LDEO

ALUMNI AND FRIENDS NEWS

SPRING 11

Issue 17

FEATURE ARTICLE

A Tree-Ring Time Machine: Lamont-Doherty's Tree-Ring Lab Reconstructs Asia's Most Devastating Droughts

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Cover image: Mongolia's Orkhon River: Researchers at Lamont-Doherty's Tree-Ring Lab retrieved core samples from more than 300 sites across Asia in order to construct their Monsoon Asia Drought Atlas.

Eileen Barroso

Letter from the Interim Director

Bruce Gilbert

G. Michael Purdy

Al Hofmann

Lamont-Doherty celebrated Taro Takahashi's 80th birthday and decades of scientific contributions in March. Shown here, Bill Smethie presents Takahashi with a reproduction of Takahashi's iconic global ocean map showing the distribution of the air-sea CO_2 transfer rate.

Kevin Krajick

Tree-ring researcher Kevin Anchukaitis (foreground) examines cores in the forests of Vietnam.

Dear Friends,

I hope this spring issue of our newsletter coincides with the arrival of milder climes, wherever it may find you.

The new year ushered in several noteworthy changes at the Observatory, not least of which was the appointment of Lamont-Doherty Director G. Michael Purdy to the position of Executive Vice President for Research at Columbia University. The move is bittersweet. The University as a whole will benefit tremendously from Mike's singular intelligence and vision, while we at Lamont-Doherty will miss the man who has demonstrated such superb leadership these past 10 years. We wish him the very best in his new role and extend our heartfelt thanks for the valuable initiatives he spearheaded at the Observatory.

Identifying an individual of equal caliber will be my most important task while serving this year as interim director. To that end, Jeff Sachs and I are heading a search committee whose members share a broad view of earth science and its importance to human endeavors, a deep understanding and representation of the culture and constituencies of the Observatory, and a commitment to the interdisciplinary scholarship and education underlying Lamont-Doherty and The Earth Institute. Together, the committee will conduct a thorough and thoughtful search to guarantee that Lamont-Doherty's next director will be the ideal candidate to lead this world-class research institution.

I have been at the Observatory for more than 25 years—as a researcher and, subsequently, as associate director for the Seismology, Geology, and Tectonophysics Division—and recognize what it offers to the international community. We are an institution steeped in a tradition consisting of path-breaking discovery within each of the earth science disciplines. We celebrate the immense contributions of our scientific forefathers (such as seismologist Jack Oliver and geochemist Taro Takahashi, who are both profiled in the following pages) by building on their scientific accomplishments. Their creation of new knowledge over the years allows us to stay at the frontier of innovative research. And the presence of new talent, younger generations eager to work alongside luminaries like Takahashi, ensures that Lamont-Doherty will explore new avenues of research and tackle future environmental challenges as they arise.

Sometimes the biggest breakthroughs in science involve the elucidation of events or processes occurring thousands, even millions, of years in the past. Our feature article describes the Tree-Ring Lab's reconstruction of monsoon variability in Asia over the past millennium. Their Monsoon Asia Drought Atlas is a comprehensive history of climate patterns in this region and is already proving to be a monumental resource for investigators interested in predicting climate phenomena. Producing high-resolution, accurate records of climate data such as theirs is a critical endeavor, essential for building a robust foundation against which we can gauge current and future climate trends.

In closing, I thank you for your friendship and interest in Lamont-Doherty. I can guarantee that the Observatory both you and I love will continue to thrive during this period of transition.

Sincerely,

Art Lerner-Lam

LDEO's EarthObserver App©, The Whole World in Your Hands

With **EarthObserver**, users can zoom into and explore meandering Pacific deep-sea canyons or ripple marks in the New York harbor; visualize Earth's tectonic plates and their rates of movement; call up histories of earthquakes, volcanoes, and other hazards in specific places; view plankton productivity at river mouths; see Arctic ice cover during different months of the year or temperatures past and present across the world; plot human populations and indexes of their well-being; and access maps of cloud cover, permafrost, or rock types. The application comes with overlays of political boundaries and includes charts of US offshore waters and lakes, as well as topographical maps of the United States suitable for planning hikes.

The project was overseen by Lamont-Doherty marine geologist William Ryan. Among the databases providing updated content for **EarthObserver** is Lamont-Doherty's own Marine Geoscience Data System. Scientists have already been accessing the data available on **EarthObserver** on conventional computers via the Observatory's GeoMapApp and 3-D Virtual Ocean software.

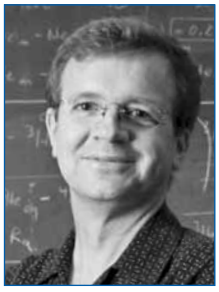
www.earth-observer.org

Lamont-Doherty 2011 Award Winners

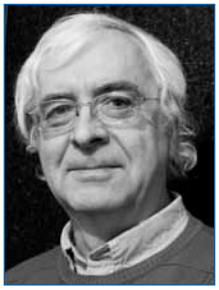
During the winter months, several people at Lamont-Doherty were recognized for scientific or teaching excellence.

Lamont-Doherty geochemists **Wally Broecker** and **Peter Schlosser** were elected fellows of the American Association for the Advancement of Science (AAAS) in February. Founded in 1848, AAAS publishes the peer-reviewed journal *Science* and is dedicated to advancing science and technology worldwide.


Wally Broecker


Peter Schlosser

At the December meeting of the American Geophysical Union, geochemist **Dave Walker** was presented with the Harry Hess Medal. Hess, a geology professor at Princeton, made seminal breakthroughs in our understanding of Earth's lithosphere—the rigid outer layer of the planet that includes the crust and uppermost mantle. In awarding Walker the medal, the committee referred to him as "a true leader in experimental petrology, both in designing and improving experimental equipment and in pioneering new ideas of the evolution of Earth, Moon, and the planets."


Dave Walker


Paul Olsen


Jerry McManus

Arthur D. Storke Memorial Professor **Paul Olsen** received the 2011 Distinguished Faculty Award by Columbia's Faculty of Arts and Sciences. The award honors exceptional teaching at both the undergraduate and graduate level, and is endowed by Columbia Trustee and Lamont-Doherty supporter Gerry Lenfest.

The Graduate Student Committee in the Department of Earth and Environmental Sciences selected geochemist **Jerry McManus** as the winner of their Best Teacher Award. Graduate student **Kat Allen** received the Best Teaching Assistant Award for her role as TA in the course The Climate System.

This year's winner of the Sara Langer Book Prize is graduate student **Amelia Paukert**. The award acknowledges a PhD candidate for his or her positive impact on student life within the Department of Earth and Environmental Sciences.


Kat Allen


Amelia Paukert

Update on the R/V *Marcus G. Langseth*

Eduardo Acorda/Sandbox Studio SF

The Langseth, displaying her new paint job, was photographed in February in the San Francisco Bay.

Columbia Trustee Kyriakos Tsakopoulos and G. Michael Purdy

Lamont-Doherty's research vessel is set to complete six more cruises this year. Two of these research cruises will include Observatory scientists Donna Shillington, Spahr Webb, and Jim Gaherty as principal investigators. The *Langseth*'s first operation will entail a 3-D survey off the coast of Costa Rica. The next four cruises will take the *Langseth* to Alaska (Gulf of Alaska, Aleutians, and the Bering and Chukchi Seas).

Shillington and Webb's project will involve imaging the Aleutian subduction zone—an active plate tectonic boundary that produces large, destructive earthquakes. It will concentrate on an area that last ruptured in 1938 and may be well along in the cycle of building up enough stress to culminate in another dangerous quake. At the end of the year, Gaherty will lead a cruise to the south of Hawaii to image the sub-seafloor, where he and his team aim to illuminate the processes that allow new tectonic plates to form and that control their evolution.

