

Reconstruction of paleoenvironments in the western Pacific for the last 220 years

Mutsumi Chihara¹, Ayaka Fukushima², Minoru Ikehara³, Hodaka Kawahata², Atsushi Suzuki⁴,
*Mayuri Inoue¹

1. Department of Earth Sciences, Okayama University, 2. Atmosphere and Ocean Research Institute, the University of Tokyo, 3. Center for Advanced Marine Core Research, Kochi University, 4. Geological Survey of Japan, AIST

In the tropics, *Porites* corals are recognized as the excellent archives of past climate and environmental and oceanic conditions because coral skeletal geochemistry, such as oxygen and carbon isotopes and Sr/Ca ratios, provides quantitative information on sea surface temperature (SST) and salinity. However, continuous long records more than 200 years based on coral records have been limited.

Here, we present a 224-year SST record with high time resolution (~2 month) derived from Sr/Ca ratios and stable isotopes ($\delta^{18}\text{O}$ and $\delta^{13}\text{C}$) from Philippines (13°N, 124°E), which located on the northern edge of the western pacific warm pool (WPWP).

Coral Sr/Ca was measured by an inductively coupled plasma optical/atomic emission spectrometer (ICP-OES/AES) with a precision was better than 0.6 ‰ which is equivalent to 0.5 °C. Analyses of $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ were measured by isotope ratio mass spectrometer (IR-MS). Precision was better than 0.05 ‰ for $\delta^{13}\text{C}$ and 0.10 ‰ for $\delta^{18}\text{O}$. In this study, spectral analysis was performed by using the kSpectra.

Reconstructed SST varies from 25 to 32 °C and shows that there were multiple cold events during the last 224 years in the western tropical Pacific. A decreasing trend in $\delta^{13}\text{C}$ for the last 50 years was found which may reflect accelerated increase in the amount of anthropogenic CO₂ (Suess effect). The result of $\delta^{18}\text{O}$ analyses implies western pacific climate was cooler and drier in the early 19th century which is almost consistent with other coral records. In contrast, warmer and wetter conditions persist since 1950s. The spectral analysis of the annual SST and $\delta^{18}\text{O}$ anomaly for 224 years shows significant peaks at 3-8 years. These frequencies are considered to be related to the ENSO variability.

Keywords: the western Pacific, coral skeleton, paleoclimate