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Holocene glacier fluctuations recorded in eastern Jotunheimen, southern Norway

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Sediment records from proglacial lake Russvatnet in eastern Jotunheimen central southern Norway comprise a complex combination of direct glacier-derived material from glaciers in the catchment as well as material from a variety of different episodic mass movement processes. To disentangle the sedimentary units we utilize a multi proxy approach analyzing sediment cores from Russvatnet and extract the glacier-derived signal from the complex multi-process record.

The prevailing wintertime westerlies in the North Atlantic region leads to a strong west-east precipitation gradient across southern Norway, and the study area is, at present, located in the precipitation shadow of the Jotunheimen mountains. Comparing our reconstructed record of Holocene glacier activity with independent pollen-based reconstructions of temperature, we deduce the varying influence of temperature and winter precipitation on glacier fluctuations, and thus gain information on the dominating climate regime and strength/influence of the westerlies during the Holocene. During the Holocene thermal maximum (around 7000 cal. yr BP), the glacier signal is weak and glaciers were probably small. At about 4500 cal. yr BP glacier activity increased and results indicate a significant correlation between the reconstructed glacier fluctuations and summer temperatures over the following 2000 years (c. 4500-2500 cal. yr BP), arguably indicating a continental climate regime. After c. 2500 cal. yr BP there is no significant correlation between glacier variability and summer temperature, indicating a relative higher influence of a maritime climate regime, and a relative increase in winter precipitation.