

**August 2010**

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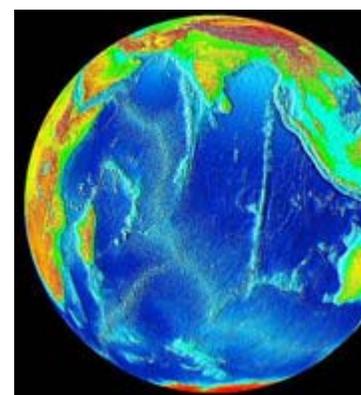
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NSF AT WORK

Sea-Level Rise in Indian Ocean Observed

A new study concludes that Indian Ocean sea levels are rising unevenly and threatening residents in some densely populated coastal areas and islands. The study, led by scientists at the University of Colorado (CU) at Boulder and the National Center for Atmospheric Research (NCAR) in Boulder, Colo., finds that the sea-level rise is at least partly a result of climate change. Funding for the research came from the National Science Foundation (NSF), NCAR's sponsor, as well as the Department of Energy and NASA.

Sea-level rise is particularly high along the coastlines of the Bay of Bengal and the Arabian Sea, as well as the islands of Sri Lanka, Sumatra and Java, the authors found. The key player in the process is the Indo-Pacific warm pool, an enormous, bathtub-shaped area spanning a huge region of the tropical oceans stretching from the east coast of Africa to the International Date Line in the Pacific. The warm pool has heated by about 1 degree Fahrenheit, or 0.5 degrees Celsius, in the past 50 years, primarily because of human-generated emissions in greenhouse gases.



Indian Ocean. Credit: NASA

"Our results from this study imply that if future anthropogenic warming effects in the Indo-Pacific warm pool dominate natural variability, mid-ocean islands such as the Mascarene Archipelago, coasts of Indonesia, Sumatra and the north Indian Ocean may experience significantly more sea-level rise than the global average," says scientist Weiqing Han of CU and lead author of a paper published last month in the journal *Nature Geoscience*. Read more about this research [here](#).

Bedrock Is a Milestone in Climate Research

Tiring of this summer's record heat? Here's an image that will cool you off—in recent weeks an international team of researchers from 14 countries, including NSF-supported scientists from multiple institutions, finished drilling into more than a mile of solid ice in Greenland as part of the North Greenland Eemian Ice Drilling, or NEEM, project. Located in a particularly remote region of northern Greenland, NEEM began in 2008 to gather ice core samples from the last interglacial period, or the Eemian Period, which ended about 120,000 years ago.



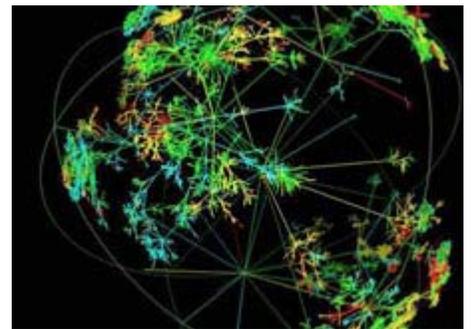
Pushing an ice core out of the drill. Credit: NEEM ice core drilling project.

This year, scientists finally hit bedrock at NEEM, bringing an end to drilling operations and the final--and oldest--ice core samples from the project. The ice samples are carefully analyzed and can offer insights into the atmosphere and climate during the pre-historic times when Greenland's ice sheet was much thinner, resulting in a sea level about 15 feet higher than today's level. Read more about the NEEM project in a [NSF press release](#) and [video special report](#).

VIVO: A Digital Matchmaker for Scientists

Ask any scientist what he or she is working on, and you might be surprised at just how specific most of the answers can be. A marine biologist may have devoted much of the past 20 years, for example, to examining how changes in wave action impact the reproduction of a specific microorganism in the waters off the west coast of Florida. Now imagine that an engineering graduate student is working on perfecting a desalinization plant near Tampa, and could really use the biologist's insights. How do the two scientists find each other?

