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An assessment of the contribution of the Greenland ice sheet to future sea level rise

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We assess the order of magnitude of future sea level rise due to the melting of the Greenland ice sheet. To this end, we forced GRISLI ice sheet model (LGGE, France) with output from climate simulations run with CNRM-CM5 in the framework of CMIP5 (Coupled Model Intercomparison Project phase 5).
GRISLI is a 3D thermo-mechanically coupled ice sheet model which mixes shallow ice approximation and shallow shelf approximation. The horizontal resolution is 15km. We use surface mass balance modeled by CNRM-CM5 as a top boundary conditions.
CNRM-CM5 is a global coupled climate model developed by CNRM/CERFACS (France). This new global coupled climate model is based on the ocean-atmosphere core formed by the most up-to-date versions of NEMO and ARPEGE-Climat. Surface-atmosphere exchanges, sea ice and river routing are respectively represented by SURFEX v5, Gelato v5 and TRIP models. The atmospheric component of CNRM-CM5 has 31 vertical levels and a horizontal resolution of 1.4Â°, and the ocean has 42 levels and a horizontal resolution of 1Â°.
GRISLI was forced with the output of a preindustrial simulation run with CNRM-CM5 in order to generate an initial state for the ice sheet that is in near-equilibrium with the preindustrial climate. Then, GRISLI was forced with CNRM-CM5 data from a 1850-2005 historical experiment. From 2006, several scenario experiments run with CNRM-CM5 were run: RCP2.6, RCP4.5 and RCP8.5 over 2006-2300. We estimate the additional sea level rise over the whole 21st century. It should be noted that for the RCP8.5 scenario the melting rate of Greenland accelerates very rapidly after the 21st century, which results in almost total melting of Greenland ice sheet before year 2800. This acceleration phenomenon is probably amplified by topographic changes induced by the shrinking of the ice sheet.