

Daily Planet

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The Department of
 Atmospheric, Oceanic
 and Space Sciences
 Newsletter

Phoenix lands on Mars! Water lands on Phoenix?

by Deborah K. Eddy

Don't look for little green men of Mars to be skinny-dipping in canals, but their dousing rods might just have a chance of jerking down toward the Red Planet, at least if they are dousing for salt water.

In 2002 the Mars Odyssey Orbiter found large amounts of water ice below the surface of Mars' northern arctic plain. So in August 2007 that's where the Phoenix Mars Lander headed. As part of the NASA Mars science strategy "Follow the Water," Phoenix aimed to dig up and examine the water ice, to (1) study the history of water in the Martian arctic, and (2) search for evidence of a habitable zone and assess the biological potential of the ice-soil boundary.

On 25 May 2008 the Phoenix Mars Lander touched down at the relatively boulder and crater-free north polar region of the planet Mars. As the thrusters blew away the top layer of soil, a layer of water ice was uncovered. One very exciting moment for the mission came when the lander's robotic arm sampled that water ice and placed it in the Thermal and Evolved-Gas Analyzer (TEGA). William Boynton, the TEGA



Photo credit: NASA/JPL-Caltech/University of Arizona

instrument lead scientist, said, "Of course, we know the GRS on Mars Odyssey discovered this ice six years ago, but we've now finally touched it and tasted it." And, he said, "it tastes very fine." Fellow project scientist Peter Smith, of the University of Arizona, Tucson, explained, "Through this analysis we hope to also be able to answer questions that go beyond just finding water ice, but is this a habitable zone on Mars? A habitable zone meaning that we have periodic liquid water, not today but over time, and we have the materials that are the basic ingredients for life forms."

The "not today" part rose for debate as another Wow moment for the mission reached Earth in the form of pictures that seemed to show droplets on one of the lander's struts. Droplets that looked



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AOSS Accolades

Faculty

Professor **Mark Moldwin**, who will be joining the AOSS faculty in the fall, was awarded a UCLA 2009 Academic Senate Distinguished Teaching Award. Factors considered in making the awards include impact on students: scholarly approach to teaching and involvement in community-linked projects and profession.

Congratulations to AOSS Research Fellow **Jason Gilbert** who is one of the seven winners in the 1,000 Pitches contest. Jason won in the Social Change category for MSignS, which was featured in the Spring 2007 issue of the Daily Planet (<http://aoss.engin.umich.edu/files/pages/0507-dp.pdf>). MSignS is a system that translates sign language into speech and vice versa using cell phone technology.

The 1,000 Pitches Contest was organized by the student group MPowered Entrepreneurship and the College of Engineering's Center for Entrepreneurship to encourage students to put forth ideas for new businesses, inventions and non-profit groups. The competition was web-based, with each participant videotaping a three-minute pitch and submitting it online.

On the Web

More about MPowered Entrepreneurship can be found at:
<http://mpowered.web.itd.umich.edu/>
More about the Center for Entrepreneurship is at:
<http://cfe.engin.umich.edu/>

Chris Ruf, SPRL director and AOSS professor, is the Editor in Chief of the IEEE Geoscience and Remote Sensing Society's refereed journal *Transactions on Geoscience and Remote Sensing*.

On the Web

The IEEE Journal can be found at:
<http://www.grss-ieee.org/Publications/TGARS>

AOSS Associate Chair **Perry Samson** was awarded the first Teaching Innovation Prize by the Provost for his "innovative approaches to teaching that incorporate creative pedagogies." More about this will be in the Summer/Fall *Daily Planet*.

AOSS Research Professor **Sandy Sillman** received the AGU 2008 Editors' Citation for Excellence in Refereeing for his work on the *Journal of Geophysical Research*. This is the third time he has been honored with this award. His previous wins were in 1998 and 2003.

Staff

Congratulations to **Frank Lee** who was selected to receive the 2009 College of Engineering Staff Service Award. More to follow in the Summer/Fall **Daily Planet**.

Three AOSS/SPRL staff members are celebrating their 10-year anniversaries this year:

Line Van Nieuwstadt, Senior Engineer, February 1

Other February 1999 events:

- February 11 - Pluto moves along its eccentric orbit further from the Sun than Neptune. It had been nearer than Neptune since 1979, and will become again in 2231.
- February 27 - While trying to circumnavigate the world in a hot air balloon, Colin Prescott and Andy Elson set a new endurance record after being aloft for 233 hours and 55 minutes.

Jim Raines, Programmer Analyst, July 20

Other July 1999 events:

- July 10- USA soccer player Brandi Chastain scores the game winning penalty kick against China in the World Cup, making this one of the best moments in sports history.
- July 20 - Mercury program: Liberty Bell 7 is raised from the Atlantic Ocean.

