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Uncertainty in Future Solid Ice Discharge from Antarctica

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Future solid ice discharge from Antarctica under climate scenarios based on the Extended Concentration Pathways is investigated with the Potsdam Parallel Ice Sheet Model (PISM-PIK), a shallow hybrid model with a consistent representation of the ice flow in sheet, shelves and the transition zone.
Both the uncertainty in the climate forcing as well as the intra-model uncertainty are taken into account: All simulations are performed for a 81-member perturbed- physics ensemble and the likely range of surface and ocean warming under the emission pathways derived from the results of 20 CMIP3-AOGCMS.
The effects of surface warming, ocean warming and increased precipitation on solid ice discharge are separately considered. We find that solid ice discharge caused by enhanced basal ice-shelf melting exceeds that caused by surface warming. Increasing precipitation leads to a change from net sea-level rise to sea-level drop.
Our results suggest that the history of the ice-sheet plays an important role with respect to projections of solid ice discharge.