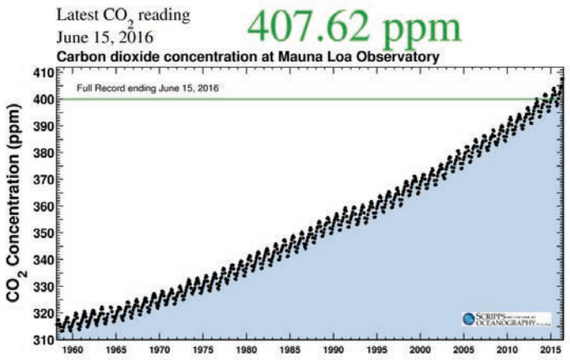

SCRIPPS INSTITUTION OF OCEANOGRAPHY, UC SAN DIEGO, scientists first sounded the alarm a half-century ago about climate changes that could affect every aspect of life on Earth. Today Scripps Oceanography continues to be the world leader in climate change research. Our goal is to understand and protect the planet. We do so by observing the changes taking place in nature with the potential to adversely affect society and to communicate our observations to people who can make a difference.

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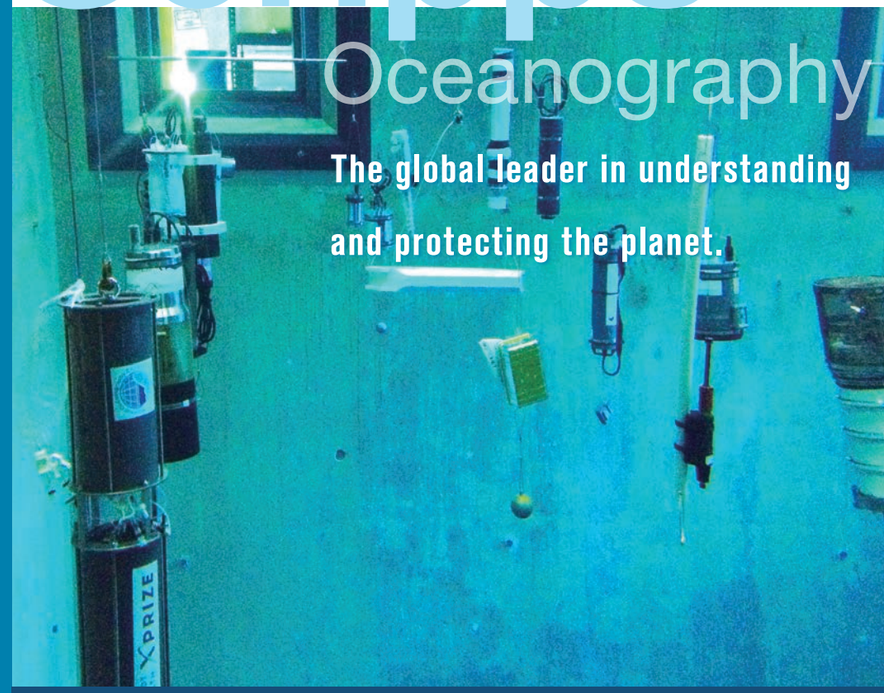

XPRIZE TANK TRIALS OF TEAM DURAFET SENSORS

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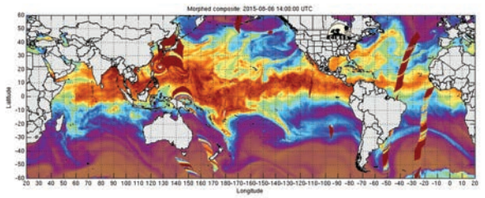
RESEARCH ADVANCES

A Threshold Crossed

A critical record of humanity's impact on the global environment is the rising curve of CO2 concentration from the Mauna Loa Observatory, also known as the "Keeling Curve." May 2013 marked a symbolic milestone when the Keeling Curve surpassed a concentration of 400 parts per million (ppm) for the first time in human history. In September 2016, Scripps researchers predicted that the the sub-400 ppm levels recorded earlier in the year would be the last seen for several generations.

