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The influence of natural climate variability on Canadian Arctic glaciers during the last millennium

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Glacier mass loss is expected to remain a large contributor to sea level rise during the 21st century. Excluding the Greenland an Antarctic Ice Sheets, approximately $\frac{1}{4}$ of the ice on land is located in Arctic Canada. Understanding the sensitivity of glaciers in the Canadian Arctic to regionally changing climatic conditions is therefore crucial. Due to its relatively high density in climate data, the last millennium is a useful period to quantify the relative importance of natural variability and anthropogenic forcing on glaciers. The aim of this study is to assess the impact of natural climate variability on the mass balance of glaciers in the Canadian Arctic during the last millennium. The Open Global Glacier Model (OGGM) has been used to simulate the Canadian Arctic glaciers for the last millennium. In these simulations OGGM has been forced with temperature and precipitation anomalies from the Community Earth System Model Last Millennium Ensemble (CESM-LME) with respect to the 1961-1990 CRU CL v2.0 data. Our simulations show that internal climate variability has a large influence on the glacier mass balance in the Canadian Arctic. Neglecting or under-representing this variability results in a significant overestimation of glacier volume in the region.