While undergoing a maintenance period alongside the pier at the Scripps Marine Facility in San Diego CA in February, the research vessel was visited by Columbia Trustee Kyriakos Tsakopoulos. This was the first time a Columbia Trustee had visited the *Langseth,* and the visit provided an excellent opportunity to show the vessel's unique research capabilities.

Mr. Tsakopoulos, who is cochair of the Trustees Committee on Physical Assets, stayed on board for almost three hours touring the labs, accommodations, and engine spaces, receiving briefings from G. Michael Purdy, Columbia University's Executive Vice President for Research; Sean Higgins, Director of Lamont's Office of Marine Operations; as well as other members of the *Langseth*'s marine and technical team.

SPRING PUBLIC LECTURES 2011

Watch the lectures you missed online!
Videos of all four lectures can be viewed at the Lamont-Doherty website.

SUNDAY, MARCH 6, 2011
"A Delicate Balance: Antarctica and Its Surrounding Oceans"
Doug Martinson, PhD, Lamont Research Professor

SUNDAY, MARCH 13, 2011
"Ancient Trees Reveal Environmental Histories"
Neil Pederson, PhD, Lamont Assistant Research Professor

SUNDAY, MARCH 27, 2011
"Hudson River: A Swimmable Future?"
Andrew Juhl, PhD, Lamont Associate Research Professor;
Gregory O'Mullan, PhD, Adjunct Associate Research Scientist;
John Lipscomb, Riverkeeper Boat Captain

SUNDAY, APRIL 3, 2011
"Climate Change in Arctic Tundra: From Wildfire to Songbirds"
Natalie Boelman, PhD, Lamont Assistant Research Professor

In January, Lamont-Doherty hosted a media workshop for scientists led by Rich Hayes, who coauthored the book *A Scientist's Guide to Talking with the Media.* By analyzing TV clips and taking part in role-playing activities, Observatory scientists received tips for articulating their message clearly and succinctly.

A CO_2 Icon: Taro Takahashi

By Erika Freimuth

Al Hofmann

Taro Takahashi is the Ewing Lamont Research Professor of geochemistry at the Observatory and an adjunct professor in Columbia's Department of Earth and Environmental Sciences. This year marks Takahashi's 80th birthday—a fitting opportunity to celebrate his outstanding influence as a geochemist and longtime "Lamonter."

Takahashi was born in Japan, where he grew up in a family of mining engineers. His father was a petroleum engineer for an operation based in Texas, and his uncle owned mines. Both men lauded geologists for their indispensable guidance on where to dig the most productive holes, and they encouraged Takahashi to enter the field of geology.

Earning an engineering degree from the University of Tokyo in 1953 amid the post–World War II national strife over labor union movements, Takahashi craved an unbiased scientific environment in which to pursue his work. At the time, the Military Geology Branch of the U.S. Geological Survey was working in Tokyo under the leadership of Sherman Neuschel, who had studied at Columbia. Upon hearing of Takahashi's aspirations, Neuschel assured him that Columbia was *the* place to study and dashed off a letter to Paul Kerr, who was chairman of the Geology Department at Columbia and instrumental in establishing the Lamont Geological Observatory.

New York was home then to not just one, but three major league baseball teams, making Takahashi all the more eager to live and study there. The young man—whose only images of America had been his father's photos of cows and oil derricks in the fields of Texas—made the journey to New York City.

At Columbia, Takahashi found himself surrounded by a group of brilliant students such as Wally Broecker, Karl Turekian (now at Yale), Dick Holland, and Bill Bassett (now at Cornell). He learned a great deal from the head of the Geochemistry Division, Larry Kulp. Upon earning his PhD in 1957, Takahashi joined the Observatory and embarked on his first ocean research expedition—10 months aboard the R/V *Vema* measuring the oceans' uptake of carbon. During the expedition, he was strongly influenced by the scientific vision and charisma of Maurice "Doc" Ewing, the founding director of the Observatory. While onboard, Takahashi reported to Bruce Heezen his discovery of a previously uncharted seamount in the Southeastern Atlantic and named it the *Vema Seamount*.

In preparing for his time on the *Vema*, Takahashi was advised by Sam Gerard to pack a shower curtain. It wasn't until he spent his first night at sea, and saw the moon glinting through cracks in the wooden deck above, that he understood the purpose of the curtain. On stormy or rough nights, one either laid the curtain over one's blanket or woke up drenched.

The topic of carbon dioxide (CO_2) captured Takahashi's interest because of the role this molecule plays throughout the earth system. His overarching research goal has been to describe, as accurately and extensively as possible, the rate at which CO_2 is exchanged between Earth's oceans, atmosphere, and terrestrial ecosystems. Oceans account for 70 percent of Earth's surface and serve as a central receptacle for atmospheric CO_2.

To facilitate his research, Takahashi developed an instrument known as the Showerhead Equilibrator, a chamber that measures the sea-air flux of carbon dioxide. This instrument has enabled Takahashi and his colleagues to compile a database that includes some four million data points and allows for a global characterization of the patterns of sea-air carbon flux—a literal revolution in human understanding of the oceans' function in the earth system. The instrument is still used today (in a modified form) to make these measurements—a testament to its reliability and significance.

In recognition of Takahashi's contributions to the field and the influence he's had on his colleagues and students, the editors of *Deep Sea Research II* dedicated the April 2009 issue to him. "He has been an undisputed mentor for many of us, freely contributing encouragement and ideas. Taro is an outstanding scientist, colleague, and mentor, with a graciousness and humility that has been an inspiration to us all throughout his entire career," they wrote.

In 2010, the United Nations presented Takahashi with their Champions of the Earth Award, recognizing him for his environmental leadership and action. In his acceptance speech, Takahashi depicted the scientist as one who provides the unbiased knowledge that empowers others to make responsible decisions. Takahashi donated the entire $40,000 prize to Lamont-Doherty for the support of its environment and seismology research.

Takahashi's career is exemplary for the creativity and indefatigable curiosity he has brought to his scientific research.

Taro giving a haircut to Peter Esmay aboard the R/V *Vema,* South Atlantic, 1957

In Memoriam: Jack E. Oliver

Jack Oliver, a geophysicist with deep roots at Lamont-Doherty whose research helped revolutionize our understanding of the basic forces shaping the planet, died in January at the age of 87.

Oliver attended Columbia on a football scholarship, earned his bachelor's degree in 1947, and went on to receive a PhD at the Observatory. He was head of the seismology program at Lamont-Doherty from 1955 to 1971.

Together with fellow Lamonters Bryan Isacks and Lynn Sykes, he wrote a paper in 1968 entitled "Seismology and the New Global Tectonics," which made a compelling case for the then-novel theory of plate tectonics.

"[That paper] was literally the bible for understanding seismology," said Larry D. Brown, a former student of Oliver's who is now chairman of Cornell's Department of Earth and Atmospheric Sciences. "Jack was an explorer, in the best scientific sense of the word."

"Jack Oliver, along with Bryan Isacks, Lynn Sykes, and others in the Lamont seismology group, showed how the properties of earthquakes were a near-perfect fit to the emerging theory of plate tectonics," Art Lerner-Lam said.

Oliver was also one of the first scientists to understand how to detect nuclear explosions using seismic waves and became an adviser for the Nuclear Test Ban Treaty.

