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Greenland ice sheet contribution to 21st century sea level rise as modelled by the coupled CESM2.1-CISM2.1

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With the Community Earth System Model version 2.1 (CESM2.1) interactively coupled to the evolving Greenland Ice Sheet as simulated by the Community Ice Sheet Model version 2.1 (CISM2.1), we examine the Greenland Ice Sheet (GrIS) mass balance. The model has been run for the period 1850-2100 with historical and SSP5-8.5 scenario forcing, contributing to the coupled experiments within the framework of the Ice Sheet Model Intercomparison Project for CMIP6 (ISMIP6) (Nowicki et al., 2016).

CESM2.1-CISM2.1 simulates a relatively strong global warming signal and strong weakening of meridional overturning circulation by 2100 compared to CMIP5 models. In our projection, the GrIS contributes 23 mm sea-level equivalent by 2050, and 109 mm by 2100, to global mean sea level rise. The southern GrIS drainage basins contribute 73% of the mass loss by mid-century, but the contribution decreases to 55% by 2100, as surface runoff in the northern basins progressively increases.