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Modelled Holocene thinning in Greenland improved by new developed transient past climatologies.

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Reconstructions of Greenland Summit elevation changes indicate at least 150 m of surface thinning since the onset of the Holocene. Even higher thinning values are found at locations closer to the ice-sheet margin, where the influence of higher ablation rates and ocean-induced retreat is greater. Interestingly, the performance of 3D ice-sheet models in representing such elevation changes is generally poor, even though they can reasonably reproduce the state of the ice sheet at different times, such as the last glacial maximum (LGM) or the present day. The reasons behind this data-model mismatch are still unclear. Here we use a recently developed 3D ice-sheet-shelf model to test the impact of different model parameters and of boundary conditions on simulating the Greenland ice sheet evolution through the last deglaciation to today. Specifically, we investigate the role of past climatologies in reproducing the elevation changes at ice core sites when used to force the ice-sheet model. By applying recently developed transient deglacial climatologies we can investigate the ice-sheet deglaciation with exceptional detail. Results support the need of additional transient climatologies to be released to ensure a robust description of the Greenland retreat history throughout the Holocene.