Moral Authority Supports the Message of Science

Scripps Oceanography Distinguished Professor of Climate and Atmospheric Sciences Veerabhadran Ramanathan has built bridges between the worlds of science and religion. In June 2015, Pope Francis released a historic encyclical identifying environmental protection as a social justice issue and moral imperative. Ramanathan influenced the Pope's message during an unprecedented joint workshop of the Pontifical Academy of Sciences and the Pontifical Academy of Social Sciences on this topic in May 2014. Previously, in 2012, Ramanathan engaged His Holiness the Dalai Lama on climate, eliciting a pledge from the spiritual leader to work on the issue for the rest of his life.

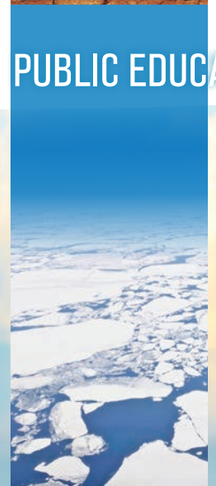


Marine Biodiversity Under Threat

Scripps biological oceanographer Lisa Levin has documented trends in ocean deoxygenation caused by climate change. She has found evidence that declining oxygen levels, acidifying ocean waters, and rising water temperatures can be expected to substantially reduce biodiversity along continental margins, ocean regions that are among the most economically important in the world. As a means of protecting the ecosystem services upon which people rely, Levin advocates for an expansion of ocean oxygen measurement, monitoring, and analysis capabilities and networks globally, especially in deep water.

The Drought-Busting Potential of Atmospheric Rivers

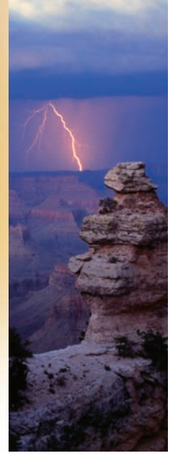
Atmospheric rivers are channels of water vapor that can bring immense amounts of precipitation to a region over the course of individual storms. Historically these events have delivered up to half of the precipitation received by the state of California, but only within the last two decades have scientists even been able to identify them. A new Scripps Oceanography program, the Center for Western Weather and Water Extremes, has become a global leader in research on a phenomenon that has brought floods as well as drought-busting relief to the western United States. The advanced analysis of atmospheric rivers and improved capability to forecast how much precipitation they will produce is information that center leaders hope will aid understanding of the phenomenon in other areas of the world where it is common.



PUBLIC EDUCATION, OUTREACH, AND RESEARCH SUPPORT

Ocean pH Monitoring

A team featuring Scripps Oceanography researchers was awarded $250,000 in the Wendy Schmidt Ocean Health XPRIZE, a competition to create effective instrumentation for the measurement of ocean pH. These sensors will provide much-needed information about ocean acidification, which could be one of the most profound and widespread effects of climate change. Team DuraFET included representatives of Honeywell Aerospace and Monterey Bay Aquarium Research Institute as well as Scripps oceanographer Todd Martz. The team will contribute the prize money to add pH sensors to select units in the international Argo network,



an array of floats that makes fundamental measurements of conditions in all world ocean basins. The sensors, which are manufactured by Team DuraFET member Sea-Bird Electronics, are also being added to 40 floats to be deployed by Scripps oceanographers in the Southern Ocean.

A $5 million gift from Scripps Oceanography supporters Richard and Carol Hertzberg launched the Center for Climate Change Impacts and Adaptation. Humankind faces massive changes in weather patterns, sea levels, ocean acidity, and oxygen levels. As already seen in events such as Superstorm Sandy and record-breaking droughts, climate change is in motion. If societies do not respond, their populations face water and food shortages and severe economic disruptions. Countless plant and animal species will be at risk. The center brings together experts in marine and atmospheric science; leaders in policy, sociology, and economics; and key representatives at all levels of government. This dynamic network will develop strategies for climate change adaptation based on top-tier science and a thorough understanding of community needs.

The Oceans Are Recognized at COP21

The final text of the landmark agreement forged among 195 countries at the COP21 climate talks in Paris made explicit mention of the need to protect the oceans for the first time in the history of the international negotiations. Scripps Oceanography researchers and students pressed for action at the December 2015 conference on a range of fronts including enhancement of ocean-observing capabilities and mitigation of greenhouse agents besides carbon dioxide. At COP22, Scripps will continue to highlight the importance of observation as the first step of successful adaptation and mitigation efforts.