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The anthropogenic environmental impacts and changes in the tropical Atlantic - a high resolution Cuban coral time series over 154 years

Marie Harbott[1], Henry Wu[1], Henning Kuhnert[2], Simone Kasemann[2], Anette Meixner[2], Carlos Jimenez[3], Patricia González-Diáz[4], and Tim Rixen[1,5]

[1]Leibniz Institute of Tropical Marine Research, Germany (marie.harbott@leibniz-zmt.de)
[2]Marum - Faculty of Geoscience & Center for Marine Environmental Sciences, University of Bremen, Germany
[3]The Cyprus Institute, Nicosia, Cyprus
[4]Centro de Investigaciones Marinas Universidad de La Habana, Ciudad de la Habana, Cuba
[5]Institute of Geology, University of Hamburg, Hamburg, Germany

Changes in the surface ocean pH and temperature caused by the uptake of anthropogenic CO_2 are posing a threat to calcifying marine organisms. Recent studies have observed significant impacts on coral reef ecosystems with impaired carbonate skeletal growth and decreased calcification due to acidifying oceans. In situ measurements from buoys, ships, and remote observations by satellite of sea surface temperature, salinity, and ocean's carbonate chemistry are sparse and only date back a few decades. The current coverage of observations for the northwestern Cuban coastal waters provides hence an incomplete picture of natural climate variability over interannual to interdecadal timescales, showing the need for high resolution climate archives.

Cuba is situated between densely populated landmasses of North and South America offering a unique environment to study multiple aspects of anthropogenic activity across the region as well as their interconnectivity.

A massive coral, *Siderastrea siderea*, from Cuba's northwestern coast, was used as a natural archive to reconstruct bimonthly changes in SST, and carbonate chemistry through a multi-proxy approach since preindustrial times.

Preliminary results indicate a decrease in $\delta^{18}O$ of 0.32 ‰ over 154 years since 1852, indicating warming and/or freshening of the surface water over this period. Over the same time period, the $\delta^{11}B$ ratio decreased by ca. 1.6 ‰, translating into a decrease of 0.1 on the pH scale, reflecting the acidification of the northwestern Cuban coastal waters. Furthermore, an accelerating decrease of coral $\delta^{13}C$ from the 1850s to 2005 of 1.5 ‰ demonstrates the anthropogenic imprint due to increased fossil fuel combustion. Further investigation and the comparison to trace elements indicate possible baseline shifts in regional seawater carbonate chemistry that have been affected by anthropogenic activity.