



EOS SPHERES

Institute for the Study of Earth, Oceans, and Space • A University of New Hampshire Research Institute • Morse Hall, Durham, NH

UNH Ranks High

According to a national analysis of Earth science citations.



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A Journey Awaits

Into the remnants of political and social upheaval.



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It's a Small World

But a massive Earth Ball on GIS Day 2002.



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Winter 2003

Vol. 2 Issue 1

EOS explores the links between our research and public health through the Public Health and Sustainability: Vital Signs of New Hampshire series. These ongoing public presentations are coordinated by the Office of Sustainability Programs, and co-sponsored by EOS and other campus groups. Past topics have included the health impacts of climate change and bad air quality. Spring topics will include integrative health and water shortage.

http://www.sustainableunh.unh.edu/climate_ed/vital_signs.html

Focus on the Region

Collaboration Proves Healthy for Air Quality Research

Kids attending camps in New Hampshire this summer will be routinely breathing into spirometers, instruments that look like small wind fans, to provide a measure of their daily pulmonary health. At the same time, Earth scientists will be collecting hourly air quality data for quantifying the relationship between poor air quality episodes and respiratory health problems. This pilot study is just the beginning of a much larger collaborative research project representing a new way of involving stakeholders in climate and air quality research at EOS.



A poor air quality day (bottom) near Mt. Washington may be responsible for exacerbating respiratory problems. Notice the visible difference made by a good air quality day (top) at the same location. Photo by CamNet (www.hazecam.net).

Sponsored by the Office of Global Program's Regional Integrated Sciences and Assessments program, a main funding criterion was to include a broad range of stakeholders in every step of the project. The diverse group of knowledgeable stakeholders for this study includes epidemiologists, economists, nurse researchers, local and state health departments, public health organizations, and various university programs.

"This is a new way, from my experience, of doing science," explains Cameron Wake. Wake is research assistant professor of Earth Sciences, faculty member of EOS, and principal investigator working with co-investigators Tom Kelly, director of the UNH Office of Sustainability Programs, and Jeff Salloway, professor of health management. "The payoff will be in more socially relevant research. Health practitioners need this information, and in this project, they will not have to find out about it from a journal article published way after the research was conducted, but will be able to use the results immediately."

Better and quicker access to information, in the case of pulmonary health, can help to save lives. Plus, explains Wake, quicker dissemination of information from the study can inform policy decisions in a timely manner. Says Wake, "we have been able to develop a research program that is better, stronger, and faster."

While neither collaborative research, nor research on these kind of relationships is new, very little research on air quality and human health has been done in New England. Plus, with the help of EOS's AIRMAP project, the NH Department of Environmental Services, and the ME Department of Environmental Protection, air quality data of high spatial and temporal resolution will offer up-to-the-minute reports on a large variety of criteria pollutants. With the help of the health professionals, the group will also strive for continuous measures of pulmonary function.

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Can Space Science Save Lives?

What do the Sun and the innermost recesses of the human body have in common? Both may someday be explored by technologies designed by UNH astrophysicists for the Solar Neutron Tracking Experiment (SONTRAC), a neutron imaging spectrometer.

While SONTRAC was originally conceived to monitor high-energy emissions from the Sun, this versatile instrument may have an application here on Earth in cancer therapy. For space science, SONTRAC is valuable in that it measures both the direction and energy of neutrons that enter the detector by tracking their collisions with protons. While neutrons are of little interest to the medical community, SONTRAC's ability to precisely track protons can be a matter of life or death.

"Let's say someone has a tumor in their skull," explains Richard Miller, Research Assistant Professor of astrophysics at EOS. "Protons of the right energy, precisely directed in fine beams, can traverse the surrounding matter and deposit most of their cell-killing energy

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Technician Stan Ellis posing by the SONTRAC neutron imaging spectrometer.



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Can Space Science Save Lives? continued from page 1



at the tumor location. The SONTRAC detector could be a valuable tool for calibrating these proton beams.”

One challenge with current methods of proton radiotherapy is that the proton beam needs to be positioned accurately to avoid killing healthy tissue. According to Miller, UNH astrophysicists have developed a highly efficient detector with better than 1mm position resolution, which is good news for people with cancer.

Miller acknowledges that this is not his area of expertise, “We’re not medical oncologists, so we are currently looking for knowledgeable people interested in partnering with us.” Miller is working with EOS scientists Jim Ryan, and Mark McConnell, and collaborators at the University of Bern, Switzerland, to develop the spectrometer.

John Macri, Project Manager for SONTRAC, recently attended a conference on medical imaging. There, he found clear signs that the type of detector being developed for SONTRAC could meet the performance required for cancer therapy.

