

# Great Barrier Reef 'glue' at risk from ocean acidification

September 2 2020

---



Associate Professor Jody Webster inspects a core sample on ocean investigation vessel Greatship Maya. Credit: University of Sydney

The scaffolds that help hold together the world's tropical reefs are at risk from acidification due to increased carbon dioxide in the world's oceans, according to geoscientists at the University of Sydney.

Extensive sampling of the Great Barrier Reef fossil record has shown

that the calcified scaffolds that help stabilize and bind its structure become thin and weaker as pH levels fall.

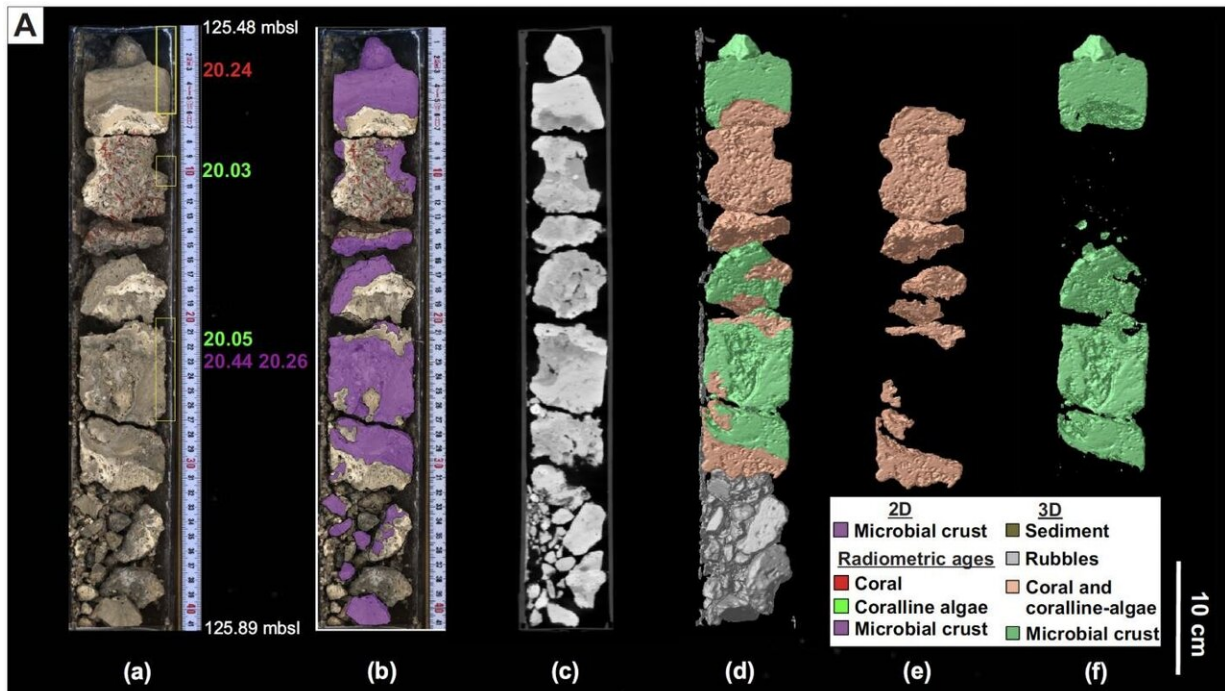
Scientists have seen incidental evidence for this in the past, but a new study led by Zsanett Szilagyí of the Geocoastal Research Group at the University of Sydney has shown that this is a global process, affecting reefs worldwide.

The research is published this week in *Marine Geology*.

"For the first time we have comprehensively shown that the thickness of this geologic 'reef glue' correlates with changes in ocean pH and dissolved carbon dioxide," said Ms Szilagyí.

The thickness of these crusts can now be regarded as a reliable indicator of ocean acidification going back tens if not hundreds of thousands of years.

"We haven't had such a complete and high-resolution record before. And this geologic study shows that as oceans became more acidic, this is reflected in the thickness of these reef crusts," said Associate Professor Jody Webster from the School of Geosciences, who coordinated the study.



Core samples from the Great Barrier Reef displaying fossil record of microbialites. Credit: University of Sydney

## What Are Microbialites?

The 'reef glue' is made up of calcified deposits from microbes that live within reef formations around the world. Known as microbialites, these structures play an important role in many types of aquatic systems and are probably best known from the ancient stromatolites that are built by cyanobacteria in Western Australia, which are billions of years old.

In some types of reef systems, including the Great Barrier Reef, microbialite crusts likely formed by sulfate-reducing bacteria stabilize and bind the reef framework, forming a robust scaffold that can be used by corals and other reef builders to colonize and grow.

In the past these crusts have been more abundant than the corals and algae that grow on and around them and they display variations in thickness over time, while still performing their structural role.

"This means they are really good indicators of changes in environmental conditions of our oceans," Associate Professor Webster said.

The study found a variation in thickness from 11.5 centimeters 22,500 years ago to about 3 centimeters in younger Great Barrier Reef sections, about 12,000 years ago.

When combined with studies from 17 reef systems worldwide, the data shows this thinning of the microbialite crusts coincides with pH dropping below 8.2 right up to modern times.

## **Global Results**

The researchers gathered a dataset of microbial crusts from the Great Barrier Reef as far back as 30,000 years. They compared a comprehensive three-dimensional analysis of samples to two-dimensional scans of the [crust](#) thickness.

The results from the Great Barrier Reef show that the two-dimensional analysis of crust thickness provides an accurate proxy for the more detailed three-dimensional method. Compiling 2-D sample data from across the world, the scientific team built a global model of microbialite thickness through time.

The study found that the 2-D technique gave results within 10 percent of the 3-D analysis.

"A real breakthrough here is that we are confident we can now apply a 2-D analysis to reefs and obtain reliable information about the history of

microbialite formations. This will give us substantial savings in time and resources," Associate Professor Webster said.

"Previous studies have given us glimpses as to how these microbial crusts respond to changes in their environment. What is new in our study is that we measured more than 700 well-dated microbialite samples from the International Ocean Discovery Program on the Great Barrier Reef and combined this with a meta-analysis of 17 other reef records from around the world," he said.

"This allowed us to assess global-scale changes in microbialite development over the past 30,000 years. And, frankly, the findings are a stark warning sign for the dangers of rapid acidification of oceans."

The study argues that in the present-day context of rapid global climate change, changes in dissolved [carbon dioxide](#), pH and temperature, could lead to reduced microbial crust formation, thereby weakening [reef](#) frameworks in the future.

**More information:** Zs. Szilagyi et al, Controls on the spatio-temporal distribution of microbialite crusts on the Great Barrier Reef over the past 30,000 years, *Marine Geology* (2020). [DOI: 10.1016/j.margeo.2020.106312](#)

Provided by University of Sydney

Citation: Great Barrier Reef 'glue' at risk from ocean acidification (2020, September 2) retrieved 23 June 2024 from <https://phys.org/news/2020-09-great-barrier-reef-ocean-acidification.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is

provided for information purposes only.