



## Join the Adventures at Scripps

### Education: Graduate Studies

[siograddept.ucsd.edu](http://siograddept.ucsd.edu)

Scripps offers degrees in oceanography, marine biology, and earth sciences. Graduate students are enrolled in the Ph.D. program within eight curricular groups: applied ocean sciences, biological oceanography, climate sciences, geochemistry and marine chemistry, geological sciences, geophysics, marine biology, and physical oceanography.

### Birch Aquarium at Scripps

[aquarium.ucsd.edu](http://aquarium.ucsd.edu)

The achievements of Scripps scientists and the world of oceanography are introduced at Birch Aquarium at Scripps. Nearly 400,000 visitors a year enjoy marine-life tanks and hands-on exhibits and participate in public lectures, classes, field activities, and more. The aquarium's Planet Earth Express takes educational programs to schools and community events. For information, call (858) 534-FISH or e-mail [aquariuminfo@ucsd.edu](mailto:aquariuminfo@ucsd.edu).

### Public Information

#### Scripps Communications & News

[scrippsnews.ucsd.edu](http://scrippsnews.ucsd.edu)

This office handles public information, news media contacts, and institutional communications.

Contact Scripps Communications at (858) 534-3624 or e-mail [scrippsnews@ucsd.edu](mailto:scrippsnews@ucsd.edu).

### explorations

#### Scripps's electronic magazine

[explorations.ucsd.edu](http://explorations.ucsd.edu)

Sign up to receive exciting Scripps Oceanography science news e-mailed to you FREE every month.

## Life *Ocean Food Webs, Marine Biodiversity, Genomics, & Marine Chemistry*

MARINE BIOLOGISTS EXAMINE THE MOLECULAR, BIOCHEMICAL, AND ECOLOGICAL CHARACTERISTICS OF OCEAN BACTERIA, PLANTS, AND ANIMALS.

Along the California coastline, Scripps has established a Long-Term Ecological Research network site to survey and monitor physical and biological conditions in the coastal ocean. The project will help ensure survival of key marine populations in the region and improve weather forecasting for the western United States.

### California Current Ecosystem LTER

[ccelter.sio.ucsd.edu](http://ccelter.sio.ucsd.edu)

At the remote Line Islands in the central Pacific, Scripps marine ecologists are surveying nearly pristine coral reefs to understand the impacts of humans on reef ecosystems and to obtain a blueprint for successful restoration of degraded reefs worldwide. Additional studies of marine biodiversity are being conducted in Baja California, Belize, and other areas.



### Line Islands Expedition

[scripps.ucsd.edu/lineislands](http://scripps.ucsd.edu/lineislands)

New techniques of genetic analysis are being applied in traditional areas of marine biology at the Scripps Genome Center. The focus is on marine microbes, which are enabling scientists to devise novel methods for assessing environmental conditions and to discover compounds with potential to treat diseases. Other studies examine the chemistry of coral reef animals to assay for pharmaceuticals.

### Scripps Genome Center

[genomes.ucsd.edu](http://genomes.ucsd.edu)

### Center for Marine Biotechnology and Biomedicine

[cmbb.ucsd.edu](http://cmbb.ucsd.edu)

## GET INVOLVED

### SCRIPPS OCEANOGRAPHIC SOCIETY (SOS)

[sos.ucsd.edu](http://sos.ucsd.edu)

SOS members enjoy free admission to Birch Aquarium at Scripps and discounts on purchases and educational programs.

### E. W. SCRIPPS ASSOCIATES

[supportscripps.ucsd.edu](http://supportscripps.ucsd.edu)

E. W. Scripps Associates is Scripps's premier annual membership group. Members enjoy opportunities to learn firsthand about Scripps research from scientists through behind-the-scenes events.