Says Macri, “If we present our case and make it visible to the medical imaging community, they may recognize an advantage in our approach.”

However, he points out that their primary goal for the instrument is to put it on a NASA mission to observe the Sun. A recent grant from NASA will go towards making this goal possible as the team prepares SONTRAC for flight in space. –AS

<http://astrophysics.sr.unh.edu/>

From the Director

Milestones in Research

As we enter a New Year, two extraordinary milestones must be noted.

First, according to the Institute for Scientific Information (ISI), UNH is ranked first in the country in Geosciences for the period 1997-2001 (<http://in-cities.com>). UNH was followed in this ranking by Harvard, Princeton, Univ. of California-Irvine, and the Univ. of Washington. (See UNH Ranks First, page 3.) Much of this success is based on publications by EOS Faculty.



The other very significant milestone was the continued increase in the level of outside support for our science. The year 2002 saw the largest volume of externally funded research activity in the Institute’s history – nearly \$25 million. These milestones both reflect, in part, the community’s recognition of the scientific excellence of the Institute. The challenge for us as scientists, educators, students, and staff is to continue to contribute our collective energy and intellect to understand the fundamental processes that control the universe and shape life on Earth. In doing so we keep central our commitment to create an environment that advances visionary scholarship and leadership in the Earth and space sciences.

Reflecting on our past achievements and the remarkable people in EOS and other colleagues who partner with EOS, I am confident we will continue in the tradition revealed by the recent ISI rankings. – Berrien Moore III

A tribute to fellow explorers . . .

Just as this issue of Spheres was going to press, we learned the fate of the astronauts on board Columbia Space Shuttle Mission STS-107 (113).

Astronauts and human space flight are deeply interwoven in EOS. Only recently, we shared the excitement of Lee Morin’s visit following his successful flight STS-110 (109), and last June, our students were thrilled and challenged by STS-109 (108) Astronaut Richard (Rick) Linnehan’s graduation address. While not a UNH graduate, EOS delighted in Piers Sellers’ wonderful flight on Atlantis aboard STS-112 (111). Thinking back, all of us in EOS remember the extraordinary tension and eventual elation when GRO was launched on STS-37 on April 5, 1991.

The tragic loss of the crew of Columbia raises again the debate about human space flight. This debate is proper; it honors the activity, and it recognizes that space exploration, like all exploration, has a risk. This debate is old, and yet it is forever new, as technologies and missions, goals and objectives, change and evolve. I recall well Judith Resnik, who perished in the Challenger accident, discussing with great clarity the various issues and balance points at a Space Studies Board meeting in the summer of 1985. She reveled in space flight and in the debates about space flight.

We all need their bravery now.

Collaboration Proves Healthy continued from page 1

Gathering measures of pulmonary function is not an easy task, making this “an interesting and, at times, difficult study.” To use the example of asthma, not everyone who has an asthma attack seeks medical help, so the actual rates of exacerbation might be hidden behind household doors. Also, because of incomplete medical knowledge of this condition, people who don’t have asthma can sometimes be diagnosed as asthmatic, and vice versa.

While part of this study will look at trips to the emergency room and the doctor’s office, this is only, says Wake, “the tip of the iceberg.” The team will also be looking at the less obvious evidence of pulmonary distress, such as school and work absenteeism and insurance information. Spirometer measurements will allow for continuous data collection, a notion that came from a research team member from the American Lung Association.

Adam Wilson, a graduate student coordinator of the project, has already begun a preliminary study in Portland, ME, looking at admissions to hospitals for respiratory distress and is comparing these records with daily air quality data on a city scale. Following this summer’s pilot study in camps, spirometer measurements will be taken in elementary schools in Manchester, NH, in conjunction with the Manchester Health Department. The current funding also enables research in Burlington, VT.

Although the study has just recently begun, Wake is already convinced that collaborative research is key to a study of this type. States the scientist, “For complex problems that involve the environment and people, this is a much better way of doing science.” – Amy Seif

<http://airmap.unh.edu/assessment/index.cfm>

EOS Innovations

Speaking Volcano-ese

Even the most dramatic events, such as the spectacular eruption of a volcano, can start in tiny, almost undetectable, ways. The prediction of volcanic eruption still eludes scientists, but an international group of modelers are determined to get closer to understanding this often devastating phenomenon.

Just days after the eruption of Mt. Etna in November, the Volcanic Eruption Mechanism Modeling Workshop was held for three busy days in Durham, NH. Participants from Russia, England, Italy, Israel, Japan, France, Germany, and the U.S. found that, when it comes to developing models of volcanic processes, they can all speak the same language.

