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Reconstructing the Indonesian Throughflow variability and its climatology using long corals from the North-western coast of Australia

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The Indonesian Throughflow (ITF) is the primary tropical current, which transfers heat and salinity to the tropics and extratropics region. Crucial to the global ocean circulation system, the ITF is a major component of the tropical and global climate pattern. Re-analysis of instrumented data together with the results of coupled ocean-atmosphere model experiments, provide an understanding of the linkages between ITF variability and inter-annual modes of climate variability such as the El Niño Southern Oscillation (ENSO) and the Indian Ocean Dipole (IOD). However, the lack of longer climatic records of ITF variability makes it challenging to isolate the anthropogenic signal from natural variability. Here we present preliminary new, absolutely dated, seasonally resolved proxy records of sea surface salinity and temperature from the Timor Sea, northwest coast of Australia using cores taken from long-lived corals (~240 years) on the Hibernia-Ashmore reef. The Timor Sea is a proximal location for the ITF outlet into the eastern Indian Ocean, where temperature and salinity anomalies are greatest and ITF control is unequivocal. Herein we report sea surface temperature and the oxygen isotopic composition of seawater reconstructed using paired analyses of skeletal Sr/Ca and oxygen isotope composition for the last 40 yr. The resulting bimonthly coral record aids in understanding the linkage between ENSO, IOD and ITF strength. Comparison of the long ITF records with the marine and terrestrial records from around the region and world further reveals the relationship between ITF variability and Austral-Asian-African monsoon rainfall changes.