



Initializing the Greenland ice sheet to investigate its sensitivity to climate changes: a study with the GRISLI model.

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The Greenland Ice Sheet (GrIS) is bound to play a crucial role in sea level rise over the next century. In this context, initializing Greenland ice sheet models properly is of prime importance. In this work, we will use the GRenoble Ice Shelf and Land Ice (GRISLI) model at 5km resolution (Ritz et al., 2001) to evaluate the evolution of the Greenland ice sheet under different climate forcings. The first step is to choose the most appropriate parameters to obtain a realistic Greenland ice sheet for present day. To perform this initialization, we use an inverse method and determine the basal stress given the observed geometry and mean climate between 1979 and 2014. We use the mean climate computed by the MAR regional atmospheric model (Fettweis et al., 2013) forced by reanalyses. At the end of this first step, we run a first simulation using the mean climate to check if the model is not drifting. In a second step, we apply three other climatologies built from MAR. We use: 1/ the warmest years of the period, 2/ the coolest years, 3/ the 2012 extreme melt event year (Nilsson et al, 2015). For each experiment we analyse the impact of these different climates on mass balance in 7 different regions (corresponding to drainage basins) of Greenland.