



Climate modification by future ice sheet changes and consequences for their mass balance

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Changes in the future mass balance of ice sheets due to anthropogenic climate change could affect global climate and the local climate over the ice sheets due to modification of surface albedo, orography and meltwater fluxes. The last two effects have the potential to modify atmospheric and ocean circulations.

In this study we present results from model simulations performed with a global ice sheet model bi-directionally coupled to a climate model (AOGCM and land vegetation). The mass balance of the ice sheets is calculated with an energy balance scheme and the atmospheric forcing is not corrected prior to application to the ice sheet model, which represents a step forward in the comprehensive modeling of the future evolution of ice sheets.

The response of the climate system and ice sheets to a doubling and quadrupling of atmospheric carbon dioxide concentration is investigated. A 4xCO₂ simulation not including the feedbacks between ice sheets and climate shows a faster decay of the Greenland ice sheet than a similar simulation which includes those feedbacks. The reasons for this are presented and discussed and the modifications of global and high latitude climate due to changes in the ice sheets are analyzed.