



## **Radiocarbon and $\delta^{18}\text{O}$ in modern corals from the Cocos (Keeling) Islands and implications for ENSO and Indian Ocean Dipole in eastern Indian Ocean**

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The influence of El Niño/Southern Oscillation (ENSO) in the Indian Ocean is still debated, but there is a growing body of literature presenting evidence of a possible link between changes in the tropical Pacific and those in the Indian Ocean during major ENSO events. Here we present preliminary results of our study using radiocarbon and  $\delta^{18}\text{O}$  in modern *Porites* corals from the Cocos (Keeling) Islands (12°S, 97°E) to investigate the possible presence of ENSO influences and Indian Ocean Dipole (IOD) in eastern Indian Ocean.

For  $\delta^{18}\text{O}$ , 672 monthly coral samples covering 56 years (AD 1924-1934 and 1947-1991) have been analysed at ANU and University of Wollongong. The results showed a good anti-correlation with GOSTA and IGOSS SST records for a 1° latitude by longitude grid centered on 12.5°S, 96.5°E. The  $\delta^{18}\text{O}$  values showed distinct depletions during 1983, 1987 and 1991, which may indicate warmer than normal SSTs at Cocos relating to the 1982-1983, 1986-1987 and 1991-1992 ENSO events in the Pacific. Enhanced  $\delta^{18}\text{O}$  values during 1961 may indicate a cooling event at Cocos associated with a strong IOD in 1961.

For radiocarbon, 31 annual samples (AD 1955-1985) during the bomb period have been analysed by AMS at ANSTO. Relatively low  $\Delta^{14}\text{C}$  values (outside analytical error ranges) in this coral record were observed during some ENSO events, and in the 1961 and 1967 IOD events. Surface waters at Cocos are mainly derived from North Pacific via the Indonesian Throughflow (ITF), whose  $\Delta^{14}\text{C}$  values are significantly

higher than those of Cocos corals for the bomb period. During ENSO events,  $^{14}\text{C}$ -elevated waters carried to Cocos by the ITF are significantly reduced, which may cause low  $\Delta^{14}\text{C}$  values for Cocos. During IOD events, anomalous easterly winds along the Java-Sumatra coasts enhance upwelling, resulting in  $^{14}\text{C}$ -depleted, upwelled waters reaching Cocos that consequently causes low  $\Delta^{14}\text{C}$  values for Cocos. Measurements of sub-annual coral samples for radiocarbon for a longer period (AD 1947-1991) are in progress.