

Skeletal records in a long-lived *Porites* coral from Okinoerabu-jima, Ryukyu Islands

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Tropical and subtropical ocean-atmosphere interactions play a significant role in global climate changes on seasonal, interannual and decadal timescales. Knowledge of past ocean variability is crucial for understanding and modeling current and future climate. However, spatial and temporal instrumental time series from tropical and subtropical oceans before 1950 are quite limited. There is, therefore, a strong need for high-resolution paleoclimate proxies such as corals and sclerosponges from the oceans that extend beyond the instrumental data.

Massive *Porites* corals, living in shallow waters of the tropical to subtropical oceans, precipitate annually banded aragonite skeletons. These colonies provide robust chronological control and allow sub-sampling at monthly-to-seasonal resolution. Oxygen isotope composition of coral skeleton reflects variations in sea surface temperature and seawater oxygen isotope composition (salinity) with the latter being closely related to the precipitation-evaporation balance at sea surface and changes in water mass transport (e.g., Gagan et al., 1998). Long-lived corals are an excellent archive for documenting high temporal resolved time series of thermal and hydrologic changes at sea surface for the last several centuries (e.g., Quinn et al., 1998). Nevertheless, there are a few published long coral records of more than 100 years in the tropical northwestern Pacific (Guam: Asami et al., 2005; Ogasawara: Felis et al., 2009; Ishigaki: Mishima et al., 2010).

We collected a 4.5-m-long skeleton core from a modern *Porites* coral colony in Okinoerabu-jima, Ryukyu Islands on October 2011. Our continuous observational data at the coral living site for the years 2009-2011 are consistent with gridded sea surface temperature and salinity products, suggesting that the site is exposed directly to open sea surface conditions. X-ray images of the coral skeleton showed well-developed annual density bands for the last several centuries. Here we present monthly-to-bimonthly resolved oxygen and carbon isotope composition time series from the coral skeleton to reconstruct secular trend of oceanographic changes before and after the Industrial Revolution. Along with previously published long coral records, our coral-based climate reconstruction will document spatial changes in thermal and hydrologic conditions in the northwestern Pacific for the last several centuries.

Keywords: coral skeleton, oxygen isotope composition, carbon isotope composition, paleo-temperature, paleo-salinity, Ryukyu Islands