

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

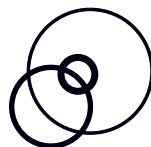


OCEANS OF DISCOVERY

# OPEN HOUSE

SATURDAY, OCTOBER 7, 2006, 10:00 AM to 4:00 PM

[www.ldeo.columbia.edu](http://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 9:40 a.m., 10:00 a.m., 10:20 a.m., 10:40 a.m., 11:00 a.m., 11:20 a.m., 11:40 a.m., 12:00 p.m., 12:20 p.m. and 12:40 p.m. Buses return to 118th Street and Amsterdam Avenue from LDEO at 3:20 p.m., 3:40 p.m., 4:00 p.m., 4:20 p.m., 4:40 p.m., 5:00 p.m., 5:20 p.m., 5:40 p.m. and 6:00 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.

**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



High School Activities

#### **1 LDEO GIFT SHOP**

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

#### **2 CENTER FOR INTERNATIONAL EARTH SCIENCE INFORMATION NETWORK (CIESIN)**

##### **Geoscience Building**

CIESIN, part of The Earth Institute at Columbia University, addresses the impacts of human activities and institutional arrangements on the environment and, in turn, the ways in which environmental change affects human health and welfare. Visit <http://www.ciesin.columbia.edu>

#### **3 EARTH2CLASS**

##### **Geoscience Lounge, First Floor**

"E2C" is a unique professional development program designed to improve the knowledge, teaching and technology skills of middle and high school science educators through interactive workshops with LDEO research scientists. The E2C Team provides theme-related content information, curriculum activities, technology integration and educational resources. Five E2C participants will present mini-workshops about how they use LDEO and other research with their classes. Visit <http://www.earth2class.org>

#### **4 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.

##### **Dendro Hike: The History of Eastern U.S. Tree-Ring Analysis**

The hike introduces you to our outdoor laboratory—the forest—and shows how we use trees to study environmental history. It is approximately one hour in length and requires shoes appropriate for the woods. Limited to groups of 15, the tour departs from the front of the Marine Biology/Seismology Building at 10:30 a.m., 11:30 a.m., 12:30 p.m., 1:30 p.m. and 2:30 p.m. Visit [http://www.earth2class.org/docs/lamont\\_walk.pdf](http://www.earth2class.org/docs/lamont_walk.pdf)



### Become an Earth Observer!

Become an Earth Observer by exploring LDEO's exhibit tents and answering questions on our earth science quiz. Complete your quiz and come back to the Welcome Tent for the answers!



## 5 CORE REPOSITORY/HUDSON RIVER RESEARCH

### 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.ldeo.columbia.edu/res/fac/CORE\\_REPOSITORY/RHP1.html](http://www.ldeo.columbia.edu/res/fac/CORE_REPOSITORY/RHP1.html)

#### Hudson River Research

Explore highlights of LDEO's ongoing research on the Hudson River. What is an estuary, and what makes it so important? Learn about sediments eroding and depositing in the river. What resides in those benthic communities? <http://www.ldeo.columbia.edu/res/pi/Hudson/>

#### Viewing the River

Imagine using Google Earth to visualize the bottom of the Hudson River—well, you can do just that at the Hudson River tent!

#### Hudson Marsh

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

#### River Summer 2006

A group of scientists and educators joined forces to examine the Hudson River through the lenses of geologic, human, legal, art and economic history. College, high school and middle school teachers from all over the Hudson Valley set out up the Hudson, from 30 miles outside the harbor up to the Adirondacks, joining forces in a boat-based interdisciplinary and multi-institutional summer field course exploring the Hudson watershed



## 6 SEISMOLOGY, GEOLOGY AND TECTONOPHYSICS

Visit <http://www.ldeo.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.

### Evidence From Global Positioning System (GPS)

See a demonstration of today's plate motions, strain and stress buildup at plate boundaries, and the distribution of seismicity that have been evaluated from a decade of GPS tracking over the global network.

