

EGU21-15795

<https://doi.org/10.5194/egusphere-egu21-15795>

EGU General Assembly 2021

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Tracking the South Pacific convergence zone variability and recent acidification reconstructed from tropical corals

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Massive tropical corals represent one of the most important natural archives of modern climate change. Coral based reconstructions give us the possibility to extend the instrumental oceanographic records and observe hydrographic variability on seasonal to interdecadal scales in tropical oceans. South Pacific convergence zone (SPCZ) variability, Interdecadal Pacific Oscillation (IPO) and El Niño-Southern Oscillation (ENSO) events are major drivers of global climate and may exert control on regional CO₂ absorption, outgassing and pH variability.

Porites sp. corals from Tonga and Rotuma (Fijian dependency) are being analyzed for multi-proxy (e.g. Sr/Ca, $\delta^{18}\text{O}$, $\delta^{13}\text{C}$, $\delta^{11}\text{B}$, B/Ca) reconstructions of sea surface temperature and salinity (SST, SSS) and carbonate chemistry, on a monthly to annual resolution. Preliminary data of the Rotuma *Porites* sp. coral shows $\delta^{18}\text{O}$ has been decreasing by 0.004 ‰ per year at the end of the 20th century, suggesting freshening and/or warming of the surface water. In the same period, we observe a $\delta^{13}\text{C}$ decrease of 0.017 ‰ per year in-line with the anthropogenic CO₂ driven Suess effect. Initial results of the $\delta^{11}\text{B}$ Tonga *Porites* sp. show high interannual variability, and a strong trend of decrease of -0.0626 ‰ per year in the last five decades of the record (1949-2004) suggesting acidification. The results are in agreement with published coral-based reconstructions from the region.

When completed, the new records will facilitate exploring the effects of modern anthropogenic influence on ocean carbonate system and pH variation, and the relationship between them and interannual and decadal-interdecadal climatic fluctuations.