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# Reducing the uncertainty in projections of future ice shelf basal melting

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Simulations of ice shelf basal melting in future climate scenarios from the IPCC's Fourth Assessment Report (AR4) have revealed a large uncertainty and the potential of a rapidly increasing basal mass loss particularly for the large cold-water ice shelves in the Ross and Weddell Seas. The large spread in model results was traced back to uncertainties in the freshwater budget on the continental shelf, which is governed by sea ice formation. Differences in sea ice formation, in turn, follow the regional differences between the atmospheric heat fluxes imprinted by the climate models.

A more recent suite of BRIOS and FESOM model experiments was performed with output from two members of the newer generation of climate models enganged in the IPCC's Fifth Assessment Report (AR5). Comparing simulations forced with output from the AR5/CMIP5 models HadGem2 and MPI-ESM, we find that uncertainties arising from inter-model differences in high latitudes have reduced considerably. Projected heat fluxes and thus sea ice formation over the Southern Ocean continental shelves have converged to an ensemble with a much smaller spread than between the AR4 experiments. For most of the ten larger ice shelves in Antarctica, a gradual (but accelerating) increase of basal melt rates during the 21st century is a robust feature throughout the various realisations. Both with HadGem2 and with MPI-ESM forcing, basal melt rates for Filchner-Ronne Ice Shelf in FESOM increase by a factor of two by the end of the 21st century in the RCP85 scenario. For the smaller, warm-water ice shelves, inter-model differences in ice shelf basal mass loss projections are still slightly larger than differences between the scenarios RCP45 and RCP85; compared to AR4 projections, however, the model-dependent spread has been strongly reduced.