Aimee Reische, Research Administrator, October 18

Other October 1999 events:

- October - NASA loses one of its probes, the Mars Climate Orbiter.
- October 12 - World population reaches 6 billion people, as the 6 billionth person (according to the UN) is born in Sarajevo, Bosnia and Herzegovina.



New Grants

Sushil Atreya, *MARS Express Planetary Fourier Spectrometer Investigation (Phase E) FY09-FY010*, \$216,111, NASA-JPL

John Barker, *Analysis of Chemically-Activated Atmospheric Reactions Important in the Upper Troposphere and Lower Stratosphere*, \$285,000, NASA

Michael Combi, *Studies of the Dynamics and Composition of the Cometary Coma*, \$835,571, NASA; *US Rosetta Project for Phase E: Virtis Science Support FY09-FY12*, \$436,630, NASA-JPL

Charles Edmonson Jr., *HVPS Fabrication Support to Battel Engineering*, \$14,999, Battel Engineering, Inc.

Lennard Fisk, Susan Lepri, Thomas Zurbuchen, *The Origin and Composition of the Solar Wind and Interstellar Pickup Ions Using Data from the Solar Wind Ion Composition Spectrometer (SWICS) on the Ulysses Mission*, \$263,228, NASA-JPL

Tamas Gombosi, Kenneth C. Hansen, *Interdisciplinary Scientist (IDS) for the Cassini Interdisciplinary Magnetosphere and Plasma Investigation: MO & DA Efforts, Extended Mission*, \$1,135,432, NASA-JPL

Tamas Gombosi, Michael Combi, Kenneth C. Hansen, *U.S. Rosetta Project for Phase E, ROSINA Instrument*, \$1,884,705, NASA-JPL

Xianglei Huang, *Radiative Impact of Cirrus Clouds on Tropical Troposphere to Stratosphere Transport*, \$30,000, NASA-JPL

Xianglei Huang, *Defining CLARREO in a Pre-Phase A Study: A Climate*

Observing System Simulation Experiment and Impact Study on the CLARREO Mission Architecture, \$70,954, NASA-Harvard University

Susan Lepri, *E/PO Supplement, SWICS and SWIMS Instruments for the Advanced Composition Explorer (ACE): Mission Operations and Data Analysis*, \$5,000, NASA-CIT

Michael Liemohn, *GEM: Assessing the Storm-Time Magnetic Distortion in the Inner Magnetosphere*, \$396,835, NSF

Andrew Nagy, *Cassini Mission Team Member: Radio Science Team Extended Mission FY09-FY10*, \$242,499, NASA-JPL

Andrew Nagy, Kenneth C. Hansen, *Comparative Studies of the Interaction and Ionospheric Processes at a Variety of Different "Non-Magnetic" Solar System Bodies*, \$303,355, NSF

Nilton Renno, *In-Situ Studies of Terrestrial Dust Devils and Ambient Meteorology: Applications to Mars' Climate*, \$36,441, NASA-PSI; *MSL MLE Site-Alteration and Dust Lifting Test Program*, \$35,000, NASA-JPL

Christopher Ruf, *An Application for: Collaborative R & D Initiative for the Gulf of Mexico - Development of Hurricane Forecasting Flight Instrument HIRAD*, \$180,000, NOAA-VCSI

Thomas Zurbuchen, Michael Liemohn, *Pickup Ion Composition Spectrometer (PICS) on Mars Atmosphere and Volatile Evolution (MAVEN)*, \$26,981, NASA

