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# Multi-trace element sea surface temperature coral reconstruction for the southern Mozambique Channel reveals teleconnections with the tropical Atlantic

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Here we report seasonally resolved sea surface temperatures for the southern Mozambique Channel in the SW Indian Ocean based on multi-trace element temperatures proxy records preserved in two Porites sp. coral cores. In particular, we assess the suitability of both separate and combined Sr/Ca and Li/Mg proxies for improved multi-element reconstructions, as well as the reliability of the multi-annual resolved Sr-U tandem proxy. Overall geochemical records from Europa Island Porites sp. emphasize the potential of Sr/Ca and Li/Mg ratios as high-resolution climate archives, whereas Sr-U in its reliability and its, due to its calibration method currently only reduced possible resolution underperforms.
Nevertheless, Sr/Ca and Li/Mg show significant differences in their response at this Indian Ocean tropical reef site. Our reconstruction from 1970 to 2013 using the Sr/Ca-SST proxy reveals a warming trend of 0.58 $\pm$ 0.1 °C in close agreement with instrumental data (0.47 $\pm$ 0.07 °C) over the last 42 years (1970 to 2013). In contrast the Li/Mg showed unrealistically large warming trends, most probably caused by uncertainties around different uptake mechanisms of trace elements Li and Mg and uncertainties in their temperature calibration. However, spatial correlations between the combined detrended Sr/Ca, and Li/Mg proxies compared to instrumental SST at Europa revealed robust correlations with local climate variability in the Mozambique Channel and teleconnections to regions in the Indian Ocean and southeastern Pacific where surface wind variability appeared to dominate the underlying pattern of SST variability. The strongest correlation was found between our Europa SST reconstruction and instrumental SST records from the northern tropical Atlantic SST. Only a weak correlation was found with ENSO, with recent warm anomalies in the geochemical proxies coinciding with strong El Niño or La Niña. We identified the Pacific/North American (PNA) atmospheric pattern, which develops in the Pacific in response to ENSO, and the tropical North Atlantic SST as the most likely causes of the observed teleconnections with the Mozambique Channel SST at Europa.