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Preindustrial to modern variability of sea surface temperatures and CO_2 uptake in the South Pacific

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The modern increase in atmospheric CO_2 driven by fossil fuel combustion and land-use change is warming our atmosphere and surface oceans. The absorption of this excess CO_2 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, $\delta^{18}O$, $\delta^{13}C$, 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 CO_2 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.