Earth.
Planets.
Climate.
Life.

THE DEPARTMENT OF EARTH, ATMOSPHERIC AND PLANETARY SCIENCES
Massachusetts Institute of Technology

CAMPAIGN FOR A BETTER WORLD

Image credit: Subaru Telescope (NAOJ), Hubble Space Telescope, Martin Pugh; Processing: Robert Gendler

From our earliest history, humans have marveled at the planet we call home, and wondered in awe about what lies beyond the moon and stars.

From distant stars and exoplanets to the asteroids and planetary bodies in our own solar system, EAPS planetary scientists stand at the forefront of their field, driving innovations in techniques and technology to discover the origins of the universe.

At MIT's Department of Earth, Atmospheric and Planetary Sciences (EAPS), we are driven by curiosity. How did life originate? Is it unique to Earth? When did the oceans and atmosphere form? What can 4.3 billion year-old rocks tell us about our past and future climate and its influence on life? We delve into questions about the fundamental forces shaping the natural world, spanning the full scale of space and time—from microscale structures of minerals and aerosols to the composition of massive planetary bodies light years away; from earthquakes which strike in a split second to the co-evolution of life and environmental systems over billions of years. Our work stands at the crossroads between basic theory—be it physics, biology, or chemistry—and practical applications to sustain life on Earth, allowing us to both benefit from and protect our planet.

The breadth of our research is unparalleled. In our pursuit of answers, EAPS students and faculty cross boundaries between disciplines, fostering interdepartmental collaborations unmatched by any other program. Geologists team with atmospheric scientists to understand how a model of changing precipitation trends can help predict landslides. DNA sequencing of extant organisms combined with isotopic dating of ancient rocks reveals the origins of animal life in sea sponges and the influence of tiny microbes on mass extinction. Ours is a truly interdisciplinary effort to understand nature in all of its forms.

We are explorers. We travel the globe, scouring the geologic record for evidence of ancient organic life. We partner with NASA to search distant space for signs of exoplanetary atmospheres. We examine how the forces tens, hundreds, or even thousands of kilometers below our feet influence the surface we live on. We survey the oceans, clouds, and ice caps to understand Earth's dynamic climate, and even its implications for our environment and human health. Our pioneering research provides the facts that help inform the understanding of the broader community—from policymakers and the public, to our colleagues in science and industry around the world.

Four complementary themes drive our research:

EARTH. Examining the origin, evolution, and future of our planet, we investigate how landscapes form and how environmental systems like the oceans change over time. This fundamental research also allows us to address practical issues—like exploring for natural resources and safely extracting them from the ground, and expanding our ability to forecast, mitigate, and adapt to natural hazards.

PLANETS. Seeking to understand the Earth within the context of our solar system—and the universe beyond—we explore planetary accretion, magnetic fields, formation of climates and atmospheres, asteroid impacts, and the potential for life on planets orbiting distant stars.

CLIMATE. By delving into the history, mechanics, stability, and future trajectory of Earth's climate, we study the boundaries and resilience of the entire climate system, revealing the complex interplay between atmosphere, oceans, land, ice, and life.

LIFE. Probing ancient rocks for biological signatures, we reconstruct prehistoric environments to understand how life evolved within them. Our discoveries explain how the biosphere affects climate, the causes of mass extinctions, and how ancient organisms shaped landscapes, while also developing techniques to detect life on other planets.

Graduate student James Bryson works in the Weiss Paelomagnetism Lab's magnetically-shielded room to analyze magnetic signatures in slices of meteorite smaller than a millimeter across with the scanning SQUID microscope — uncovering evidence of how and when the planetary bodies of our solar system formed.

As part of the MIT-WHOI Joint Program, Gabriela Serrato Marks studies paleoclimates in the McGee Lab. By making uranium-series isotopic measurements to precisely date stalagmites, lake deposits, and marine sediments, the lab reconstructs how past precipitation and wind patterns were affected by ancient changes in Earth's climate.

Image credits: Kent Dayton

EAPS students scour the globe to understand the interconnected systems of the natural world. Here, along the shoreline of an ancient lake high in the Chilean Andes, graduate student Christine Chen investigates carbonate tufa rock formations, which are the fossilized remains of algal beds.

Image credit: Christine Chen

Join Us.

The fundamental research we are undertaking is an exciting journey, yielding groundbreaking discoveries every day, with broad-reaching implications for understanding of our past, present, and future. Whether as a student, colleague, global thought-leader, or benefactor, we invite you to be a part of this important endeavor.

How You Can Help

For our work to continue, we need you. EAPS relies on generous gifts from our alumni and friends to ensure we continue attracting the most outstanding students and scientists in the field. There are a number of ways you can participate, such as supporting a graduate student or donating to our Discretionary Fund. Or, better yet, establish your own fellowship and create a lasting legacy at MIT.

For more information about EAPS and how to support our students and our research, please contact:

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How did the earliest life forms on Earth influence the environment? What is the climate like on Pluto? How many earthlike planets are out there? Is it possible to predict earthquakes? Or landslides? What role do the oceans play in regulating Earth's temperature? Can we capture and store carbon emissions safely underground?

EAPS

http://eapsweb.mit.edu

LEFT

In the lab, Professor of Meteorology Dan Cziczo demonstrates how aerosols affect cloud formation.

MIDDLE

Geobiology Professor Tanja Bosak in the field, hunting for evidence of early microbial life preserved in the geologic record.

RIGHT

Planetary sciences Professor Richard Binzel and graduate student Alissa Earle witness the first images of Pluto during the historic New Horizons mission flyby.

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