The workshop was funded through the National Science Foundation and hosted by Dork Sahagian, EOS and Earth Sciences Research Professor, and EOS Research Scientist Alex Proussevitch. Sahagian set the tone for the workshop with his opening announcement, "This is a workshop, not a conference. So, let's roll up our sleeves and get to work."

Much of the discussion on the first day of the workshop revolved around "bubbles," gas that gets trapped in and around rock crystals after an eruption. These scientists, who can spend days examining the intricacies of beautiful rock crystals, seem to share a common understanding within this foreign world, regardless of their various backgrounds.

The second day focused on the models themselves, and the workshop culminated with the establishment of requirements for all models of volcanic eruption. The true test of the participants' ability to speak a common language through models will be at the April American Geophysical Union meeting in Nice, France where results from this workshop will be presented. -AS  http://gaim.sr.unh.edu/volc_workshop/



An erupting volcano, mysterious and beautiful, produces gases, particles, and earthquakes that may provide modelers with clues for predicting future eruptions.

UNH Ranks First

UNH can boast of being a top-notch university in the geosciences, ecology and environmental sciences thanks to recent ranking by the Institute for Scientific Information (ISI). ISI analyzed the average citations per paper among the top 100 federally funded U.S. universities that published at least 100 papers in ISI-indexed journals, and placed UNH among the "High-Impact Universities" in these fields.

In geosciences, UNH is ranked first — ahead of Harvard University and Princeton University. According to the ISI analysis, from 1997-2001 UNH published 281 geosciences papers, with an average of 10.19 citations per paper.

In a similar analysis of papers in ecology and environmental sciences, UNH is ranked fourth — below the University of Chicago and above Stanford University. According to the ISI analysis, from 1996-2000 UNH published 169 papers in ecology/environmental science with an average of 7.56 citations per paper.

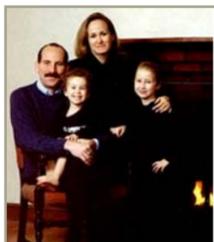
A large number of EOS-affiliated faculty, as well



as colleagues in the College of Engineering and Physical Sciences and the College of Life Sciences and Agriculture, contributed to the high rankings.

Not only is the university as a whole ranked high, but our very own John Aber, professor in EOS and Natural Resources, is noted as one of the top 20 most cited scientists nationally in ecology/environmental sciences over the last decade. Aber is ranked eleventh by ISI, with 54 papers that were cited 1,765 times by other scientists. The scientists on the top 20 list represent the top 1% of scientists ranked by total citation count in this field.

As research funding for the university continues to rise, with an increase of 4.8% recorded for the last fiscal year, the quality of research at EOS and at the university is likely to receive similar accolades in the future. Total funding for EOS in the last fiscal year was recorded at \$22,784,304, with our largest sponsors being the U.S. Department of Commerce (NOAA) and NASA.  <http://in-cites.com>



In Memory Charlie Falkenberg, who with his family was a victim of the 9/11 hijackings, is remembered as a friend and as the innovative engineer who designed EOS-WEBSTER. At the December AGU Meeting, a memorial award in his name was announced, to be presented to young scientists "who have contributed to the quality of life, economic opportunities and stewardship of the planet through the use of Earth science information." <http://esipfed.org/donation.jsp>

Bookmark this

A Foot in the Door

Described as "a perfect opportunity to get first-hand research experience and to get your foot in the door," the Research & Discover Internship Program is now seeking applicants for its second year. Applications for this summer program "and a whole lot more" are due on March 14, 2003. Research & Discover offers a select group of college juniors the opportunity to work alongside some of the leading researchers in their fields. The following summer, successful participants are eligible for a second internship at NASA-Goddard and a two-year fellowship to graduate school at UNH. 

<http://www.eos.sr.unh.edu/ResearchAndDiscover>

Research & Discover
Summer Internship Program in Earth Sciences
June 9 - August 15, 2003
at the University of New Hampshire's Institute for the Study of Earth, Oceans, and Space
Cosponsored by NASA and UNH

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EOS Research
EOS Faculty
EOS Graduate Studies
PhD program

Research & Discover in the news ...
UNH Studied on Expedition to Greenland
Scientists Trained in Amacoma to Assess Fires

2002 Interns
Heather Bain
Thomas Dewey
Catherine Desnoesourt
William Sacks

Application Deadline: March 14, 2003

About Research & Discover
Join some of the nation's top scientists at the Institute for the Study of Earth, Oceans, and Space this summer for a paid internship through the UNH-Goddard Joint Center for the Earth Sciences. Right from the start, you will work in tight collaborations with researchers who are recognized as leaders in the national and international scientific community. Our geoscience and environmental science research is among the most frequently cited in the country. As a Research & Discover intern, you would be involved in some of the groundbreaking research conducted at the Institute, in an area which relates best to your own interests.