### Human-Triggered Earthquakes

Have you ever thought about humans triggering earthquakes? No? Then come and learn more about how Earth's crust responds to human actions at the subsurface, such as mining, reservoir impoundment, natural resource exploitation or long-term waste disposal.

### Hudson River History

Learn how the Hudson River has changed and how climate has been changing in New York City for the last 7,000 years.

### Make Your Own Earthquake

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

### Seafloor Vibrations: Ocean-Bottom Seismometers at Lamont

Lamont is home to the Ocean-Bottom Seismometer Instrument Facility, which operates a fleet of 35 broadband seismometers under the sponsorship of the National Science Foundation. These complex instruments must be able to drop to the seafloor, record earthquakes for a year, and then return to the surface on command. We'll have an instrument on display to illustrate how the design tackles each of these challenges, and we'll show how the recorded data are used to study structures and processes deep in Earth's crust and mantle.

## SEISMOLOGY, GEOLOGY AND TECTONOPHYSICS DIVISION

### LECTURES AND DEMONSTRATIONS BY SCIENTISTS

### SEISMOLOGY BUILDING, SEMINAR RM. 2ND FLR.

- 11:00 a.m. *Global Warming, Sea Level Rise and Threats to the Lower Hudson River Valley, New York City and Long Island* with **Klaus Jacob**
- 1:00 p.m. *Our Local Earthquakes* with **John Armbruster**
- 2:30 p.m. *Earthquakes, Glaciers and Climate Change* 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 sounds of Earth!

### Room 214: Rock Touching Room

Touch and examine rocks and minerals from around the world.

## 7 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.



## What Does “Pig Pen” Have to Do With the Air We Breathe and Climate Change?

Come measure the invisible dust cloud around yourself and learn how these particles impact our health and the global climate.

### 8 FOOD TENT



### 9 GEOCHEMISTRY

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 interactive sand tanks. Visit <http://superfund.ciesin.columbia.edu/home.html> and <http://research.radlab.columbia.edu/emsi/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.

#### 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.

#### Global Warming: Carbon Cycle—Carbon Sequestration

Climate change—global warming is damaging our planet at an alarming pace. Come see how the scientists from the Geochemistry Division present their research about Earth’s past and present climate and how we can tackle the global warming problem.

## 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.

#### Clean Chemistry Lab, Room 6

#### Mass Spectrometer Lab, Room 18

Tour the clean lab, where trace elements are separated from rock samples under ultra-clean conditions, and then the mass spectrometer lab, where isotope ratios are measured on samples as small as a billionth of a gram. LDEO staff will demonstrate the uses of mass spectrometry in the earth sciences to determine ages of samples, to trace geological processes, and to investigate the history of our planet. (Group size is limited.)

## 10 OCEAN AND CLIMATE PHYSICS



Visit <http://www.ideo.columbia.edu/res/div/ocp/index.shtml>

#### 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.

#### Saltwater Tasting Contest

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

#### Cool Views of the Ocean Surface

How do satellites look at the ocean, and what can we learn from them? See a demonstration of ocean surface infrared imaging.

#### Oceanographic Equipment Display

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

#### 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

### LECTURES AND DEMONSTRATIONS BY SCIENTISTS

#### Oceanography Building, Room 104

- 1:00 p.m. *How to Use Satellite Data for Reconstructing Climate of the Past Centuries*  
with **Alexey Kaplan**
- 2:30 p.m. *Chasing Climate History With Hockey Sticks*  
with **Jason Smerdon**

## 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 4:00 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. Visit <http://superfund.cie>

### **Barnard College**

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

### **Department of Ecology, Environment and Evolutionary Biology (E3B)**

Speak with representatives of the Department of Ecology, Environment and Evolutionary Biology about the environmental biology major.

### **Master of Arts Program in Climate and Society**

The need for professionals who understand the link between climate and society is acute and grows ever more so as human activity alters the global atmosphere. Speak with representatives of this program and learn about the knowledge and skills needed to meet these needs.

### **Earth Institute's Office of Educational Programs**

Find out about the University's Environmental Science and Policy master's degree program integrating environmental science with policy analysis and management principles.



