

# Impact of icebergs on the seasonal submarine melt of Sermeq Kujalleq

## Supplementary figures and tables

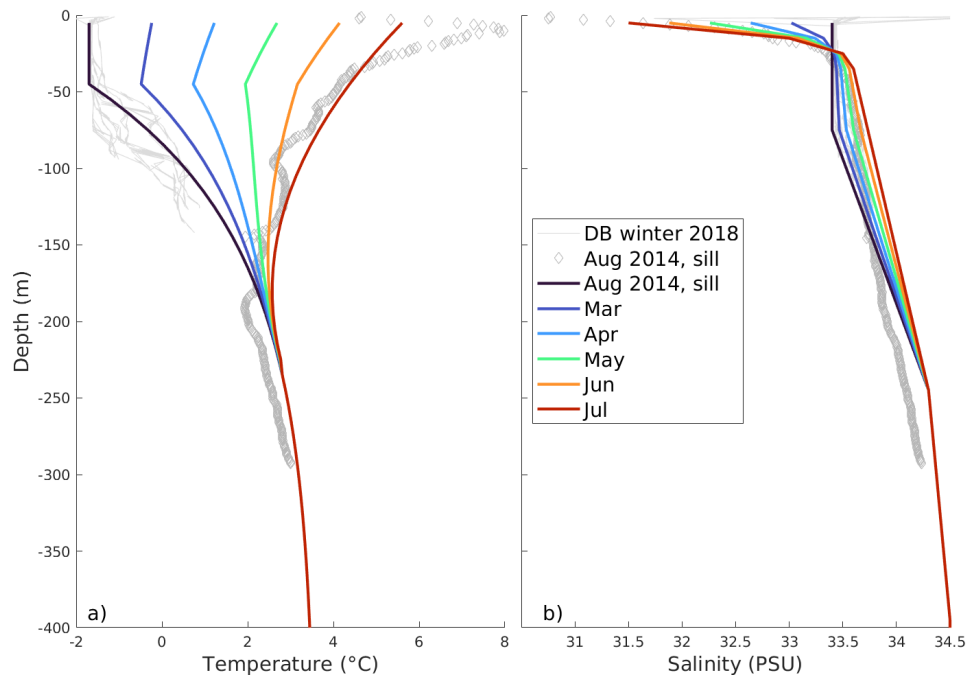
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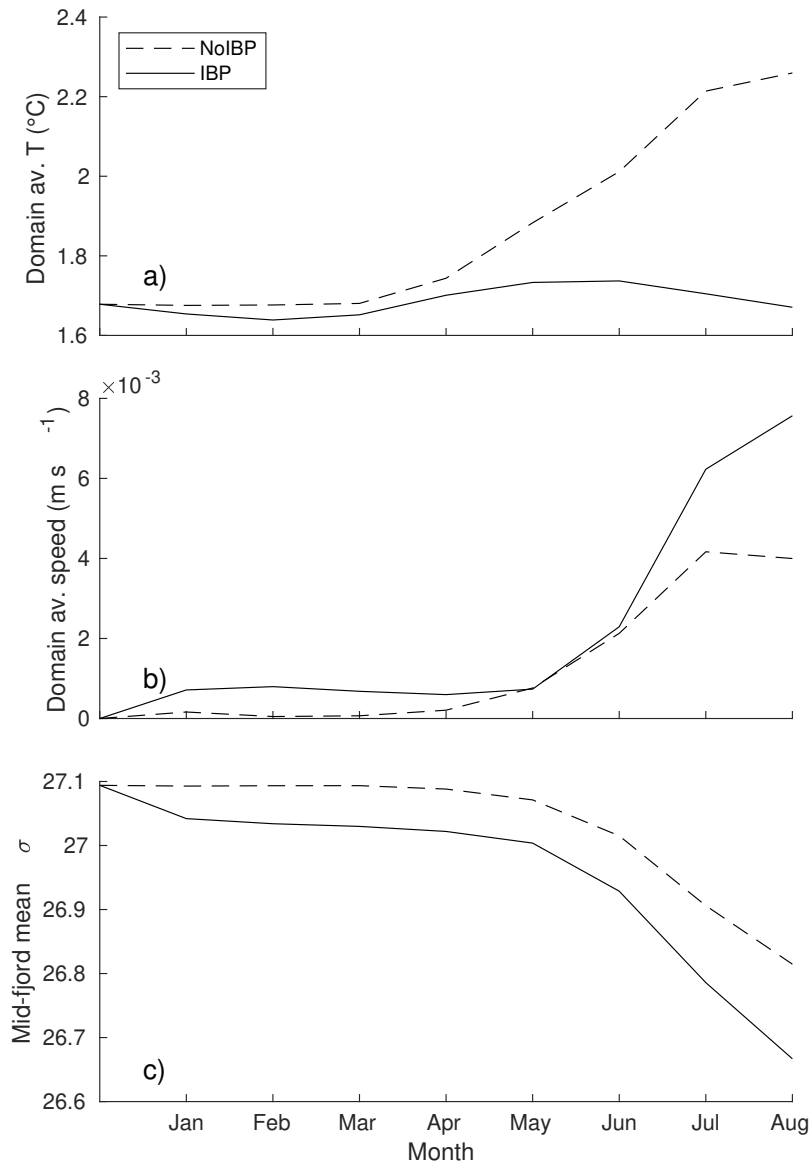
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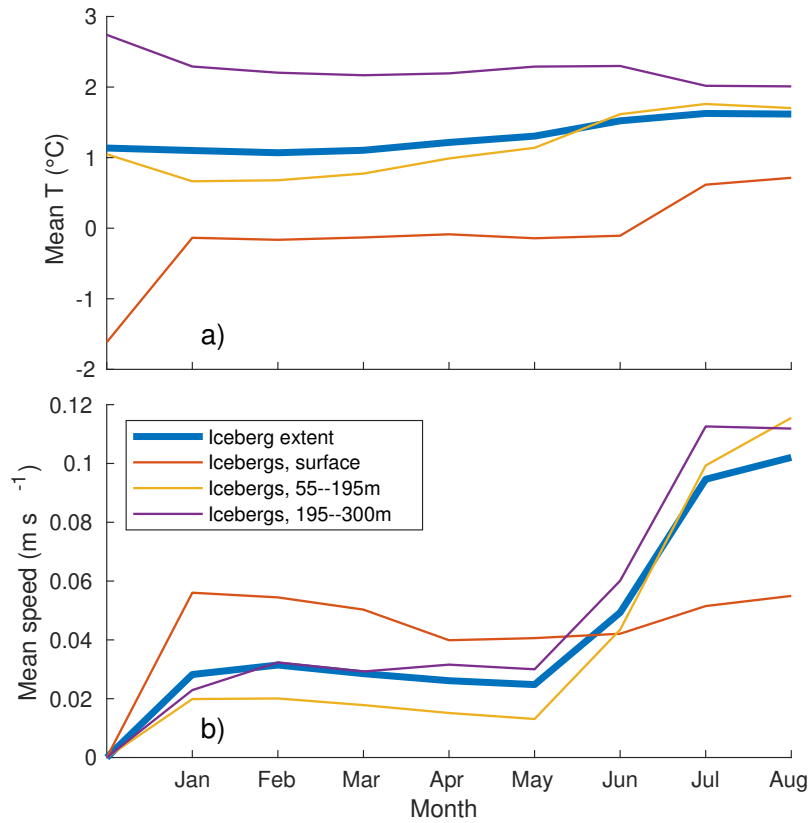
**Figure S1.** Model temperature (a) and salinity (b) boundary conditions for Disko Bay (colored lines), August 2014 temperature and salinity profiles on Disko Bay next to the sill (grey diamonds) (Beaird et al., 2017), and winter profiles for Disko Bay close to Quequertarsuaq (grey lines) (Greenland Ecosystem Monitoring, 2020).

