layers that consisted of salt and ice. A NASA orbiter detected hints of ice on the Red Planet in 2002 and the Phoenix mission confirmed its presence.

Renno also proposed that the motion of landing would blast dirt away from underneath the rover and churn up the layers of salty ice and dirt, splashing the rover.

"The evidence is clear that we have droplets of liquid water under the Phoenix lander," he said.

Renno said finding liquid water underneath the rover has many implications for past or current life on Mars.

"If my idea is right – if we really found liquid water – this would be the first place outside Earth we found liquid water to

surface," he said. "And for bacterial life to develop, you don't need much – just a few drops of liquid water is enough."

From its position further north on Mars than any prior spacecraft had been, the lander also observed snow falling from clouds.

Though the lander didn't find any evidence of life on Mars, Renno said the central question was more about the conditions that would lead to life.

"We only know of one place where life exists – Earth," he said. "But if you have the right conditions, would life evolve on most places or not? Is there anything unique about life on Earth?"

The University's team also predicted how the jets on the lander would affect its surrounding soil after touching down, assisted in getting soil samples from the Mars surface to the lab inside the lander and used numerical testing to predict the lander's endurance.

Renno's team has already contracted with NASA for the next mission to Mars, which will launch in October 2009 and will continue examination of many of the same components of the Red Planet from the Phoenix mission.

Scientists say there is a chance the current lander could resume communications if the weather clears on Mars, but the chances of that are slim.

The results of the mission have been submitted to the peer-reviewed journal *Science* for publication.

Cassini Flyby Offers Insight into Solar System History

by Nicole Casal Moore

NASA's Cassini spacecraft flew within 16 miles of Saturn's moon Enceladus on October 9 and measured molecules in its space environment that could give insight into the history of the solar system. Enceladus is Saturn's sixth-largest moon, orbiting within the planet's outermost ring. It is approximately 313 miles in diameter.

"This encounter will potentially have far-reaching implications for understanding how the solar system was formed and how it evolved," said professor Tamas Gombosi, AOSS chair.

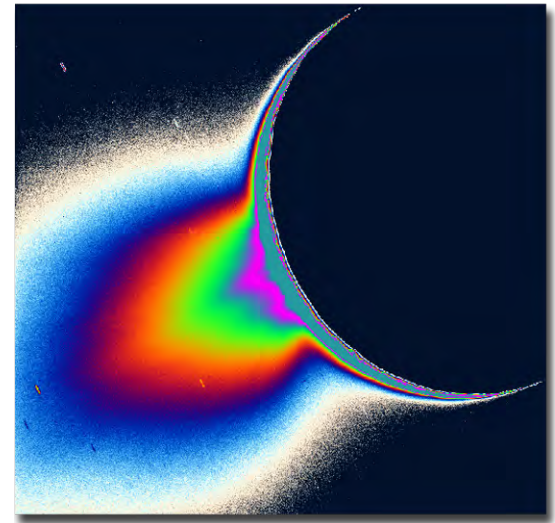
Gombosi is the interdisciplinary scientist for magnetosphere and plasma science on the Cassini mission. His role is to coordinate studies that involve multiple plasma instruments on the spacecraft.

In this flyby, Cassini was close enough to Enceladus to identify individual molecules in the moon's

space environment, including ions and isotopes. The atoms around Enceladus are expected to hold clues to the past because they come from interior regions that have changed little since the moon was formed. Geysers near the moon's south pole spew water and other molecules from the satellite's interior. Because of Enceladus' weak gravity and low atmospheric pressure, the water and gas molecules waft off to space.

The encounter will contribute to scientists' understanding of how particles become charged and energized in Saturn's magnetosphere. Also, when Cassini identifies the different isotopes in the space around the moon, it will help scientists discern the temperatures at various stages in Enceladus' formation eons ago.

Cassini discovered the geysers on Enceladus in 2005. Scientists believe that there could be a liquid ocean



Enceladus geysers

NASA/JPL/Space Science Institute

beneath the moon's surface. They also detected organic molecules at the moon in March. Organic molecules have carbon-hydrogen bonds, and are found in living organisms, and in comets.