Oliver was a member of the National Academy of Sciences and president of both the Seismological Society of America and the Geological Society of America. He authored or coauthored more than 200 scientific papers and wrote several books, including *Shakespeare Got It Wrong: It's Not "to Be," It's "to Do": Autobiographical Memoirs of a Lucky Geophysicist.*

At the end of his autobiography, available online, Oliver indulges in a weakness for limericks and includes this among many:

Though it often seems somewhat
mysterical,
Science is not the outcome of miracle,
Just the organization,
Of sound observation,
In essence all strictly empirical.

In the fall of 1947, I was taken over to meet [Maurice] Ewing. I spent about 5 minutes with him. He said, "Okay, I'll hire you." I was astounded [but delighted]. So I got up and I walked out of the room; and when I opened the door, I saw a sign that said, "Professor of Geology." I thought, Gee, this guy thinks I'm a graduate student in geology. He doesn't know I'm a graduate student in physics. I've got to go back in and tell him. So I went back in and I said, "Professor Ewing, I'd love to have that job, but I've got to tell you—I'm a graduate student in physics. I've never studied a course in geology in my life." Ewing [said], "Well, that will be two of us!" He never studied any geology, either. My mouth fell open, but at the same time that had a big impression on me, because I realized somebody could come into that field from physics and do well.

—Jack Oliver, Oral History transcript, Niels Bohr Library & Archives

In 1960 I visited Lamont on a spring Saturday as I was finishing a BS and MS at MIT. My intention had been to work on a PhD at Cal Tech or Berkeley. After spending several hours with Jack Oliver, however, I decided to attend graduate school at Columbia and Lamont, and to work under him on a PhD in seismology, decisions that I have never regretted. If I had not done that, I surely would not have been part of the plate tectonic revolution and the interaction with scientists from marine geology, geophysics, and geochemistry. This was surely the most exciting and stimulating time of my scientific life.

Jack started me working on the propagation of short-period seismic waves across oceanic areas and guided me to huge piles of months of seismograms that were arriving from about 15 seismic stations that Lamont had put out around the world in 1958–59 during the International Geophysical Year.

A memorable moment for me occurred in early 1966 [when] Jim Heirtzler and Walter Pitman invited Oliver and me to view a "magic profile" of magnetic anomalies that were symmetrical down to the smallest wiggles for 500 km about the axis of the East Pacific Rise. On seeing their results, seafloor spreading and continental drift became a reality to us. That led me the next day, with Jack's encouragement, to start working on mechanisms of earthquakes along the ridge system, which showed that the transform fault hypothesis was correct and, by extension, that continental drift and seafloor spreading were occurring.

—Lynn Sykes, Higgins Professor Emeritus, Lamont-Doherty

A Fond Farewell: A Party for the Departing Director

Al Hofmann

G. Michael Purdy

Al Hofmann

Interim Director Art Lerner-Lam

Al Hofmann

Geophysicist Robin Bell

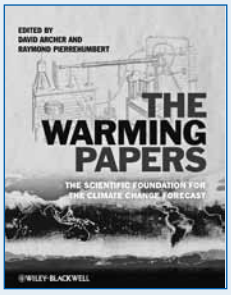
Lamont-Doherty's much-loved director has been appointed Executive Vice President for Research at Columbia. Art Lerner-Lam, associate director of the Seismology, Geology, and Tectonophysics Division, has taken over as interim director and is currently serving as cochair of the worldwide search for a permanent director.

On January 31, researchers and staff congregated to toast Purdy and acknowledge his tremendous accomplishments during his 10 years as director of Lamont-Doherty. He assured everyone present he would keep a watchful eye over the Observatory; in his new role, Purdy will oversee every research unit at the University, including Lamont-Doherty.

On Our Bookshelf

The Warming Papers: The Scientific Foundation for the Climate Change Forecast

Edited by David Archer and Raymond Pierrehumbert, Wiley-Blackwell, January 2011



The Warming Papers is a compendium of classic scientific papers that constitute the foundation of our knowledge about anthropogenic global warming. The editors contextualize the science with introductions to the papers that span more than a century and a half of research. Amidst papers by John Tyndall, Roger Revelle, Charles Keeling, Michael Mann, and James Hansen—to name just a few—is a 1977 paper by Lamont-Doherty geochemists **Wally Broecker** and **Taro Takahashi** entitled, "Neutralization of Fossil Fuel CO_2 by Marine Calcium Carbonate."

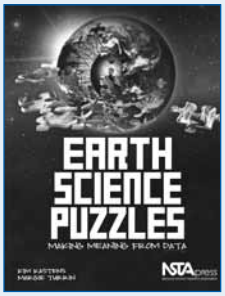
On the *Times*' Green blog, *New York Times* science writer Justin Gillis calls the book "a rich feast for anyone who wants to trace the history of climate science from its earliest origins to the present."

Earth Science Puzzles: Making Meaning from Data

By Kim Kastens and Margie Turrin, National Science Teachers Association, December 2010

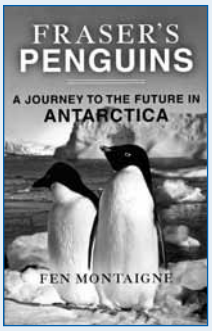
The National Science Teachers Association has published a book featuring science exercises or "puzzles" written by Lamont-Doherty geophysicist **Kim Kastens** and Lamont-Doherty education coordinator **Margie Turrin** on such topics as weather forecasting, earthquakes, estuaries, watersheds, and hydrothermal vents. *Earth Science Puzzles* uses authentic data gathered by researchers at the Observatory and elsewhere.

Puzzles include graphs, maps, tables, images, and narratives, and ask students to use temporal, spatial, quantitative, and concept-based reasoning to draw inferences from the data. For the teacher, each puzzle is supported by an extensive Pedagogical Content Knowledge Guide with background information, required skills, common student misconceptions, and a bank of resources for further exploration of the science topics.



Fraser's Penguins: A Journey to the Future in Antarctica

By Fen Montaigne, Henry Holt, November 2010



Travel writer and journalist Fen Montaigne spent five months tracking penguins through the breeding season on the northwestern Antarctic Peninsula with scientist Bill Fraser. His book is a bittersweet account of the stark beauty of the continent and the climate change that threatens its delicate ecosystem.

Montaigne consulted with Lamont-Doherty oceanographer **Doug Martinson**, who is quoted in the book discussing how Antarctica's Circumpolar Current—the most powerful current on Earth—delivers heat to the Antarctic Peninsula and spurs glacial and ice sheet melt, the latter leading to the demise of the penguin colonies discussed in the book.

Testing the Waters: Monitoring Contamination in the Hudson River

By Susan L. Young

Environmental biologist Andrew Juhl is part of a small team monitoring contamination levels in the Hudson River.

The Hudson River has undergone a remarkable transformation over the last 30 years. Once treated like an open sewer, the river has benefited from upgrades to wastewater treatment plants and new management policies. Now, swimmers, boaters, and fishermen are returning to its waters. But while average water quality is better, there are still off days and contaminated locations, and visitors to the river may be risking their health.

People are drawn back to the river, says Lamont-Doherty environmental biologist Gregory O'Mullan, but they don't realize how variable water quality can be at different locations and times. To help inform water resource managers and New Yorkers ready for recreation, O'Mullan and colleague Lamont-Doherty environmental biologist Andrew Juhl have teamed up with advocacy group Riverkeeper to monitor sewage contamination up and down the Hudson.