## SUPPORT SCRIPPS

### PARTNERSHIPS FOR THE FUTURE

[supportscripps.ucsd.edu](http://supportscripps.ucsd.edu)

There are many opportunities for becoming a partner in helping Scripps achieve a sustainable balance between human activities and the environment by supporting research, education, and outreach. Contact Scripps Development Office at (858) 822-1865 or e-mail [supportscripps@ucsd.edu](mailto:supportscripps@ucsd.edu).





# SCRIPPS INSTITUTE OF OCEANOGRAPHY

U N I V E R S I T Y O F C A L I F O R N I A , S A N D I E G O

*“Thus human beings are now carrying out a large-scale geophysical experiment of a kind that could not have happened in the past nor be reproduced in the future.”*

—ROGER REVELLE AND HANS SUESS

“Carbon Dioxide Exchange Between Atmosphere and Ocean and the Question of an Increase of Atmospheric CO<sub>2</sub> during the Past Decades,” *Tellus IX* (1957)

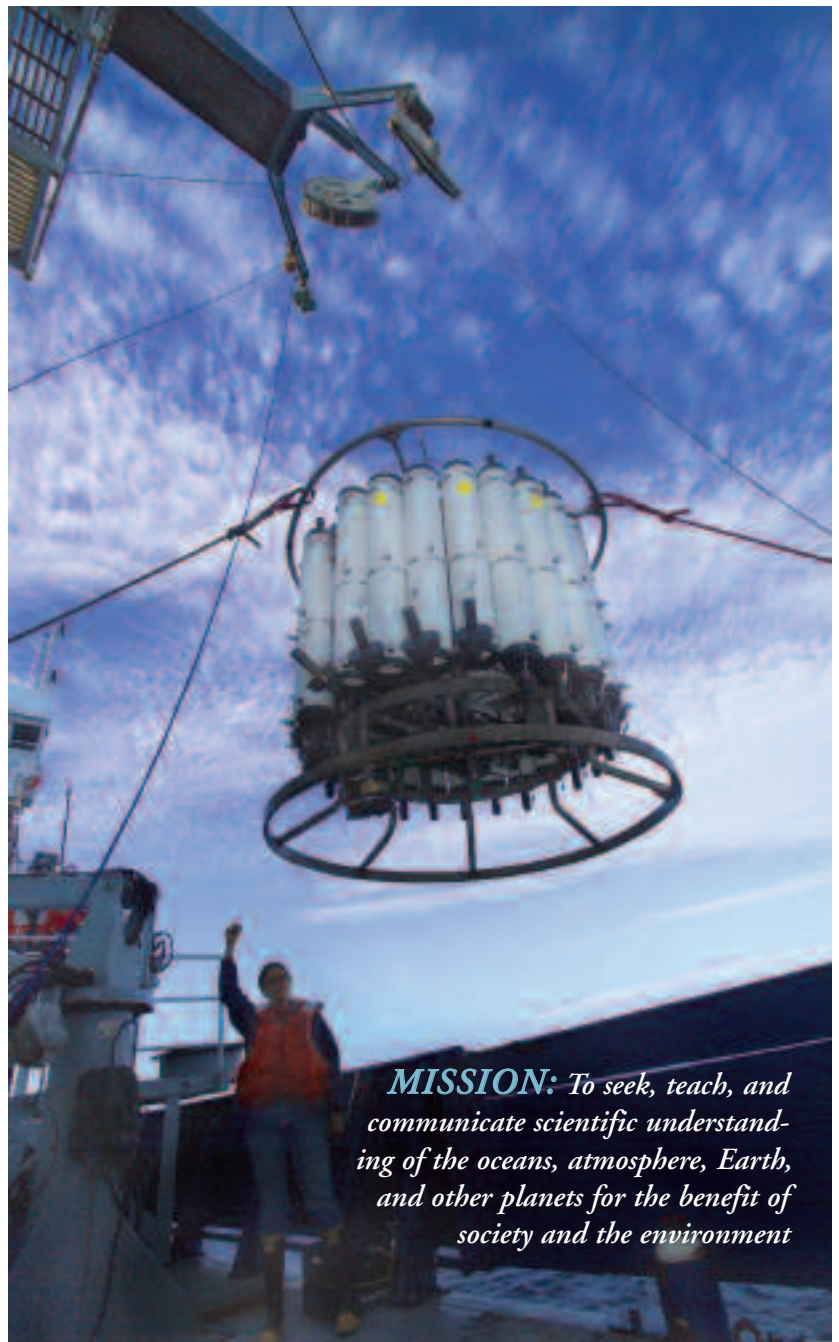
## Second Century of Ocean and Earth Science