And a Whole Lot More ...
Research & Discover is a new summer internship program available to students who have completed their junior year. Participants will receive a generous stipend, as well as room and board. However, there's more... Following the first summer internship, participants will be encouraged to apply for a second summer internship held at the NASA-Goddard Space Flight Center, NASA-GSFC, located on the outskirts of Washington, D.C., is the nation's largest organization of combined scientists and engineers studying the Earth, solar system, and the universe. Following this internship, participants will be eligible to receive a two-year fellowship for graduate study at UNH.

Our scientists are engaged in:

- Investigating the effects of human activities on the Earth, including the causes and effects of global climate change and deforestation;
- Analyzing samples of snow, ice, and the atmosphere to study climate and chemical changes;
- Exploring both physical and biological oceanography.

Faculty/Staff News

Earth System Science

Janet Campbell reports that OPAL hosted a MODIS Ocean Products Workshop on February 3-4. There were 80 participants, some from as far away as Germany, The Netherlands, Puerto Rico, and California. Campbell and the Project Lake Watch team, including nine students, attended the Aquatic Sciences Meeting of the American Society of Limnologists and Oceanographers in Salt Lake City on February 8-14.

New research by **Erik Hobbie** and his research colleagues was published in the *New Phytologist* this October. The study determines whether fungi are mycorrhizal (receiving carbon from plants) or saprotrophic (receiving carbon from decaying matter) by a new approach measuring C-14:C-12 ratios.

Changes to farming practices in rice paddies in China may have led to a decrease in methane emissions, reports **Changsheng Li**, and a decline in the rate that methane has entered the Earth's atmosphere over the last 20 years. Results of this study appeared in *Geophysical Research Letters* in December.

Scott Ollinger traveled to Prague in October as part of the Scientific Committee on Problems of the Environment (SCOPE) Element Interactions Rapid Assessment Project. In December, he presented a paper at the American Geophysical Union (AGU) meeting on modeling forest productivity using high resolution remote sensing and field data.

Michael Prentice received a NSF grant to reconstruct the history of climate change in the highlands of Papua, New Guinea, during the peak of the Last Ice Age. The project involves an expedition to a 4400 m high extinct volcano to determine how glaciers could have covered much of the mountain during the Ice Age and just exactly when this was.

A study published in *Science* this past December, co-authored by **Charles Vörösmarty**, **Richard Lammers**, and **Alex Shiklomanov**, reveals that the average annual discharge of freshwater from the six largest Eurasian rivers to the Arctic Ocean has increased 7 percent since 1936. This paper projects potential large-scale impacts on the ocean circulation pattern that brings heat to the northern latitudes.

Karen Von Damm was named an AGU Fellow at the AGU meeting in December for "unparalleled contributions to exploring and understanding the chemistry of submarine hydrothermal systems and for leadership and service to the mid-ocean ridge scientific community."

Space Science

Charles Farrugia is a co-author on eight papers accepted for publication in the journals, the *Journal of Geophysical Research*, *Annales Geophysicae*, *Planetary and Space Science*, and *Solar Wind*. Topics include Solar Cycle maximum conditions, Wind-ACE solar wind correlations, and the excitation of electromagnetic ion cyclotron waves in coronal mass ejections, among other topics.

At the AGU meeting in December, **Joseph Hollweg** was named an AGU Fellow for "outstanding research on topics throughout the solar corona and solar wind and for consistent clear elucidation of the fundamental physical processes involved."

James Connell and **Clifford Lopate** recently received a grant from NASA's "Living with a Star" program for \$410,878 over three years. This research project, titled "Development and Testing of a New Angle Detecting Inclined Sensor System," has, as its main goal, an improved technology to build inexpensive, low-power, low-weight instruments that can measure the charged particle environment.

Antoinette Galvin reports that the PLASTIC instrument for the STEREO mission passed its Critical Design Review, a key milestone in an instrument program's development cycle. According to **Steve Turco**, the PLASTIC team received accolades for the amount of progress that has been made since September's Preliminary Design Review.



Mark Dowell (left), formerly a Senior Research Scientist in OPAL, has been promoted to Research Assistant Professor. Robert Griffin (right) recently arrived from Duke University to start his new position as Assistant Professor with a joint appointment in the CCRC and Earth Sciences.