Once a month, from about April to November, a small team of scientists makes the 155-mile boat trip from the New York City harbor up past Albany. The journey takes them four days, and the team samples roughly 80 different locations along the way, hanging over the side to scoop up samples in plastic bottles. Part of Riverkeeper's nearly 40-foot-long boat has been converted into a mini-lab, where the scientists can quickly test their samples.

Of all the potential contaminants in the Hudson, sewage poses the most immediate risk to human health. Old and overburdened sewer systems, illegal discharge, and leaky septic tanks can contaminate the river's waters. Contact with sewage can cause eye infections, gastrointestinal distress, and other illnesses. In particular, the team looks for *Enterococcus*, a bacteria that lives in the guts of warm-blooded animals, such as humans.

Within 24 hours of collecting the sample, the team counts the number of *Enteroccocus* bacteria and compares that number to federal safety standards. Once back on land, the researchers upload their results to the Riverkeeper website, which incorporates a Google Maps interface. Curious parties can look up their favorite location and view the data.

The team has found the contamination to be highly variable. Sometimes a location that is frequently polluted is within a few miles of a site that is rarely polluted, says Juhl. For example, Sparkill Creek, one of the sites nearest to the Lamont campus, is regularly plagued by a dangerous number of bacteria. But, Croton Point Beach, just a bit north, never exceeds the safety guidelines.

The middle of the river is often clean, especially in dry weather, indicating that contamination along the shore can be quite localized, explains O'Mullan, who is also a professor at Queens College, City University of New York. "If we see a problem in your near-shore waters, it's because of a near-shore source," he says. To better map the pollution in places where the boat can't reach, some communities, including residents near Sparkill Creek, are assisting the scientists' efforts by collecting samples in the tributaries that feed into the river.

The scientists plan to extend their study to include sampling of the river's bottom. When bacteria enter the Hudson, some sink down and settle in the sediment. These low-lying bacteria may be kicked up when someone steps into the river and disturbs the sediment—a potential source of contamination that currently goes unchecked. The researchers are also mentoring students whose thesis research focuses on the river environment. For example, Columbia PhD student Eli Dueker studies whether microbes may be carried into the air on the fine water droplets that spray off of whitecaps, while Queens College master's student Suzanne Young studies whether sewage carries antibiotic-resistant bacteria into the river along with the *Enteroccocus*.

In many parts of the Hudson north of New York Harbor, the LDEO-Riverkeeper collaboration is the only source of water quality data, says Juhl. Although the team doesn't make recommendations about when and where people should swim, they do encourage the public to look through their posted results. "It allows people to see the kinds of variation that's there and to make their own decisions," O'Mullan says.

Part of Riverkeeper's boat has been converted into a mini-lab for scientists.

The team hopes that as people begin to realize that sewage contamination is coming from a local source—and not the city upstream—they will take action by asking government agencies to upgrade wastewater treatment plants, fix broken sewer pipes, and prevent illegal discharge.

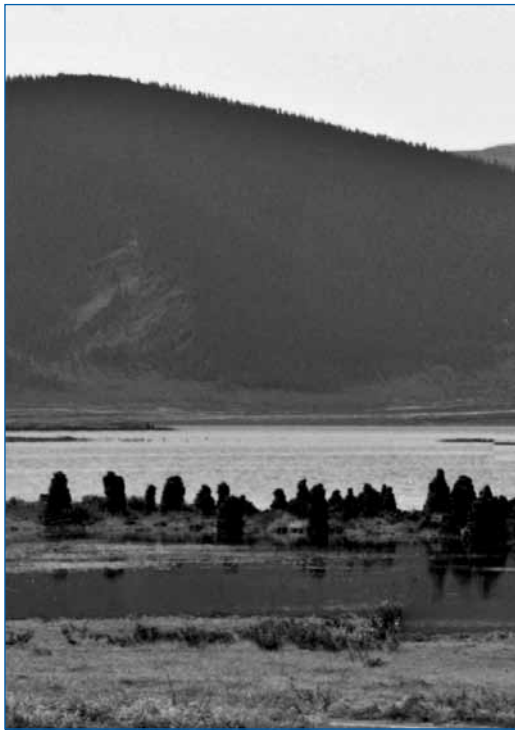
"If you find that source and turn it off, you're going to improve your local water quality," O'Mullan says. "That's a powerful thing to tell somebody: you hold the key to fixing the problem."

Hudson River Water Quality: www.riverkeeper.org/water-quality/hudson

A Tree-Ring Time Machine

Lamont-Doherty's Tree-Ring Lab Reconstructs Asia's Most Devastating Droughts

By Kim Martineau


Neil Pederson

Asia's seasonal monsoon rains water the rice paddies and wheat fields that feed much of the world's population. When the rains fail, people can go hungry or worse. Over the last 1,000 years, the fall of some of the world's great civilizations coincided with epic dry spells according to a new Monsoon Asia Drought Atlas produced by Lamont-Doherty's Tree-Ring Lab.


Kevin Anchukaitis

Le Canh Nam, who is a Vietnamese forest specialist, is shown here with a core from a tree in Bidoup Nui Ba National Park.

The drought atlas speaks to climate's powerful role in shaping human history while serving as a rich tool for scientists intent on unraveling the land, sea, and atmospheric interactions that drive the Asian monsoon. These complex interactions are responsible for the torrential rains that have recently caused extensive flooding in Sri Lanka and Australia, and the withering drought that has dried out large parts of China's wheat belt.

Some scientists expect parts of Asia to grow drier as temperatures rise from man-made climate change. Forecasting how the rains may shift will be of central importance to this densely populated region. The drought atlas may also function as a crystal ball of sorts. By allowing climate modelers to test their theories about years when the monsoon rains failed to arrive, it can help modelers predict future monsoon failures.

Putting together a millennium-length rainfall record of Asia was not easy. With limited weather records at their disposal, the scientists focused on a proxy—the growth rings of old trees—to retrieve climate data farther back in time. Like pages in a book, the rings of some trees can tell scientists how moisture levels varied year to year. In wet years, the trees grow wider rings, while dry years produce tighter rings. By sampling these ancient trees, using a method that does no damage to the trees, scientists can produce a long-term climate record.

With this basic concept, a team of Lamont-Doherty scientists and international collaborators fanned out across Asia, over mountains, tundra, jungle, and floodplains, looking for the Methuselahs of the forest. They sought out remote places, untouched by loggers. At more than 300 sites, from Siberia down to Indonesia, from Pakistan eastward to Japan, they extracted pencil-thin cores from the trees. After 15 years of work—the last 5 supported by the National Science Foundation's Paleoclimate Program—they assembled a year-by-year picture of moisture fluctuations across Asia going back a thousand years.

"The Asian monsoon gives water to three billion people, and the instrumental records go back only 50 years in some places," Lamont-Doherty scientist Neil Pederson explains. "You build the drought atlas, and you start to see how often bad years come, how often the monsoon fails, and what the climate interactions that drive the monsoon are."

In a study last year in the journal *Science*, researchers from the Tree-Ring Lab identified at least four epic droughts that likely altered the course of history. The drought atlas was described in the same issue by scientists not involved in the study as a "crucial step forward" for studies of past climate in a region that could become more vulnerable to crop failures as the planet warms.

A Resource for Other Studies

The drought atlas is already helping scientists narrow in on particular regions of interest. Using the Indonesian tree-ring records, Lamont-Doherty scientist Rosanne D'Arrigo has reconstructed stream flow in Java's Citarum River basin, a region that waters much of Indonesia's rice crop. In a study published in *Climate Dynamics*, D'Arrigo found that weak monsoon rains in Indonesia in the last 250 years often coincided with El Niño, the cycli-

Tree-Ring researchers collected samples of trees near Terkhin Tsagaan Nuur, a freshwater lake in Mongolia.

cal warming of the tropical Pacific.

