

Influence of the recent circulation change in summer on future surface mass balance of Greenland ice sheet

Alison Delhasse, Xavier Fettweis, Christoph Kittel, and Charles Amory
Université de Liège, Geography, Belgium (alison.delhasse@uliege.be)

Regional Climate Models (RCM) driven by General Circulation Models (GCM) are often used to produce future projections of the surface climate and surface mass balance (SMB) of polar ice sheets. However, GCM do not represent the recent circulation change observed in summer over the Greenland Ice Sheet (GrIS) since the 2000's and do not predict any circulation changes for the next century. The goal of this study is to evaluate the impact of an atmospheric circulation change (as currently observed) combined with a temperature increase on the future GrIS SMB. We compare here SMB results from the RCM MAR (Modèle atmosphérique régional) forced by warmer reanalyses (ERA-Interim with a temperature correction of +1, +1,5 and +2°C at the lateral boundaries) to SMB results from MAR future simulations forced with GCM during a period where there is a temperature increase of +1, +1,5 and +2°C compared to 1980-1999. Mean SMB produced with warmer reanalyses over 1980-1999 is similar to that obtained when forcing with GCM over a period characterized by a similarly warmer climate. During last years (2000-2016) when a circulation change has been observed in summer, MAR forced with warmer reanalyses shows a significant amplified SMB decrease compared to future simulations forced by GCM for the same temperature increase.