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The 1958-2008 Greenland ice sheet surface mass balance variability simulated by the regional climate model MAR

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Results made with the regional climate model MAR over 1958-2008 show a very high interannual variability of the Greenland ice sheet (GrIS) surface mass balance (SMB) modelled in average to be 330 $\pm$ 130 km^3/yr. To a first approximation, the SMB variability is driven by the annual precipitation anomaly minus the meltwater run-off rate variability. Sensitivity experiments carried out by the MAR model evaluate the impacts on the surface melt of (i) the summer SST around the Greenland, (ii) the snow pack temperature at the beginning of the spring, (iii) the winter snow accumulation, (iv) the solid and liquid summer precipitations and (v) the summer atmospheric circulation. This last one, by forcing the summer air temperature above the ice sheet, explains mainly the surface melt anomalies.