The atlas is also providing some surprises. In a recent paper in *Geophysical Research Letters*, Lamont-Doherty scientist Kevin Anchukaitis and colleagues used the data to upend the established view of how large volcanic eruptions affect monsoon rains in Southeast Asia. Erupting volcanoes spew particles in the air that block the sun's energy, cooling the air for months, even years, at a time. "Volcanic winters" produced by these particles are thought by some to have wiped out the dinosaurs, for example. More recently, the blowup of Indonesia's Mount Tambora volcano in the early 19th century caused crop failures across Europe and North America.

Some climate models have predicted that volcanic explosions reduce monsoon rainfall directly by cooling the air—in cooler weather less water evaporates into the air and less vapor falls as rain. Until now, these models predicted that volcanic eruptions would disrupt the monsoon by bringing less rain to Southeast Asia, but the recent study demonstrated just the opposite: mainland Southeast Asia became wetter.

The study looked at 54 volcanic explosions in the last 800 years, including a 1258 eruption in an unknown tropical site (the most powerful in the series); the 1600–1601 eruption of Peru's Huaynaputina; Indonesia's Tambora in 1815; Indonesia's Krakatau explosion in 1883; and the Philippines' Mount Pinatubo blowout in 1991. Anchukaitis' group found that arid Central Asia dried up and mainland Southeast Asia got more rain in years with an eruption, the opposite pattern simulated by some climate models.

Asia's monsoon rains are governed by several factors, including the shape of landmasses, atmospheric circulation patterns, and the cyclical warming and cooling of the Pacific and Indian Oceans. Scientists say it's too soon to tell why volcanic eruptions make some regions rainier and others drier. But the study suggests that a response similar to the cold phase of the El Niño–Southern Oscillation (ENSO), which drives temperatures over the Pacific, may amplify or counteract the direct drying effect of the volcanic explosions.

The Asian drought atlas complements a similar atlas for North America that Lamont-Doherty scientist Ed Cook finished in 2004, reconstructing the continent's hydroclimate for the last two thousand years. Both atlases were built using the same methods, allowing for easy and direct comparisons. In the modern era, short-term rainfall patterns across North America and Asia appear to be closely linked to ENSO, the warming and cooling of the tropical Pacific atmosphere-ocean system. El Niño, the warm phase of ENSO, often shuts down the monsoon rains in Asia, causing drought, while bringing more rain to the west coast of North America. La Niña, the cold phase, brings added rainfall to Asia and drought to North America. ENSO's link to two continents separated by the vast Pacific Ocean can be thought of as a "bridge" that allows for large-scale comparisons to be made.

"By comparing both atlases jointly, we can determine how this ENSO bridge between continents has varied and changed over the past millennium," says Cook.

Climate and Culture

The Monsoon Asia Drought Atlas is also a boon to historians, putting precise dates on environmental disruptions that may have figured into the collapse of several civilizations. In the *Science* paper last year, for which Cook was lead author, he and colleagues identified the Victorian-era "Great Drought" of 1876–1878 to be the worst in the series. Its effects were felt across the tropics, triggering famines that by some estimates killed up to 30 million people. According to the tree-ring evidence, the effect was especially acute in India but extended as far away as China and present-day Indonesia. Colonial-era policies left regional societies ill-equipped to deal with the drought's consequences, as historian Mike Davis details in his book *Late Victorian Holocausts*. Famine and cholera outbreaks at this time in colonial Vietnam fueled a peasant revolt against the French.


Kevin Anchukaitis

A statue at Angkor's Bayon temple is a silent witness to the collapse of the Khmer civilization.


Peter Brown

A *pinus sylvestris* is seen here north of Mongolia's capital city of Ulaanbaatar.

The Monsoon Asia Drought Atlas is also a boon to historians, putting precise dates on environmental disruptions that may have figured into the collapse of several civilizations

The study also suggests that a severe dry spell played a role in the 1644 fall of China's Ming dynasty. Historical texts reference the drought as the worst in five centuries, which the tree-ring evidence supported, narrowing the event down to a three-year period, 1638–1641. The drought was most sharply expressed in northeastern China, near Beijing, and is thought to have influenced peasant rebellions that hastened the demise of the Ming.

In modern day Cambodia, Lamont-Doherty scientist Brendan Buckley and colleagues have linked dramatic swings in the monsoon rains to the collapse of the ancient Khmer civilization at Angkor nearly 600 years ago. In a study last year using tree-ring records from the drought atlas, Buckley showed evidence of a mega-drought in the wider region around Angkor from the 1340s to the 1360s, followed by a more severe but shorter drought from the 1400s to the 1420s. Both killer droughts, interspersed with bouts of heavy monsoon rain, may have weakened the empire by shrinking Angkor's water supplies and damaging its vast irrigation system, which was central to its economy. The kingdom is thought to have collapsed in 1431 after a raid by the Siamese from present-day Thailand.

Expanding the Atlas

The Tree-Ring Lab is now at work improving the resolution of the drought atlas by increasing the number of data points. They are pushing to extend its timeline back another 300 to 500 years, through at least 800 AD, by trekking to other isolated regions where the ancient trees still grow and well-preserved timbers can be scavenged from the forest floor. The scientists continue to fill in geographical gaps, with the goal of narrowing the present resolution of 150 square miles to 60 square miles.

Over the next year, Buckley and Anchukaitis, with postdoctoral fellow Andrew Bell, will travel to Southeast Asia in search of thousand-year-old Fujian cypresses and other untested species that may have recorded past climate changes. D'Arrigo will return to Myanmar to continue sampling teak trees and teak posts from the 1553 palace of former Myanmar King Bayinnaung. Pederson will go back to the grasslands of Mongolia to sample Siberian larch and pine trees, while Cook travels to Bhutan and the Himalaya to continue research on Asia's highest forests.

The stories handed down on parchment over the years have allowed historians to learn about the great Asian civilizations of the past. People have come and gone over this time, but a few sturdy trees have lived through it all and have their own stories to share. By reading the rings like so many tea leaves, scientists at Lamont-Doherty are helping to untangle the important ways that climate influences history.

"Not every drought leads to a historical collapse, and civilizations may decline without a climatic change," says Anchukaitis. "But the drought atlas allows us to start thinking in a more nuanced way about what it takes for a drought to affect society."

Tree Rings May Reveal Origin of Ancient Ship Unearthed at World Trade Center Site

By Kim Martineau

The site of the World Trade Center is a brutal reminder of the worst terrorist attack in US history as well as a symbol of New York City's future. But one unexpected discovery from the wreckage has nothing to do with global politics or modern finance. A wooden ship discovered under the rubble of the site harkens back to the days before subways and electronic trading, when hailing a taxi uptown meant hopping a boat on the Hudson River.

Last summer, archeologists monitoring the excavation of the site stumbled upon the hull of what is believed to have been an 18th-century merchant ship. The ship was found immediately south of where the Twin Towers once stood, in what is slated to become an underground parking garage. As Manhattan grew from colonial outpost to cosmopolitan center, the shoreline of the Hudson River moved progressively west as the island filled up and out. Historic maps show that water once covered the location where the ship was found, but that by 1797, the area had been filled in. Was the ship buried here at the end of its life? As archeologists probe the relic for clues, scientists at Lamont-Doherty have been called in to determine the provenance of the ship's timbers and establish their approximate age.