Professor takes on climate change skeptics in lecture

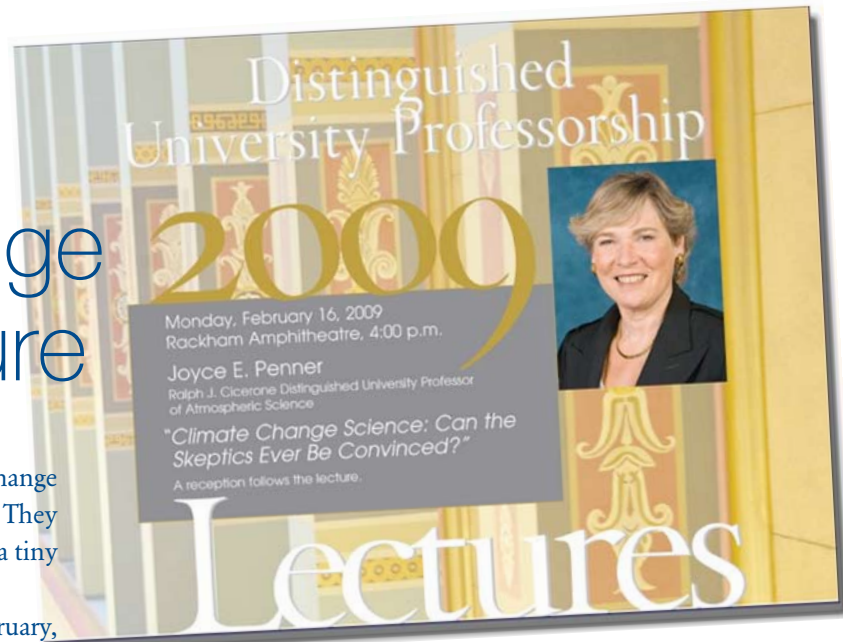
by Nicole Casal Moore

Despite scientific consensus to the contrary, a few climate change skeptics don't believe humans are causing global warming. They blame the sun's cycles, or they base a divergent theory on a tiny piece of the planet's temperature history.

At her Distinguished University Professor lecture in February, AOSS Professor Joyce Penner gave evidence to support and refute some of the popular criticisms of the human-caused climate change theory. The Ralph J. Cicerone Distinguished University Professor of Atmospheric Science, Joyce titled her talk, "Climate Change Science: Can the Skeptics Ever Be Convinced?"

"I went through some of the common arguments against climate change and what the scientific community has done to look at them," Penner said. "I discussed whether the skeptics' arguments have validity, and some of them do. Some of the arguments are based in reality and provide future avenues for research that will eventually enable climate change science to rest on a firmer foundation."

For example, climate change critics have recently drawn ammunition from the World Meteorological Association's data which show that temperatures appear to be falling since 1998. It's true, Penner says, but it's important to look at climate cycles more broadly.



There's also some truth in the skeptics' claim that current computer models of climate change aren't reliable, Penner says. She finds fault in particular with how the models predict aerosols in clouds will affect the climate. Aerosols are fine particles such as smoke and dust that affect cloud thickness. Current models say aerosols will make clouds thicker, exacerbating future warming. But Penner says this might not be the case, and that aerosols might in some circumstances thin clouds out.

Penner's research focuses on how atmospheric aerosols interact with clouds and the effects this has on climate change. She was the coordinating lead author for a chapter of the Intergovernmental Panel on Climate Change's report to the United Nations in 2001 and a co-winner of the 2007 Nobel Peace Prize.



On the Web

The Penner Distinguished Professor Lecture can be viewed at:

<http://lecb.physics.lsa.umich.edu/CWIS/SPT--FullRecord.php?ResourceId=1481>

Drake named Henry Carhart Collegiate Professor of Space Physics

Joining the ranks of other distinguished AOSS faculty members, Paul Drake was named the Henry Carhart Collegiate Professor of Space Physics by the University of Michigan Board of Regents. Professor Drake joined AOSS in 1996 and was director of the Space Physics Research Laboratory from 1998 to 2002. Prior to this he held several positions at the Lawrence Livermore National Laboratory and was at UC-Davis.

At this year's CoE Faculty Awards Banquet, where he received the AOSS Faculty Excellence Award, Paul was recognized as follows:

"Paul Drake typifies what is thought of as a 'rocket scientist'. His areas of study are high energy density physics; experimental astrophysics; nonlinear hydrodynamics and radiation hydrodynamics; and plasma waves in interplanetary and interstellar space. Not something that usually excites your ordinary scholar. But Paul isn't your ordinary scholar – no one with a combined BA in physics AND philosophy from Vanderbilt is ordinary. He followed this with an MS and PhD in physics from Johns Hopkins University; he was elected fellow of the American Physical Society and is an APS distinguished lecturer in plasma physics. Last year, Paul became the director of the U-M Center for Radiative Shock Hydrodynamics – CRASH – a \$17 million interdisciplinary project funded by the NASA Office of Advanced Simulation and Computing and was named the Henry Smith Carhart Collegiate Professor of Space Physics. Paul is anything but ordinary. He is truly an extraordinary scientist and professor. One we are proud to say is part of AOSS."



Paul excelling at one of his many passions.



A special birthday celebration

Long-time AOSS staff member, Margaret Reid, celebrated a milestone birthday April 3 and, while she worked on her birthday, she was "Queen for a Day." The department helped celebrate Margaret's day with a surprise party with cake and other goodies. Margaret joined AOSS in 1986, but we're not telling which milestone birthday she celebrated! If you'd like to wish her a happy birthday, she'd be happy to hear from you at aoss.um@umich.edu.

