



## **Circum Indian Ocean marine and terrestrial records of climate variability: investigating land-ocean interaction since A.D. 1650**

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In this study we examine the relationship between three tropical and two subtropical western Indian Ocean coral  $\delta^{18}\text{O}$  time series to land temperatures and rainfall over India, tropical East Africa and southeast Africa with a special emphasis on decadal to multidecadal variability. The western Indian Ocean tropical and subtropical coral  $\delta^{18}\text{O}$  time series show a strong correlation with land temperatures on interannual to multidecadal time scales. We find coherent signals at frequencies ranging from 18-45 years with surface temperature over western India and East Africa. Coral  $\delta^{18}\text{O}$  time series from the subtropical western Indian Ocean show a strong correlation with South African temperature variability in the 16-30 years frequency band over more than 300 years. The relationship between western Indian Ocean SST and rainfall over land areas is more complex. Running correlation analysis suggests a non-stationary relationship of tropical coral  $\delta^{18}\text{O}$  time series and rainfall over India during the SW monsoon and the short-rain season over East Africa. Strongest decadal coherence is found between the subtropical  $\delta^{18}\text{O}$  time series and southern Africa rainfall. Comparison with paleoclimatological reconstructions of either rainfall or temperature over land areas reveals that most relationships established for the 20th century, also hold for the last 350 years. However, we also find evidence for changing teleconnection patterns, most prominent during the late 20th century. Thus, the network of coral records from the Indian Ocean proves invaluable for a better understanding of land-ocean interaction over several centuries.