



Preindustrial to modern variability of sea surface temperatures and CO₂ uptake in the South Pacific

Sara Todorovic^{1,2}, Henry C. Wu¹, Braddock K. Linsley³, Henning Kuhnert⁴, and Delphine Dissard⁵

¹Leibniz Centre for Tropical Marine Research (ZMT), Bremen, Germany

²Faculty of Geosciences, University of Bremen, Bremen, Germany

³Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY, USA

⁴MARUM - Center for Marine Environmental Sciences, University of Bremen, Bremen, Germany

⁵IRD - Sorbonne Universités, UPMC, Univ Paris 06-CNRS-MNHN, LOCEAN, Paris, France

The modern increase in atmospheric CO₂ driven by fossil fuel combustion and land-use change is warming our atmosphere and surface oceans. The absorption of this excess CO₂ by the oceans decreases seawater pH in a process known as ocean acidification (OA), which represents a threat to marine ecosystems with adverse impacts on coral health. It is important to understand how modern climate change impacts interannual and interdecadal climatic cycles and atmospheric phenomena which are originating in the Pacific and modulating global climate. There is a scarcity of data necessary to study the impacts of these changes on natural variability on longer timescales. In this study, we present multi-proxy (e.g. Sr/Ca, $\delta^{18}\text{O}$, $\delta^{13}\text{C}$, B/Ca) reconstructions of sea surface temperature (SST), surface seawater carbonate chemistry, with implications for pH variability of the South Pacific back to preindustrial times. This region of the Pacific is interesting for tracking the development of OA because of the well-constrained interannual to interdecadal SST and SSS variability from existing coral-based reconstructions. Massive corals (*Porites* sp.) from Rotuma and Tonga will be analyzed to extend the currently available SST reconstructions and expand the spatio-temporal coverage beyond the instrumental records. New monthly-resolved SST records will provide larger analyses exploring the influence of interannual and decadal-interdecadal climatic fluctuations on CO₂ absorption and pH variation. We aim to quantify the anthropogenic impact on SST, pH and the ocean carbonate system to achieve a better understanding of the status in the South Pacific under open ocean conditions.

How to cite: Todorovic, S., C. Wu, H., K. Linsley, B., Kuhnert, H., and Dissard, D.: Preindustrial to modern variability of sea surface temperatures and CO₂ uptake in the South Pacific, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-21539, <https://doi.org/10.5194/egusphere-egu2020-21539>, 2020