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NEWS

**05 December 2005** **FOR IMMEDIATE RELEASE**
**American Geophysical Union 2005 Fall Meeting**

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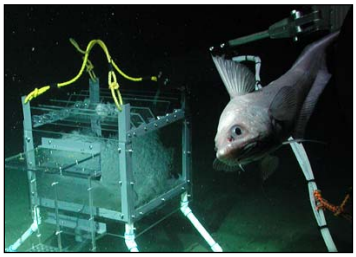
(From Dec 5 to Dec 9, we will be in the AGU press room at 415-348-4440)

# MBARI research highlights—AGU 2005 Fall Meeting

SAN FRANCISCO—Researchers from the Monterey Bay Aquarium Research Institute (MBARI) will present more than a dozen talks and posters at the American Geophysical Union 2005 Fall Meeting in San Francisco. Two important talks describe MBARI's recent studies of carbon dioxide in the deep sea. One talk by marine biologist James Barry will compare the social and environmental impacts of $CO_2$ disposal in the ocean with the impacts of global warming and ocean acidification. A second $CO_2$ talk by marine chemist Peter Brewer will describe the behavior of carbon dioxide as it emerges from underwater volcanoes and rises up through the water column.

MBARI geologists Charlie Paull and William Ussler will discuss two longstanding enigmas in marine geology: the origins of sea-bottom "pockmark fields" and the rapid growth of underwater hills on the Arctic seafloor. MBARI oceanographer John Ryan will discuss how a coastal current near New Guinea helped trigger some of the largest phytoplankton blooms ever seen. In addition, several MBARI engineers will be presenting solutions to one of oceanography's biggest challenges—how to organize terabytes of data from ocean observatories so that scientists around the world can find and access the data. Some of these topics are highlighted below. A complete list of MBARI-authored AGU abstracts is also provided on the last page of this handout.



**Weighing the biological and social impacts of carbon dioxide disposal in the deep sea**

Which is better for Earth's ecosystems and societies: storing excess carbon dioxide in the atmosphere or in the deep sea? MBARI biologist James Barry will address this question in his AGU talk on carbon storage. Even with significant changes in environmental policies, computer models suggest that atmospheric $CO_2$ levels may double by the year 2100. To reduce this $CO_2$ buildup, some countries have considered pumping atmospheric $CO_2$ into the deep sea. Such "carbon sequestration" would make the waters of the deep ocean more acidic. Barry has been trying to determine how much carbon could be added to the world's oceans without causing major damage to marine ecosystems. Previous researchers have found that the acidity of water in the deep sea varies by about 0.4 pH units across the globe; however, there is much less pH variation (only 0.05 to 0.2 pH units) within individual ocean basins. Barry calculates that if 250 billion tons of $CO_2$ were stored in the deep sea, the pH of deep-ocean waters worldwide would decrease by about 0.1 pH units. He also calculates that removing this much carbon from the atmosphere could reduce global warming by about 0.4°C over the next hundred years. Such a reduction in global warming would benefit terrestrial and upper-ocean ecosystems, as well as lowering the risks of drought, disease, hunger, and coastal flooding for millions, if not billions of people. However, Barry's calculations suggest that the relative mitigation value of ocean carbon sequestration decreases under high-$CO_2$-emission scenarios. He also points out that ocean-sequestration projects would have to be designed very carefully to limit the extent and severity of ocean acidification near $CO_2$ release sites.

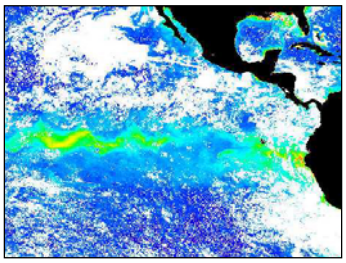
**Barry, *et al*.,** Ecosystem and societal consequences of ocean versus atmosphere carbon storage. Wed AM, 0800, MCC 2008, B31D-01.

*<Continued on reverse>*

**Understanding the fate of carbon dioxide released in the deep sea**

The recent discovery of the "Champagne Vents" in the South Pacific (shown in the NOAA image at left) has spurred interest in undersea volcanic areas where carbon dioxide is actively venting from the seafloor. Scientists are just beginning to study the origins and fate of carbon dioxide released at these vents. Over the last seven years, marine chemist Peter Brewer and colleagues have performed numerous field experiments using $CO_2$ in the deep sea. At the Fall AGU meeting, Brewer will discuss in detail how carbon dioxide moves from sea-bottom sediment up into the water column, carrying dissolved gasses such as helium, and eventually dissolving within two hundred meters of the seafloor. This detailed information will be essential for scientists who are trying to detect carbon dioxide plumes and understand their effects on deep-sea animals and ecosystems.

**P. G. Brewer, *et al.***, The characteristics, behavior, and fate of a stream of liquid $CO_2$ released into the ocean. Thurs PM 17:15, MCC 3009, V44A-07.