ALUMNI OBITUARY

Elen M. (Curtrim) Sauk (PhD '83), April 15, 2009



Since the article on **IMAGINE Africa: U-M Students Bring the Internet to Africa** ran in the Winter issue of the *Daily Planet*, people around the world have read about the project as the story has been picked up by a number of news sources including:

International Herald Tribune

<http://www.iht.com/articles/2009/01/29/technology/kenya02.1-416611.php>

New York Times

<http://www.nytimes.com/2009/02/02/technology/internet/02kenya.html?ref=technology>

Voice of America

<http://www.voanews.com/specialenglish/2009-02-14-voa4.cfm>

Government Technology

http://www.govtech.com/gt/print_article.php?id=625147

YouTube

http://www.youtube.com/watch?v=fUUI5_QhIPE

Livingston County Daily Press & Argus

<http://www.livingstondaily.com/article/20090120/NEWS01/901200306/-1/NEWSFRONT2>

Michigan Daily

<http://www.michigandaily.com/content/2009-03-17/engineering-students-bring-internet-africa>

MGU holds 6th annual meeting

The Michigan Geophysical Union, a joint AOSS-Geological Sciences student group, held its sixth annual meeting March 20 in the FXB Atrium with great participation! Each year, in preparation for future presentations at professional conferences such as the American Geophysical Union, students prepare and present posters on their research. The posters are judged by a panel of faculty and the top three posters receive awards. The year's panel of judges were:

AOSS

Natasha Andronova
Ward Manchester
Nilton Renno
Aaron Ridley

Geology

Amy Bengston
Clara Castro
Ingrid Hendy
Steve Kesler

The AOSS student winners were:

Liang Zhao, *The Current Unusual Solar Minimum*, winner of the \$1000 Thomas M. Donahue Memorial Student Award. Advisors: Lennard Fisk and Thomas Zurbuchen.

Daniel Gershman, *Modeling EUV suppression of electrostatic analyzers*, winner of the \$500 second place award. Advisor: Thomas Zurbuchen.

Yiqun Yu, *Simulation study of the Earth's ionospheric outflow*, winner of the \$250 third place award. Advisor: Aaron Ridley.





Students invent medical data logger with AOSS advisor

Six engineering students have invented an electronic data logger kit that makes it easier for medical researchers to conduct clinical drug trials in ambulances. AOSS Research Investigator Darren McKague is the team's faculty advisor.

The kit can record voices, display when its medication contents are expired, and register when the ambulance arrives, among other features. In early February, the National Institutes of Health's Neurological Emergencies Treatment Trials network distributed 150 of the students' data loggers to its 17 hub medical research institutions. The kits will be used in a four-year national study comparing how ambulance patients respond to two

different anti-seizure drugs.

Medical researchers chose the students' prototype over a design from an engineering firm, stating that, "Their solution was the most elegant." "I was very impressed that they came up with a design that was very functional, efficient and streamlined," said Dr. Robert Silbergleit, principal investigator on the study and associate professor of emergency medicine at U-M's Medical School.

The kit contains the medication, a clock, a GPS tracker, an accelerometer, a vibration sensor, a time-stamped voice recorder, two special D-batteries, a thermometer, an SD memory card and a

16-bit microprocessor to pull everything together. The data logger components are all off-the-shelf.

The team started working on the project, a joint program between AOSS, EECS and the Medical School, in April 2008, working all summer and finishing in the fall. Several of them spent two days field testing in ambulances in Cincinnati.

The project was supported by Award Number U01NS056975 from the National Institute of Neurological Disorders and Stroke. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Neurological Disorders and Stroke or the National Institutes of Health.

Magic Bus student team wins entrepreneurial competition

"*Magic Bus* Public Transportation Tracking System", submitted by the team of Jahan Khanna, Schuyler Cohen and Adam Berkaw, was selected as one of two winners from more than 30 submissions in this year's RPM-10 Internship Competition. AOSS Professor Chris Ruf has worked with students on the project since the fall of 2004.

This team of undergraduate students will expand and commercialize the *Magic Bus*, a student-run project to develop software for predicting the arrival time of campus busses to any stop via embedded GPS locators. Students can use their personal computers to track and visualize the routes of all busses currently running at the University. During their ten-week \$25,000 summer internship,

the team will expand the technology to mobile phone platforms and receive business planning and coaching from RPM Ventures and other business professionals. The student team will be expected to 1) launch the *Magic Bus* start-up company with free office space, legal services and financial support; 2) develop and deliver a prototype/demo of the *Magic Bus* mobile phone platform; and, 3) present to a panel of investors for future potential funding.

RPM is a venture capital firm based in Ann Arbor.



An Open Letter to President Obama on Climate Change from the U-M Student Forum on Climate Change

NOTE: AOSS Research Scientist Natasha Andronova is the Forum's faculty advisor.

To: President-Elect Barack Obama
From: *Student Forum on Climate Change at the University of Michigan*
Date: Friday, January 16, 2009

Dear President-Elect Obama:

We, the Student Council on Climate Change at the University of Michigan, would like to share our research, ideas and suggestions on how to take action for a positive effect on the Earth's climate. Throughout the past four months we have had brilliant minds, experts in the field of climate change from throughout the United States with substantive experience in health, economics, engineering and science, come to the University of Michigan to share with us what they have found through their research and to give us their ideas on subjects ranging from the health risks of the changing climate to geo-engineering with its benefits and risks for a changing climate. The following constitutes our evaluation of what we have learned and formulations for how we believe the U.S. government should assertively deal with the growing problems associated with climate change.

