Patterns of Pacific Decadal Variability recorded in Indian Ocean corals

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The Pacific Decadal Oscillation (PDO) is a low-frequency phenomenon showing the strongest signals in the North Pacific/North American region: In the warm phase positive SST anomalies in the Equatorial Pacific and along the west coasts of the Americas are accompanied by negative SST anomalies especially in the Central North Pacific. This pattern co-varies with a SLP pattern, characterized by lower pressure in the North Pacific. The phenomenon and the underlying physical processes of the PDO are not well known yet, especially its potential link with the Indian Ocean.

We investigate PDO signals recorded by corals from the West Indian Ocean: two bi-monthly resolved coral 18O series from La Réunion and Ifaty (West Madagascar) from 1882 until 1993 are analyzed. To isolate one main frequency range of the PDO, we apply a band pass filter passing only periodicities from 16 to 28 years. Covariance maps between the coral time series with SST and SLP of the Indian and Pacific Oceans show the typical PDO pattern for SST and SLP, confirming the coupling between the Indian and Pacific Oceans. Both corals show the strongest signal in boreal summer. The La Réunion (Ifaty) coral better records SST (SLP) than SLP (SST) pattern variability. This is confirmed by correlation between the filtered coral time series and the leading mode of the SST and SLP, respectively. We suggest that the filtered La Réunion coral 18O represents 18O of seawater that varies with the South Equatorial Current, which in turn is linked with the SST PDO. The filtered Ifaty coral 18O, influenced by the flow through the Mozambique Channel, is suggested to archive SST and is remotely linked with the SLP PDO variability. A combined coral record follows the Principal

Components of the coupled SST/SLP PDO time series (64% explained variance).