

Columbia University Department of Earth and Environmental Sciences

Lamont-Doherty Earth Observatory of Columbia University

Sponsored as a REU Site by the National Science Foundation

(Starred research projects** are supported by the IODP-USSSP. Three out of the six students supported by IODP-USSSP are required to be members of ethnic minorities.)

Summer Internship Program for Undergraduates (June 3rd-August 5th, 2021)

Theme: *Interdisciplinary Cutting-Edge Research through the Analysis of Global Data*

The Lamont-Doherty Summer Intern Program offers the chance to experience cutting-edge scientific research as an undergraduate. **The program is open to US citizens or permanent residents** who have completed their junior or sophomore year in college or community college with majors in earth science, environmental science, chemistry, biology, physics, mathematics, or engineering. **Neither graduating seniors nor international students are eligible for this internship.** Members of groups traditionally under-represented in science are encouraged to apply: minorities and first-generation college students.

Applicants should have an interest in conducting research in earth, ocean or atmospheric science. One previous earth, ocean, or atmospheric science course is desirable if they are available to the student. All students are preferred to have at least one year of calculus (high school or college) and/or good grades in college level mathematics. Students choosing research in geochemistry and chemical oceanography are required to have at least two semesters of college-level chemistry. Students choosing research in marine biology are required to have at least two semesters of college-level biology. Students choosing research in geophysics, physical oceanography or atmospheric science should have at least three semesters of college-level physics.

The Marine Geoscience Data System group at Lamont provides a freely available tool called GeoMapApp that allows the exploration and visualization of global data sets (www.geomapapp.org). With GeoMapApp, users can create custom maps and grids, import their own data sets and grids, and explore and visualize a wide range of global data sets. These include a multi-resolution digital elevation model of the oceans and continents; plate tectonic information; undersea feature names; shipboard topography, gravity and magnetics data; earthquake catalogues; deep sea core data; Alvin submersible photos around hydrothermal vents; rock sample geochemistry; satellite-derived gravity and geoid grids; seismic reflection profiles, and more. GeoMapApp is written in Java and works on any type of computer. All interns will be instructed in the use of GeoMapApp during the second week of the intern program. Interns will be encouraged to use GeoMapApp during their research projects, as well as after they have returned to their undergraduate institutions. However, both the student and the supervisor will design the research program, and therefore individual projects may contain variable amounts of data collection and data analysis.

The following members of the Lamont research staff will act as research mentors:

Dallas Abbott, Karin Block. Expertise: **Geology, Geochemistry, Sedimentology.** Research Project: Will the Next Global Crisis Be Produced by Volcanic Eruptions? Constraining the Source Volcanoes for 6th Century Eruptions.

Dallas Abbott, Stephen Jaret. Expertise: **Marine Geology and Geophysics, Petrology of Impact Ejecta.** Research Project: What are the Dates and Climatic Effects of the Proposed Impact Crater in the Ross Sea?

Jordan Abell, Gisela Winckler. Expertise: **Paleoclimatology, Paleoceanography, Geochemistry.** Research Project: How Did the Westerly Winds Change Over the Last 150,000 Years? How Will They Change with

Increased Global Warming?

Kailani Acosta. Expertise: **Biological Oceanography, Microbial Oceanography.** Research Project: What Controls Bacterially Regenerated N:P Ratios?

****Lloyd Anderson, Natalie Umling, Baerbel Hoenisch.** Expertise: **Paleoclimate, Micropaleontology, Geochemistry, Paleoceanography.** Research Project: How Well Are Microfossils Preserved Under the Seafloor After Being Buried for Millions of Years?

Clara Chang, Paul Olsen, Sean Kinney, Chris Lepre. Expertise: **Geology, Sedimentology, Paleoclimate, Geochemistry.** Research Project: What Do Lake Sediments Deposited at Different Latitudes Tell Us About Climate Under High CO₂ Conditions on Earth, in Ancient Environments or on Mars?

****David Goldberg, Angela Slagle.** Expertise: **Marine Geophysics, Carbon Sequestration.** Research Project: Can We Store Carbon Dioxide in the Oceanic Crust?

****Claire Jasper, Maureen Raymo.** Expertise: **Ice Sheet Mass Balance, Climate.** Research Project: What Is the Ice-Calving History of Antarctica Based on Iceberg-Rafted Debris From IODP Expedition 382 Sediment Cores?

Mike Jollands, Terry Plank. Expertise: **Mineral Chemistry, Diffusion Studies, Volcanology, Petrology, Geochemistry.** Research Project: Tracking the Last Moments Before Explosive Volcanic Eruptions: What Can Water in Quartz Tell Us?