On an overcast day in January, Lamont-Doherty researcher Neil Pederson laid on a table some two dozen bits of blackened oak carefully sawed from the original timbers. He began sanding the first fragment to reveal its ring structure, and would later put it under a microscope to measure the width of its rings. Most trees grow wider rings during wet years and tighter rings in dry years, accumulating a unique record of the weather at the time. By analyzing these ring measurements, scientists can learn about past climate as well as particulars about a given tree—where it grew and how old it was when people chopped it down.

At the moment, Pederson, postdoctoral fellow Dario Martin-Benito, and colleagues are in the lab calculating an average ring width for each scrap. Matching scraps will be added to a library, or "chronology," to create a xylem fingerprint of the trees in question. Researchers can then compare this fingerprint to that of hundreds of other living oaks in the United States until they find a match.

"There will be one piece that cracks the code," Pederson says.

Lamont-Doherty has worked before with archeologists at AKRF, the New York City environmental consulting firm that is leading the historical investigation at the World Trade Center site. Past projects have included dating wooden wharves, water pipes, and military fortifications uncovered at South Street Seaport and South Ferry. When the scientists at Lamont-Doherty were called last summer, they were initially nervous. Would the timbers be too rotted to analyze? Would they have enough rings to be cross-dated?

On an overcast day last July, Pederson and Rosanne D'Arrigo, associate director of Lamont-Doherty's Biology and Paleo Environment Division, visited the excavation site and watched as archeologists removed the last of the ship's hull from a pit three stories below street level. At the time, the wood was obscured in a thick layer of mud, and neither scientist could tell what they had.

Today, they are feeling more hopeful. Many of the oak beams appear to have at least 60 rings, improving the chances of finding a match. Even luckier for them, one of the beams has been identified as hickory wood. Hickory trees went extinct in Europe some two million years ago and are today found only in India, Eastern Asia, and temperate North America, suggesting that the ship was probably built in the United States and not Europe. "I jumped out of my seat when I saw hickory," remembers Pederson. "That narrows it down to practically our backyard." Further work is expected to reveal more about this mysterious ship.

Images courtesy of the Lower Manhattan Development Corp.

Left: Rosanne D'Arrigo (center) at the exacavation site; right: Neil Pederson (foreground) handling the ancient timber

Letter from Steven Cande, Alumni Board President

Dear Alumni and Friends of Lamont,

Greetings from La Jolla! I caught up with many old friends over the holidays at the American Geophysical Union (AGU) conference in San Francisco. I must admit that, as the number of AGU attendees increases (nearly 20,000!), I am always grateful to see a friendly face in the sea of strangers. The always-popular Lamont-Doherty AGU alumni bash provided the welcome opportunity for a smaller and more intimate gathering.

With my friend Mike Purdy's departure as director of the Observatory, and the search for a new leader commencing, a new chapter in Lamont-Doherty's history awaits to unfold. It is an institution with a particularly rich history—one I feel lucky to have been a part of.

I'm happy to announce that Philip Orton (PhD '10) has joined the Alumni Association Board of Directors. Orton is currently a postdoc at the Stevens Institute of Technology. You can follow his thoughts about New York's atmosphere and waterways on his blog **SeaAndSkyNY.**

Philip Orton

The sad news of marine geophysicist John Diebold's untimely death prompted Henry Cole, a young researcher at the Observatory during the 1960s, to send a letter to his fellow Lamonters. Cole does a fine job of capturing a unique moment in time, and he has agreed to let me excerpt parts of it, which I do below. Note that we welcome communications or "cables" from all of our alumni. Please send your recollections, or updates, to the editor of this newsletter, Dove Pedlosky.

Have a very pleasant spring.

Warm regards,

Steven C. Cande

Steven C. Cande, PhD '77

> For many of you, this is the first time that I have tried to reach you although I have thought long and hard about our time at Lamont, and have great memories at sea and working on the high bluff overlooking the Hudson River….
>
> Those were great days in my life and, I would venture to say, in all our lives … Panama to New York, Buenos Aires to Capetown and Mauritius, Buenos Aires to Colombo, Singapore, Japan, and assorted other trips, all in the pursuit of the wiley deep scattering layer in the global oceans.
>
> Swimming off the ship in the Indian Ocean, watching the elephants and their trainers moving logs in Ceylon. And always the continuous bustle of activity down by the waterfront….
>
> So, to all my old friends, and the memory of John, I send heartfelt greetings and the wish that you all continue with interesting and fruitful lives wherever you may be.
>
> —Dr. Henry Cole, Fairbanks, AK

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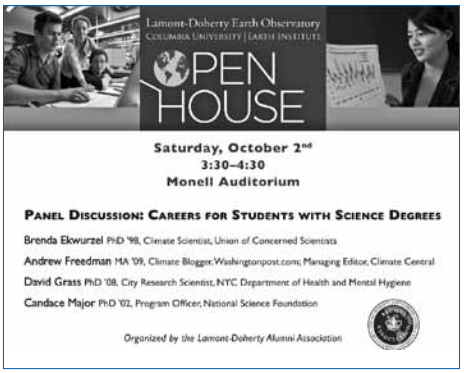
Open House Alumni Weekend 2010



Open House featured several events for Lamont-Doherty alum, including an alumni career panel, drinks in the rose garden, and a dinner barbecue at Lamont Hall.

Eileen Barroso

Eileen Barroso

AGU Alumni Reception 2010

Seismologist Nano Seeber (left) speaks with a guest.

Justin Coplan (with EarthObserver on his iPad) with Frank Nitsche and Suzanne Carbotte

Lamont-Doherty postdocs Paolo Montagna and Carlo Caso flanked by their Italian colleagues

Q & A
with Mike Coffin, PhD '85

Marine geophysicist Mike Coffin was recently appointed founding Executive Director of the Institute for Marine and Antarctic Studies (IMAS), established by the University of Tasmania in 2010.

Who or what most influenced your decision to pursue studies in the earth sciences?

Dartmouth had an exceptionally strong group of observational earth scientists, including Noye Johnson and former Lamonter Chuck Drake. Through classwork, weekend field excursions, and a field program that took me to such places as the Catskills, Lake Powell ("desert oceanography"), and Central America, I became an earth science major.

Between junior and senior years, the Woods Hole Oceanographic Institution organized a month of onshore work for me, followed by 4.5 months aboard the R/V *Atlantis II.* That extended sea time provided a superb opportunity to evaluate marine geoscience as a career and introduced me to a wide array of marine geoscientists, including Jamie Austin, Betty Bunce, Bob Detrick, Jeremy Duschenes, Ed Laine, Keith Louden, Barry Parsons, Mike Purdy, and El Uchupi. Chuck Drake supervised my senior honors thesis on magnetics data we'd collected while aboard the *Atlantis II* and encouraged me to attend Columbia for graduate school.

What research questions have engaged you over the years?

Typically questions that involve exploratory research and imagination. After finishing my PhD on rifting and breakup between East Africa and Madagascar and the intervening Western Somali Basin, I moved to Australia for five years and focused on understanding the origin and evolution of the Kerguelen Plateau in the Indian Ocean.

I then worked for nearly a dozen years under Art Maxwell and former Lamonter Paul Stoffa at the University of Texas. I realized that integrated analyses of large igneous provinces (LIPs)—oceanic plateaus, volcanic rifted margins, and continental flood basalts—could provide unique synergies lacking in studies dedicated to a single type of LIP. I collaborated closely with former Lamonter Olav Eldholm of Norway to study how the massive magmatism associated with LIPs may impact surrounding environments. Other research questions included the origin, evolution, and tectonics of the Ontong Java Plateau in the Pacific Ocean, the world's largest oceanic plateau. The physical mechanisms that initiate subduction began to intrigue me while I was in Texas, stimulated in part by the great 1989 Macquarie Ridge earthquake south of New Zealand.