A Fond Farewell

This issue of Spheres is the last to be edited by Amy Seif as the EOS Communication Coordinator. Amy virtually "invented" this position when she was hired in September 2001 and has been an invaluable contributor to the Institute's improved communications program. Amy has taken a position as Project Director with UNH's College of Life Sciences and Agriculture to develop a new collaborative center focused on conserving the region's natural resources. We're happy that Amy is remaining at UNH, pursuing her dream of creating solutions to local and regional environmental problems, and wish her well in all her endeavors. — David Bartlett

Faculty Profile

One Lucky Guy



A conversation with Patrick Crill, Director of the Complex Systems Research Center, will transport you to all corners of the globe in pursuit of understanding the world's beauty. Crill is compelled to be a scientist, because the "elemental flow of the Earth as a planet" is "gorgeous stuff."

About his work, Crill says, "I'm a really lucky guy."

He is, indeed. Crill sailed all around the North Atlantic and the Caribbean as a technician in the Coast Guard. Then, as a student of marine science, Crill explored the continental shelf to the Flemish Cap and the Aleutian Islands. Since then, he's been journeying to terrestrial ecosystems around the world, including "just about" every major wetland in the Western Hemisphere, making trace gas measurements to understand biosphere-atmosphere interactions.

"I love to travel, but it is hard to be a tourist because you don't really have a reason to be there," he says. "As a scientist, you have a deeper interest in a place and can make better connections."

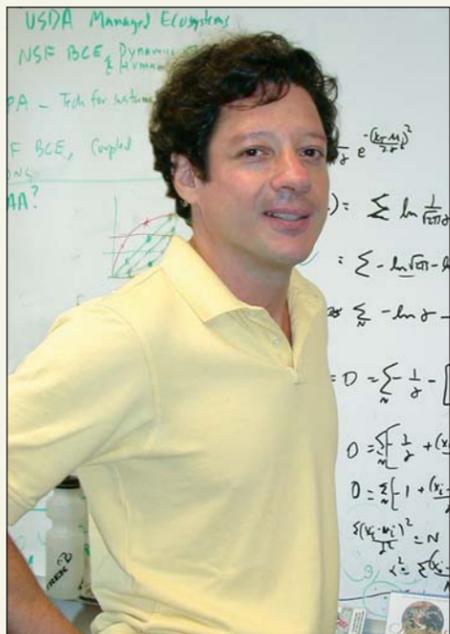
Much of his current work focuses on the Amazon region through the Large-scale Atmosphere-Biosphere Experiment in Amazonia. This region of the world enticed Crill to leave oceanography for NASA Langley in Virginia. Crill's contacts at NASA introduced him to EOS, where he has been able to conduct international, collaborative research. Collaboration is important to the scientist; he hardly ever refers to "I" when talking about his research, instead Crill says "we," meaning the EOS Trace Gas Biogeochemistry Group.

"We have always done local studies with global implications," says Crill. An image of Manchester, NH, tacked to the wall of his office is proof that his research does sometimes stay close to home, although Crill might be easier to track down in an exotic locale rather than inside Morse Hall.

"Being an Earth scientist is a good excuse to be outside," he says, although quickly dispelling any image of him roughing it in the field. "I'm a city boy," he says with an ironic smile. "I always work at places where I can find shelter, and get a dry bed and a warm meal." — AS 🌍

Student Profile

His Research is Hot



When graduate student Manoel Cardoso isn't out in the field chasing fires, he may be found back at the office plugging his data into mathematical models.

Manoel Cardoso, a Ph.D. candidate in the Natural Resources and Earth Systems Science program, was living in Sao Paulo, Brazil, when a large portion of the Brazilian state of Roraima went up in flames for days. Although the fires were miles away in the forest, this event left an impression on Cardoso who has spent the past three years chasing fires, both literally and intellectually.

"In Amazonia, fires are commonly used by people as an inexpensive tool to clear the land and to keep pasture areas open," explains Cardoso. "Fires are cheaper than tractors, easy to use, and still efficient."

However, fires can have important unintended consequences. For example, repeated burnings can significantly alter vegetation composition, emitting greenhouse gases to the atmosphere. Cardoso is fascinated by the decisive effects fire can have on ecosystems, the cycling of carbon and nutrients, and the atmosphere.

"Vegetation accumulates and stores carbon over what can be a century time scale. With fire, in less than a day, you can reverse everything," says Cardoso.

On two field investigations in Brazil, which involved driving through Amazonia looking for fires, Cardoso and his colleagues identified about 150 fires in seven days. His on-the-ground observations are being analyzed together with fire data obtained by satellites, and the results will contribute to the interpretation of remote sensing data on fires.

Cardoso got his first taste of fire science while working as a research fellow with a fire monitoring program run by the Brazilian Center for Weather Forecast and Climate Studies. There, he heard about the Large Scale Biosphere Atmosphere Experiment in Amazonia (LBA) and was enticed to come to the United States for graduate studies at UNH, where he could offer his experience as a Brazilian to American scientists involved with the LBA.