**THE WORLD IS CHANGING** dramatically. Roger Revelle and Hans Suess of Scripps Institution of Oceanography realized this 50 years ago when they wrote that humans are returning to the atmosphere and oceans much of the carbon dioxide that has been stored in the solid earth and biosphere over millions of years. Their warning: This experiment will change the processes that determine our weather and climate, and in turn affect every aspect of life on Earth.

Today, we see the inadvertent impacts of industrialization in air pollution, warmer atmospheric temperatures, increased extreme weather, altered water cycles, desertification, degraded ecosystems, and more. The task for scientists is to discover new information about the environment and communicate those findings to other scientists, policy makers, private industry, and the public in ways that transform knowledge into prudent actions and direct benefits to society.

Scripps Institution of Oceanography is uniquely positioned to contribute to a better understanding of the environment and the future. As a part of UC San Diego, it has connections to vital collaborative research programs across disciplines, specialized teaching opportunities for undergraduate and graduate students, and joint faculty appointments with other UCSD academic departments and divisions.

Since 1903, Scripps’s preeminence in many scientific fields reflects its continuing commitment to excellence in research, modern facilities and ships, distinguished faculty, and outstanding students—and the horizons continue to expand.



**MISSION:** *To seek, teach, and communicate scientific understanding of the oceans, atmosphere, Earth, and other planets for the benefit of society and the environment*

# Scripps Oceanography



**WHILE KNOWLEDGE ITSELF** is reason enough to explore the natural world, most research at Scripps Institution of Oceanography has applications to many of society's most crucial and complex environmental concerns. Local, state, national, and international decision makers increasingly call upon Scripps researchers to provide the scientific expertise necessary to address such issues.

Scripps scientists have a legacy of environmental discoveries. They were the first to discover rising levels of carbon dioxide and have revolutionized understanding of fundamental earth processes, including climate change, plate tectonics and earthquakes, marine ecology, and ocean waves and currents.



Most research groups have facilities and engineers for developing advanced technologies and unique instruments for their studies, from autonomous underwater floats to satellite-based imaging devices. There also is considerable expertise at Scripps in collecting and processing large amounts of data on supercomputer networks and through analysis with innovative visualization techniques.

Among Scripps's assets is a treasure trove of seafloor sediments, preserved marine life, and numerous other samples gathered from the world's oceans during the past century. Scripps also specializes in long-term data series, providing an unparalleled accounting of how Earth systems have developed and changed over time. These collections and information not only provide insight into today's environment, but also give greater reliability to predicting what future conditions may bring.

There are hundreds of Scripps research projects under way in 65 nations, on every continent, and in every ocean. Listed here are just a few to illustrate the scope of these endeavors.

## Oceans

*Physical Oceanography, Coastal Processes, & Ocean Engineering*

FROM THE GREATEST OCEAN DEPTHS TO THE SHORELINE, PHYSICAL OCEANOGRAPHERS MEASURE CURRENTS, OCEAN MIXING, AND OTHER FACTORS THAT AFFECT MANY ENVIRONMENTAL SYSTEMS.

A free-floating instrument developed at Scripps to measure subsurface ocean conditions is being deployed in a global network supported by 18 nations and the European Commission. This year, the program will have 3,000 floats worldwide that periodically surface and transmit their data to satellites for use in air-sea studies and forecasts of conditions that affect hurricanes, fish stocks, and weather over the continents.