Moving to Japan in 2001, I complemented further Ontong Java Plateau studies with investigations of the Manihiki Plateau, Macquarie Ridge, and the Izu-Bonin Arc. I also began to work closely with geochemists and paleoceanographers to understand links between LIPs and the great Cretaceous oceanic anoxic events, which are marked by significant depletion in oceanic oxygen levels.

In 2007, I moved to the UK to commence full-time administrative work across the major oceanographic disciplines at the National Oceanography Centre, Southampton. Now, as in my three years in the UK, I experience research mainly vicariously through collaborators and students. Nevertheless, last year I sailed on the first deep seismic investigation of the Ontong Java Plateau with Japanese colleagues, and I'm keen to address further Kerguelen Plateau and Macquarie Ridge questions on Australia's new R/V *Investigator* after she's launched in 2013.

In a field that seeks to understand the integrated systems of our planet, your experience living and working on four continents must be particularly valuable.

I must say that I feel extremely fortunate to (1) have grown up in Maine with a Canadian mother, a French grandmother, and an American father who nurtured and supported my curiosity about international cultures; (2) live at a time when international mobility is relatively unconstrained; and (3) have English, the current lingua franca of science, as my native language. These circumstances have greatly fostered working and living on four continents.

Earth and ocean processes transcend any political boundaries, and observational earth scientists typically travel far and wide to study what are usually universal phenomena. Thus, we are automatically "internationalists" when we choose to study earth science. It is no accident the Integrated Ocean Drilling Program (IODP) is not only the largest international program in the earth and ocean sciences but is among the largest of its kind in any scientific discipline. The success of other international programs, such as the World Ocean Circulation Experiment or the Argo project (not to mention the Intergovernmental Panel on Climate Change), bears testimony to the enormous efforts and outstanding successes of earth scientists working together across cultures.

I'd encourage aspiring young scientists to pursue international research ashore and afloat. The rewards are many and the risks are few.

What challenges and opportunities do you foresee for the nascent IMAS?

We are a mere toddler compared with our aspirational peer institutions. Fortunately, we are geographically situated at the locus of Southern Hemisphere oceanographic and Antarctic research. The Hobart region is home to not only IMAS (~150 staff) but also to Australia's Commonwealth Scientific and Industrial Research Organization Marine and Atmospheric Research (~550 staff) and the Australian Antarctic Division (~300 staff), so we have a sizable critical mass here. Our greatest challenge is to forge these academic and governmental researchers into a synergistic community, which is also our greatest opportunity. Such a concentration of ocean and Antarctic expertise is remarkable for any country, let alone one with a population of only 22.5 million people. My role at IMAS can be summarized in six words: build IMAS, drive change, develop people.

What led you to make the transition from a scientist to assuming your current leadership role?

In retrospect, the transitions from researcher and teacher to coordinator and leader seem quite blurred and gradual. In 1992, I was recruited by the International Association of Volcanology and Chemistry of the Earth's Interior to build an international commission focusing on LIPs. Over the course of five years, John Mahoney (University of Hawaii) and I pulled together an international community of more than 500 people. In 1999, I was drafted to cochair the international working group that put together the initial science plan for the IODP, and I served as inaugural chair of the IODP's Science Planning Committee. Striving for (and achieving) community goals proved fulfilling and rewarding. The opportunity to build a major new research and educational institution is rare in anyone's career, and I feel exceedingly privileged to be leading IMAS.

Celine Herweijer, PhD '06

By Dove Pedlosky

By any standard, Celine Herweijer's rise in the world of climate policy has been meteoric. Born in London, Herweijer came to New York to pursue graduate studies at Columbia, where she wrote her PhD thesis on drought modeling with Lamont-Doherty climate modelers Mark Cane and Richard Seager.

Through her thesis, Herweijer became interested in the policy and business response to managing climate impacts, including a mechanism that grants farmers in the developing world access to what only the richest 3 percent of people on our planet have: insurance. Columbia University's International Research Institute for Climate and Society, together with the United Nations, had begun to explore the idea of climate index insurance. By employing climate models to gauge weather-related scenarios, scientists could diminish investment risks for both farmers and insurers.

"Insurance agencies were just starting to pay attention to climate change, looking at both risks and opportunities for new products and markets," Herweijer explains.

Inspired by this intersection of science and policy, Herweijer worked on some of the earliest pilot projects at the UN Division for Sustainable Development in 2005, while finalizing her PhD (Herweijer's competency is reflected in the fact that a few years later she shared a panel with Kofi Annan at the Global Humanitarian Forum in Geneva). Herweijer was keen to apply her technical expertise in climate outside of academia, in both the public and private sector. "I'm driven by a desire to help influence change," Herweijer says.

Returning to London, Herweijer accepted the role of project director at the Lighthill Risk Network, a start-up organization funded by large insurers and re-insurers, and by the UK government. Her assignment at Lighthill was to construct a link between the world of academic research and the insurance market, and to facilitate effective dialogues between both entities. Reflecting on her time with Lighthill, Herweijer now realizes she received an invaluable education in launching a start-up company and assembling talent from scratch.

With this experience under her belt, Herweijer was recruited by Risk Management Solutions (RMS) at the start of 2007. RMS is the world's largest catastrophe modeling firm and builds models for insurers and banks associated with natural events, such as earthquakes, volcanoes, and hailstorms, in addition to man-made catastrophes, like terrorism and pandemic flu. At RMS she worked with the model development team to address how climate variability and change would affect model design, and with RMS' insurance clients on the impacts of climate change on their business.

As the director of the RMS Climate Change Practice, Herweijer also began to create new markets for RMS, encouraging the company to apply their models more widely to help clients outside the insurance industry. Concentrating on climate risk and adaptation, she worked with RMS to engage clients in the public sector—from individual cities to the governments of developing countries and development banks—and in business, from corporates to private equity firms.

Herweijer enjoyed the diversity of the clients she cultivated at RMS, and, when PricewaterhouseCoopers (PwC) recruited her in 2009, decided to join them as a director in their UK Sustainability and Climate Change team, leading their climate change and international development business. PwC's climate change capacity is truly immense: Their global network of climate change and international development experts comprises over 800 people in more than a hundred countries who support governments, donors, international organizations, the private sector, and NGOs on issues from policy development to fund management, project implementation and impact assessment. Examples of their work include managing large-scale donor funds for the United Nations program on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+), and advising governments on how to move toward a low carbon and climate resilient future. Often this means addressing national institutional structures, policy and fiscal reform, and creating a favorable environment for private investments to reduce emissions and to maximize other sustainable outcomes.

With Herweijer's efforts, PwC was recently selected to manage a five-year, £55 million flagship program funded by the UK and Dutch governments referred to as the Climate and Development Knowledge Network (CDKN). Herweijer currently acts as CDKN's chief strategy adviser. The CDKN supports leaders and decision makers in developing countries to design and deliver climate-compatible development policies. It does this by providing technical assistance, cutting-edge research, strategic knowledge sharing, and capacity building, in more than 20 developing countries. Collaborating with researchers, think tanks, the private sector, donors, UN agencies, and foreign media, Herweijer and her team are building a network of international experts who can help promote green and climate resilient growth.

