EGU2020-2682
https://doi.org/10.5194/egusphere-egu2020-2682
EGU General Assembly 2020


# The future sea-level contribution of the Greenland ice sheet: a multi-model ensemble study of ISMIP6

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The Greenland ice sheet is one of the largest contributors to global-mean sea-level rise today and is expected to continue to lose mass as the Arctic continues to warm. The two predominant mass loss mechanisms are increased surface meltwater runoff and mass loss associated with the retreat of marine-terminating outlet glaciers. In this paper we use a large ensemble of Greenland ice sheet models forced by output from a representative subset of CMIP5 global climate models to project ice sheet changes and sea-level rise contributions over the 21st century. The simulations are part of the Ice Sheet Model Intercomparison Project for CMIP6 (ISMIP6). We estimate the sea-level contribution together with uncertainties due to future climate forcing, ice sheet model formulations and ocean forcing for the two greenhouse gas concentration scenarios RCP8.5 and RCP2.6. The results indicate that the Greenland ice sheet will continue to lose mass in both scenarios until 2100 with contributions of 89 ± 51 mm and 31 ± 16 mm to sea-level rise for RCP8.5 and RCP2.6, respectively. The largest mass loss is expected from the southwest of Greenland, which is governed by surface mass balance changes, continuing what is already observed today. Because the contributions are calculated against a unforced control experiment, these numbers do not include any committed mass loss, i.e. mass loss that would occur over the coming century if the climate forcing remained constant. Under RCP8.5 forcing, ice sheet model uncertainty explains an ensemble spread of 40 mm, while climate model uncertainty and ocean forcing uncertainty account for a spread of 36 mm and 19 mm, respectively. Apart from those formally derived uncertainty ranges, the largest gap in our knowledge is about the physical understanding and implementation of the calving process, i.e. the interaction of the ice sheet with the ocean.

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