

LAMONT-DOHERTY EARTH OBSERVATORY
THE EARTH INSTITUTE AT COLUMBIA UNIVERSITY

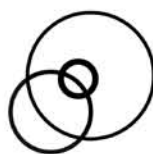


COOL SCIENCE

OPEN HOUSE

SATURDAY, OCTOBER 6, 2007, 10:00 AM to 4:00 PM

www.ldeo.columbia.edu



**LAMONT-DOHERTY
EARTH OBSERVATORY**
THE EARTH INSTITUTE AT COLUMBIA UNIVERSITY

Located on a 157-acre campus on the Hudson River, the Lamont-Doherty Earth Observatory (LDEO) is the only research center in the world examining the planet from its core to its outermost atmosphere across every continent and every ocean. From global climate change to earthquakes, volcanoes, shrinking natural resources, environmental hazards and beyond, LDEO scientists continue to provide the basic knowledge of Earth systems that must inform the wise stewardship of our planet. LDEO's annual open house is an exciting opportunity for adults and children of every age to learn about Earth in fun and engaging ways.

Bus From Morningside Heights

Buses depart for the LDEO campus in Palisades, NY, from 118th Street and Amsterdam Avenue at 9:30 a.m., 10:00 a.m., 10:30 a.m., 11:00 a.m., 11:30 a.m., 12:00 p.m., 12:30 p.m., and 1:00 p.m. Buses return to 118th Street and Amsterdam Avenue from LDEO at 11:00 a.m., 11:30 a.m., 12:00 p.m., 12:30 p.m., 1:00 p.m., 1:30 p.m., 2:00 p.m., 3:00 p.m., 3:30 p.m., 4:00 p.m., 4:30 p.m., 5:00 p.m., and 5:30 p.m.

Shuttle Bus From IBM Conference Center, Route 9W

People arriving in cars or vans should park at the IBM Conference Center on Route 9W just north of the LDEO campus. Shuttle buses run continuously from 10:00 a.m. to 4:00 p.m. and arrive to and depart from the Geoscience Building at LDEO. Persons with special needs or questions should contact the LDEO Development Office at (845) 365-8634.

Coach USA Schedule

Port Authority Terminal-Palisades, NY: 9:15 a.m., 11:22 a.m. and 12:22 p.m. GW Bridge Station-Palisades, NY: 9:40 a.m. and 10:40 a.m.

Palisades, NY-Port Authority Terminal: 11:58 a.m., 1:58 p.m., 2:58 p.m. and 3:58 p.m. Palisades-GW Bridge Station: 12:58 p.m. and 2:58 p.m.

PARKING IS COMPLIMENTARY THANKS TO THE GENEROUS SUPPORT OF THE IBM DOLCE CONFERENCE CENTER.

LDEO and Columbia University Alumni Information

All LDEO and Columbia faculty, staff and student alumni are invited to a special hospitality suite in the Lamont Hall Seminar Room, open from 10:00 a.m. until 4:00 p.m.

FOR THEIR SAFETY, PLEASE NOTE THAT IT IS ESSENTIAL THAT CHILDREN BE SUPERVISED AT ALL TIMES.

LEGEND



Children's Activities



International Polar Year



High School Activities

1 WELCOME TENT

Receive Open House programs and campus maps here. Also at this tent:

Walking Tours

Sign up for walking tours of the LDEO campus. The 45-minute tours, limited to groups of 20 people each, depart from the front of Geoscience at 10:30 a.m., 11:30 a.m., 2:00 p.m. and 3:00 p.m.

2 LDEO GIFT SHOP

Purchase LDEO T-shirts, baseball caps, knapsacks, mugs and more!

3 EARTH2CLASS

Geoscience Lounge, First Floor

"E2C" is a unique professional development program designed to improve the knowledge, and teaching skills of teachers through interactive workshops with LDEO research scientists. Mini-workshops by E2C participants will describe how they use LDEO and other research with their classes. 10:30, 11:30, 12:30, 1:30, and 2:30. Visit <http://www.earth2class.org>.