The specific problem we would like to see addressed is the large amount of anthropogenic greenhouse gas emissions in the atmosphere and its effect on the energy balance of the Earth. Since the industrial revolution, the major sources of contributing greenhouse gases have increased approximately 25%. Research has nearly conclusively shown that this increase in greenhouse gas (GHG) emissions is associated with an increase in global temperature, which leads to a variety of problems ranging from health issues to an increase in severe weather patterns.

In order to reduce change in temperature, a number of ideas have been researched, considered and interviewed in order to intervene in the changing temperatures associated with anthropogenic emissions. After looking at all of the suggestions, we evaluated them from the point of view of scientists, engineers, economists and policy makers and are proposing the following plan to combat global warming.

We also recognize that steps are already being taken. The next necessary steps we propose build off of the measures for decreasing GHG emissions that are in effect now. We understand that there are limited funds to allocate to climate change. With this in mind, we think the funds available should be focused on research, education, power generation and the development of new energy sources in the following ways:

First, we want to invest money and effort on improving efficiency and lessening the carbon dioxide and GHG in the atmosphere. Other geo-engineering methods including the input of additional aerosols into the stratosphere and reflective devices out in space have the possibility to cause even further damage to our delicate environment - whether by unforeseen physical effects or the psychological deterrent of positive steps we have already taken toward mitigation.

We suggest that the steps that should be implemented and/or researched further include:

- I. Air capture and Carbon sequestration
- II. Algae-based biofuel
- III. Educational awareness of the concept of energy efficiency in elementary schools
- IV. Regulations on the efficiency of building codes and common household appliances
- V. The creation of a nationwide movement towards mass transportation.
- VI. The use of solar power, wind generated power, and the expansion of nuclear power.

In the attached paper we detail how we came to these recommendations and provide a more explanation of which steps we would like to see implemented in the United States.

Thank you very much for considering our proposal. We wish you and your New Administration the utmost success, including in aggressively taking on the challenge of global warming.

Sincerely,
Student Forum on Climate Change at the University of Michigan

Update on U-M Solar Car Team

Dear U-M Solar Supporters,

This year marks the 20th anniversary of the founding of the University of Michigan Solar Car Team, a period that has seen the team win an unprecedented five national championships and finish as high as third in the world three times. Michigan's display at the 2009 North American International Auto Show (NAIAS) showcased Continuum after its victory in the 2008 North American Solar Challenge, and also provided a retrospective of the team's rich history. As we seek to inspire and educate the public about our team's achievements, we also provide recognition to the sponsors who have made our team's success possible. Lastly, this display previewed our next vehicle, Infinium, which is to compete in the World Solar Challenge in October 2009.

Additional information may be found on the team's website at: <http://www.umsolar.com>.

Go Fast, Go Smooth, Go Blue!

Steve

—
Steve Hechtman
2009 Project Manager
Solar Car Team
University of Michigan

AOSS is a proud supporter of the U-M Solar Car Team

News from the U-M Alumni Association

The U-M Alumni Association of the University of Michigan recently announced that it is offering free one-year memberships, normally priced at \$64, for unemployed U-M alumni. The free memberships will be funded through a newly created Economic Hardship Fund. "In this economic environment, more and more alumni are looking to us to take advantage of the alumni network, our career services and discounts," said Steve Grafton, Alumni Association president and CEO. "It's the right thing to do."

The Alumni Association also unveiled a new Web page (<http://www.umalumni.com/economicresponse>) that focuses on the benefits that alumni most need now. These include job postings, career

counseling, career-focused podcasts, short-term health benefits, and other savings and discounts. In addition, the site has a section highlighting ways that employed alumni can help others in the Michigan network by volunteering as career mentors and posting jobs at their companies. Alumni who have the means are encouraged to join the Association and contribute to the Economic Hardship Fund. Member dues and the Economic Hardship Fund subsidize these complimentary memberships and all of the Association's programs and services.

Alumni can find details on all member benefits and how to take advantage of the free year by visiting <http://www.umalumni.com/economicresponse>, calling 800-847-



ALUMNI ASSOCIATION
UNIVERSITY OF MICHIGAN

4764 (Monday-Friday, 9:00 AM – 5:00 PM) or emailing m.alumni@umich.edu. Those interested in contributing to the Economic Hardship Fund should contact Jane Spiess at 734-763-9702 or cjspiess@umich.edu.

