

# Coral geochemical proxies of the East Asian winter monsoon and hydrological conditions from 1979-2004 AD in the central Vietnam

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## Abstract

We propose to use monthly-resolution geochemical proxies, including  $\delta^{18}\text{O}$ ,  $\delta^{13}\text{C}$ , Sr/Ca, and Ba/Ca, in a living *Porites* coral head, collected from Son Tra Island, central Vietnam (16°12'59.4", 108°1'57.1"), to quantitatively reconstruct the annual dynamics of the East Asian winter monsoon (EAWM), as well as the monthly change of regional hydrological conditions. By comparing the 1/4-century geochemical data, four features are identified. (1) The coral  $\delta^{18}\text{O}$ - and Sr/Ca-inferred winter sea surface temperatures matches well with the 1° x 1° instrumental data and surface pressure difference between the southern South China Sea (SCS) (0-10°N, 105-115°E) and the northern SCS (22.5-32.5°N, 112-122°E). The observations indicate that the coral can be employed to retrieve past EAWM history. (2) 1‰ seasonal anomaly of  $\delta^{18}\text{O}$  residual ( $\Delta\delta^{18}\text{O}$ ) represents a 3-4-psu seasonal salinity change between dry and wet seasons. (3) The monthly  $\Delta\delta^{18}\text{O}$  suggests that the regional rainy season is from late summer to early winter, consistent with the meteorological record. (4) The phenomenon of synchronous seasonal anomalies in records of  $\delta^{13}\text{C}$ , Ba/Ca and  $\Delta\delta^{18}\text{O}$ , implies the high discharge of terrestrial flux input during the rainy season. Our results show that the validity of using coral geochemical proxies from this specific site as multi-indicators for the EAWM, as well as regional hydrological conditions.