LDEO Borehole Research Group scientists and E2C Organizer, Michael Passow, participated in the Integrated Ocean Drilling Project's "School of Rock 2007." This teacher enhancement program created classroom-ready activities based on sea-floor drilling by the JOIDES Resolution. Mini-workshops will share examples of "SOR" educational activities. 11:00, 1:00, 3:00. Visit <http://www.joilearning.org/schoolofrock/>.

Dendro Eco-Hike: Exploring Lamont's Forest History Through Tree-ring Analysis

This hike introduces you to our outdoor campus laboratory-our forest-and shows how we use trees to study environmental change. It is approximately one hour in length and requires shoes appropriate for the woods. Limited to groups of 15, the tour departs across from the front of the Marine Biology- Seismology Building at 10:30, 11:30, 12:30, 1:30, and 2:30. Visit <http://www.earth2class.org/docs/lamont%20walk.pdf>

4 CORE REPOSITORY/INTERNATIONAL POLAR YEAR

Biology and Paleo Environment and Marine Geology and Geophysics Divisions

Deep Sea Sediments

LDEO's Deep Sea Sample Repository archives sediment cores from



every major ocean and sea around the world. Examine the sediment and learn the stories these cores have to tell. Visit http://www.ideo.columbia.edu/res/fac/CORE_REPOSITORY/RHP1.html

Polar Landscapes in New York at the Close of the Ice Age

Use microscopes to look at seeds and pollen, complete a plant puzzle, and see glacial clay.

Arctic Sea Ice - How Does Ice Move in the Northern Polar Region?

See a computer visualization of movement of Arctic sea ice created by Lamont scientists.

The International Polar Year

This is the 4th International Polar Year (IPY). What have we learned from the first three and what is the focus of 2007-2009?

Understanding Polar Science

Education materials and resources for teachers focused on polar science.



5 SEISMOLOGY, GEOLOGY AND TECTONOPHYSICS

Visit <http://www.ideo.columbia.edu/res/div/sgt/>

Disaster Preparedness Around the World

Lamont scientists advise many countries and institutions around the world on disaster risk reduction and management. We also partner with aid agencies and nonprofit organizations to help deliver the best available technical information to people most at risk. This exhibit, developed together with one of our nonprofit partners, displays some of the materials that are distributed to communities facing the specter of natural hazards.

Monitoring Great Earthquakes by Satellite Geodesy

Two great earthquakes happened in November 2006 and January 2007 north of Japan. Our Global Positioning System (GPS) was there to capture the signals from both events. Come see the GPS instrument used and the meaning of these signals.

Global Research Projects – A Slide Show

Come see a recurring slide show of the exotic, remote, and unique locations where our scientists conduct their research.

Make Your Own Earthquake

With the use of a portable seismograph, visitors can see the ground shaking generated by their motion.

Ice Ages in Earth History

Not all ice ages saw woolly mammoths and their human hunters prowling the landscape. Come discover the different ways Earth's climate could be cold, very cold.

Seafloor Vibrations: Ocean-Bottom Seismometers

Lamont is home to the Ocean-Bottom Seismometer Instrument Facility, which operates a fleet of 30 broadband seismometers under the sponsorship of the National Science Foundation. These instruments drop to the seafloor, record earthquakes for a year, and then return to the surface on command. See how the instrument's design tackles each of these challenges, and how the recorded data is used to study structures and processes deep in Earth's crust and mantle.

Bamboo Bike Project

Bicycles are the primary mode of mobility for millions in poorer parts of the world.

Bamboo is grown in Africa, and bamboo bicycles have the potential

to be a sustainable business providing local employment in areas away from power and other facilities. Objectives of this project are to: 1) build a better bike for poor Africans in rural areas; and 2) stimulate a local bicycle building industry in Africa.

