

Reconstructing Deep-Water Circulation in the Subtropical Western Pacific during Glacial-Interglacial Periods

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Global deep water circulation is important in regulating long-term carbon storage in the ocean and atmosphere. Downwelling deep water in high-latitude regions has been considered one of the major sources of sinking carbon dioxide. Although the modern North Pacific has no deep-water downwelling, previous studies revealed that during the Last Glacial Maximum (LGM), the North Pacific was better ventilated above around 2000 m. Besides, a potential deep-water might have formed and sunk to more than 3000 m during two deglacial cold periods, the Heinrich event 1 and the Younger Dryas. Thus, the deep-water circulation in the glacial and deglacial Pacific was quite different from that in the interglacial. As the deep water ventilation age records in the low-latitude western Pacific are still insufficient, this study provides ocean ventilation ages using the sediment core YK15-01 PC13 (23.5°N 124.24°E, southeast of Ishigaki Island) conducted in the western Pacific low latitude with water depth around 2520 m. The deep-water ventilation ages are estimated by the coexisting planktonic and benthic foraminifera radiocarbon ages and the surface reservoir age. According to the foraminiferal radiocarbon-derived ventilation ages, deep-water ventilation in the western Pacific was different in both long-term patterns from the LGM to Holocene and millennial-scale during deglaciation. Besides, the different ventilation changes between the YK15-01 PC13, western equatorial Pacific, and eastern Pacific during deglaciation might indicate the distribution of the potential deep water forming in the North Pacific.