Man-made CO2 pushes the world's oceans into an acidic 'unknown territory'

Lauren Morello, Environment and Energy Publishing, 3-2-12

The chemistry of the ocean appears to be shifting faster than it has for at least 300 million years, and carbon dioxide emissions are the culprit.

That's the conclusion of a study published yesterday in the journal Science by a team of 21 researchers from five countries.

"The current rate of (mainly fossil fuel) CO2 release stands out as capable of driving a combination and magnitude of ocean geochemical changes potentially unparalleled in at least the last [300 million years] of Earth history, raising the possibility that we are entering an unknown territory of marine ecosystem change," wrote the science team, led by Bärbel Hönisch of Columbia University's Lamont-Doherty Earth Observatory.

Oceans have absorbed roughly two-thirds of the carbon dioxide emitted by human activities since the Industrial Revolution began, leaving seawater 30 percent more acidic now than it was then. That corresponds to a drop of 0.1 units on the 14-point pH scale scientists use to gauge a substance's relative acidity or alkalinity.

Scientists believe that ocean pH could drop another 0.3 units by the end of this century, to 7.8 units, leaving seawater 150 percent more acidic than it was at the start of the Industrial Revolution.

The pace of that modern-day change is faster than similar events in the past 300 million years of Earth's history, the new study finds.

The period that comes closest to matching the speed of the current changes in ocean chemistry is the Paleocene-Eocene Thermal Maximum (PETM), 56 million years ago -- a time when the concentration of CO2 in the atmosphere doubled, raising the average global temperature by 6 degrees Celsius and causing ocean pH to drop about 0.4 units in 5,000 years.

But the current shift in ocean chemistry is still happening 10 times faster than the changes that took place during the PETM, the new study concludes.

Researchers are especially worried about ocean acidification's effects on marine organisms, because as ocean water becomes more acidic it becomes harder for corals, shellfish and plankton to build chalky shells. If ocean water becomes too acidic, it can erode those shells faster than the animals can grow them, disrupting ocean food webs.

Fossil and sediment records from the PETM suggest that acidification during that period wiped out many types of corals and single-celled organisms, the new study notes, suggesting that marine life higher up the food chain also suffered.

That's in line with modern-day studies, including research presented last month at the annual meeting of the American Association for the Advancement of Science that found steep declines in biodiversity as pH drops at sites on the ocean floor where CO2 seeps from volcanic vents.