$\Delta^{14}C$ variability of the Kuroshio region reconstructed from corals

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Coral calcium carbonate skeletons are widely utilized in paleoclimatology such as reconstruction of sea surface temperature in the past. Radiocarbon (^{14}C) is not only used for a dating method but for as a tracer of ocean circulation. ^{14}C in coral skeletons record dissolved inorganic carbon (DIC) of ambient seawater thus reflecting the changes of water masses. Before 1950 (Pre-Bomb period), it is known that regional ^{14}C offset existed between atmosphere (IntCal13) and DIC, known as the local marine reservoir effect (ΔR). This offset is resulted from the regional oceanography such as vertical mixing. Thus it is important to determineΔR when ^{14}C ages are determined.

In this study, we measured high-resolution ^{14}C record of corals from Luzon in the Philippines, Ishigaki and Kikai islands in Japan located in the western Pacific using the accelerator mass spectrometry (AMS) at the Atmosphere and Ocean Research Institute, The University of Tokyo (YS-AMS) to explore the seasonal-annual mass change of Kuroshio Current. We also compared them with published $\Delta^{14}C$ data in the western Pacific. The results showed that $\Delta^{14}C$ along the Kuroshio Current have been constant since 1950, whereas Pre-Bomb period data showed that $\Delta^{14}C$ in 1940s were different from $\Delta^{14}C$ in 1900s that were previously reported. Thus sea surface $\Delta^{14}C$ seems to fluctuate over a short period of time (less than 50 years) in the western Pacific. This variability would affect to derive radiocarbon dates usingΔR.