## **13 INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE AND SOCIETY (IRI)/ TROPICAL AGRICULTURE PROGRAM**

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

This year IRI commemorates its 10th anniversary. Stop by and help us celebrate. Learn the causes of the damaging heavy rains and flooding events in the tri-state area this summer. See the impacts that the global climate events of the past year have had on society. Participate in an exercise that illustrates new ways of reducing climate-related risk, and learn how climate information is being used for decision making in Asia. Follow IRI researchers around the world through photographs they have taken on their travels.

### **Apprentice Meteorologist**

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

### **Talks in the IRI Tent:**

- 12:30 p.m. *Seasonal Climate Predictions: What Do the Oceans Tell Us?*  
with **Tony Barnston**
- 1:30 p.m. *Climate: Weather It's Not*  
with **Arthur Greene**
- 2:30 p.m. *Thaw and Freeze and Syrup From Trees: The Sugar Maple—Climate Connection*  
with **Brad Lyon**



## **14 MARINE OPERATIONS/ MARINE GEOLOGY AND GEOPHYSICS DIVISION**

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

Visit <http://www.ldeo.columbia.edu/res/div/mgg/>

### **Marine Operations**

The next generation of excellence in research at sea: LDEO begins conversion and operation of the largest research vessel in the academic fleet.

### **Marine Geology and Geophysics: Lake Vostok, Antarctica**

Buried under 2.5 miles of ice in the heart of the Antarctic continent lies Lake Vostok, one of the world's largest freshwater lakes. Scientists at LDEO are using geophysical data to understand the dynamics of the water exchange system of the lake and its link to the geologic framework. Visit [http://www.earth2class.org/k12/w8\\_s2005/index.php](http://www.earth2class.org/k12/w8_s2005/index.php)

### **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.

### **Impressions From a Marine Expedition to Antarctica**

View a selection of short video clips from a research expedition to Antarctica. See the beautiful landscape and gain insight on how the work on board a research vessel is actually done.

## **OCEANOGRAPHY BUILDING, ROOM 108**

### **LECTURES AND DEMONSTRATIONS BY SCIENTISTS**

- 11:00 a.m. *Using Camels and Satellites to Study the Largest Known Terrestrial Rifting Episode*  
(Ongoing in Afar, Ethiopia)  
with **Roger Buck**
- 1:00 p.m. *On the Trail of the Deluge Comet*  
with **Dallas Abbott**

## **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/tr/>

## **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 New York, New Jersey and Pennsylvania through the research of a LDEO paleo-biologist. 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**

11:00 a.m. – 11:30 a.m. **The Great Sand/Dust Storms of China: Climate and Human Impacts**  
Jeffrey Weissel  
Doherty Senior Scholar  
Lamont-Doherty Earth Observatory

11:45a.m. – 12:15 p.m. **The 100th Anniversary of the San Francisco Earthquake**  
Lynn Sykes  
Higgins Professor Emeritus  
Columbia University

12:30 p.m. – 1:00 p.m. **The Dilemma of Global Dimming**  
Beate Liepert  
Doherty Research Scientist  
Lamont-Doherty Earth Observatory

1:15 p.m. – 1:45 p.m. **The New York Ice Age and the Cosmogenic Nuclide Lab at Lamont**  
Joerg Schaefer  
Doherty Associate, Research Scientist  
Meredith Kelly  
Postdoctoral Research Fellow  
Lamont-Doherty Earth Observatory

2:00 p.m. – 3:00 p.m. **Columbia University Undergraduate Admissions Information Session for High School Students**  
Join Peter Johnson, 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.

