

Researchers show corals struggle to grow under multiple stressors

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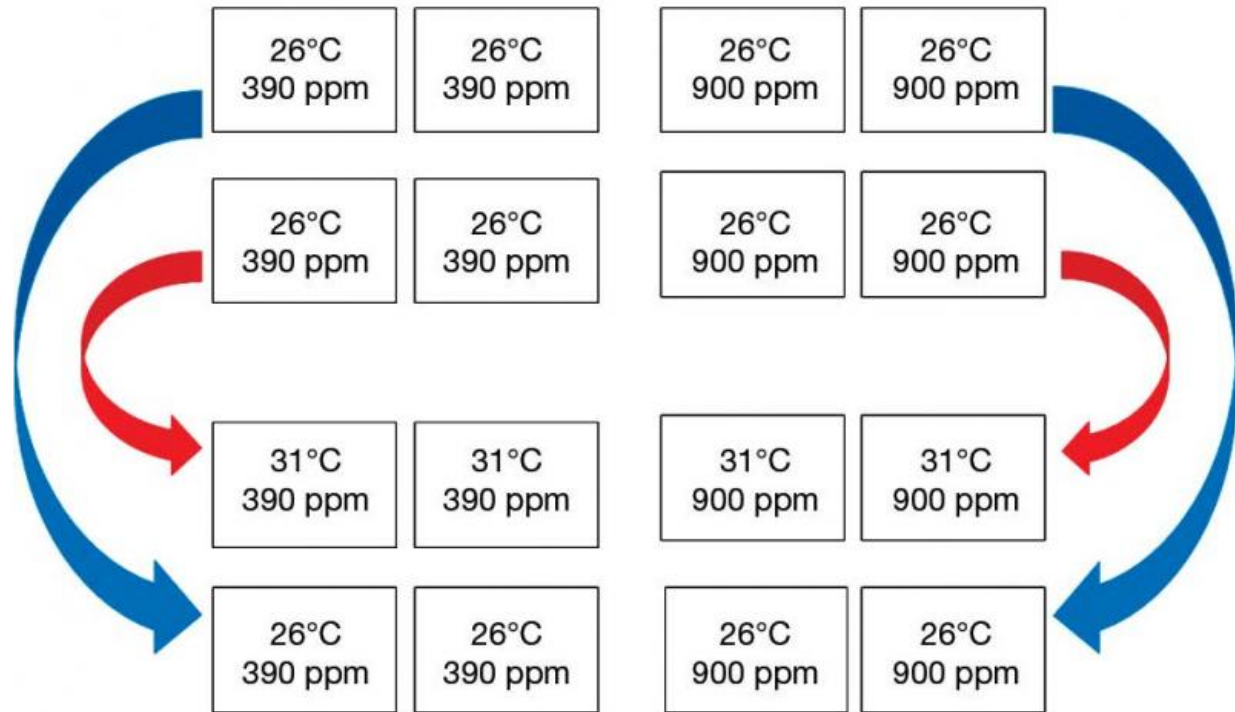
Branched finger coral (*Porites porites furcata*). Credit: James St. John

A new study from researchers at the University of Miami (UM)

Rosenstiel School of Marine and Atmospheric Science found that multiple stressors might be too much for corals. The findings have important implications for the resilience of coral reefs to climate change.

To test the [coral](#)'s response to multiple environmental stressors at once, UM Rosenstiel School researchers placed Caribbean branching coral *Porites porites* in waters with high levels of [carbon dioxide](#) (900 parts per million) for two months to mimic high ocean acidification conditions. Following the preconditioning, half of the corals were then subjected to increased water temperatures for two months. Following the five-month period, the researchers analyzed the growth, feeding rates, and photochemical efficiency of their algal symbionts in both groups to understand how they responded to multiple [environmental stressors](#). Many previous studies have assessed the effects of multiple stressors, but this study is novel because it is the first to precondition corals to high CO₂ before exposing them to a thermal bleaching event.

Corals preconditioned to high CO₂ levels before the increased temperatures showed 44 percent lower growth rates compared to the group that only experienced a single stress of increased carbon dioxide. The researchers suggest that preconditioning to elevated CO₂ worsens coral response to thermal stress, which could potentially exacerbate the effects of climate change stressors on [coral reefs](#).



Schematic of the five month experimental design. The upper 8 tanks represent the preconditioning phase of the experiment (first 3 mo.) where all corals were held at 26°C and half were exposed to ambient CO₂ (390 ppm) and the other half exposed to high CO₂ (900 ppm). The bottom 8 tanks represent the warming phase of the experiment (last 2mo) where 2 of the 4 tanks at 26°C/390ppm were ramped to 31°C (represented by red arrows), while the other 2 remained the same (represented by blue arrows), and 2 of the 4 tanks at 26°C/900ppm were ramped to 31°C while the other 2 remained the same. Credit: Erica Towle, Ph.D.

"This study is similar to what corals will likely experience in nature in the coming decades," said Erica Towle, a UM alumna and lead author of the study. "The findings improve our understanding of how reefs will respond to [climate change](#) in the future."

The [carbon dioxide level](#) of 900 parts per million was chosen to represent the value projected by the IPCC for the year 2075 under a

'business as usual' scenario.

The new study, titled "Preconditioning to high CO₂ exacerbates the response of the Caribbean branching coral *Porites porites* to high temperature stress," was published in the March 21 issue of the journal *Marine Ecology Progress Series*.

More information: www.int-res.com/abstracts/meps/v546/p75-84/

Provided by University of Miami

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