SEISMOLOGY, GEOLOGY AND TECTONOPHYSICS DIVISION

LECTURES AND DEMONSTRATIONS BY SCIENTISTS

SEISMOLOGY BUILDING, SEMINAR RM. 2ND FLR.

- 11:00 a.m. *Deciphering the Earthquake Code Using Time Reversal and Supercomputers* with **Vala Hjorleifsdottir**
- 1:00 p.m. *Earthquake Prediction in the Shadow of Chaos* with **Bruce Shaw**
- 2:30 p.m. *Rumbling Towards the Sea: Fast-moving Glaciers and Earthquakes in Greenland* with **Meredith Nettles**

Room 201: Lamont-Doherty Cooperative Seismographic Network

See a demonstration of the modern, real-time seismographic network for the East Coast. Learn about earthquakes in the North-eastern United States and view the LCSN Web page (<http://www.LDEO.columbia.edu/LCSN>) for images of recent earthquake activity. (Group size is limited.)

The Earthquake Ring

If you were standing on the surface of Earth during an earthquake, you would hear a low rumble at the bottom of your ears' limits of perception; the rest you would feel. Now imagine you are deep inside Earth, listening to the earthquakes popping and ringing around the surface. Come step inside this 24-foot diameter global simulator and experience the astounding sound of Earth!

Room 214: Rock Touching Room

Touch and examine rocks and minerals from around the world.

6 CENTER FOR INTERNATIONAL EARTH SCIENCE INFORMATION NETWORK (CIESIN)

CIESIN is a research and data center that produces, collects, and distributes data on the impacts of human activities on the environment and in turn, studies how environmental change affects society. Part of what we do is transform the data into maps and interactive graphics. Use our hands-on displays to learn about carbon dioxide emissions across the United States; understand how sea-level rise might affect your home; discover what a poverty map is; and more. Visit <http://www.ciesin.columbia.edu/>

7 FOOD TENT

8 MARINE BIOLOGY AND PALEO ENVIRONMENT DIVISION

Aquatic Food Web

Learn about the connections between aquatic organisms and the importance of plankton. See aquatic organisms under the microscope. Build your own plankton net.

Forests & Birds

Sites and sounds of a rapidly changing Hawaiian Rainforest Ecosystem.



Take a walk through a Hawaiian rainforest as it changes from its native form to something completely different as result of invasion by an exotic tree species. Listen to how the birds that live there change along with it. While you're at it, learn about how invasion by exotic plants is impacting forests right here in New York State!



9 GEOCHEMISTRY DIVISION

Visit <http://www.ideo.columbia.edu/res/div/gc/index.html>



Arsenic in Drinking Water—A Global Problem

At least 100 million people worldwide are currently drinking water that does not meet the World Health Organization (WHO) drinking water standards for arsenic. LDEO scientists study the processes that mobilize arsenic in groundwater and potential solutions for this problem. Includes demonstrations with determination of arsenic in drinking water. Visit <http://superfund.ciesin.columbia.edu/home.html> and <http://research.radlab.columbia.edu/ems/edout/sandtanks/>

The Solid Earth Cycle

In the last half-century earth scientists have related dynamic processes, such as volcanic eruptions and earthquakes, to the motions of large tectonic plates on Earth's surface. Rocks bear witness to this cycle, recording the birth of new ocean floor, volcanoes and mountain ranges as well as their destruction. Come see and touch these rocks for yourself.

Climate Change: Carbon Cycle-Carbon Sequestration

Climate change – global warming is damaging our planet at an alarming pace. Come see how scientists from the Geochemistry Division present their research about the Earth's past and present climate, and how we can tackle the global warming problem. Innovative solutions are demonstrated.

