

# 1 Supporting information

## 1.1 Input data of all glaciers

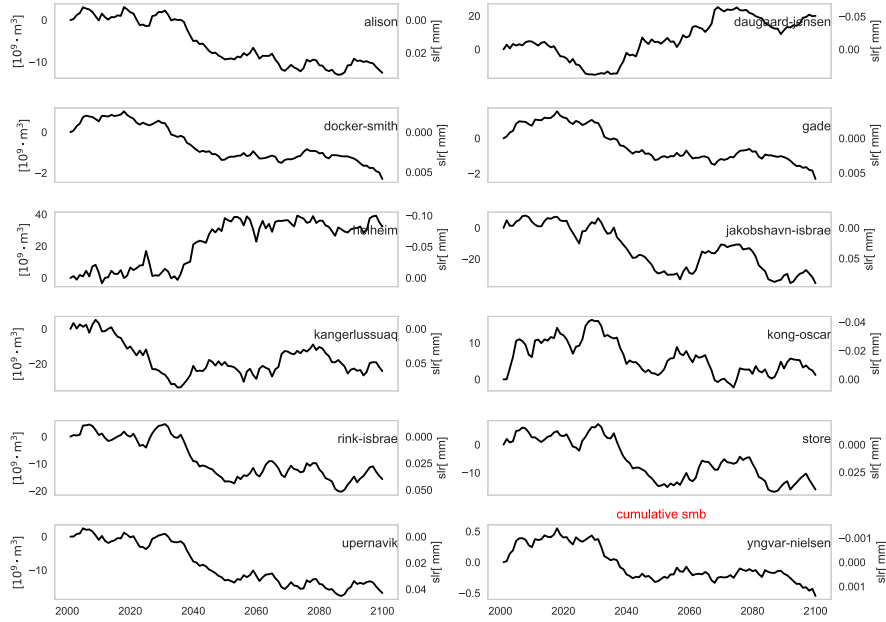


Figure S1: Cumulative SMB forcing from MAR with the CMIP5 MIROC5 model.

