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Simulating the effect of subsurface drainage on the thermal regime and ground ice in blocky terrain in Norway

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S1 Simulated subsurface drainage rates

In Fig. S1 we provide simulated subsurface drainage rates for two model scenarios at Juvvasshøe in addition to air temperature and rainfall at the site.

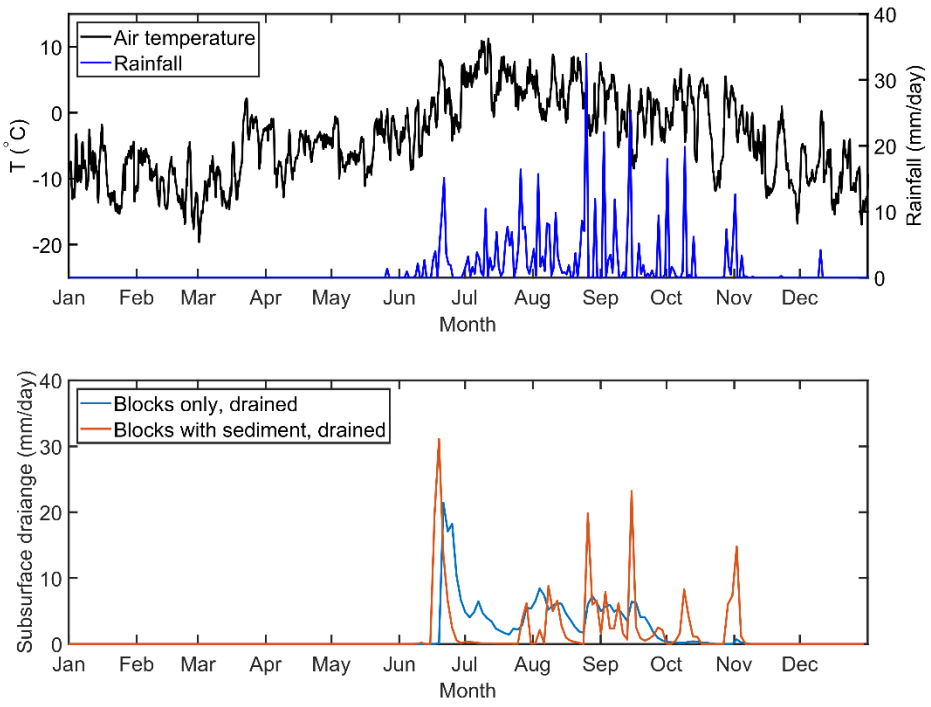

Figure S1. Air temperature and rainfall (top) and lateral subsurface drainage out of the model realization for the *blocks only* and *blocks with sediment* stratigraphies (see Table 1), both *drained* (bottom) during a year of an equilibrium run at Juvvasshøe. *Sf* = 0.25. The drainage rate is the summed drainage over all grid cells.

S2 Sensitivity to porosity of the blocky layer

In Table S1, we provide the sensitivity of mean ground temperatures at 2 m depth for differences in porosity in the blocky layer (upper 5 m of the ground). Simulations are setup as in section 3.3.2 (equilibrium runs), but for three different porosities at a single snowfall factor. For *blocks with sediment* stratigraphy, we assume the porosity value for each the blocks and the sediment to be the same. For example, with porosity 0.4, blocks with 40% porosity, which are filled with sand which also has 40% porosity, resulting in a final porosity of 0.16 (0.32 for porosity 0.6).

Table S1: Equilibrium ground temperature (°C) at 2 m depth for the three idealized stratigraphies at three different porosities. The snowfall factors are the same as resulted from the model validation.

Site	Stratigraphy	Porosity 0.4	Porosity 0.5	Porosity 0.6
Juvvasshøe (sf = 0.25)	*Blocks only*	-3.2	-3.2	-3.1
	Blocks with sediment	-3.0	-3.2	-3.4
	Sediment only	-3.7	-3.6	-3.4
Ivarsfjorden (sf = 1)	*Blocks only*	-0.3	-0.4	-0.2
	Blocks with sediment	2.0	1.8	1.6
	Sediment only	1.8	1.6	1.5

S3 Sensitivity to drainage rates

In Table S2, we provide the sensitivity of mean ground temperatures at 2 m depth for differences in d^{lat}, which is the parameter used to control the drainage rate. Simulations are setup as in section 3.3.2 (equilibrium runs) but with five different values for d^{lat} and one snowfall factor. The increase of d^{lat} by one order of magnitude results in the same drainage rate as decreasing the K_H (saturated hydraulic conductivity) by one order of magnitude (see Eq. 1). $sf = 1$ is used, as differences between drainage rates are minimal for $sf = 0.25$ (Fig. 4).

Table S2: Equilibrium ground temperature (°C) at 2 m depth for the three idealized stratigraphies at five values of d^{lat}.

Site	Stratigraphy	d^{lat} 10^4 m	d^{lat} 10^3 m	d^{lat} 10^2 m	d^{lat} 10^1 m	d^{lat} 10^0 m
Juvvasshøe (sf = 1)	*Blocks only*	0.3	0.0	0.0	-0.7	-0.9
	Blocks with sediment	0.3	0.3	0.3	0.2	0.2
	Sediment only	0.3	0.3	0.3	0.2	0.0
Ivarsfjorden (sf = 1)	*Blocks only*	1.3	0.3	0.1	-0.1	-0.4
	Blocks with sediment	1.8	1.8	1.8	1.8	1.8
	Sediment only	1.7	1.7	1.7	1.6	1.6