"With the combined expertise of LBA scientists, we are trying to answer important questions on the role Amazonia plays in the Earth system. For example, the question of whether Amazonia is a major contributor to global climate change," explains Cardoso. "Understanding fires is very important to answering this question." —AS 

New Exchange Program

When Seeing is Believing

The elaborate tale of the environmental impacts of political and social upheaval in Eastern Europe, until recently one of the most polluted regions of the Northern Hemisphere, continues to fascinate scientists. This perspective will be woven into a new exchange program that brings Czech and American students together to explore and compare the forests and wetlands of the Czech Republic and New England.

The University of New Hampshire-Charles University Exchange Program is scheduled to start in June 2003 with the summer field institute portion of the program. Students from both countries will learn about remote sensing methods at UNH, one of the leading universities using this technology to assess environmental conditions, and will conduct research in the Adirondacks, the Green, and the White Mountains.

During the second half of the summer, the students will travel to Charles University in Prague. Damage to the forests of the Czech Republic, a former Soviet Block country, has been severe. New studies show an initial recovery of Czech forests, due to government intervention and the introduction of emission-reducing technologies. Here, the students will study the progressive resurgence of forest health in the mountains of Bohemia, as well as learn about local hydrology from state-of-the-art wetland management studies.

"We will be providing students with first-hand experience and knowledge regarding the extent and severity of environmental impacts in both places," explains Barrett Rock, Professor of Natural Resources and EOS and co-coordinator of the program with Dr. Jana Albrechtova of Charles University. During the academic year, coursework at both universities will supplement the on-the-ground knowledge gained through the summer fieldwork. Classes are offered in English.

Undergraduates in their junior or senior year or first-year graduate students are invited to apply to the program. If interested, contact Dr. Rock at 603 862-2949 or barry.rock@unh.edu. Tuition scholarships are available through the New Hampshire Space Grant Consortium. —AS
See <http://cu-unh.sr.unh.edu/> 



Air pollution damage in an eastern European forest in 1991. Photo by Barrett Rock.

Student News

Kevan Carpenter, a M.S. candidate, has been regularly visiting the AIRMAP research sites on Mount Washington and in Castle Springs, N.H. He is now beginning data reduction on information gathered from these sites for a preliminary look at long-range versus short-range pollution events for the region.

A poster examining the Asian Dust Storm events of 2001 and associated pollution observed in New England by the AIRMAP Monitoring Network was presented by **Linsey DeBell**, **Marcy Vozzella**, and other authors at the December meeting of the American Geophysical Union.

After several years of working for Cabletron, **Hui Feng**, who received his M.S. degree in Oceanography under the direction of Wendell Brown, has returned to OPAL to pursue a Ph.D. He is now working on a NASA TOPEX altimeter mission with Doug Vandemark.

Sam Miller, a Ph.D. candidate, reports that his paper "Synoptic-Scale Controls on the Seabreeze of the Central New England Coast" has been accepted in the journal, *Weather and Forecasting*. Another paper, "A Review of the Seabreeze," was invited for publication in *Reviews of Geophysics*.

Adam Wilson, a M.S. candidate, reports that a paper that he co-authored with his advisor Professor Cameron Wake and Professor Barrett Rock has been accepted for publication in *Geophysical Research Letters*. This paper finds the estimates of temperature change in New England in the New England Regional Assessment (NERA) report to be conservative.

Lukas Saul, a Ph.D. candidate, continues examining data from the SOHO, WIND, and CLUSTER satellites for information on pick-up ions in the solar wind.

Inspiring the Next Generation

While every day is Earth Day at EOS, November 20, 2002 will be remembered as the day the giant 11-foot in diameter Earth Ball hung suspended from the top of the Morse Hall atrium. The 250 high school students participating in GIS Day, symbolized by the Earth Ball, will likely remember a lot more about the day, with some of them choosing a career in the geosciences because of this event.

Geographic Information Systems (GIS) Day is an annual event at the Institute, celebrated worldwide in 91 countries, organized to give the public a better understanding of the geospatial sciences. The Governor of New Hampshire has proclaimed this day as "National GIS Day in New Hampshire." GIS Day at UNH started modestly four years ago, with a few displays on the second floor and an open house in the GIS lab. The event has grown to fill the four floors of the Morse Hall atrium.

"We've taken this event to a different level than what most people do," explains Michael Routhier, GIS Day Coordinator and a tireless advocate for the event. "I think UNH has the biggest GIS Day event in the state. This year was more successful than before, in terms of getting more high school students to participate, and our afternoon programs for the public had more participants than ever before."

