New Hot Papers - 2010

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Scott C. Doney talks with *ScienceWatch.com* and answers a few questions about this month's New Hot Paper in the field of Geosciences. The author has also sent along images of his work.

Article Title: Ocean Acidification: The Other CO2 Problem
Authors: Doney, SC;Fabry, VJ;Feely, RA;Kleypas, JA
Journal: ANNU REV MAR SCI, Volume: 1, Page: :169-192, Year: 2009
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* NOAA, Pacific Marine Environm Lab, Seattle, WA 98115 USA.
* Natl Ctr Atmospher Res, Inst Study Soc & Environm, Boulder, CO 80307 USA.

SW: Why do you think your paper is highly cited?

Over the past few years, ocean acidification has emerged rapidly as an important issue touching broadly on many aspects of marine chemistry, biology, and even geology. Our paper is a timely resource that provides one of the few concise overviews of the current state of knowledge and the scientific challenges involved.

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

The paper is a synthesis of the scientific literature, bringing together disparate information on topics ranging from observed changes in seawater chemistry over the past several decades to laboratory and field studies that measure how organisms respond to elevated carbon dioxide (CO_2) levels.

SW: Would you summarize the significance of your paper in layman's terms?

When we burn fossil fuels for energy, CO_2 gas is released into the atmosphere. Some of this anthropogenic CO_2 dissolves in the ocean, where it changes seawater chemistry in several ways, including increasing acidity.

Ocean acidification appears to slow calcium carbonate shell and skeleton growth by many plants and animals; on the other

hand, elevated CO_2 levels may increase the growth rates of some photosynthetic organisms.

At present, the ability of marine life to acclimate and adapt to these increasing levels of CO_2 is unclear, as is the overall impact on marine ecosystems.

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Scott Doney collecting a water sample on the NOAA R/V Ronald H. Brown in the South Atlantic as part of a global survey of ocean carbon distributions.

SW: How did you become involved in this research, and were there any problems along the way?

My background is in ocean tracer chemistry and numerical modeling, and for a number of years I have worked to quantify oceanic uptake of anthropogenic CO_2.

My coauthors are pioneers in assessing biological responses to ocean acidification, in particular for coral reefs and pteropods —small planktonic marine mollusks. Their passion for their research helped draw me to study not just how seawater chemistry is changing but how these changes may alter marine ecosystems.

SW: Where do you see your research leading in the future?

I am fascinated by several unresolved questions: how will rising CO_2 (and falling dissolved oxygen, a result of climate warming) affect marine microbes and ocean biogeochemistry?

Could oceanic acidification alter marine food-webs, especially in polar latitudes and coastal upwelling regions where surface waters may become corrosive for some carbonate minerals in the near future?

What are the possible social and economic consequences of ocean acidification for coastal and island communities and nations, and are there practical adaptation strategies?

SW: Do you foresee any social or political implications for your research?

Ocean acidification has the potential to negatively impact the marine fisheries, aquaculture, and coral reefs that many people depend upon for food and economic well-being. Better scientific understanding is needed to provide improved information for worldwide decision-makers.

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