Formation of the Rocky Planets

See the transition from gas-dust nebula to a collection of growing planetesimals to a solar system in which Mercury has relatively high proportion on core to mantle, the Moon has a very low proportion of core to mantle, and Venus rotates on its axis in the opposite direction to all the other planets.

The New York Ice Age and the Cosmogenic Nuclide Lab at Lamont

See former ice extents in New York State and cosmogenic nuclide dates of glacial features from locations such as Long Island, Staten Island, Central Park, Harriman State Park, Black Rock Forest and the Lamont Campus. Come see when your area became ice-free.

GEOCHEMISTRY BUILDING

Cosmogenic Lab, Room 3

Extracting a thousand atoms from a few kilograms of rock—the challenges and potential of terrestrial cosmogenic nuclide chemistry are presented in the Cosmogenic Dating Laboratory

GEOCHEMISTRY BUILDING, SEMINAR RM

LECTURES AND DEMONSTRATIONS BY SCIENTISTS

- | | |
|-----------|--|
| 1:00 p.m. | <i>What's in the Pipeline? Peak Oil and our Shifting Energy Future</i>
with Sally Odland |
| 2:30 pm | <i>Dinosaurs!</i>
Paul E. Olsen |

10 OCEAN AND CLIMATE PHYSICS DIVISION

Visit <http://www.ideo.columbia.edu/res/div/ocp/index.shtml>
Follow the mooring line up the hill to OCP!



Saltwater Tasting Contest

Test your taste buds and see how you fare against modern oceanographic instruments in the Saltwater Tasting Contest.

Climate Phenomena

Investigate the physics of climate phenomena in the atmosphere and oceans and how changes affect the environment. View tank experiments modeling some of the amazing processes found in oceans and the atmosphere.

Oceanographic Equipment Display

View a display of seagoing instruments used to sample the world's oceans.

Polar Research in the Ocean and Climate Physics Division

See video and still imagery of Lamont researchers working in the Antarctica.

Experiments With Clouds and Ice

See experiments demonstrating cold climate physics including cloud formation and ice properties on different scales.

OCEAN AND CLIMATE PHYSICS DIVISION

OCEAN AND CLIMATE PHYSICS LECTURES

Oceanography Building, Room 104

- | | |
|-----------|---|
| 1:00 p.m. | <i>The Fate of Perennial Arctic Sea Ice</i>
with Stephanie Pfirman |
| 2:30 p.m. | <i>The Coldest, Highest, Driest and Windiest Continent: Antarctica in a Time of Change</i>
with Richard Cullather |

11 CICAR

The Cooperative Institute for Climate Applications and Research (CICAR) is a partnership between the National Oceanic and Atmospheric Administration and Columbia University. Learn how scientists from The Earth Institute's Lamont-Doherty Earth Observatory and NOAA's Office of Oceanic and Atmospheric Research (OAR) collaborate to advance climate research, education and outreach. Visit <http://www.ideo.columbia.edu/cicar/>

12 ACADEMIC RESOURCES

Monell Building, Upper Lobby (12:00 p.m. to 4:00 p.m.)

Undergraduate Admissions

Staff members from the Columbia University Office of Undergraduate Admissions will be available from 12:00 p.m. to 3:00 p.m. in the Monell Auditorium Lobby to answer questions about the admissions process, financial aid and undergraduate opportunities in the sciences. Current Columbia University Rabi Scholars and Department of Earth and Environmental Science students will also be present from 12:00 p.m. to 2:00 p.m. to display, discuss and showcase their latest research.

Department of Earth and Environmental Sciences (DEES)

Talk with representatives from the Department of Earth and Environmental Sciences to learn about pursuing a degree or an internship program in the earth sciences at Columbia University. High school



students who would like advice about how to best take advantage of Open House should come here <http://eesc.columbia.edu/>

Barnard College

Learn about Barnard College's undergraduate major in Environmental Sciences. Visit <http://www.barnard.edu/envsci/>

The Earth Institute's Office of Academic and Research Programs

Find out about the University's Environmental Science and Policy master's degree program integrating environmental science with policy analysis and management principles; the new special concentration in sustainable development for undergraduates; the PhD in Sustainable Development, the MA in Climate and Society and all the other academic programs affiliated with The Earth Institute.



