



Impact of 1.5°C global warming on the Greenland and Antarctic ice sheets

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For strengthening the global response to climate change, it is crucial to assess to what extent limiting global warming to low values may reduce the impacts on society. To tackle this issue, the IPCC has decided to provide a special report in 2018 on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways.

Ice sheets are well known contributors to sea level rise and many studies have aimed to provide projections of their future contribution in response to climate change, although the focus was often on worst-case scenarios. Here we propose to review the present knowledge of how the ice sheets could be affected in the case of a limited warming of 1.5°C to 2.0°C.

We will review the various processes and feedbacks known to induce ice sheets vulnerability. They are different for Greenland, where we know that the surface mass balance plays a crucial role, and Antarctica where the major risk is marine ice sheet instability. One point of interest is to define, in terms of local forcing, the tipping points associated with these processes. We note that limiting global warming to 1.5°C may mean substantially more warming in the polar regions. This polar amplification can be assessed from experiments following the RCP2.6 scenario that have been carried out in recent (post IPCC AR5) studies. This scenario can be considered as an upper limit for 1.5°C. The final question concerns the long term (millennial) impact. There is a general consensus that there are tipping points both for Greenland and Antarctica, which potentially lead to irreversible mass loss. We will review the current knowledge of how long it takes to reach these tipping points and whether subsequent ice-sheet demise is, indeed, unstoppable.