Today, Herweijer's work mainly consists of traveling to Washington DC, Brussels, or developing countries, meeting with top decision makers and experts, and scoping out strategic collaborations. She is a key adviser to the G-20 and World Economic Forum's business-expert taskforce around adaptation, a member of the Munich Climate Insurance Initiative, and a private sector representative of the World Bank's Climate Investment Funds. In January, she briefly alighted in Manhattan, just long enough to meet with this (grateful) writer and a group from the US State Department that is in the early stages of establishing a US government program in many ways akin to the CDKN.

Since 2011, Herweijer has been a visiting senior research fellow at the London School of Economics' Grantham Institute for Climate Change. This (part-time) return to research is something she relishes. "Grantham will provide me with some vital headspace to collaborate with peers and students on publishing papers again," Herweijer says.

Herweijer doesn't discount a return to academics in the future. "My years at Lamont-Doherty were some of the happiest I've experienced. I would love to spend my 'sunset years' immersed in research again and teaching, ideally at The Earth Institute, back in New York, and on the soccer pitch!"

Virginia M. Oversby, PhD '69

Editor's Note: Virginia M. Oversby, a Lamont-Doherty alumna who received her PhD in geochemistry under Paul Gast, reconnected with our alumni office in 2009 during the annual general alumni meeting held at the American Geophysical Union conference. She had recently retired from her role as a consultant in Sweden on issues of radioactive waste management and, along with her Swedish husband Lars Werme, had settled in Walnut Creek CA.

Oversby felt compelled to reach out to the institution that had fostered her career in the sciences, and she was eager to support the future of Lamont-Doherty. She informed us that she had established a very generous bequest for the Observatory, making her the most recent member of our Torrey Cliff Society. Below, Oversby explains her connection to Lamont-Doherty and reflects on the motivation behind her gift.

Please share with us how you first became interested in the earth sciences.

I attended Wellesley College with the intent of pursuing a major in political science. As part of Wellesley's academic program, students are encouraged to follow a course of study that is broad in scope. I had taken an introductory political science course and found it a bit diffuse for my taste but truly enjoyed my geology class. It was this class that initially piqued my interest in earth science and initiated my decision to major in geology. With a new direction, additional geology classes, and a chemistry class mixed in, I was able to identify mineralogy/petrology as the most appealing topic for me in the field. One of my professors convinced me I should major in chemistry with a geology minor.

What first brought you to Lamont-Doherty?

In my junior year a professor informed me about a summer job opportunity for chemistry majors at Lamont-Doherty. I applied, was accepted, and spent a wonderful summer working on a research project supervised by Archie Kaufman. That experience convinced me to pursue a graduate degree at the Observatory.

How did your time here shape your thinking and influence your career?

My time at Lamont-Doherty taught me that there was a fantastic array of subjects within earth science and geochemistry. I felt encouraged to pursue research opportunities that were outside the area of my thesis work. While I was working on my thesis, we had a visiting professor from the Australian National University (ANU) working with us in the lab. He convinced me to work at ANU after I finished my degree. I did, and eventually I worked with Ted Ringwood on developing a synthetic waste form for the high-level radioactive waste that results from the reprocessing of spent nuclear fuel.

What led you to leave a bequest in your will to support the Observatory?

I was a scholarship student at Wellesley, and know I would never have gotten the education I received if it were not for the endowment that supports scholarship aid for students. Thus feeling an obligation to "pay back" for all I received, I make donations to help the institutions that nurtured me as a student.

I am clearly indebted to Lamont-Doherty for preparing me to enter the world of research and giving me the confidence to try new areas of work. I feel that the financial comfort I have now, provided by a series of well-paying jobs, would not have been possible without the solid foundation I received at the Observatory. I truly believe that the fortunate should share their talents and resources with others who could benefit.

> "I want to preserve the rich tradition of research and mentoring that I experienced at the Observatory."

By including the Observatory in your estate plans through a bequest, charitable gift annuity, or other planned giving vehicle, you become a member of the **Torrey Cliff Society.** *Reflecting the original name of the property on which the Observatory is located, the Torrey Cliff Society pays homage not only to the extraordinary generosity of Thomas and Florence Lamont, who donated their weekend estate to Columbia University in 1948, but also to those who support the Observatory's decades of scientific achievement with an enduring legacy.*

If you have already made provisions for Lamont-Doherty, or if you would like to learn more about planned giving options, please contact Stacey Vassallo at 845-365-8634.

Honor the spirit of discovery and support the John B. Diebold Fund with your purchase of a handcrafted pen from the R/V *Vema.*

The R/V *Vema* shown here in its earlier incarnation as a luxury sailing schooner

Last fall, an assemblage of teak from the base of the R/V *Vema*'s eagle figurehead was found in the rafters of one of the old barns used for storage on the Lamont campus. A local craftsman offered to turn his lathe to the task of creating an elegant writing instrument from this venerable wood.

The first round of production on the pens is now complete, and the sale of this inaugural collection will be used to benefit the **John B. Diebold Student Fellowship Fund**, which was established in John's memory in July 2010 to provide support for Columbia students to go to sea and participate in research expeditions.

John and the *Vema* share a common history, having both spent many years circling the globe for the Observatory. Between them, they explored every ocean and sailed more than a million and a half nautical miles collecting vital data. With your purchase, not only will you pay tribute to one of the Observatory's most beloved colleagues and have a bit of the *Vema* in your hand, you will also honor the spirit of exploration that inspires Lamonters to this day.

Pens pictured are prototypes. Actual pens will be inscribed R/V *Vema.* All pens are shipped in a grey felt box with commemorative information about the *Vema* enclosed.

Cigar style pen $300* (pen only)

Slimline style $250* (please specify pen or pencil)

One of each (please specify pen or pencil for Slimline style) $500*

Contact Erika Freimuth at freimuth@ldeo.columbia.edu or 845-365-8599 to purchase your commemorative pen(s).

**The net proceeds from the sale of the pens will be added to the Diebold Student Fellowship Fund. The tax deductible portion of your purchase price is $190 for cigar style pens, $155 for slimline pens or pencils, or $295 for a set."*

Lamont-Doherty Earth Observatory
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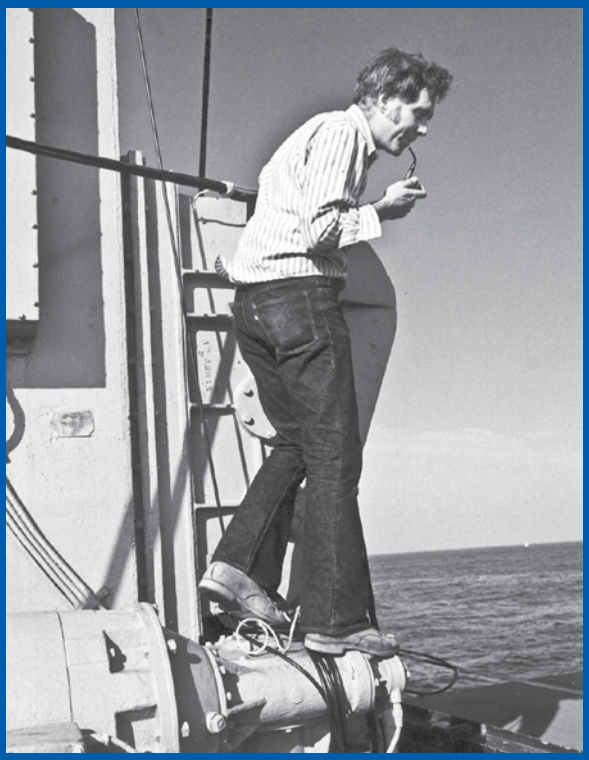

A gentleman at sea: if anyone can identify this pipe-carrying oceanographer, please contact the Lamont-Doherty alumni office.

INSIDE