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INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE AND SOCIETY (IRI) TROPICAL AGRICULTURE AND RURAL ENVIRONMENT PROGRAM

Visit <http://www.iri.columbia.edu/>

IRI scientists work to find new ways of using climate information and forecasts to help people cope with the risks of climate variability. See how making better use of climate information can be used in areas such as health, agriculture, and water resources. Learn about the Tropical Agriculture Program's efforts to improve agriculture in Africa, and how the Millennium Villages being established across Africa are attempting to combat extreme poverty.

Mapping Climate Information

See a demonstration of new ways of mapping, displaying, and sharing climate and environmental information.

Apprentice Meteorologist

Become an "Apprentice Meteorologist" and test your skills drawing your own weather map.

Talks in the IRI Tent:

- 11:00 p.m. *Stability within Variability? Local and International Water Resources Management* with **Paul Block**
- 12:00 p.m. *IRI Forecasts of Seasonal Temperature and Precipitation* with **Tony Barnston**
- 1:00 p.m. *What Does "I.P.C.C." Stand for, and Why Should I Care?* with **Arthur Greene**



14

MARINE OPERATIONS/HUDSON RIVER RESEARCH/MARINE GEOLOGY AND GEOPHYSICS DIVISION

Visit <http://www.ldeo.columbia.edu/res/fac/oma/>

Marine Operations

The next generation of excellence in research at sea: LDEO nears completion of the conversion and beginning of the operation of the global class research vessel the R/V Marcus G. Langseth. The Langseth will be operated as an academic research vessel and a member of the UNOLS fleet of research vessels. While outfitted as a general purpose research vessel the ship will possess the highly specialized capability to carry out 2D and 3D multi channel seismic programs for deep imaging of the earth's structure. The ship will also have a state-

of-the-art multi-beam system for mapping the ocean's bottom.

Hudson River Research

Explore highlights of LDEO's ongoing research on the Hudson River.

What is an estuary, and what makes it so important? Visit <http://www.ldeo.columbia.edu/res/pi/Hudson/>

GeoMapApp/Looking at Maps From the Ocean Floor

GeoMapApp is a data exploration and visualization tool—an integrated mapping application developed at Lamont. See how this tool helps us visualize and explore the seafloor. Visit <http://www.geomapapp.org>

"Finding Your Way"—Latitude? Longitude? GPS? Compass?

Join Lamont scientists and the Girl Scouts of America as they explore ways to find their way around campus, including using a Global Positioning System (GPS) receiver.

Impact Ejecta in Hudson River Cores: Evidence for a Tsunami Generated by an Oceanic Impact

Using beautiful scanning electron microscope images and provocative science, we examine evidence that a historical tsunami event in the Hudson River area was caused by a large impact in the ocean.

MARINE GEOLOGY AND GEOPHYSICS DIVISION

LECTURES AND DEMONSTRATIONS BY SCIENTISTS OCEANOGRAPHY BUILDING, ROOM 108

- 11:00 a.m. *Climate Catastrophes and Bolide Impacts* with **Dallas Abbott**
- 12:15 p.m. *Fieldwork in Antarctica: Past Breakups of the Ice Sheets* with **Trevor Williams**

15

TREE RING LABORATORY



Biology and Paleo Environment Division

Dendrochronology is the science of analyzing annual growth rings of old trees to learn about past environmental changes. There are many applications of tree-ring analysis that assist scientists in myriad disciplines, including climatology (e.g., El Niño, droughts and global warming), earthquake history, archaeology, forestry, fire, history, art history and even law. View tree core collections from around the world and discover the many ways in which tree ring scientists gather, interpret and use tree ring information to unfold history. Visit <http://www.ldeo.columbia.edu/res/fac/trl/>

16

BATHTUB SCIENCE



Feel how a bathtub full of cornstarch and water can be used to understand the dynamics of the solid Earth.

