The Greenland Ice Sheet during the Last Interglacial: Using proxy data from ice cores to constrain model results

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The climate of the Last Interglacial (LIG; about 125,000 years ago) was substantially warmer than today and is often argued that it can be used as a possible equivalent for warmer future climate conditions caused by anthropogenic climate change.

This study is focusing on the shape and evolution of the Greenland Ice Sheet (GrIS) during the LIG. The GrIS interacts strongly with the surrounding environment and with a thickness of several thousand meters it also has the potential to modify atmospheric circulation. It is therefore important to know how the GrIS evolved in the past to better understand its behaviour and use this knowledge to improve future predictions for climate dynamics and global sea level rise.

The GrIS was the focus of many studies in the past. The most recent assessment report of the Intergovernmental Panel on Climate Change (IPCC AR5) discusses several of these studies in context of the contribution to sea level rise from the GrIS during the LIG. The report also identifies the big differences between these studies in terms of GrIS extent and the resulting sea level rise.

To model the dynamics of the GrIS the Ice Sheet System Model (ISSM) is used. The model results are constraint using proxy data derived from deep ice-cores of the GrIS. In addition a more exhaustive review of previous work on the GrIS during the LIG is given. The smallest extents of the GIS simulated by various authors are shown and summarized. A focus is thereby given to the methods used to calculate the surface mass balance. A hypothesis of the present work is that the varying results of the previous studies can largely be explained due to the various methods used to calculate the surface mass balance.