



SCRIPPS INSTITUTE OF OCEANOGRAPHY

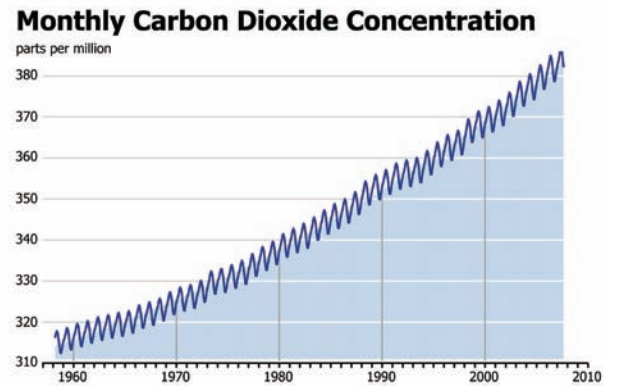
UC San Diego

CLIMATE MATTERS *at* SCRIPPS



SCRIPPS OCEANOGRAPHY SCIENTISTS FIRST SOUNDED THE ALARM A HALF-CENTURY AGO ABOUT CLIMATE CHANGES THAT COULD AFFECT EVERY ASPECT OF LIFE ON EARTH. TODAY SCRIPPS CONTINUES TO BE THE WORLD LEADER IN CLIMATE CHANGE RESEARCH. DISCOVERY AND OUTREACH HAVE ALWAYS BEEN AN IMPORTANT PART OF OUR MISSION AND ARE ESPECIALLY SO NOW AS WE WATCH THE EARLY WARNINGS BECOME REALITY.





Building on 50 Years of Climate Change Research



Hydrological monitoring in the Sierras

SCRIPPS RECENTLY CONCLUDED A YEAR-LONG observance of two major events in the institution's history. It began with a celebration of the 50th anniversary of the Keeling Curve, a measurement of rising carbon dioxide levels in the atmosphere. The Weather Channel has recognized this "discovery of global warming" as history's Biggest Weather Moment. The Curve has had profound impacts on subsequent climate research and on national and international environmental policy. In March, Scripps marked what would have been the 100th birthday of Roger Revelle, the Scripps director who recruited Keeling. Revelle conducted his own pioneering work in climate modification and oceanographic exploration. The institution bestowed the first Roger Revelle Prize

to former vice president Al Gore at a special ceremony and \$150,000 in proceeds from the event established the Roger Revelle Leadership Fund, which provides critical support to help recruit and retain outstanding students, faculty, and researchers to Scripps—an objective that was always paramount to Revelle when he was Scripps director.

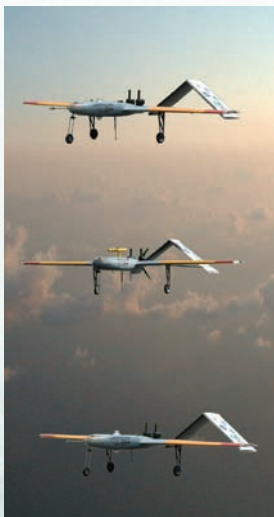
A Water Crisis in the West

Scripps climate scientists Tim Barnett and David Pierce continue to document a potential threat to the water supply of Southern California and other western states. In April 2009, they released an analysis showing a strong likelihood of shortfalls in water supply from Lake Mead, the largest man-made reservoir in the United States, if human-caused climate change continues drying trends. The researchers previously reported that a combination of scheduled lake water allocations and projected climate changes could lead to a yearly average net loss of 1 million acre feet of water, an amount equivalent to the average annual water use of 2 million households. Without changes in water policy, the pair forecast a 50-percent chance that the lake could go dry in 15 years. For more about western water research, visit scrippsnews.ucsd.edu.

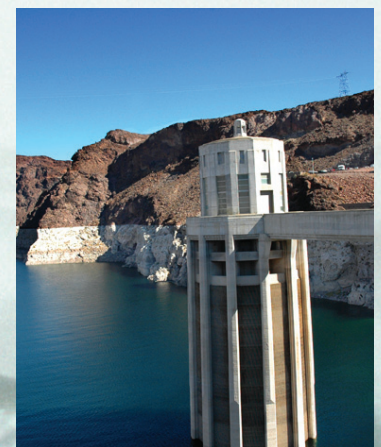
A Promising Energy Resource from the Oceans

Scripps is part of an intensive biofuel development effort to harness marine algae as an energy resource. Scripps marine biologist Greg Mitchell, along with other researchers at Scripps, UCSD's Division of Biological Sciences, and around the region, have founded the San Diego Center for Algae Biotechnology

RESEARCH ADVANCES



AUAV observations



Shrinking supplies at Lake Mead



(SD-CAB), an algal biofuel consortium that includes academic collaborators, CleanTECH San Diego, industry representatives, and public and private partners. For more information, visit algae.ucsd.edu.