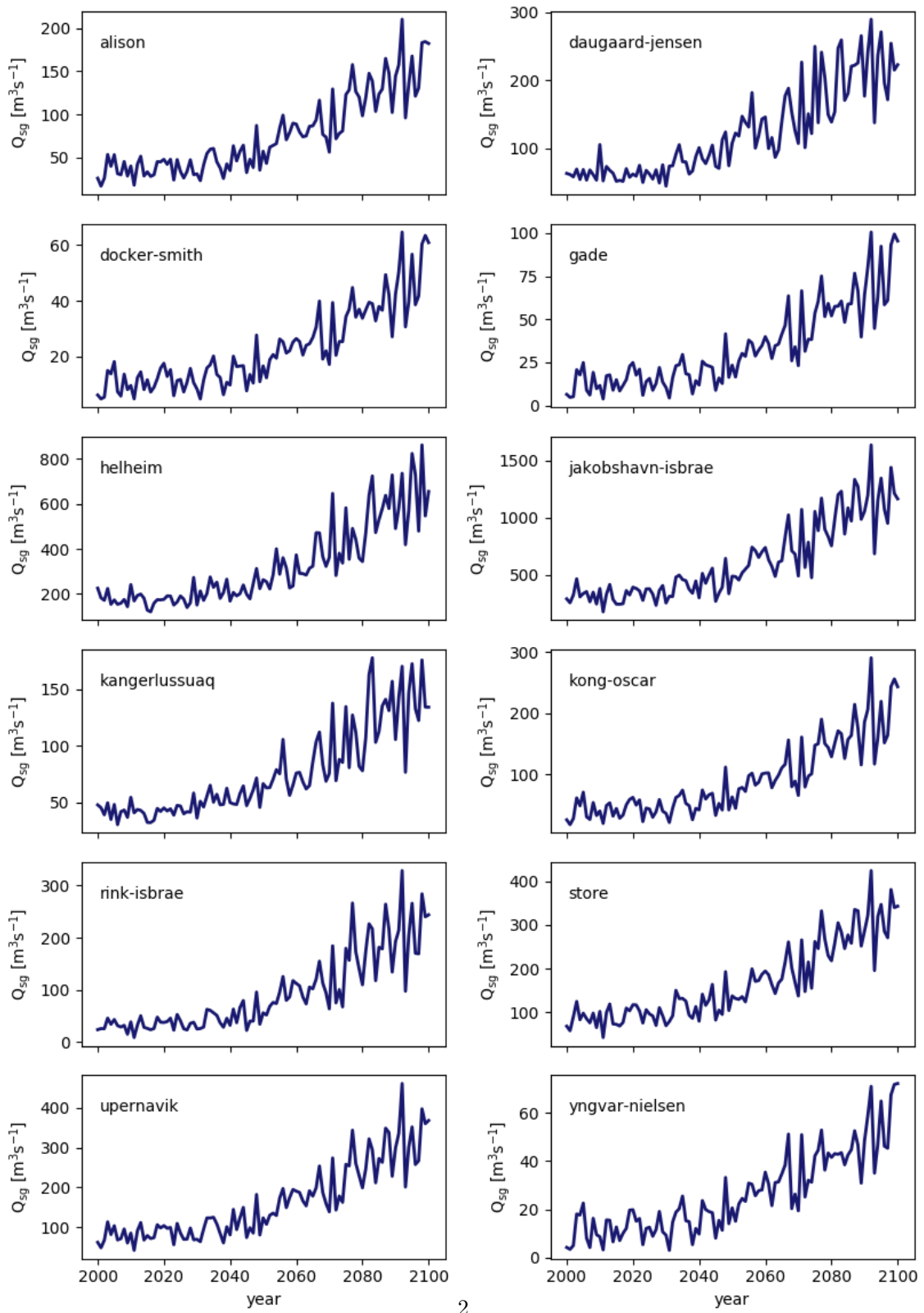


Figure S2: Annual subglacial discharge.

Table S1: CTD location from reanalysis data and CMIP5 model at 400 m depth and corresponding temperature trend for 100 years.

glacier name	Reanalysis	MPI-ESM-LR		HadGEM2-CC		GFDL-ESM2G	
	lon,lat	lon,lat	$\frac{\Delta T}{100a}$	lon,lat	$\frac{\Delta T}{100a}$	lon,lat	$\frac{\Delta T}{100a}$
Daugaard-Jensen	-25.19, 70.96	-24.71, 70.44	3	-23.85, 69.98	5	-18.90, 71.53	3
Helheim	-38.1, 65.17	-38.13, 65.07	2	-34.83, 64.97	2	-37.29, 64.48	3
Jakobshavn Isbae	-52.35, 69.17	-52.61, 69.05	4	-58.06, 67.92	2	-58.96, 69.29	2
Kangerlussuaq	-31.66, 67.89	-31.66, 67.89	3	-27.96, 66.94	3	-31.48, 66.32	4
Rink Isbrae	-54.46, 71.05	-31.52, 67.66	3	-59.20, 70.95	1	-59.20, 70.95	2
Store	-54.41, 70.94	-55.39, 70.89	3	-59.04, 70.74	1	-58.96, 70.63	2
Kong Oscar	-61.87, 75.76	-60.76, 75.61	3	-64.11, 74.99	1	-62.17, 75.62	2
Alison	-58.83, 74.6	-58.83, 74.60	3	-60.29, 73.93	1	-59.04, 74.36	2
Upernavik Isstrom	-57.57, 73.1	-57.57, 73.10	3	-60.03, 72.81	1	-58.85, 73.69	2
Yngvar Nielsen	-64.01, 75.94	-63.29, 75.76	3	-64.11, 74.99	1	-62.17, 75.62	2
Docker Smith	-62.57, 75.94	-62.86, 75.80	3	-64.11, 74.99	1	-62.17, 75.62	2
Gade Glacier	-64.01, 75.94	-63.29, 75.76	3	-64.11, 74.99	1	-62.17, 75.62	2