17

BOREHOLE RESEARCH GROUP

Marine Geology and Geophysics Division

Discover the world of downhole logging, where scientists unlock the mysteries of our planet by deploying an assortment of geophysical tools in holes drilled deep into Earth's crust. Visit <http://www.ldeo.columbia.edu/BRG/>

**18 DINOSAURS****Biology and Paleo Environment Division**

Dinosaurs once ruled the very ground that LDEO occupies today. Examine the beginning of the age of dinosaurs in the Northeast through the research of an LDEO paleobiologist. Visitors will see local fossils from 200 million years ago, including those of dinosaurs and their contemporaries, and exhibits describing the unique geological setting and history of our region.

**19 LDEO CHILDHOOD DEVELOPMENT CENTER**

Hands-on activities for young children and information about on-site child care in Bright Horizons day-care center.

EARTH SCIENCE LECTURES MONELL AUDITORIUM**IPY****HS**

10:30 a.m. – 11:00 a.m.

**Exploring the Changing Poles:
The International Polar Year 2007-9**
Robin E. Bell, *Doherty Senior Research Scientist, Lamont-Doherty Earth Observatory*

11:15 a.m. – 11:45 p.m.

**The Challenge of Negotiating a
New Climate Change Protocol**
Jeffrey D. Sachs, *Director Earth Institute at Columbia University*

12:00 p.m. – 12:30 p.m.

**The Tappan Zee Bridge, and
the Needs and Challenges of
a Replacement**
Klaus Jacob, *Special Research Scientist, Lamont-Doherty Earth Observatory*
Paul Richards, *Mellon Professor of Natural Sciences, Columbia University*

12:45 p.m. – 1:15 p.m.

**The Gulf Stream, European Climate
and Abrupt Climate Change**
Richard Seager, *Doherty Senior Research Scientist, Lamont-Doherty Earth Observatory*

1:30 p.m. – 2:00 p.m.