The Emerging Threat of Ocean Acidification

There is growing evidence that fossil fuel use is lowering the pH of the oceans, posing a threat to a wide range of marine organisms, especially ones that form calcium carbonate shells and skeletal structures. In response, Scripps researchers have deployed one carbon dioxide sensor off the California coast and plan to launch another in fall 2009 toward the long-term goal of contributing to a comprehensive monitoring network. Because of its history and emphasis on collaborative research, the institution is poised to become a leading world center in the study of this phenomenon.

Black Carbon Sootprint

Every year the use of wood- or dung-burning ovens leads to the premature deaths of hundreds of thousands of people, mostly women and children, in south and east Asia due to direct exposure to the smoke they produce. In addition, the smoke is a major component of soot and other forms of atmospheric black carbon, the second largest contributor to global warming among all human-produced greenhouse gases. Now Scripps climate and atmospheric scientist V. Ramanathan and partners

have launched an effort to advance scientific knowledge while improving public health. Project Surya is deploying its first 300 solar and other energy-efficient cookers to homes in Uttar Pradesh State and has received \$150,000 from the United Nations Environment Programme to further develop the program. Researchers will document the cookers' roles in reducing emissions of carbon dioxide and soot. Scientists believe the benefits of a large-scale conversion to such cooking methods could have widespread societal benefits. In addition, because black carbon remains in the atmosphere only for a matter of days to weeks, its contribution to global warming could be significantly mitigated in a relatively short period of time.

Climate Risks in California

Climate scientist Dan Cayan and collaborators in the California Climate Action Team (CAT) released in April the draft version of their second biennial assessment of climate change effects on California. Two different scenarios, one with lower and one with higher rates of greenhouse gas emissions, were considered in this assessment. The results indicate that even under the lower emissions scenario, climate changes are poised to affect virtually every economic and social sector and many of the natural ecosystems in the state. Most of the impacts are deleterious and if the higher emissions scenario actually materializes, severe and costly climate change impacts will be likely to occur across the state. The report is accessible through the California Climate Change portal at climatechange.ca.gov.

Nobel Prize-Winning Effort

Scripps scientists played key roles in the fourth report of the Intergovernmental Panel on Climate Change (IPCC), a United Nations-sponsored agency that has synthesized climate change research since 1990. The IPCC's Fourth Assessment Report, released in stages through November 2007, has become a widely cited work in subsequent climate policy talks held around the world. Four Scripps researchers took part in the preparation of the opening report on observed climate change and several others lent their views on climate through a press conference and international media interviews. In all, 21 Scripps researchers that participated in this and previous IPCC reports joined thousands of international scientists in sharing the 2007 Nobel Peace Prize, which was awarded to the U.N. panel and former vice president Al Gore.



Assessing resources and risk





PUBLIC EDUCATION, OUTREACH, AND RESEARCH SUPPORT

A Bridge to Business

Scripps Oceanography is the first and only science institution to partner in a global educational alliance with the Young Presidents' Organization (YPO). YPO is a worldwide network of young chief executives and their families. There are more than 16,000 YPO-WPO members in 100 countries. YPO members are business leaders under the age of 45 that are the chief executive of companies that meet minimum size and complexity criteria. The Scripps educational alliance with the group will provide scientific education and information to members and their families. Scripps-YPO programs will

connect members and graduates, regionally and internationally, with Scripps experts to advise on the integration of science solutions into business practices.

SPHEAR

The Scripps Partnership for Hazards and Environmental Applied Research (SPHEAR) is a business development program to produce cutting-edge research in weather phenomena, natural hazards, climate change, and ocean biology. In the first quarter of 2009, SPHEAR corporate partners Chesapeake Energy, Susquehanna International Group, and Citadel Investment Group teamed with Scripps researchers led by Alexander Gershunov to launch a pilot project that will deliver insights on weather extremes as applied to energy trading.

The Facts about Climate Change

The award-winning Birch Aquarium at Scripps exhibition *Feeling the Heat: The Climate Challenge* continues to inspire visitors. This exhibition presents the science of global warming through interactive displays

and multimedia experiences and helps convey to visitors the dramatic climate changes taking place locally and globally. The lead sponsor of the \$1.5 million exhibition is the Conrad N. Hilton Foundation, which matched \$750,000 of funds raised.

Part of the Solution

In 2008, UC San Diego became the first campus on the West Coast to join the Chicago Climate Exchange (CCX), North America's only voluntary, legally binding trading system to reduce emissions of greenhouse gases. UCSD is only the seventh university in the nation to join the exchange. The university entered into a commitment with the CCX to reduce greenhouse gas emissions to baseline levels through 2010. UCSD's co-generation facility, one of the largest and most efficient university-owned co-generation plants in California, should allow the campus to cut emissions beyond the baseline level, and then trade the excess on the CCX's open market. The commodity traded at the CCX is a contract that represents the equivalent of 100 metric tons of CO₂.

Algae biofuels



Beach erosion



Project Surya



Economic opportunity



To learn more about climate change, Scripps, and the *Feeling the Heat* exhibit at Birch Aquarium at Scripps, visit aquarium.ucsd.edu/Exhibits/Feeling_the_Heat.

To contact the Scripps Development Office, please visit supportscripps.ucsd.edu or call (858) 822-1865.