On the Web

For more informaton, visit:
<http://www.umalumni.com>

Alumni Notes



University of Michigan Athletic Director Bill Martin, shows off the *Little Brown Jug* to AOSS Alumni **Jeff Masters (BS, '82; MS, '83; PhD, '97)**. Martin, who is a Weather Underground fan, gave Jeff and wunderground software developer Yaniv Zimet a "behind the scenes" tour of the U-M Athletic Department. The *Little Brown Jug* is the oldest sports trophy in existence in the US.

Paul Harrison (PhD, '70) had his memory tickled when he received the 2009 WeatherDance announcement. "It brings back memories of a forecast-off that we had about 1967. I placed third in a field of about 60 students and faculty. The faculty narrowly won the top two spots by not forecasting the more difficult days and yet made the 90% participation rule. I, lacking the stealth, forecasted 98% of the days. We had a state supported weather reporting station ... I was the Tech. for about six years. I earned about \$ 25.00 a month.... I was glad to get it even though you had to visit the site at 5 PM every day, but I had help for \$1.00 a day from Lucy Torres a tech from Columbia (not a student)."



State Champs!



On page 10 of the *Winter Daily Planet* was an article about two teams of science students from the Huron Valley Oxbow Elementary School in White Lake Township who had been mentored by AOSS Research Scientist **Natasha Andronova**.

Hard work and mentoring paid off as one of the teams, pictured above took first place in the state tournament. Here is what their science teacher, Chris McAuliffe, had to say about the win and Natasha's mentoring of the girls.

"We have some very exciting news for you. The girls competed last weekend at the state tournament in Novi and took first place. We would really like to thank you for all of your help. You inspired the girls and took the time to make them feel important. They told the judges that they couldn't believe somebody as important as you took the time to help them. You made a difference in their lives ... Thanks again and we will keep in touch."

Natasha is already talking about "adopting" the girls and, of course, continuing to work with their teacher. This is a great example of how a small amount of outreach can reap huge benefits. Congratulations to the two teams, Mr. McAuliffe and Natasha.

Does anyone remember when... who... or why?

If you know anything about this person or event, send your remembrances to:
aossnews@umich.edu

continued from Page 1

an awful lot like liquid water. Over the next 44 Martian days, the droplets grew, as if pulling in more “water” from the thin, cold atmosphere. They seemed to move, drip, and merge, before eventually disappearing as the temperature fell.

Though Mars is currently too cold for the kind of liquid water you and I might care to consume to be present on the surface or in the atmosphere, many salts, working like antifreeze, or the salt you put on your driveway in the winter, lower the temperature at which water freezes. If these salts are present on Mars, then there is the chance that some vestige of the liquid water that many lines of evidence say was present when Mars was a younger, warmer place, may still be present just below the surface and in the atmosphere, as well as in the frozen reserves below its topsoil.

Such perchlorate salts, or brines, were indeed detected in the area where Phoenix landed.

To help explain the visual images and thermodynamical evidence from Phoenix, experiments were run in a laboratory planetary chamber at the Center for Astrobiology in Madrid, Spain, simulating the conditions on Mars at the Phoenix landing site to get a closer look at what might develop. When water vapor was added to the chamber, small spheroids appeared, remarkably similar to those in the photos from Mars, further strengthening the identification of the Phoenix phenomena as liquid salty water, also known as brine. The sodium perchlorate in the test chamber became spheroidal, darkened, and grew, similar to what had been seen on the Phoenix landing strut.

According to Susanne Young of the science team, the amount of carbonates found in the Martian soil also argues for the existence of liquid water.

The evidence was convincing enough that AOSS Professor Nilton Renno stood before a room full of eager (and skeptical) participants of the 40th Lunar and Planetary Science Conference in The Woodlands, Texas, on 23 March 2009 and announced that the “evidence for liquid water is overwhelming.” The paper he presented at that meeting was coauthored by 21 of his coinvestigators on the Phoenix mission, though other members of the Phoenix team disagree (see sidebar).

Professor Renno was invited to NASA Headquarters to give a talk on this exciting discovery, and papers outlining the evidence for liquid saline water on Mars have been submitted to the *Journal of Geophysical Research and Science* magazine.

If there is water, liquid water, could there be life? If not little green men, perhaps at least bacteria? Temperatures on this part of Mars are currently in the 5° to 140° F range. But over the years Mars has tilted on its axis, bringing more sunlight to the arctic region, warming the soil and melting the ice. Could such times have allowed life to evolve there?

