



12 February 2004

FOR IMMEDIATE RELEASE

**Media Contact:**

Kim Fulton-Bennett, (831) 775-1835, kfb@mbari.org

## **Cutting-edge oceanography helps scientists understand climate change on Earth (and other planets)**

MOSS LANDING, California—To most people, the deep ocean seems as remote as the surface of the moon. But it may play a vital role in determining how the Earth's climate responds to the millions of tons of carbon dioxide that human activities release into the atmosphere each year. This week at the annual meeting of the American Association for the Advancement of Science, two MBARI scientists have been invited to present talks that link the ocean to global climate change. A third MBARI scientist will explain how new tools provide a big-picture view of ocean processes on Earth and may be useful for studying oceans—and possible life—on other planets.

***A CO<sub>2</sub> enriched ocean: enormous blessing or future problem?***

**Session: CO<sub>2</sub> Fertilization: Boon or Bust?**

**Monday, February 16, 2004, 8:00 a.m. - 11:00 a.m.**

MBARI chemist Peter Brewer, who has spent the last eight years developing new methods for studying carbon dioxide in the deep sea, describes the impacts of increased atmospheric carbon dioxide on the ocean and outlines the experiments needed to assess different sequestration strategies. Brewer will report on his use of MBARI's remotely operated vehicles to establish underwater chemical laboratories that perform precision measurements on gases in the water column and on the seafloor. These experiments have yielded unexpected results on how carbon dioxide interacts with seawater in real environmental conditions. Recent work has involved teaming with marine biologists to study the effects of carbon dioxide releases on deep-sea animals.

***Bridging the gap: creating a hydrate laboratory on the ocean floor?***

**Session: Methane Hydrates: Fuel, Carbon Storage, and Climate Change**

**Friday, February 13, 2004, 2:30 p.m. - 5:30 p.m.**

In a separate talk, Brewer will describe his novel seafloor experiments on methane hydrates, ice-like solids that exist in large reservoirs in the deep sea. The stability of methane hydrates at various depths and temperatures is a critical factor in determining whether this greenhouse gas will be trapped in the deep sea or released into the atmosphere under various climate change scenarios. Although laboratory studies have been able to provide high-precision

**Cutting-edge oceanography and climate change**

2/12/2004

Page 2

measurements of hydrate formation, they do not exactly mimic the dynamic conditions that exist on the ocean floor. In the last year, Brewer's team has adapted laboratory instruments such as a laser Raman spectrometer and nuclear magnetic resonance (NMR) device for studying hydrates in the ocean.

***The role of iron in regulating climate – what we don't understand about its ocean chemistry but need to know*****Session: Taking the Heat: What Is the Impact of Ocean Fertilization on Climate and Ocean Ecology?****Friday, February 13, 2004, 9:00 a.m. - 12:00 noon**

The oceans absorb carbon dioxide primarily through the photosynthetic activity of microscopic organisms (phytoplankton) that live near the sea surface. It has been suggested that humans could reduce the amount of carbon dioxide in the atmosphere by fertilizing the world's oceans to create phytoplankton blooms. Iron—a micronutrient in ocean waters that can stimulate phytoplankton growth with even slight increases in its concentration—has been proposed as the fertilizer. As head of a panel of scientists examining iron in the oceans, MBARI chemist Ken Johnson will summarize what scientists currently know (and more importantly, what they don't know) about iron's role in ocean ecosystems. Such basic information is essential for improving the global computer models that attempt to predict how adding iron to the ocean would effect carbon dioxide in the Earth's atmosphere.

***New technologies for exploring oceans*****Session: Oceans in Our Solar System****Saturday, February 14, 2004, 9:00 a.m. - 12:00 noon**

Whether exploring the deep sea or the surface of Mars, one of the most difficult challenges for scientists is to understand how their immediate data and observations relate to large-scale, long-term processes. In some ways this is easier on Mars, where satellites can view and map the entire surface. During the last two decades, oceanographers have benefited from an amazing array of high-tech tools that allow them to collect data over large areas and relatively long time periods. MBARI microbiologist Peter Girguis will join astronomers to discuss how recent advances in oceanography may provide insights for planetary scientists. Girguis will discuss how underwater robots are presently collecting data with and without human help, penetrating such inaccessible locations as beneath Earth's ice caps for hours or days at a time. He will also provide a glimpse into the future, when fleets of robots will roam the oceans for months at a time, and oceanographers will collect data from arrays of seismometers, chemical sensors, biological experiments, and other instruments mounted semi-permanently on the seafloor or in the water column. Such ocean observatories will allow real-time monitoring of ocean conditions,

**Cutting-edge oceanography and climate change**

2/12/2004

Page 3

and have the potential to spur oceanographic discoveries in the same way that satellites revolutionized the atmospheric sciences.

###

Images available at [http://www.mbari.org/news/news\\_releases/2004/aaas2004-images.html](http://www.mbari.org/news/news_releases/2004/aaas2004-images.html)