Enter **VIVO**, a project led by University of Florida researcher **Michael Conlon** that seeks to help researchers find collaborators and carry out their research more efficiently. VIVO, supported with funding from the National Institutes of Health (NIH), will create profiles of scientists and their research and help match them up where needed. NSF-funded investigator **Katy Börner** is in charge of creating VIVO's social network. The project also hopes to use existing computational infrastructure such as NSF's **Open Science Grid** to help expand the project to as many institutions as possible. As scientific endeavors become increasingly interdisciplinary, many scientists may soon find VIVO to be the perfect match.



Visualization of Internet connection
Credit: The Regents of the University of California

New Material Discourages Biofilm Formation



Test rod with new anti-biofilm surface treatment (left) compared to untreated control rod (right). The untreated rod exhibits unwanted biofilm coating (white material).
Credit: Semprus Biosciences.

Semprus Biosciences has developed an anti-microbial and anti-thrombotic surface for medical devices that significantly reduces the growth of biofilm, the leading cause of medical infections. This new material, developed with **funding** from NSF's Small Business Innovation Research (SBIR) program, virtually eliminates incidences of blood clot formation.

The surface modification is currently designed for use in thin plastic tubes, or catheters, inserted into blood vessels for drug delivery or blood collection. Semprus' surface modification technique can lead to a 99 percent decrease in both biofilm and thrombus, or blood clot, formation on the catheter surface, when compared to an equivalent, but unmodified, material.

Existing technologies utilize a slow delivery of active antimicrobial agent, which depletes over time and may encourage drug-resistant "super-bugs" to develop. Semprus researchers have, instead, focused on manipulating the device material itself to reduce

complications. Through this approach, the technology will perform as long as the device is insi

the body and has a lower risk for toxicity or drug-resistant strains of bacteria.

DID YOU KNOW?

NSF-funded scientists at Columbia University are experimenting with a new treatment for Alzheimer's and Parkinson's patients that involves ultrasound waves. Ultrasound, most commonly used in medicine for imaging purposes, can temporarily open small channels across the blood-brain barrier, allowing the injection of drugs into highly localized regions of the brain. The new technique has, so far, been tested only in animals, so treatment of humans with brain disorders may still be years off.

Ultrasound has also proven to be of use in the treatment of chronic pain due to arthritis, NSF-funded scientists at Cornell University reported earlier this year. In this case, the ultrasound vibrations loosen the sac holding excess fluid around the joints, allowing the pressure to be reduced, and alleviating some of the pain. Read more about both of these promising medical advances [here](#).

FACES OF NSF RESEARCH

Connecting Women Across the Globe to Foster Scientific Leadership

Women in science and engineering have, in recent years, been increasingly hired for tenure track faculty positions and have also made important strides in earning tenure. Less progress, though, has been achieved in promotion to full professor and obtaining faculty leadership positions, according to Machi Dilworth, Head of NSF's Tokyo Office. She says, "NSF's Science and Engineering Indicators show continued drop-off of women scientists and engineers at every career stage." A number of possible explanations exist, but lack of international research reputation is often cited as a factor.

Last month, more than 40 early- to mid-career women scientists and engineers gathered in Saitama, Japan, to participate in an **NSF-sponsored workshop** designed to help establish international research collaborations. The "Connections" workshop, which brought together U.S. scientists with their counterparts from Japan, aimed to prepare the participating women for leadership positions in their fields by expanding their professional networks while also fostering the personal and professional connections that drive research collaborations.

The participants included women scientists whose achievements already show promise that their work will have major impact on their fields of study. Speakers included MRC Greenwood, president of the University of Hawaii System, and Chieko Asakawa of IBM-Japan. They encouraged the women to explore ways to promote synergies in the solution of the big questions of science and engineering—through new technologies, tools and approaches, and through encouraging new interactions between researchers from different cultures and different fields.

During the workshop's three days, professional networks grew; following the symposium, U.S. researchers each spent several days visiting current and potential collaborators in Japan and participating in further discussions about specific research projects. Plans are underway to continue the connections established this year by holding future workshops focused on specific research areas identified by the participants. Many of the participants expressed enthusiasm for holding a similar U.S.-Japan networking symposium next year in the United States. Details are expected to be announced later.



U.S. and Japanese scientists and engineers participate in the Connections workshop. Credit: K. Shinohara, NSF

NSF IN THE NEWS

U.S. Could Experience More Heat Waves in Next Thirty Years (*USA Today*) A recent study of surface temperature records has shown that heat waves could become five times as likely between 2020 and 2029 as they were from 1951-1999. The research was funded by NSF and the Department of Energy.