On Earth life has been found in the most unlikely of places: in the dry valleys of the Antarctic, the coldest, driest places on Earth, microbes called lithophiles make a living in tiny pools of water several

NOT EVERYONE CONVINCED

Some scientists, including some of the Phoenix science team, are not quite convinced. University of Arizona’s Peter Smith, principal investigator of the Phoenix mission, is keeping his options open. Though he signed the paper announcing the water find, he is also an author on another paper that claims no liquid water was found. According to Mike Hecht of NASA’s Jet Propulsion Laboratory, the images are too low resolution to be able to say unequivocally that the droplets are spheres, that the droplets are more likely to be frost. Bill Boynton, head of the TEGA team, does not believe the evidence is complete.

kilometers below the surface, surviving on energy from chemical reactions between the water and surrounding rock. Microbes have also been found to survive in small pockets of water—inclusions—trapped within evaporated salt deposits, and cyanobacteria have been found, still exhibiting low levels of metabolic function, in deposits of evaporated salts. Quite similar to the salt deposits found on Mars.

In November 2008, more than five months after touching down on the Red Planet, the Phoenix Lander watched the sun descend, the source of power for its solar cells calling it a night, and the Phoenix mission came to an end, leaving its Earth-bound team members to sift through the data and ponder and debate what it all means.

On the Web

Read more about the NASA Phoenix Mars Lander at:
http://www.nasa.gov/mission_pages/phoenix/main/index.html.

Civil Space: The Legacy and the Future

Recently, AOSS Professor Lennard Fisk had the opportunity to speak to two disparate groups on Civil Space and the National Agenda. First, on March 3, he testified before the House Committee on Appropriations Subcommittee on Commerce, State, Justice and Related Agencies. Second, on March 10, he received the prestigious University of Michigan Henry Russel Lectureship Award and delivered his Henry Russel Lecture.

In both, Professor Fisk gave perspective to the great impact space science has had on society – weather, telecommunications and global positioning satellites; astronomical observatories that have expanded our knowledge of the universe; space flights that have shown us the fragility of the Earth; space missions that have increased our understanding of the Sun and our solar system.

Following are excerpts from the presentations:

“There are some who think of civil space only as NASA, and then only as human space flight; whether it is worth it, where should we go? Civil space is so much more. It impacts our every-day lives – how we communicate with

each other; our weather forecasts; how we understand our globally intertwined world.

Civil space impacts our understanding of our place in the cosmos, the future of our planet.”

“One of the most important impacts of space on society is that space has provided the basis

“Over the years since the beginning of the Space Age, we have also seen space become part of the underlying infrastructure of our civilization.”

for our growing human awareness that we are highly interdependent. What China does to the atmosphere affects the United States. What the United States does to the atmosphere affects Europe. What we all do to heat the Earth affects the polar regions. And so on. Most of us know this. Most of us came to this realization because of the global perspective on the Earth that has been provided by space observations. Most of us would like to see wise decisions being made to protect that fragile globe that we saw from

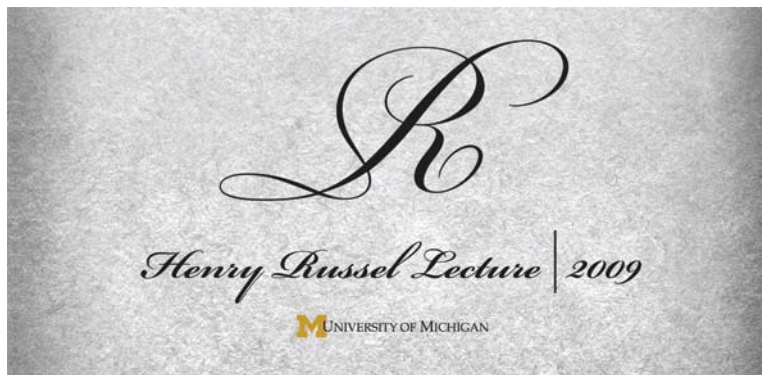


Apollo 8 and be sure that it remains our hospitable home in the hostile and lonely environment of space.”

“At the foundation of all our space activities is science in NASA. Science often provides the initial reason for why we explore a new region in space, or even a new region of the electromagnetic spectrum. The technology developed for scientific exploration enhances our other space activities, and finds its way into our economy.”

“We invest in scientific research because it provides the foundation of knowledge on which we depend to advance our civilization.

We invest in space because it is essential to the future of our nation, for the stewardship of our planet, for the growth in our economy, for our position as a world leader. It follows, therefore, that the science of space, space and Earth science in NASA, is as important to our nation as any other scientific discipline.”



Zurbuchen calls attention to need for University-class space missions



In testimony delivered during a recent Capitol Hill hearing organized by the Aerospace States Association (ASA), Thomas Zurbuchen, AOSS Professor and Vice Chair of the Universities Space Research Association's (USRA) Council of Institutions, urged action on two pressing issues affecting space-related research at US universities and our nation's ability to remain a leader in space. His remarks drew attention to the dramatic decline in “hands-on” research opportunities for graduate students and also on the need to better balance the impact of ITAR restrictions on US space-related research with national security needs.