**Immense algal blooms follow El Niño events**

Soon after the 1997-1998 El Niño, ocean-color satellites detected one of the largest phytoplankton blooms ever seen. This bloom covered almost half a million square kilometers of the equatorial Pacific Ocean. MBARI oceanographer John Ryan has determined that similar large-scale blooms occurred after the 2003 El Niño and following a similar warm-water event in 2005. These immense blooms were fertilized by iron delivered to the equatorial Pacific by a current that starts along the coast of New Guinea. Ryan's presentation will document a series of remarkable links between New Guinea's sediment-choked rivers, strong coastal currents, and blooms of marine algae thousands of miles away.

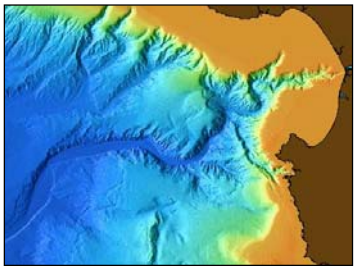
**J. Ryan, *et al.***, Western Pacific modulation of large phytoplankton blooms in the central and eastern equatorial pacific. Tues AM 11:35, MCC3012, OS22B-06.

**Geologists examine the role of methane in creating "pockmarks" and hills in the sea floor**

For decades, geologists have been puzzled by strange pitted areas in the seafloor. Some researchers have suggested that these pits (which can exceed 5 meters deep and 50 meters across) are formed by methane emerging from sea-bottom sediments. However, after performing detailed geotechnical and geological surveys at three "pockmark fields" off California, Maine, and Norway, MBARI geologist Charlie Paull and his fellow researchers found no signs of active methane venting in these areas. In his talk at AGU, Paull will describe these findings, which may force geologists to re-evaluate their theories on the timing or mechanisms of pockmark formation.

In a related presentation, MBARI geochemist William Ussler will describe the copious amounts of methane that were discovered venting from enigmatic hills on the floor of the Arctic Sea. His detailed chemical analysis suggests that this methane may be released by the gradual warming and decomposition of methane hydrates (ice-like solids) in sea-floor sediments. Ussler's work also indicates that these undersea hills are not relicts from the last ice age, but are relatively modern features that are still growing.

**C. K. Paull, *et al.***, Is there evidence of gas venting from pockmark fields?. Wed AM 10:40, MCC3001, OS32A-02.
**W. Ussler**, ***et al.***, Methane leakage from pingo-like features on the Arctic Self, Beauford Sea, NWT, Canada (poster). Mon AM 0800, C11A-1069.



**Deep-sea geologic fieldwork shows periodic flushing of Monterey Canyon sediments into the deep sea**

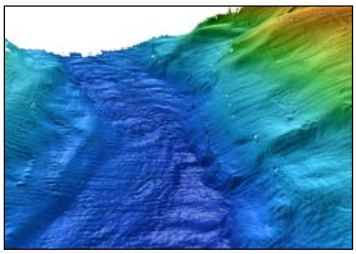
For more than 10 years, MBARI researchers have used remotely operated vehicles (ROVs) to perform detailed underwater geologic "fieldwork" in Monterey Canyon. By collecting and analyzing sediment cores from different parts of the canyon, they have determined that the upper portion of the canyon is very active, carrying one or more major sediment flows each year. The outer portion of the canyon, at a depth of about 3,500 meters, appears to be less active. Former MBARI postdoctoral fellow Joel Johnson analyzed traces of DDT and carbon-14 from sandy sediment in this outer portion of the canyon and found that major flushing events occur in this area about once every 230 years. The last major event to transport sand to the outer canyon apparently took place between 60 and 150 years ago. Johnson points out that the 1906 San Francisco earthquake occurred during this time period, and could conceivably have triggered such an extensive flushing event.

**J. E. Johnson, *et al.***, Late Holocene turbidity currents in Monterey Canyon and Fan channel: implications for interpreting active margin turbidite records (poster). Tues AM 0800, OS21A-1521.

**Got metadata? MBARI engineers develop "cyberinfrastucture" for ocean observing systems**

One of the biggest challenges faced by oceanographers is how to integrate the volumes of data created by different types of instruments and ocean observing systems. MBARI engineers are spearheading an effort to address this challenge using "marine metadata." Metadata is like the information in an old-fashioned library card catalog—it describes and summarizes individual sources of data (such as the data provided by a single oceanographic instrument). The Marine Metadata Interoperability Project (to be described in talks by John Graybeal and Luis Bermudez) is an effort to get marine scientists to describe their data in ways that will allow this data to be shared more easily. Posters by MBARI engineers Kevin Gomes and Michael Godin will show how marine metadata can help scientists combine data from various sources and find the "needles" of data in "haystacks" of oceanographic information. Andrew Chase will demonstrate how user-friendly software can make it easy for scientists to set up and control their instruments within metadata-rich observing systems.

