

Relative sea level records using high-resolution radiocarbon dating based on new sediment cores from the Bonaparte Gulf

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Sea level is the best indicator of the ice volume change, which plays an important role on the global climate in the Quaternary period (e.g., IPCC AR5). The last glacial maximum (LGM), centered around 20,000 years ago, is a key period for understanding the climate system because the global ice volume reached its maximum. However, the sea level record during the LGM is not enough to understand the relationship between the climate and ice volume changes. Here we present the sea level records during the LGM using the new cores from the Bonaparte Gulf, northwestern Australia.

The Bonaparte Gulf is a suitable site for reconstructing the ice volume change since this region is located at far-field site: location that is distant from the former ice sheet and the adjustment of glacio-hydro-isostatic effect is relatively small. During the cruise of KH11-1 in winter 2011, more than 20 cores were obtained from the various water depths, which provide the continuous sea level records in the Bonaparte Gulf. In this study, over 400 radiocarbon dates of molluscs and organic matters were measured together with total organic carbon, total nitrogen and stable carbon isotope of organic matters. Moreover, cores were investigated by the sedimentology using a CT scan and major elemental analysis. Furthermore, the results were compared with the paleo tidal model to assess the sea level error by the tide in this region. We suggest that sea level fall occurred at ~21,000 years ago and the duration of the LGM is shorter than the previous studies (eg, Clark et al., 2009, Lambeck et al., 2014).

Keywords: Last Glacial Maximum, Relative Sea Level, Radiocarbon Dating, Marine Sediment Core