Geophysical Research Abstracts
Vol. 21, EGU2019-5706, 2019
EGU General Assembly 2019

Response of the Antarctic Ice Sheet to the peak warming during Marine Isotope Stage 11

Martim Mas e Braga (1,2,3), Jorge Bernales (3), Irina Rogozhina (4), Arjen Stroeven (1,2), Matthias Prange (3), and the Magic DML Consortium

(1) Geomorphology and Glaciology, Department of Physical Geography, Stockholm University, Stockholm, Sweden (martim.braga@natgeo.su.se), (2) Bolin Centre for Climate Research, Stockholm University, Stockholm, Sweden, (3) MARUM, Bremen University, Bremen, Germany, (4) Department of Geography, NTNU Trondheim, Trondheim, Norway

Studying the behaviour of the Antarctic Ice Sheet during periods with a climate that was similar or warmer than today can yield analogues for understanding its present-day changes and future trajectory. Among these, Marine Isotope Stage 11 (MIS 11) is one of the best candidates given its limited insolation variability, which is very close to our current interglacial. However, Antarctic ice core data indicates that CO_2 levels were merely close to pre industrial, but that warmer-than-present temperatures (about 2 K) lasted for much longer than other Quaternary interglacials. Sea level was 6 to 13 m higher than present, implying a potential substantial contribution from Antarctica.

While substantial work has been conducted regarding the behaviour of the Greenland Ice Sheet during MIS 11, the Antarctic Ice Sheet history and dynamics during this period remain poorly constrained, both in terms of its configuration and its potential contribution to sea level. Thus, in this study we present an ensemble of continental scale transient simulations of the Antarctic Ice Sheet between 420 ka and 394 ka using the ice sheet model SICOPOLIS forced by climate simulations from CCSM3. We evaluate the possible range of ice sheet geometries, the Antarctic contribution to sea level rise and the associated range of uncertainties during the longest interglacial of the Quaternary period. Our results aim to provide insights into the style of the Antarctic deglaciation towards the peak warming of MIS 11 and help set the bounds on the minimum volumes and extents of the western and eastern ice sheet counterparts as possible future analogues.