Holocene changes in relative sea-level in the Lützow-Holm Bay region, East Antarctica

Verleyen E.[1], Tavernier I.[1], Hodgson D.A.[2], Imura S.[3], Kudoh S.[3], Sabbe K.[3], Vyverman W.[1]

→ elie.verleyen@ugent.be

1 Ghent University, Protistology & Aquatic Ecology, Belgium

2 British Antarctic Survey, United Kingdom

3 National Institute for Polar Research, Japan

Of the global ice sheets, the Antarctic ice sheet has least field data to constrain its past volume and contribution to global sea-level change since the Last Glacial Maximum. Moreover, little is known about the timing of deglaciation in vast sectors of the continent and ice sheet responses to Holocene climate variability, despite this information being critical for estimating the ice sheet's contribution to future sea-level changes in a warming world. In order to minimize these uncertainties, we developed a new relative sea-level (RSL) curve for Lützow-Holm Bay (East Antarctica) using marine to freshwater transitions in sediment cores from isolation lakes. We combined this with a study of the deglaciation history by radiocarbon dating transitions from glaciogenic to organic-rich sediments in glacial lakes. We focused on West Ongul Island and Skarvsnes, a peninsula 60 km distant. On West Ongul Island, the Holocene RSL maximum was below 17 m above sea-level (a.s.l.). RSL fell from this maximum at a rate of 2.8 to 2.15 mm/yr during the past 4650-4660 calibrated years, which is in agreement with previous findings based on raised beach data. On Skarvsnes, the Holocene RSL maximum could not be determined exactly, but was above 28 m a.s.l. between 4045 and 3200 cal. yr BP. RSL fell at 11.6 mm/yr between 3200 and 915 cal. yr BP, dropping rapidly to 1.6 mm/yr during the past 915 years. This reconstruction differs from previous findings based on raised beach data from the region. The observed patterns may be explained by increasing the modeled maximum ice thickness in this region and by imposing a subsequent melting event, possibly during the mid to late Holocene warm period. If correct this will imply that the East Antarctic ice sheet in this region was probably less stable during the Holocene than previously believed.