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Impact of ice sheet mask and resolution on estimating the surface mass balance of the Greenland ice sheet

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The impacts of the spatial resolution and a Greenland ice sheet mask on modelling the Surface Mass Balance are studied with the regional climate model MAR coupled with a complex energy balance/snowpack model. On the one hand, too coarse resolution prevents the model from resolving adequately the steep ice sheet margin and the ablation zone, not wider than 100 km in Greenland, where substantial seasonal melting occurs. The resolution affects also the precipitation modelling. On the other hand, a too large ice sheet mask (i.e. with low-altitude ice pixels in the model, where there is no ice in reality) leads to an overestimation of the run-off. In addition, due to the albedo feedback, biases in the ice sheet mask have also consequences on the surface energy balance.