The morning of the event is reserved for high school students and their teachers and is packed full with presentations, hands-on learning opportunities, and a college fair. The afternoon attracts the public and professionals who browse the four floors of exhibits by vendors, regional organizations, and academic institutions, while taking in conference talks by technology vendors.

Geospatial technologies are key to the success of many of the Institute's research projects. The concept of the three main technologies, GIS, remote sensing, and geographical positioning systems (GPS), is rather simple, and these technologies are useful for an amazing variety of applications.

Explains Routhier, "If you want to build a new school, you can use GIS to examine the different factors that determine the best site, such as the locations of wetlands and accessible transportation routes. If you want to find out how much of the Amazon is deforested, remote sensing can provide a land cover analysis. GPS, through a system of navigational satellites, can help find location points needed to map a mountain trail network."

These technologies are still largely misunderstood. Routhier still finds it difficult to attract school groups to the event, even though these technologies can open the door to a number of fruitful careers. A new emphasis has been to attract students from outside the N.H. seacoast, and this year, groups came from as far away as western and northern New Hampshire.

"Our future plans include inviting more schools, but less students from each school, in order to keep the morning attendance to about the same size," says Routhier. "I think that the students get a lot out of GIS Day. At the very least, they get a basic understanding of the geospatial sciences. If we have inspired just some of them, then the day was worth it." – AS

<http://gisday.sr.unh.edu>



While high school students browse the GIS Day 2002 displays on all four floors of Morse Hall, several students listen attentively to a demonstration by a representative from Delorme, a navigation software company.

Space Grant News

Space Grant welcomed in the new year with the Faculty Mapping Access Project, a new institute for training faculty and teaching assistants in the use of geospatial technologies. The real purpose of FacMAP, funded through the National Space Grant's workforce development program, is to give undergraduates more exposure to these powerful technologies by training teachers.

"There's a real lack of undergraduate opportunities to learn about geospatial technologies," says Nancy Lambert, an Extension Specialist and co-coordinator of FacMAP with EOS's Fay Rubin. "However, there is more data becoming available making these technologies broadly applicable."

FacMAP took place over seven days in January, and participants came from a wide range of disciplines, a testament to the broad potential for the application of this technology. For example, participants included a communications professor who wants to code theater regions for learning about likely movie goers, a faculty member in history who wants to make maps of child labor distributions, and a marine scientist developing a course in geographic information systems (GIS).

"There's a fairly steep learning curve for these tools, and they can be intimidating," explains Lambert. "This workshop allowed faculty to put some time aside and grapple with these technologies."

Other sponsors of FacMAP include UNH Academic Technology, the UNH Library, GRANIT, and Cooperative Extension. – AS

Graduate fellowships are available through the NH Space Grant Consortium to students wishing to conduct Earth, air or space-related research. Applications must be received by March 14, 2003.

See <http://www.nhsgc.sr.unh.edu>.

Sea Grant News

The new year has ushered in some changes and new developments at NH Sea Grant. At the end of January, NH Sea Grant and Northeast Consortium moved into a new office space on the first floor of the Morse Hall atrium. Both programs are hoping that the new space will give them heightened visibility and more opportunities to showcase their work both inside and outside UNH.

“Our hope is that the new location in Morse Hall will enable us to reach out to the public more effectively,” says Ann Bucklin, director of NH Sea Grant and Northeast Consortium. “The atrium hosts many events throughout the year, and anyone who is passing through will be able to learn more about our programs through posters and possibly a kiosk and other displays.”

NH Sea Grant is also expanding its extension work into the area of climate change and variability. While the National Sea Grant network explores ways to assist NOAA with global climate change outreach, NH Sea Grant is doing similar work with EOS climate researchers on a regional scale. As one of the world’s most productive marine ecosystems, the Gulf of Maine and its watershed face many threats from climate variability and change.

By partnering with EOS researchers, NH Sea Grant will be able to deliver the knowledge and analytical tools needed by local marine and coastal users to anticipate and respond appropriately to major climatic events and trends. If you would like more information about this collaboration, please contact Ann



Sand dunes like these at Hampton Beach could be threatened by erosion caused by climate change and variability.

Bucklin at ann.bucklin@unh.edu or Kathleen Schmitt at kathleen.schmitt@unh.edu.