## 1.2 Results for present-day

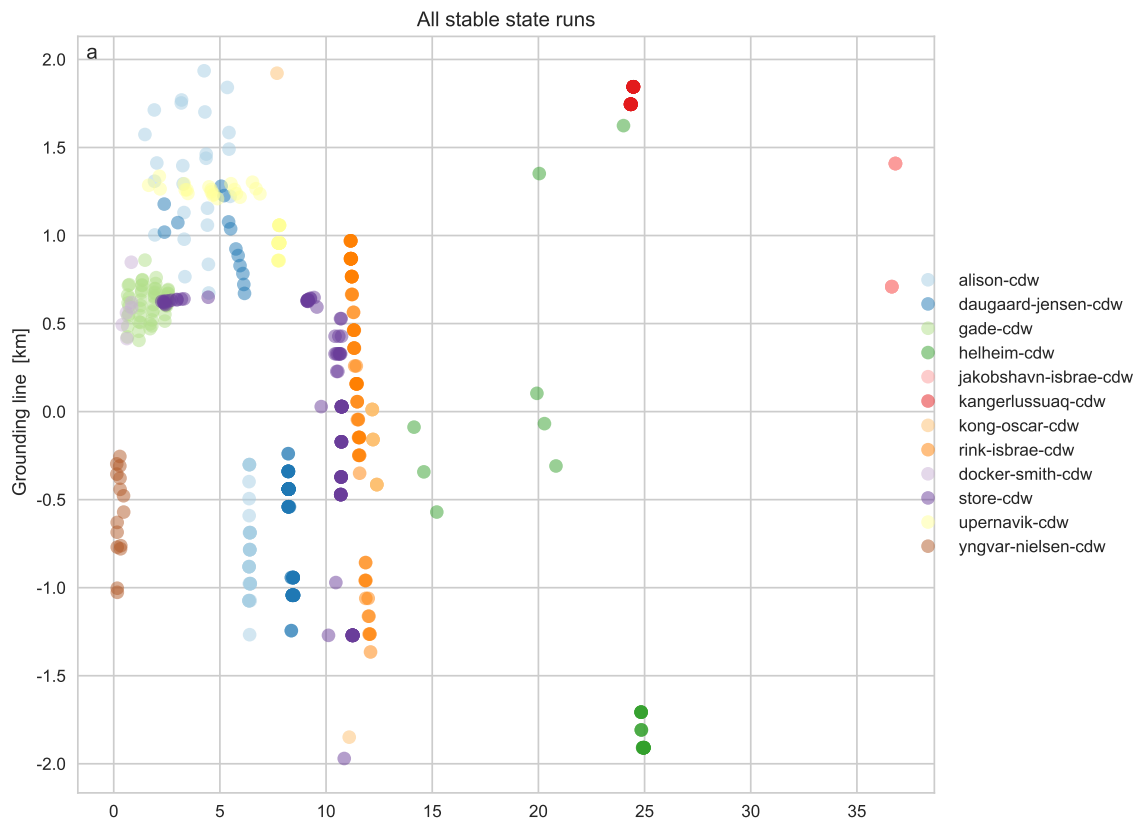
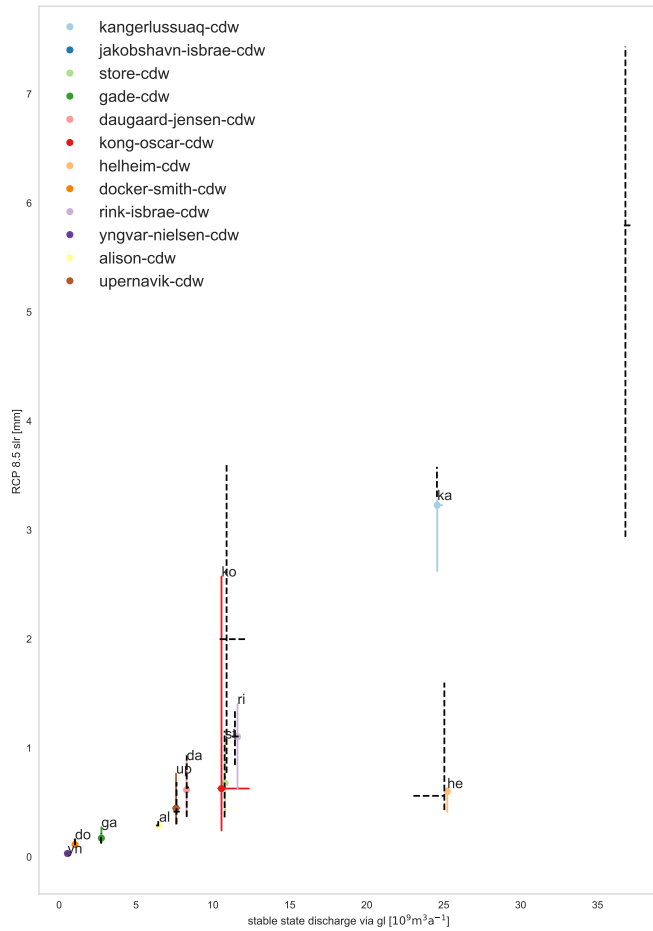


