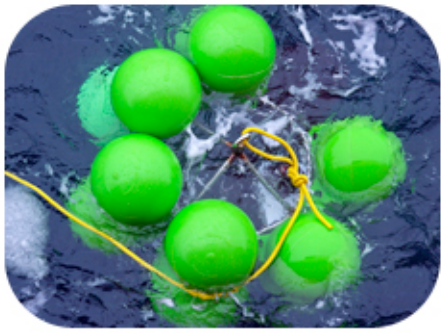
LIVERMORE LAB
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, April 23-27, 2012

The New York Times WORTH ITS SALT



Monitoring of the Southern Ocean using arrays of anchored and drifting instruments reveals freshening of deep waters around Antarctica. Photo by Steve Rintoul/CSIRO.

The world's oceans have become saltier in some areas in part because of the carbon dioxide being pumped into the atmosphere.

In a new study published in the journal *Science*, Lab researcher Paul Durack found that change patterns in salinity in the world's oceans during the past 50 years are a clear symptom of climate change.

By looking at observed ocean salinity changes and the relationship between salinity, rainfall and evaporation in climate models, the teams determined the water cycle has become 4 percent stronger from 1950-2000. This is twice the response projected by current generation global climate models.

Scientists monitor salinity changes in the world's oceans to determine where rainfall has increased or decreased. "It provides us with a gauge -- a method of monitoring how large-scale patterns of rainfall and evaporation (the climate variables we care most about) are changing," Durack said.

To read more, go to the *New York Times*.

PBS VIDEO PUSHING THE CO_2 ENVELOPE

Julio Friedmann

In a preview of the PBS miniseries, "Earth: The Operators' Manual," the PBS NewsHour takes a look at how the Earth's climate is shifting.

Scientists are looking at how turning the carbon dioxide knob up has affected historical temperatures and then turned around and applied it to future climate.

China's largest coal-mining firm, Shenhua Group, is implementing a national pilot project in carbon capture and storage technology and the Lab's Julio Friedmann, leader of the carbon management program, says it has real promise.

"It works and the cost and performance are pretty well understood so if it can be widely applied then it creates the new benchmark that will define whether or not this works anywhere else," Friedmann said.

To see more, go to PBS NewsHour.

THE REMAINS OF THE REEFS

A healthy elkhorn coral. *Photo courtesy of NOAA*

Though word on the street is that human-induced climate change is causing the most damage to coral reefs of the world, new research shows it occurred much earlier than the 20th century.

Researchers from the Scripps Institution of Oceanography at UC San Diego and the Laboratory reconstructed a timeline of historical change in coral reefs near Bocas del Toro in Panama and discovered that damage to the area was caused by man as far back as the late 1800s.

Though human-induced climate change since the 1980s has resulted in bleaching, disease and algal overgrowth in the area, the recent study quantitatively shows that earlier deforestation and overfishing were degrading Caribbean coral and mollusk communities long before climate change impacts began to really devastate reefs.

Using radiocarbon dating techniques at Lawrence Livermore's Center for Accelerator Mass Spectrometry, Lab geochemist Tom Guilderson determined the age range of degradation as reflected in species composition and fossilization, and analyzed nearly a hundred coral skeletons excavated from the Bocas del Toro region.

To read more, go to the Web.

WHITE GETS IT RIGHT

Roger White
Roger White, a designer in the Lab's B-Division from the Weapons and Complex Integration (WCI) Directorate and a principal investigator for nuclear forensics design, was named the "top contributor of the quarter" (January-March, 2012) by the Defense Threat Reduction Agency (DTRA).

The award was given for integrating a multi-lab effort to develop a prompt diagnostics research event scheduled for early this spring.

Funded by DTRA, the program is developing new methods for improved forensic analysis of speed-of-light signals from a nuclear explosion.

"This is a perfect example of Lab multi-disciplinary teams working together to solve a critical 21st century nuclear security problem," White said.

To read more, go to the Web.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

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