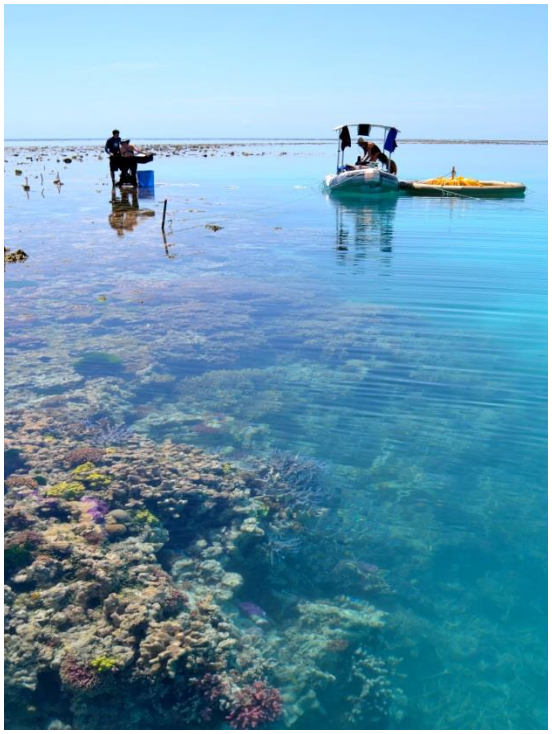
Reversal of ocean acidification enhances net coral reef calcification

Albright R.*, L. Caldeira, J. Hosfelt, L. Kwiatkowski, J. Maclaren, B. Mason, Y. Nebuchina, A. Ninokawa, J. Pongratz, K. Ricke, T. Rivlin, K. Schneider, M. Sesboüé, K. Shamberger, J. Silverman, K. Wolfe, K. Zhu, K. Caldeira

Coral reefs are widely regarded as one of the most vulnerable ecosystems to ocean acidification, in part because the very architecture of the ecosystem is reliant on calcifying organisms.

Widespread declines in coral reef calcification have been reported over the last several decades, prompting scientists to suggest that a global phenomenon like ocean acidification may be responsible. However, determining the contribution of ocean acidification to these changes is difficult due to the confounding factors of other environmental factors like changes in temperature, water quality, and fishing pressure.



What did we do?

To understand whether ocean acidification is already impairing coral reef growth, our goal was to restore seawater chemistry on a coral reef to conditions that would have occurred ~100 years ago, effectively reversing ocean acidification, and measure the calcification rate to see how the reef responded. This study represents the first seawater chemistry manipulation experiment of a natural coral reef community, allowing us to move beyond lab experiments to understand responses in the natural environment.

What did we find?

We found that when ocean chemistry is restored closer to pre-industrial conditions, the reef calcifies more quickly. These results provide evidence that the ocean acidification caused by our carbon dioxide emissions is already slowing coral reef growth.

Our study was conducted at One Tree Reef in Australia's Great Barrier Reef (study site denoted by orange square). We manipulated the chemistry of ~240 tons of seawater flowing over a coral reef flat and monitored the calcification response.

Why is it important?

- *Our work provides new field-based evidence that ocean acidification is already taking its toll on coral reef communities.*
- *To avoid continued impacts of ocean acidification on coral reef growth, large-scale and long-term protection of coral reefs depends on deep and rapid reductions in CO_2 emissions.*

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*Correspondence to: Rebecca Albright, ralbright@carnegiescience.edu