Figure S3: All considered initial stable runs depicted in their tuned grounding line position and their resulting average grounding line discharge (last 20 years) (x-axis) for the cdw-calving law. The y-axis illustrates the deviation to the tuned grounding line position from the one (or present day at  $y = 0$  km).

### 1.3 Results for future simulaitons



First till third quartile (median indicated with a dot) of contribution to SLR under RCP 8.5 for each glacier as a function of the present-day grounding line discharge. Simulations were run with initial temperature profile taken from CTD measurements only (solid) and reanalysis data (dashed).

### 1.3.1 Docker Smith

	slr [mm]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	0.18	0.16	0.20
$\Delta$ smb $\Delta QT_{min}$	0.18	0.15	0.18
$\Delta$ smb	0.09	0.09	0.10
drift	0.00	0.00	0.00
gl retreat [km]			
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	15.53	14.72	16.59
$\Delta$ smb $\Delta QT_{min}$	14.61	14.11	16.18
$\Delta$ smb	5.16	4.57	5.32
drift	0.00	0.00	0.00

### 1.3.2 Jakobshavn Isbrae

	slr [mm]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	5.31	4.05	7.95
$\Delta$ smb $\Delta QT_{min}$	4.45	3.39	7.57
$\Delta$ smb	1.36	0.87	3.33
drift	0.00	0.00	0.00
gl retreat [km]			
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	38.71	27.65	41.00
$\Delta$ smb $\Delta QT_{min}$	29.43	18.34	40.47
$\Delta$ smb	6.62	0.09	26.27
drift	0.00	0.00	0.00

### 1.3.3 Helheim

	slr [mm]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	0.58	0.41	0.75
$\Delta$ smb $\Delta QT_{min}$	0.38	0.36	0.54
$\Delta$ smb	0.29	0.29	0.29
drift	0.00	0.00	0.00
gl retreat [km]			
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	8.70	1.45	9.27
$\Delta$ smb $\Delta QT_{min}$	1.01	0.77	3.63
$\Delta$ smb	0.20	0.17	0.26
drift	0.00	0.00	0.00

### 1.3.4 Daugaard Jensen

	slr [mm]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	0.69	0.40	0.86
$\Delta$ smb $\Delta QT_{min}$	0.55	0.34	0.78
drift	0.00	0.00	0.00
$\Delta$ smb	-0.31	-0.36	-0.22
	gl retreat [km]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	39.39	38.97	39.91
$\Delta$ smb $\Delta QT_{min}$	39.04	28.97	39.53
$\Delta$ smb	0.66	0.18	4.65
drift	0.00	0.00	0.00