"The mission as a whole is expected to bring central pieces of the solar system evolution puzzle into place," Gombosi said. "This encounter is expected to provide some of those puzzle pieces."

This was Cassini's fifth encounter with Enceladus. A sixth encounter took place on October 31 with an approach of within 122 miles of the moon. Four more flybys are planned in the next two years of Cassini's extended mission, the Cassini Equinox Mission.

Great Chili! Great Time!

On Monday, November 17, AOSS held what we hope was the first annual Chili Cook-off. A great time – and great chili – was had by all.

Thanks to the three judges: AOSS Professor Ricky Rood and AOSS graduate students Erika Roesler and Liang Zhao. SPRL electrical/mechanical designer Ron Rizer made the first place chili, second place went to graduate student Dave Pawlowski, and third place to Mary Nehls-Frumkin, AOSS communications manager.



The Chili Cook-off's three judges: Ricky Rood, Erika Roesler and Liang Zhao



Special thanks goes to research administrator Cheri Champoux for organizing a wonderfully tasty event.



Before



After



And in between

News from the Center for Entrepreneurship

The Clean Energy Prize: This is the biggest energy-focused competition at U-M. It is open to teams that include at least one member of the University of Michigan community. For more information visit: <http://www.dtecleanenergyprize.com>

Tech Transfer and Apple present "The Innovation Challenge": Part of the mission of the Office of Technology Transfer is to promote innovation across campus. Tech Transfer and Apple Inc., along with their entrepreneurial partners announced at the "Celebrate Invention" event in October the iPhone Application Challenge. Prizes will be awarded for innovative applications created by current students, faculty and/or staff for iPhone or iPod Touch. The Challenge is designed to be a creative outlet for employees and students and to show off some of the ingenuity at U-M. For more information visit: <http://techtransfer.umich.edu/iphone/>

MPowered Entrepreneurship: MPowered is a student organization focused on students interested in entrepreneurship. The organization offers a great variety of programs and activities. Visit them on the web at: <http://umich.edu/~mpowered>

AOSS Professor Thomas Zurbuchen is Director of the CFE.

Come Here Often?

by Deborah K. Eddy

For a loyal contingent of AOSSers, the answer is Yes. Regulars, such as Jason Daida, Ahmed Tawfik, Mike Liemohn, Dan Welling, and our esteemed Chair, Tamas Gombosi, seem to enjoy gathering around the espresso machine between 3:00 and 4:00 PM in the AOSS Student Lounge. However, there is room for more.

Tea Time offers a chance to get a fresh perspective from faculty and students on that niggly little problem that's been driving you bonkers, or to escape it all together, to talk policy or football. And there's free food! While some just stop by for a pick-me-up and head back to work. "I come for the chocolate," says Roger De Roo. "When the sun shines in my face, I know it's time to get up and take a break." Many agree, coffee/tea/hot chocolate/biscotti time is a good time to get out of our cubby holes and relax, stretch those legs and shoulder muscles, maybe laugh a little. Manish Mehta grabs the opportunity to catch his breath. When he feels too locked up in his own world, Tea Time "gets me out."

Attracting anywhere from 10 to more than 40 faculty, staff, and students a day, AOSS Tea Time is a hit.

So what would make it an even better experience? Well, one suggestion was honey sticks and real Half & Half,

and the sponsoring committee will take that under advisement. Another suggestion might be a bit more complicated to arrange. One must report that, at least during the few days this November when the scene was under surveillance, faculty tended to talk to faculty and students tended to talk to students. A major goal of the committee that invented Tea Time was to provide an opportunity for faculty-student interactions in a more informal, relaxed atmosphere. It's up to those who frequent Tea Time to take

advantage of the opportunity and make that goal a reality. Surely we have students brave enough to stroll over and ask a faculty member if he or she saw the game last weekend. And surely we have faculty brave enough to stroll over to the cube, settle down into those cushy cushions, put their feet up, and find out if any of the students present have biked to the Upper Peninsula lately, or got their cross-country skis ready for the next good snowfall. Or, if you're more comfortable talking about work, the Fall AGU meeting is just around the corner. Who's got some sage advise or a good restaurant to share?



What's NEW?