**Table S1.** List of model parameters

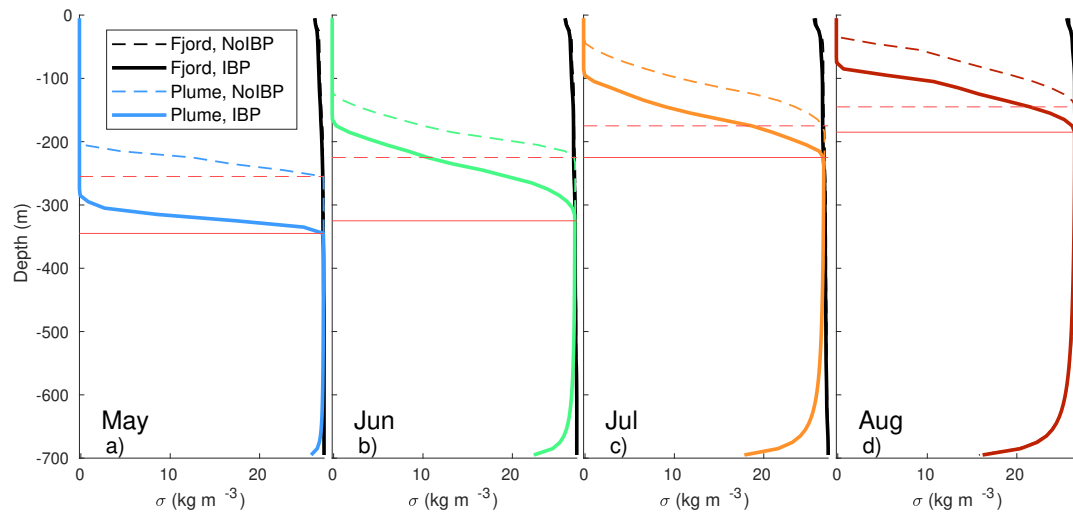
Parameter	Value	Unit
Heat capacity of ice	2000	$\text{J kg}^{-1} \text{ } ^\circ\text{C}^{-1}$
Heat capacity of water	3974	$\text{J kg}^{-1} \text{ } ^\circ\text{C}^{-1}$
Acceleration due to gravity	9.81	$\text{m s}^{-2}$
Ice temperature	-10	$^\circ\text{C}$
Latent heat of melting	$3.34 * 10^5$	$\text{J kg}^{-1}$
Thermal turbulent transfer coefficient	0.022	
Salt turbulent transfer coefficient	0.00062	
Iceberg drag coefficient	0.0025	
Freezing point slope	-0.0573	$^\circ\text{C PSU}^{-1}$
Freezing point offset	0.0832	$^\circ\text{C}$
Freezing point depth	0.00076	$^\circ\text{C m}^{-1}$
Background velocity, icebergs	0.06	$\text{m s}^{-1}$
Background velocity, plume	0.017	$\text{m s}^{-1}$
Ice density	917	$\text{kg m}^{-3}$
Vertical Laplacian diffusion coefficient of temperature and salinity	$1 * 10^{-5}$	$\text{m}^2\text{s}^{-1}$
Horizontal diffusion coefficient of temperature and salinity	20	$\text{m}^2\text{s}^{-1}$
Vertical eddy viscosity	$1 * 10^{-5}$	$\text{m}^2\text{s}^{-1}$
Smagorinsky non-dimensional viscosity factor	2.2	
Entrainment parameter	0.1	
Reference density	1027	$\text{kg m}^{-3}$
OBCS relaxation timescale, inner boundary	30	d
OBCS relaxation timescale, outer boundary	16.7	h



**Figure S2.** Time evolution throughout the model run of a) domain averaged temperature, b) domain averaged speed and c) vertically averaged potential density at mid-fjord location for experiments with and without icebergs (*IBP* and *NoIBP* respectively).



**Figure S3.** Average temperature (a) and speed (b) within the extent of the icebergs throughout experiment *IBP*, for the whole iceberg extent (sill to glacier, surface to 300 m depth, as in Fig. 2), surface layer, intermediate layer water above 195 m, and intermediate water below 195 m.



**Figure S4.** Seasonality of the density within the plume and the nearest grid cell from May to August with (*IBP* solid lines) and without icebergs (*NoIBP* dashed lines). Neutral buoyancy depth in each case is indicated with horizontal red lines, above which the plume starts to drain into the fjord.

## References

Beaird, N., Straneo, F., and Jenkins, W.: Characteristics of meltwater export from Jakobshavn Isbræ and Ilulissat Icefjord, *Annals of Glaciology*, 58, 107–117, <https://doi.org/10.1017/aog.2017.19>, 2017.

Greenland Ecosystem Monitoring: MarineBasis Disko - Water column - CTD measurements (Version 1.0) [Data set], Tech. rep., Greenland

5 Ecosystem Monitoring, <https://doi.org/https://doi.org/10.17897/WH30-HT61>, 2020.