### 1.3.5 Gade

	slr [mm]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	0.20	0.16	0.33
$\Delta$ smb $\Delta QT_{min}$	0.16	0.14	0.26
$\Delta$ smb	0.09	0.09	0.10
drift	0.00	0.00	0.00
	gl retreat [km]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	8.20	4.66	15.84
$\Delta$ smb $\Delta QT_{min}$	5.19	4.51	12.67
$\Delta$ smb	3.12	3.06	3.16
drift	0.00	0.00	0.00

### 1.3.6 Kangerlussuaq

	slr [mm]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	3.19	3.08	3.26
$\Delta$ smb $\Delta QT_{min}$	2.97	2.76	3.00
$\Delta$ smb	0.45	0.45	0.49
drift	0.00	0.00	0.00
	gl retreat [km]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	28.52	28.52	28.61
$\Delta$ smb $\Delta QT_{min}$	28.52	28.44	28.52
$\Delta$ smb	0.17	0.17	0.43
drift	0.00	0.00	0.00

### 1.3.7 Yngvar Nielsen

	slr [mm]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	0.03	0.03	0.03
$\Delta$ smb $\Delta QT_{min}$	0.03	0.03	0.03
$\Delta$ smb	0.02	0.02	0.02
drift	0.00	0.00	0.00
	gl retreat [km]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	5.14	4.73	5.51
$\Delta$ smb $\Delta QT_{min}$	4.23	3.93	4.66
$\Delta$ smb	2.65	2.51	2.74
drift	0.00	0.00	0.00

### 1.3.8 Alision

	slr [mm]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	0.27	0.26	0.30
$\Delta$ smb $\Delta QT_{min}$	0.26	0.26	0.29
$\Delta$ smb	0.18	0.17	0.21
drift	0.00	0.00	0.00
	gl retreat [km]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	9.26	8.70	10.78
$\Delta$ smb $\Delta QT_{min}$	9.17	8.69	10.68
$\Delta$ smb	8.51	0.66	8.60
drift	0.00	0.00	0.00

### 1.3.9 Kong Oscar

	slr [mm]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	3.35	2.88	4.13
$\Delta$ smb $\Delta QT_{min}$	2.55	1.79	3.28
drift	0.00	0.00	0.00
$\Delta$ smb	-0.10	-0.10	-0.09
	gl retreat [km]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	18.63	17.65	19.40
$\Delta$ smb $\Delta QT_{min}$	15.78	14.33	17.23
drift	0.00	0.00	0.00
$\Delta$ smb	0.00	0.00	0.25



### 1.3.10 Rink Isbare

	slr [mm]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	1.02	0.78	1.38
$\Delta$ smb $\Delta QT_{min}$	0.86	0.57	1.24
$\Delta$ smb	0.00	0.00	0.03
drift	0.00	0.00	0.00
gl retreat [km]			
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	11.09	10.74	11.25
$\Delta$ smb $\Delta QT_{min}$	10.91	10.45	11.07
$\Delta$ smb	0.27	0.18	0.36
drift	0.00	0.00	0.00

### 1.3.11 Upernavik North

	slr [mm]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	0.46	0.31	0.84
$\Delta$ smb $\Delta QT_{min}$	0.41	0.26	0.69
$\Delta$ smb	0.20	0.19	0.21
drift	0.00	0.00	0.00
gl retreat [km]			
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	8.05	3.10	17.40
$\Delta$ smb $\Delta QT_{min}$	6.17	1.39	14.44
$\Delta$ smb	0.09	0.05	0.19
drift	0.00	0.00	0.00

### 1.3.12 Store

	slr [mm]		
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	0.62	0.36	1.06
$\Delta$ smb $\Delta QT_{min}$	0.39	0.33	1.05
$\Delta$ smb	0.31	0.31	0.36
drift	0.00	0.00	0.00
gl retreat [km]			
glacier	median	first quartile	third quartile
$\Delta$ smb, $\Delta QT_{max}$	10.02	1.50	22.51
$\Delta$ smb $\Delta QT_{min}$	3.40	0.68	17.64
$\Delta$ smb	0.19	0.08	0.84
drift	0.00	0.00	0.00