

Holocene Sea-levels at Kizahasi beach in Antarctica and the possibility of the rapid melting of Antarctic ice sheet

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The melting history of Antarctic ice sheet from last glacial maximum (LGM) has extensively been inferred from the relative sea-level (RSL) observations and glacio isostatic adjustment (GIA) modelling. The RSL variations in last deglaciation around Antarctica are, however, more poorly defined than on any other continents. We compiled the geographic evidences of the maximum extent of Antarctic ice sheet and examined the RSLs in Antarctica by GIA modelling. Consequently we inferred the maximum extent of Antarctica at LGM and temporal and spatial variations in last deglaciation. On the other hand, local investigation determined the accurate sea-level curve using in situ fossil shells and sequence stratigraphy of raised beach deposits around the Luzow-Holm Bay, and deduced that the rapid sea-level falling event which magnitude is about 6 m for about 1000 years occurred in mid-Holocene (4000-2700 years before present). This event is attributed to the rapid removal of regional ice loads. Here we examine the possibility of the episodic melting of Antarctic ice sheet, and evaluate the spatial distribution, temporal change and volume of the ice loads by GIA modelling. The simulation results can not explain the rapid sea-level falling event unless the regional ice loads about 100 m melt around this region. This results means that the volume of melting ice load is corresponding to about 0.5 m for eustatic sea-level (ESL) rise, and this value is equivalent to 15 % of the Holocene melting of Antarctic ice sheet on the basis of RSL variations in far-field of glaciated region at LGM ascribed by previous studies.