**Argo Program**

[www.argo.ucsd.edu](http://www.argo.ucsd.edu)

Scripps scientists direct two California coastal ocean-observing systems providing data from a variety of instruments monitoring coastal water quality, marine life resources, coastal hazards, and other conditions. The programs make available online the most up-to-date coastal environmental information to scientists and a wide audience of end-users from resource managers and harbor masters to recreational boaters and surfers.

**Southern California Coastal Ocean Observing System  
Coastal Data Information Program**

[sccoos.ucsd.edu](http://sccoos.ucsd.edu)  
[cdip.ucsd.edu](http://cdip.ucsd.edu)

The movement of sand on and off southern California's beaches is monitored at Scripps in efforts to help devise strategies for effective management of beach erosion by state and local governments. The studies provide models useful for evaluating beach erosion in all coastal areas.

**Southern California Beach Processes Study**

[cdip.ucsd.edu/SCBPS](http://cdip.ucsd.edu/SCBPS)



# Around the World

## Atmosphere

*Aerosol Research, C-BLAST, Stream Survey Air-Sea Interactions, Climate Prediction, & Global Climate Change*

ATMOSPHERIC SCIENTISTS MONITOR THE EXCHANGE OF ENERGY, HEAT, AND CHEMICALS AMONG THE OCEAN, ATMOSPHERE, AND LAND.

By combining expertise in ocean and atmospheric data collection and processing, Scripps researchers have developed coupled air-sea models for more accurate predictions of El Niño events that alter winter weather over Central and North America.

Climate Research Division  
[meteora.ucsd.edu](http://meteora.ucsd.edu)

Seasonal weather forecasts prepared at Scripps are helping California resource agencies predict rainfall patterns, snowpack, streamflow, and wildfire hazards, information critical to managing the state's water supplies. This data also is being used for resource management throughout the western United States.

California Applications Program [meteora.ucsd.edu/cap](http://meteora.ucsd.edu/cap)

Scripps researchers are leading international studies of high-altitude aerosols to track their effects on clouds and global warming. They have found that over the northern Indian Ocean air pollution is decreasing ocean heating, resulting in reduced rainfall in India and increased rainfall in regions of Africa. This illustrates the complexity of global warming, in that reducing aerosols in some areas may accelerate surface warming.

Ramanathan Research Group

[www-ramanathan.ucsd.edu](http://www-ramanathan.ucsd.edu)

## Land *Geology, Geophysics, & Earthquakes*

EARTH SCIENTISTS USE OBSERVATIONAL, EXPERIMENTAL, AND THEORETICAL METHODS TO UNDERSTAND GEOLOGICAL PROCESSES THAT ALTER OUR PLANET, BOTH HISTORICALLY AND IN THE PRESENT DAY.

Traditional methods of mapping the seafloor from ships are being augmented by the use of radar altimetry data from satellites in a process advanced at Scripps. The method allows mapping seamounts and navigational hazards in remote locations and is providing new insights into seafloor spreading and volcanic activities.

Satellite Geodesy

[topex.ucsd.edu](http://topex.ucsd.edu)

Scripps seismologists are advancing systems for early earthquake warnings by establishing high-speed data networks throughout Southern California and setting up precise GPS-based instruments to monitor very small movements in the Earth's crust. The resulting technology is being applied around the globe.

Broadband Seismic Data Collections Center [eqinfo.ucsd.edu](http://eqinfo.ucsd.edu)

Scripps geologists use advanced seismic and acoustic instrument systems to study the potential for large-scale submerged slope failures and tsunami generation along U.S. coastlines and continental margins around the Pacific Ocean.

Slopes, slides, and tsunamis

[earthguide.ucsd.edu](http://earthguide.ucsd.edu)

**EDUCATION:** *Scripps continues a tradition of training graduate students and postdoctoral fellows from across the country and around the globe. Many of the world's ocean and earth sciences programs and institutions include Scripps graduates among their founders and leaders.*

