Geophysical Research Abstracts
Vol. 12, EGU2010-548, 2010
EGU General Assembly 2010

Coral reconstruction of Holocene oscillations in the extent of the Indo-Pacific Warm Pool

Nerilie Abram (1), Helen McGregor (2), and Michael Gagan (3)

(1) British Antarctic Survey, United Kingdom (nabr@bas.ac.uk), (2) School of Earth and Environmental Sciences, University of Wollongong, NSW, Australia, (3) Research School of Earth Sciences, The Australian National Univerisity, Canberra ACT, Australia

The Indo-Pacific Warm Pool (IPWP) plays a key role in the propagation and amplification of climate changes through its influence on the global distribution of heat and water vapour. However, little is known about past changes in the size and position of the IPWP. We use a total of 48 modern and fossil coral records from the Mentawai Islands (Sumatra, Indonesia) and Muschu/Koil Islands (Papua New Guinea) to reconstruct oscillations in the extent of the IPWP since the mid-Holocene. We firstly show that reliable estimates of mean sea surface temperature (SST) can be obtained from fossil corals by using low-resolution Sr/Ca analysis of a suite of corals to overcome the large uncertainties associated with mean Sr/Ca-SST estimates from individual coral colonies. The coral records indicate that the southeastern and southwestern margins of the IPWP were predominantly 1.2oC $\pm$ 0.3oC cooler than present during the mid-Holocene, and we suggest that this was due to a contraction of the southern margins of the IPWP associated with the more northerly position of the ITCZ. Comparison with speleothem records of Asian monsoon rainfall further indicates that short-lived shifts to warmer than present SSTs at the coral sites during the mid-Holocene coincide with intervals of abrupt monsoon weakening (and southward displacements of the ITCZ). Examination of our coral reconstruction alongside the Kilimanjaro ice core record suggests that the Indian Ocean Dipole also adopted a more positive mean state during the mid-Holocene when the southern margins of the IPWP contracted. These results suggest that the Asian monsoon–IOD interaction that exists at interannual time scales also persists over centennial to millennial scales. The dynamic and inter-connected behaviour of the IPWP with tropical climate systems during the mid-Holocene highlights the fundamental importance of the warm pool region for understanding climate change throughout the tropics and beyond.