****Mike Kaplan, Carolina Muñoz-Saez, Steve Goldstein, Sidney Hemming.** Expertise: **Glacial Geomorphology, Volcanology, Geochemistry, Isotope Geology, Deep Earth Processes, Climate Change.** Research Project: How Much do Glaciers and Ice Sheets Affect Volcanic Activity?

Chia-Ying Lee, Suzana Camargo. Expertise: **Tropical Cyclone/Hurricanes, Risk Assessment, Climate Variability, Climate Change.** Research Project: Why Did the 2020 Hurricane Season Produce a Record Breaking Number of Storms but Lower Hurricane Bulk Energy Than in Some Previous Active Years?

Christopher Lepre, Paul Olsen. Expertise: **Paleoclimate, Dinosaur Paleontology, Terrestrial Ecosystem Evolution.** Research Project: What Was the Jurassic World Like During the Rise of Theropod Dinosaurs in Eastern North America?

Jerry McManus. Expertise: **Paleoclimate, Paleoceanography, Geochemistry, Marine Sedimentology.** Research Project: Did Icebergs Cause the Most Dramatic Climate Changes of the Last Ice Age?

Bill Menke. Expertise: **Seismology, Tomography, Geophysical Data Analysis.** Research Project: How Hot Are the Rocks Beneath North America?

Lauren Moseley, Galen McKinley, Expertise: **Ocean Modeling, Biogeochemical Oceanography, Air-Sea Gas Exchange, Climate.** Research Project: What Drives Oxygen Uptake in the Eastern Subpolar North Atlantic Ocean?

Paul Olsen, Clara Chang, Sean Kinney. Expertise: **Paleoclimatology, Timeseries Analysis, Solar System Dynamics, Geology, XRF Geochemistry, Geochronology.** Research Project: What New Scientific Insights Can We Gain From X-Ray Fluorescence Scans of ~200-Million-Year Old Cores? What Is the Astronomical Pacing of Climate at Different Time Scales?

Paul Olsen, Sean Kinney, Clara Chang. Expertise: **Paleoclimatology, Geology, Sedimentology, Petrology, Geochronology.** Research Project: What Can Detrital Zircons Tell Us About the Sources of Gigantic, Climate-Changing Volcanic Eruptions (the CAMP) and Their Transit Through the Earth's Crust?

****Celeste Pallone, Jerry McManus.** Expertise: **Paleoceanography, Climate, Geochemistry, Marine Sediments, Foraminifera.** Research Project: Did ENSO and the Eastern Equatorial Pacific Thermocline

Depth Vary During the Last Ice Age?

****Susanne Straub.** Expertise: **Igneous Geochemistry, Volcanology.** Research Project: How Frequent Are Catastrophic, Climate-Affecting Volcanic Eruptions During the Pleistocene?

Yutian Wu. Expertise: **Climate Dynamics.** Research Project: What Determines the Abundance of Chemical Species in the Upper Troposphere and Lower Stratosphere Over the Region of the Asian Summer Monsoon?

Yuxin Zhou, Jerry McManus. Expertise: **Paleoclimate, Paleoceanography, Geochemistry, Sedimentology, Micropaleontology.** Research Projects: What Was the Timing and Magnitude of Abrupt Climate Changes in the Past?

STIPEND: Students will receive a stipend of \$600 per week. The program is 10 weeks in length with a total stipend of \$6000. The ten weeks extends until Tuesday August 10th, when final papers are due.

HOUSING and TRAVEL BENEFITS: The student will receive free housing in a single room at Dominican College. Students will also receive free bus transportation between the Dominican College campus and Lamont. Students who are traveling to New York for this internship from more than 200 miles away will be reimbursed for a round-trip supersaver fare.

APPLICATION DEADLINE: Application form must be submitted by **February 18th, 2021.**

There is an online application form. It is posted at: <http://webapp.ldeo.columbia.edu/interns>

The online application form asks for the following files:

-Resume with description of scientific skills.

-A statement of interest. This statement can include a description of a particular research project that the student wishes to undertake or it can be a more general statement of the three research projects that interest the student most. We recognize that students with no prior research experience may have difficulty formulating a research project and we will not penalize students who do not submit a detailed project description. The goal of our program is to teach students about the research process and we encourage students with no prior research experience to apply. The student should also include a statement of the characteristics of a good scientist and the availability of undergraduate research opportunities at their home institution.

-Two letters of recommendation from your professors. Additional letters are not required or desired.

-Scanned transcript(s). Transcripts need not be official but must be legible and in English.

If transcripts are not available to append to the online application form, send scanned transcript(s) by email to:

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For more information, look at our web page: <http://www.ldeo.columbia.edu/education/programs/summer-internship/intern-program-faqs>. Decisions for all but the waiting list will be made on or before April 1st, 2021. The National Science Foundation is designating this program as an NSF REU Site for the summer of 2021. Every year the research projects and advisors change. Please look for the yearly posting of new projects in mid-January.