

Rapid glaciation and sea level changes during the Last Glacial Maximum and the deglaciation

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Studying changes in rates and magnitudes of glaciations/deglaciations during the past is a key to understand global climate system. The Last Glacial Maximum (LGM), centered around 20,000 years ago, as well as period after the LGM, therefore, represents key period to investigate. Sea level observations from sites far from the former ice sheets (far-field) are well suited due to the relatively small influence of surface deformation caused by glacio-hydro-isostatic adjustments (GIA). Australian coastlines are located in such regions and were targeted in this study of sea level changes over the past 30,000 years. The sites are situated off the North Eastern and North Western coasts of Australia respectively the Great Barrier Reef (GBR) and Bonaparte Gulf. Over thirty fossil reef cores were obtained from GBR shelf edge and two transects in northern and southern sites and >1,000 radiometric dating were conducted, in combination with detailed sedimentologic and biologic studies (Yokoyama et al., 2018). GIA modeling was also conducted to deduce global mean sea level (GMSL) from relative sea level records obtained from these regions. The results show that the LGM started when GMSL abruptly dropped by about 40 metres at around 31,000 years ago. The sea level at the shelf edge of the Great Barrier Reef then dropped by around 20 metres between 22,000 and 21,500 years ago, to -118 metres below the present and similar changes are observed in Bonaparte Gulf samples. Sea level began to rise just after the full extent of the LGM, consistent with previous studies. The LGM GMSL obtained from our study is about -125 to -130 metres. Sea level records from the North Australian coasts suggest that glaciers may have behaved more dynamically during the LGM than previously thought. The GBR had been existed despite from severe environmental changes during the last 30,000 years (Webster et al., 2018).

References:

Yokoyama et al. (2018) *Nature*, v559, p603-607

Webster, Yokoyama et al (2018) *Nature Geoscience*, v11, p426-432

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