EGU23-8973, updated on 06 Jun 2023
https://doi.org/10.5194/egusphere-egu23-8973
EGU General Assembly 2023

How does the Greenland ice sheet respond on a medium-term time scale to various levels of warming?

Alison Delhasse[1], Johanna Beckmann[2], and Christoph Kittel[3,1]
[1]University of Liège, Laboratory of climatology, Department of Geography, Liège, Belgium (alison.delhasse@uliege.be)
[2]Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany
[3]Institut des Géosciences de l'Environnement (IGE), CNRS, France

The Greenland ice sheet is considered as one of the main causes of sea level rise (SLR) at the end of the 21st century. But what if it is already too late to reverse the loss of ice from the Greenland ice sheet? The mass balance (MB) resulting from the coupling between the Regional Atmospheric Model (MAR, ULiège) and the Parallel Ice Sheet Model (PISM, PIK) over Greenland following the CESM2 ssp585 climate indicates that even if we stop the CESM2 warming in 2100 and continue with a +7°C climate until 2200 with respect to the reference period (1961-1990), the GrIS continues to lose mass up to a contribution equivalent to 60 cm of SLR in 2200. From this coupling experiment, we ran several coupled simulations by stabilizing the warming at different thresholds (+ 1, 2, 3, ... °C) with respect to our reference period in order to highlight a kind of tipping point of the ice sheet with respect to atmospheric warming. Other experiments have been launched by reversing the climate imposed by CESM2 from 2100 to 2000, for example, with the aim of identifying whether the GrIS could gain ice mass again with a climate as warm as the present one.