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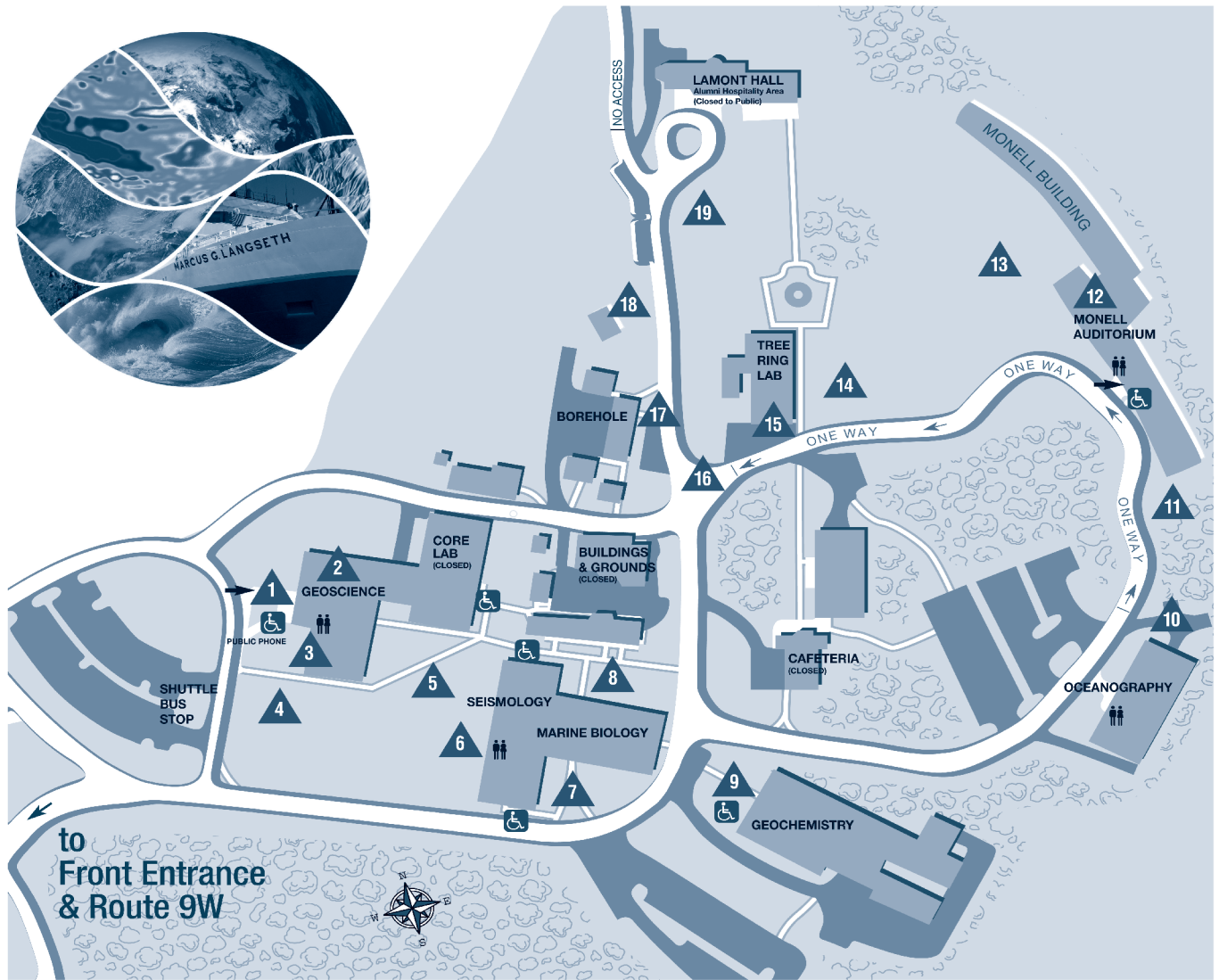


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▲ Exhibits

☿ Restrooms

♿ Handicapped Access

1. LDEO Gift Shop
2. Center for International Earth Science Information Network – CIESIN
3. Earth2Class
4. Welcome Tent
5. Core Repository/Hudson River Research
6. Seismology, Geology & Tectonophysics (SG&T)
7. Biology & Paleo Environment (BPE)
8. Food Tent
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)
15. Tree Ring Laboratory
16. Bathtub Science
17. Borehole Research Group
18. Dinosaurs
19. LDEO Child Development Center