

Community calcification of coral reefs

Coral reefs are particularly vulnerable to ocean acidification that results from increased anthropogenic carbon dioxide in the atmosphere. Among other effects, the lower pH reduces the availability of carbonate ions (CO_3^{2-}), used by corals to create the calcium carbonate skeletons that form the bulk of the reef structure. Reefs are complicated, diverse ecosystems. They contain other calcifying organisms, including some algae. What's more, calcification rates are influenced by temperature, light, and other environmental factors. And acidification can increase the rate of calcium carbonate dissolution.

Rebecca Albright, Ken Caldeira, and colleagues now report on an *in situ* experiment that isolated the effect of ocean acidification on the net calcification of an entire coral-reef community. By bubbling CO_2 into a tank of ambient seawater, the researchers artificially lowered the water's pH. They then pumped the water over an unconfined, flat 400 m² region of the southern Great Barrier Reef. By adding dye to the water, they could monitor how the acidified water spread over the reef, as shown here. After each daily pumping session, the team measured the dye concentrations and chemical properties of water samples taken along the upstream and downstream edges of the test region. From the observed differences in the relationship between dye concentration and alkalinity along the two edges, the researchers could extract the reef's net community calcification. With the pH lowered from 8.13 to 7.98—nearly a 30% change in hydrogen-ion concentration, since the pH scale is logarithmic—the net community calcification fell by 34%. Such a drop underlines the near-future risks to reefs' sustainability. (R. Albright et al., *Nature*, 2018, doi:10.1038/nature25968. Photo by Aaron Takeo Ninokawa, atninokawa@ucdavis.edu.) —RJF

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