



Doubling of future Greenland Ice Sheet surface melt revealed by the new CMIP6 high-emission scenario

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Future climate projections show a marked increase in Greenland Ice Sheet (GrIS) runoff during the 21st century, a direct consequence of the Polar Amplification signal. Regional climate models (RCMs) are a widely used tool to downscale ensembles of projections from global climate models (GCMs) to assess the impact of global warming on GrIS melt and sea level rise contribution. Initial results of the CMIP6 GCM model intercomparison project have revealed a greater 21st century temperature rise than in CMIP5 models. However, so far very little is known about the subsequent impacts on the future GrIS surface melt and therefore sea level rise contribution. Here, we show that the total GrIS melt during the 21st century almost doubles when using CMIP6 forcing compared to the previous CMIP5 model ensemble, despite an equal global radiative forcing of +8.5 W/m² in 2100 in both RCP8.5 and SSP58.5 scenarios. The total GrIS sea level rise contribution from surface melt in our high-resolution (15 km) projections is 17.8 cm in SSP58.5, 7.9 cm more than in our RCP8.5 simulations, despite the same radiative forcing. We identify a +1.7°C greater Arctic amplification in the CMIP6 ensemble as the main driver behind the presented doubling of future GrIS sea level rise contribution