

Sea surface salinity of the Kuroshio Current along the Nansei Islands in the mid-Holocene inferred from fossil corals

*Kohki Sowa¹, Chuki Hongo², Kentaro Tanaka³, Takuma Fujii⁴, Saburo Sakai¹, Kosei E. Yamaguchi^{6,5}

1. Japan Agency for Marine-Earth Science and Technology, 2. Ryukyu University, 3. The University of Tokyo, 4. Kagoshima University, 5. Toho University, 6. NASA Astrobiology Institute

Sea surface salinity (SSS), which is the parameters of water mass properties, is one of the crucial tracers for reconstructing water motion and climate system. After the mid-Holocene, a period roughly from 7000 to 5000 years ago, freshening of seawater in the Western Pacific has been reported, and the cause of the salinity variation is under discussion (e.g. Stott *et al.*, 2004). The distribution of annual-mean salinity in the Northwest Pacific is space-dependent on factors such as depth, longitude, and latitude. Therefore, to understand the cause of the freshening, more constraining salinity conditions in time and space are needed. However, most research was limited to tropical areas.

The Kuroshio Current comes from the North Equatorial Current and cultivates the coral ecosystems of the subtropical, temperate area along the Nansei Islands (N24°-31°). Therefore, the Nansei Islands provide a latitudinal constraint to the paleo SSS variation. The $\delta^{18}\text{O}_{\text{seawater}}$ estimated from $\delta^{18}\text{O}$ and Sr/Ca in coral skeletons enables reconstruction of the seasonal SSS for shallow areas. Previous studies reconstruct SSS at Kuroshio Current only for Kikai Island (28°N, 130°E), which is off the main Kuroshio Current. To discuss spatial distribution of SSS during the mid-Holocene, further SSS data at different latitudes along the main Kuroshio Current area of the Nansei Islands are useful.

This study shows SSS for Okinawa Island (26°N, 128°E) and Takara Island (29°N, 129°E) during the mid-Holocene using modern and fossil coral cores. The ^{14}C age is 5400 ± 140 cal. yr BP (Okinawa Island) from fossil *Porites* coral and 6180 ± 180 cal. yr BP (Takara Island) from *Acropora* coral, which was collected near the coring site of the fossil *Porites* coral. For Okinawa Island, the seasonal $\delta^{18}\text{O}$ of fossil *Porites* coral (~26-year, N=1) averages -4.36‰ , which is $\sim 0.54\text{‰}$ higher than that of modern coral (~5-year, N=2). XRD analysis and SEM observation imply good preservation of coral skeletons. The average extension rate > 6 mm suggests minor kinetic isotopic effect related to skeletal growth. Previous studies suggested that sea surface temperatures of the Kuroshio Current have been consistent during the past 7500 years, inferred from research on sediment cores (e.g. Lo *et al.* 2013). These imply that SSS was slightly higher in the mid-Holocene than today, at Okinawa Island. In this presentation, we will discuss SSS along the Nansei Island in the mid-Holocene using additional $\delta^{18}\text{O}$ and Sr/Ca analyses at Okinawa and Takara Island.

References

Stott *et al.* (2004) Decline of surface temperature and salinity in the western tropical Pacific Ocean in the Holocene epoch. *Nature* 431, 56-59.
Lo *et al.* (2013) Persistent sea surface temperature and declined sea surface salinity in the northwestern tropical Pacific over the past 7500 years. *Journal of Asian Earth Sciences* 66, 234-239.

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