**See reverse for times and locations of individual presentations.**



**New AUV allows high-resolution bathymetric mapping, side-scan imaging, and sub-bottom profiling in the deep ocean**

At the Fall AGU meeting, MBARI engineer William Kirkwood and geophysicist David Caress will describe the development and use of a remarkable new autonomous underwater vehicle (AUV) for high resolution seafloor mapping. This AUV carries three different sonar systems that can operate simultaneously to create detailed bathymetric relief and sidescan sonar maps of the sea bottom, as well as sub-bottom profiles showing layers of mud and rock beneath the seafloor. MBARI scientists have already used this new AUV to study sediment movement in and around Monterey Canyon. During 2006, the mapping AUV will be used to survey volcanoes, methane hydrate deposits, and earthquake faults in the deep sea.

**W. J. Kirkwood, *et al.***, MBARI mapping AUV: A high-resolution deep-ocean seafloor mapping capability (poster). Wed PM 1340, OS33C-1491.
**D. W. Caress, *et al.***, High-resolution multibeam, sidescan, and subbottom surveys in and around Monterey Canyon using the MBARI mapping AUV (poster). Wed PM 1340, OS33C-1490.

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## MBARI first-author talks at AGU FALL 2005:

| Date/ Time | Location | Subj | Title | Lead Author | Talk/ Poster |
|---|---|---|---|---|---|
| Mon 0800 | C11A-1069 | Geo | Methane Leakage from Pingo-like Features on the Arctic Shelf, Beaufort Sea, NWT, Canada | Ussler | P |
| Mon 1340 | ED13A-1132 | Edu | IOOS, ORION, MARS, EARTH oh my! Getting Past the Acronyms and Getting Data to Educators. | Matsumoto | P |
| Tues 0800 | IN21B-1176 | Tech | The Metadata Oriented Query Assistant (MOQuA): a Web Tool for Finding Data in Heterogeneous, Multi-Platform Data Collections by Simultaneously Pivoting on Multiple Metadata Hierarchies. | Godin | P |
| Tues 0800 | OS21A-1521 | Geo | Late Holocene Turbidity Currents in Monterey Canyon and Fan Channel: Implications for Interpreting Active Margin Turbidite Records | Johnson | P |
| Tues 0800 | V21B-0605 | Geo | Support for the Giant Wave (Mega-Tsunami) Hypothesis: Evidence From Submerged Terraces off Lanai, Hawaii. | Webster | P |
| Tues 1135 | OS22B-06 MCC3012 | Bio | Western Pacific modulation of large phytoplankton blooms in the central and eastern equatorial Pacific | Ryan | T |
| Tues 1455 | IN23C-06 Marriott Salon 10 | Tech | Integrating Distributed Data Systems Using Ontologies, Web Services and Standards: An MMI Case Study | Graybeal | T |
| Tues 1525 | IN23C-08 Marriott Salon 10 | Tech | Increasing Usability in Ocean Observing Systems | Chase | T |
| Wed 0800 | B31D-01 MCC 2008 | $CO_2$ | Ecosystem and Societal Consequences of Ocean versus Atmosphere Carbon Storage | Barry | T |
| Wed 1040 | OS32A-02 MCC 3001 | Geo | Is There Evidence of Gas Venting From Pockmark Fields? | Paull | T |
| Wed 1340 | OS33C-1490 | Tech | High-Resolution Multibeam, Sidescan, and Subbottom Surveys in and Around Monterey Canyon Using the MBARI Mapping AUV | Caress | P |
| Wed 1340 | OS33C-1491 | Tech | MBARI Mapping AUV: A High-Resolution Deep-Ocean Seafloor Mapping Capability | Kirkwood | P |
| Wed 1340 | IN33B-1182 | Tech | Enabling Data Sharing with the Shore Side Data System (SSDS): Lessons Learned and Future Development | Gomes | P |
| Thurs 0800 | T41E-1360 | Geo | A New Look At The 1996 Gorda Ridge Eruption | Clague | P |
| Thurs 0930 | IN41B-07 MCC 3007 | Tech | Speeding up ontology creation of scientific terms | Bermudez | T |
| Thurs 17:15 | V44A-07 MCC 3009 | $CO_2$ | The Characteristics, Behavior and Fate of a Stream of Liquid CO2 Released Into the Ocean | Brewer | T |
| Fri 0800 | V51C-1512 | Geo | Geochemistry of Basalt Lava and Hyaloclastite From Young (President Jackson) and old (Taney) Near-ridge Seamount Chains | Davis | P |
| Fri 0800 | OS51C-0576 | Tech | Detecting, Tracking and Classifying Animals in Underwater Video | Edgington | P |
| Fri 0800 | V51C-1511 | Geo | Large Lava Pond Complex on the Juan de Fuca Ridge: an Effusive, Energetic Eruption that Drained Away | Paduan | P |