Professor Zurbuchen pointed out that the number of small missions

and experimental launches – missions that had provided critical experience for generations of US researchers – had declined by more than 80% since the late ‘70s and that this decline is negatively impacting the nation's technical workforce. Quoting the findings of a 2004 commission on US Space Exploration Policy, he read, “At present, there are insufficient methods for students to acquire hands-on experience in the scientific and technical disciplines necessary for space commerce and exploration.” He indicated that USRA's university council unanimously adopted a resolution urging that at least 1% of NASA's total budget be devoted to these types of missions.

Speaking on the adverse impact of

export control regulations on US space-related scientific research, he used his own experience to illustrate the difficulties that “ITAR” restrictions pose to researchers. Referring to the MESSENGER mission to Mercury on which he had worked in 1999 designing a sensor, Zurbuchen told of the circumstance in which he was not allowed to see technical information that he himself generated, because he was not at the time a US citizen or permanent resident. In order to alleviate the difficulties created by the current export control structure, Dr. Zurbuchen urged adoption of measures recommended by USRA: 1) extend the ITAR basic research exclusion to industry and nonprofits, 2) conduct a top-to-bottom review of the current US Munitions List and Commerce Control List, and 3) extend to agencies such as NASA an ITAR exemption for international programs, similar to that accorded to the Department of Defense for foreign military sales.

On the Web

A complete copy of Professor Zurbuchen's testimony is available at:
http://www.usra.edu/galleries/ipc_files/testimony_zurbuchen09.pdf

ABOUT USRA

The Universities Space Research Association, established in 1969 by the National Academy of Sciences, is a private, nonprofit consortium of 102 universities offering advanced degrees in space- and aeronautics-related disciplines. USRA's mission is to conduct leading-edge research, develop innovative technologies, promote education and policy across the breadth of space science, and operate premier science and technology facilities by involving universities, private industry and government.

*"To repay our debt to our mentors,
we must do everything we can to
mentor the next generation."*

On March 20, AOSS Chair Tamas Gombosi delivered the Rollin M. Gerstaker Endowed Professorship of Engineering Lecture entitled, It Takes a Village: The Making of a Space Scientist. True to his Hungarian spirit, Tamas was originally going to deliver a lecture on the Detailed Derivation and Hyperbolic Properties of the 35 Moment Transport Equations with Applications to Partially Ionized Rarified Space Plasmas ... a clear head prevailed and he spoke instead on mentors – on the importance of having one and being one.

Here are Tamas' "Rules of Mentoring"

- Only mentor people who are professionally ready
 - Mentoring starts at the postdoctoral level
 - Choose people who are better than you are
- Focus on:
 - Giving the big picture and help to choose focus areas
 - Introducing to the inner circles of the field
 - Introducing to the "facts of life" (competition)
 - Challenging to strive for excellence
 - Teaching that even the most accomplished people are human and make silly mistakes
- Do not micromanage, interfere or rescue
- Don't expect gratitude or favors



Pictured with Tamas are (top) Andy Nagy, AOSS professor and one of his mentors; Zoltan and Eszter Gombosi, his son and wife.

On the Web

You can view the complete lecture at:

<http://inst-tech.engin.umich.edu/media/index.php?sk=aoss-seminars&id=4975>

AOSS Happenings

Twinkle, twinkle, twinkle stars

by D.K. Eddy

The S.H.R. group is all aglow
with three new protostars to show.
Sue Lepri and Nate Foster came forth with twins.
Herald the news on the solar winds.

Lady Averie, at 5 pounds 3,
with pinky raised, awaits her tea.
While 6 pounds 6 was brother Augustin.
From the look in his eye, best make that caffeine.

Both were born on January 4,
and the very next day we got one more.
To Jonathan and Belinda Thomas
was born son William, at 7 pounds 12 ounces.

Will means determined or resolute,
but this little guy smiles and says, "Ah shoot.
I may be a single, solitary guy,
but I've got elbow room, ha hai."

The solar-heliospheric research group
has gathered the data and garnered the scoop.
We publish our findings, these three are keepers!
Now lower our voices and let's hope they're sleepers.



Jasper Kok and Shanna Shaked wed on August 23rd, 2008, "in a little town called Qualicum Beach on beautiful Vancouver Island off the west coast of Canada. I am Dutch and Shanna is from Arizona so both our families would have to fly anyways, so we figured we'd do it in a beautiful natural setting so that our friends and family could make a vacation out of it. We also went whale-watching and sea kayaking with all the wedding guests in the days before the wedding," Jasper tells us. He also mentioned that his wife *insisted* he wear that tie! Jasper's brother Diederik officiated at the wedding.

We've also heard that Manish Mehta plans to wed on the 4th of July 2009 to Kasha Benton. Stay tuned for those pics.

Make a Michigan Difference Today



150th Anniversary Campaign

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