–Kathleen Schmitt, Sea Grant 

<http://www.seagrants.unh.edu>

EOS Profiles

A Winning Team

According to Phil Demaine, Senior Project Machinist in the machine shop on the first floor of Morse Hall, when NASA representatives visit the Institute to check on a project they are usually surprised with what the shop has accomplished with only three machinists. Demaine explains that large outfits like NASA typically have three for every one of the Morse Hall machinists. “What helps us to do our jobs is that we have a direct line to the engineers who are designing what we are machining. Places that I’ve worked in before had an engineering department, a manufacturing department, and the machine shop. Here, scientists come straight to here with no mixing of words in between.”

Mark Granoff, an EOS Engineer who often works with the machine shop, says that while this direct relationship helps, the success of the shop is due to the talent within. “I’ve been at EOS for 12 years, and have nine years of industry experience. These three machinists are, without comparison, the best I’ve seen. They all give the best they can. People visiting from other institutes are impressed and jealous. These are skilled craftsmen, and a tremendous asset.”

Another secret to their success as a small machine shop with large and unique projects appears to be the ability of the three machinists, Demaine, John Levasseur, and Arthur Anderson, to work together. While they might not come right out and say it, the amount of years they’ve been able to work together in close quarters speaks volumes about their ability to work as a team. Demaine is the “newcomer” to the group at 11 years in the machine shop, while Levasseur, the other Senior Project Machinist, has worked there twice as long. Anderson, the shop supervisor, was the first to arrive, with 33 years under his belt.

Currently, the machinists are engaged in developing high voltage plugs and connectors for PLASTIC, a space science instrument scheduled for launch in 2005. Many of the parts for space instruments are new, so they are usually making them for the first time with designs developed by EOS engineers. In fact, Demaine and Granoff were recently awarded two U.S. patents for a device they developed, now used in outer space on the ACE satellite.



Machine shop staff Arthur Anderson, Phil Demaine, and John Levasseur.

According to Demaine, the relationship between the machinists and scientists is one in which “new ideas are appreciated. Sometimes we notice an easier or different way to do something,” he explains.

“They rarely let me make a piece of junk,” Granoff jokes. “I have a lot of respect for their expertise. If options exist in a design that I am working on, I’ll invite a roundtable discussion with the machinists.”

Levasseur enjoys this close working relationship. “It is very interesting to work with the scientists. They give you time to do a good job and emphasize quality over quantity. This is important when making satellites, which are a one-time deal. You can’t fix something after it goes up into space,” he says.

Although Levasseur, who loves the outdoors, sometimes feels “stuck” inside in the shop, and Demaine would probably rather be spending time at his lake house with his family than just about anything, these guys clearly love their work. Says Demaine, “It is not like working in a factory. Here, the desire to succeed is higher. We can follow a piece all the way through from initial conception to piece of hardware, not just drill the same hole over and over again.” – AS 



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One in Two Americans Breathe Unhealthy Air . . .

Catchy titles like this one are drawing UNH students into the ever-changing world of air quality and weather as they read the student newspaper, *The New Hampshire*.

A weekly half-page column reports on this week's air quality and offers fun, educational reading, with a "quiz" at the end. Upon reading the column, one might learn that Mark Twain is not just known for his books but also for his poignant experience with New England's unpredictable weather, as described in his 1876 speech on the weather. Readers able to answer the December 3 quiz question, "What region does much of New England's air pollution come from?" could have won a free AIRMAP T-shirt.

As part of the outreach on the Atmospheric Investigation, Regional Modeling, Analysis and Prediction (AIRMAP) project, graduate students are getting together every week to review the previous week's air quality and interpret it for the UNH Community via the newspaper. Look for the column in every Tuesday's issue of *The New Hampshire*.



EOS Events

Spring Spheres Concert Series

Music continues to resound in the Morse Hall Atrium as the EOS Spheres Concert Series premiered its first Spring concert on January 23rd, with the Seacoast's own Jim Howe Jazz Quartet.

The remaining concerts are scheduled on the third Thursday of the month throughout the Spring term, from 12:15pm –

1:15pm, with no performance booked for the month of March (Spring Break). EOS warmly welcomes the UNH campus community to attend these free musical venues, all of which are usually accessible only through professional ticket agencies, concert halls, and greater metropolitan areas.

While Morse Hall was architecturally designed as an academic research facility, attendees of the concert series – as well as past performers – attest to its acoustical integrity. One recent guest performer compared the acoustics to those of a major European cathedral. If you have not yet availed yourself of this unique cultural opportunity, you have three more chances! See the listings below.

Feb. 20 Piscataqua Chamber Players...Back to the Future w/a Latin Lilt
April 17 TRIPTYCH String Trio...The acclaimed Boston String Trio
May 15 The Portland Brass Quintet



Portland Brass Quintet members (left to right) Mike Manduca, John Schnell, Michael Milnarik, John Boden, and Betty Rines.

<http://eos.sr.unh.edu/About/Events>