# New study shows ocean acidification accelerates erosion of coral reefs

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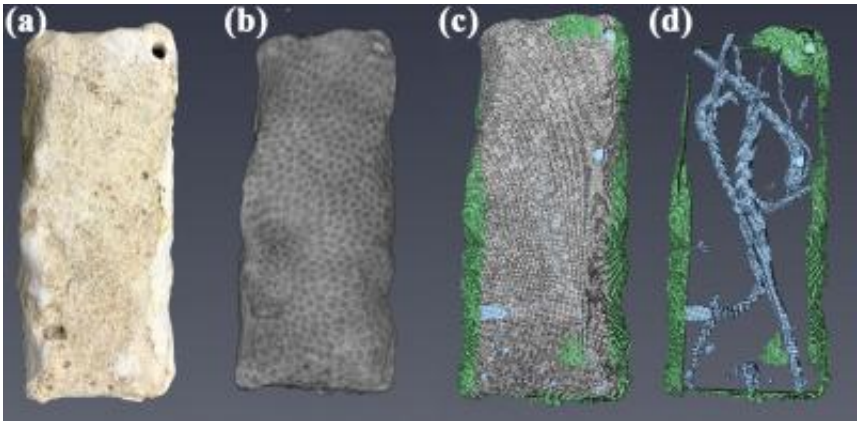


Coral skeleton sample from the study, and its 3-D reconstructions showing the external surface in gray, and CT-scan analysis of new structure added on the outside (colored green) and boreholes from worms showing structure loss on the inside (in blue). Credit: Enochs, Manzello, Kolodziej, Noonan, Valentino & Fabricius

Scientists studying naturally high carbon dioxide coral reefs in Papua New Guinea found that erosion of essential habitat is accelerated in these highly acidified waters, even as coral growth continues to slow. The new research by the University of Miami Rosenstiel School's Cooperative Institute for Marine and Atmospheric Studies (CIMAS), NOAA, and the Australian Institute of Marine Science has important implications for coral reefs around the world as the ocean become more acidic as a result of global change.

The study, published in the journal *Proceedings of the Royal Society B*, measured changes in the structural habitat at two reefs situated in volcanically acidified water off remote Papau New Guinea and, for the first time, found increased activity of worms and other organisms that bore into the reef structure, resulting in a loss of the framework that is the foundation of coral reef ecosystems.

These 'champagne reefs' are natural analogs of how coral reefs may look in 100 years if carbon dioxide continues to rise and ocean acidification conditions continue to worsen.

"This is the first study to demonstrate that ocean acidification is a two-front assault on coral reefs, simultaneously slowing the growth of skeleton, and speeding up the rate at which old reef habitats are eroded, said Ian Enochs, a coral ecologist at CIMAS and NOAA's Atlantic Oceanographic and Meteorological Laboratory and lead author of the study."

Enochs placed pieces of coral skeleton alongside these 'champagne reefs' for two years to allow diverse coral reef communities to settle on them and to understand how reefs respond to ocean acidification conditions.

Using high-resolution CT scans similar to those taken at hospitals, the scientists created 3-D models of the coral skeletons to peer inside the coral skeletons and to see the bore holes left by worms and other organisms. These scans allowed them to measure the difference between new coral material added by calcifying organisms and coral material lost through bio-erosion.

The analysis found that a net loss of coral reef skeletons was occurring due to increased bio-erosion and at the pH tipping point of 7.8, reef frameworks in this region will begin to dissolve away.

"At these reefs, carbon dioxide from subterranean volcanic sources bubble up through the water, creating conditions that approximate what the rest of the world's oceans will experience due to ocean acidification," said Enochs. "This is the first study to piece together all of the separate coral reef ocean acidification processes, simultaneously looking at the different organisms that grow and erode reef habitats, and their net effects on one another over time."

**More information:** Ian C. Enochs et al, Enhanced macroboring and depressed calcification drive net dissolution at high-COcoral reefs, *Proceedings of the Royal Society B: Biological Sciences* (2016). DOI: 10.1098/rspb.2016.1742

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