Debris From Haiti Earthquake Stands in Way of Recovery (*The New York Times*) Scientists funded by an NSF Rapid Response Research grant report that less than 5 percent of the debris from Haiti's January 2010 earthquake has been removed, and even less has been properly disposed of.

U.S. Songbirds Found to Carry Avian Flu (*ABC News*) Scientists funded by NSF and NIH report new results showing many common songbirds, such as sparrows and thrushes, carry various forms of bird flu that could potentially mutate and spread to livestock.

Efficient Nano-Motor Harnesses Light (*Physics World*) Researchers have created a new nanoscale motor that can drive a disc 4,000 times its own size. It works like a tiny windmill, but harnesses light, so it has been dubbed a "light mill." The work was partially supported by NSF.

Fluorine Could Energize Fuel Cells (*EETimes*) New research, partially funded by NSF, shows that fluorine can be compressed into both a semiconductor and a metal, promising new energy applications.

THE RIPPLE EFFECT

Energy Series on Capitol Hill



As part of its renewable energy series, "Road to the New Energy Economy," the National Science Foundation and DISCOVER magazine held, on July 14, 2010, a Capitol Hill briefing on *Natural Gas*, where energy experts discussed gas hydrates as an unconventional energy source and the role of gas turbines in achieving cleaner, more efficient energy.

Guest speakers included Amadeu Sum from the Center for Hydrate Research and Alan Epstein from the Gas Turbine Association. Robert T. Simmons, president of the American Society of Mechanical Engineers (ASME), moderated the discussion. Videos of the entire series on renewable energy briefings can be viewed [here](#).

New Employment Statistics From Business R&D and Innovation Survey

The first employment statistics from the new Business R&D and Innovation Survey (BRDIS), developed jointly by NSF and the U.S. Census Bureau, were released last month and show a substantial amount of economic activity in the research and development (R&D) area. The most recent statistics available are for 2008 and reveal that companies located in the U.S. that performed or funded research and development domestically or overseas employed an estimated 27.1 million workers in 2008. Some 7.1 percent of these employees were involved in R&D activities.

Domestic R&D employment accounted for 7.9 percent of companies' total domestic employment and for 77 percent of their worldwide R&D

Six Community Colleges Honored for Work Cybersecurity Education

Six community colleges have been named as National Centers of Academic Excellence in Information Assurance by the National Security Agency and the Department of Homeland Security. All six have received funding from NSF for programs that prepare students for careers in cybersecurity, focused on reducing vulnerabilities in our national information infrastructure.

Each of the six schools has bolstered its offerings in information assurance and cybersecurity with support from NSF's Advanced Technology Education (ATE) program. This program, which is aimed

employment that year. All told, \$346 billion of R&D activity was reported in 2008 by these companies, and 82 percent of this work was performed in the U.S.

R&D employment in some industries is higher than the 7.1 percent industry-wide average. In particular, R&D services in scientific companies accounted for 31 percent of their employee activities. Nearly as high were communications equipment businesses, at 27 percent, and computer systems design and related companies at 25 percent. These statistics are preliminary and final data is expected early in 2011. Read more [here](#).

primarily at two-year colleges, involves partnerships between academic institutions and employers to improve the educational experiences of science and engineering technicians.

Three of the institutions, Anne Arundel Community College, Hagerstown Community College and Prince Georges Community College, are located in Maryland. Two others, Oklahoma City Community College and Rose State College, are in Oklahoma and the sixth, Moraine Valley Community College, is located in Illinois. Read more about these new centers [here](#).



*The National Science Foundation (NSF) is an independent federal agency that supports fundamental research and education across all fields of science and engineering. In fiscal year 2010, its budget is \$7.3 billion. NSF funds reach all 50 states through grants to over 1,900 universities and institutions. Each year NSF receives about 48,000 competitive requests for funding, and makes over 11,300 new funding awards. NSF also awards over \$400 million in professional and service contracts yearly. Contact the **NSF Office of Legislative and Public Affairs** for more information or for permission to reuse news release images.*



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