Your classmates would like to know where you are and what you are doing. Please send us information and a recent photo for *Alumni Notes*. Fill in the accompanying form, send a news article, press release – but send us the information. You can send the information via email to aossnews@umich.edu or by mail to the address below.

Please complete this page and fill in the circles if the information you are providing is a change of address or title, if you know of job openings for students, and/or if you are willing to be a resource person for AOSS students/alumni.

Return via mail to:

Office of Communications
Atmospheric, Oceanic & Space Sciences
University of Michigan
1521C Space Research Building
2455 Hayward Street
Ann Arbor, MI 48109-2143

Name

Employer

Title This is a new title

Professional Address (City, State, Zip) This is a new address

AOSS Degree(s)/Year(s)

Email address

Here is information I would like to share with AOSS.

Class Note:

Yes, I know of summer internships and/or regular job openings for AOSS students/alumni

Yes, I am willing to be a resources person for AOSS/alumni interested in:

Atmospheric Science Space Science Geographic Location

Internship/Job Information

To update CoE grad alumni info:

<https://www.engin.umich.edu/form/gad>

To update U-M grad alumni info:

<http://www.engin.umich.edu/alumni/updateform.html>

FYI:

AOSS is currently working on a site for AOSS alumni(ae).

Thank you!

We asked for your help and you responded – Thank you. We are beginning to develop a database of the information to share with all AOSS students. Last month we asked for your help in answering the question, “What do AOSS graduates do with their degree?” Many of you clicked and took the five minutes to answer our online questionnaire. If you may have forgotten, please take five minutes now and make a *Michigan Difference* to the Department and students. Just click on the link below and tell us what you’ve done with your degree.

<https://www.engin.umich.edu/form/alumsurvey>

PROVOST SULLIVAN AND CFO SLOTTOW ISSUE FINANCIAL UPDATE

November 26, 2008

To the UM Community:

Since we last wrote on October 16, the national economic situation has evolved considerably. Although the economy may remain stressed for some time, we want to assure you that thanks to prudent investment and financial management policies, careful planning, and on-going cost containment measures, the University of Michigan's Ann Arbor campus remains financially sound.

To be sure, our campus does face extraordinary financial challenges. Based on the recent forecasts by U-M economists, the State of Michigan will see contracting revenues in this fiscal year and the next, and the Governor and the Legislature will have to make difficult choices that are likely to include reductions in the state appropriations to Michigan public universities. Affordability—always a high priority—will be a particular concern in the upcoming years as U-M students and families find themselves in more difficult circumstances and we must balance increases in tuition and investments in financial aid.

We are keeping a close watch on further developments in the economy and their impact on our revenue streams as we begin to work on advance budget planning with the Regents, executive officers, and deans. But moving forward, we expect to be able to meet the challenges of the next few years primarily through careful prioritization of our plans and activities coupled with continued cost containment efforts.

Over the past seven years the University has taken a number of steps that have helped prepare us for these turbulent times. Several years ago, the Regents approved a more conservative endowment spending rule which will help cushion our operating budget from the recent large losses in the financial markets. The University has also implemented careful budgeting and investment practices that have protected funding for its highest priority initiatives, guaranteed sufficient liquidity, and minimized losses in endowment value. At the same time, we have made investments in key activities and resources that will help us attract external support from grants, gifts, and contracts. And through an aggressive and systematic program to contain costs and improve the efficiency of our operations, we have reduced the operating costs of the University by over \$135M during the last six years. By continuing this effort, we will net additional savings that will help us deal with the period ahead.

The coming months will not be easy, but we are committed to managing the challenges before us by working together as a community to set priorities and to find new and creative ways to do our work more efficiently. In doing so, we believe we will be able to maintain student access and build the excellence of education and scholarship that is the hallmark of the University of Michigan. Thank you for your involvement and support.

Sincerely,

Teresa Sullivan, Provost and Executive Vice President for Academic Affairs
Timothy Slottow, Executive Vice President & Chief Financial Officer

Thanks to the foresight of the University and College, cuts to the University's academic programs will be minimal—this year. However, we all know that additional funding cuts are in the future.

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.

Please consider a donation to the department today. For further information about helping AOSS students, please contact:

Mary Nehls-Frumkin
734.763.7305
maryln@umich.edu

Thank you for your help.