Oceans turning to acid from rise in CO2

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A report issued by the Royal Society in the U.K. sounds the alarm about the world's oceans. "If CO_2 from human activities continues to rise, the oceans will become so acidic by 2100 it could threaten marine life in ways we can't anticipate," commented Dr. Ken Caldeira, co-author of the report and a newly appointed staff scientist at the Carnegie Institution's Department of Global Ecology in Stanford, California.

Many scientists view the world's oceans as an important sink for capturing the human-induced greenhouse gas CO_2 and slowing global warming. Marine plants soak up CO2 as they breathe it in and convert it to food during photosynthesis. Organisms also use it to make their skeletons and shells, which eventually form sediments. With the explosion of fossil-fuel burning over the past 200 years, it has been estimated that more than a third of the human-originated greenhouse gas has been absorbed by the oceans. While marine organisms need CO_2 to survive, work by Caldeira and colleagues shows that too much CO_2 in the ocean could lead to ecological disruption and extinctions in the marine environment.

When CO_2 gas dissolves into the ocean it produces carbonic acid, which is corrosive to shells of marine organisms and can interfere with the oxygen supply. If current trends continue, the scientists believe the acidic water could interrupt the process of shell and coral formation and adversely affect other organisms dependent upon corals and shellfish. The acidity could also negatively impact other calcifying organisms, such as phytoplankton and zooplankton, some of the most important players at the base of the planet's food chain.

"We can predict the magnitude of the acidification based on the evidence that has been collected from the ocean's surface, the geological and historical record, ocean circulation models, and what's known about ocean chemistry," continued Caldeira. "What we can't predict is just what acidic oceans mean to ocean ecology and to Earth's climate. International and governmental bodies must focus on this area before it's too late."

The pH (potential of Hydrogen) scale is from 1 to 14, with 7 being neutral. Anything that lowers pH makes the solution more acidic. The scientists calculated that over the past 200 years, the pH of the surface seawater has declined by 0.1 units, which is a 30% increase in hydrogen ions. If emissions of CO_2 continue to rise as predicted by the Intergovernmental Panel on Climate Change's IS92a scenario, there will be another drop in pH by .5 units by 2100, a level that has not existed in the oceans for many millions of years. In addition, the changes in the oceans' chemistry will reduce their ability to absorb CO_2 from the atmosphere, which in turn will accelerate the rate of global warming.

"This report should sound the alarm bells around the world," remarked Chris Field, director of the Carnegie Department of Global Ecology. "It provides compelling evidence for the need for a thorough understanding of the implications of ocean acidification. It also strengthens the case for rapid progress on reducing CO_2 emissions."

The report on ocean acidification was released today by the Royal Society. See www.royalsoc.ac.uk/

Source: Carnegie Institution

https://phys.org/news/2005-06-oceans-acid-co2.html