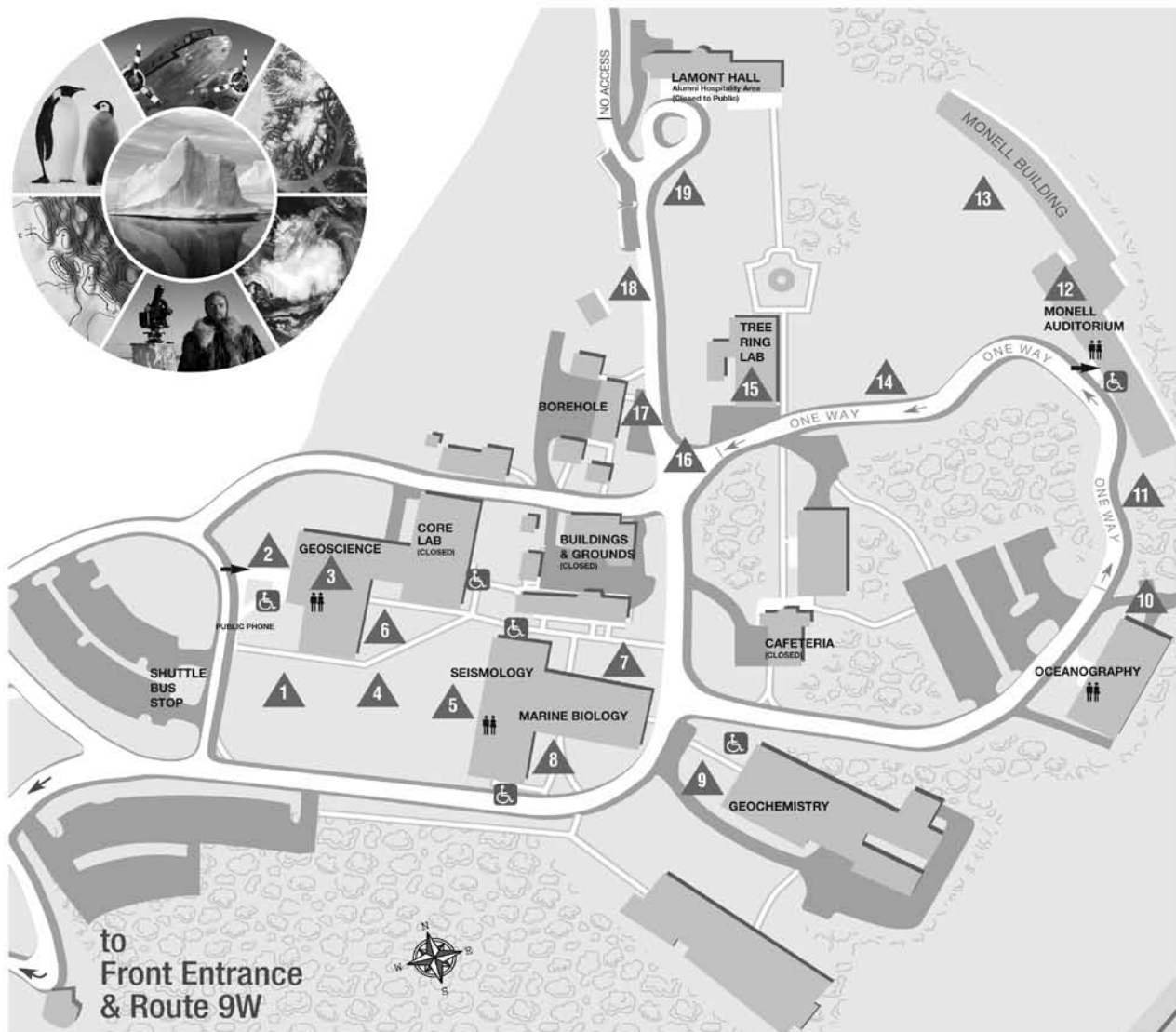
**Global Warming and Antarctic Ice:
Anyone See A Problem Here?**
Douglas Martinson
Doherty Senior Research Scientist, Lamont-Doherty Earth Observatory

2:15 p.m. – 3:15 p.m.

**Columbia University Undergraduate
Admissions Information Session for
High School Students**
Join Diane McKoy, *Senior Associate Director of Undergraduate Admissions, faculty and current students for a discussion about admission requirements, financial aid and undergraduate opportunities in the sciences at Columbia University.*

UNDERWRITTEN IN PART BY OUR GENEROUS SPONSORS





▲ Exhibits

♂ ♀ Restrooms

♿ Handicapped Access

- 1. Welcome Tent
- 2. LDEO Gift Shop
- 3. Earth2Class
- 4. Core Repository/International Polar Year
- 5. Seismology, Geology & Tectonophysics (SG&T)
- 6. Center for International Earth Science Information Network – CIESIN
- 7. Food Tent
- 8. Marine Biology & Paleo Environment (BPE)
- 9. Geochemistry
- 10. Ocean & Climate Physics (OCP)

- 11. CICAR
- 12. Academic Resources
- 13. International Research Institute for Climate & Society(IRI)/Tropical Agriculture Program
- 14. Marine Operations/Marine Geology & Geophysics (MG&G)/Hudson River Research
- 15. Tree Ring Laboratory
- 16. Bathtub Science
- 17. Borehole Research Group
- 18. Dinosaurs
- 19. LDEO Child Development Center

IN THE EVENT OF AN EMERGENCY GO TO ANY LAMONT PHONE AND DIAL 555. STATE YOUR EMERGENCY AND YOUR LOCATION.

