SUPPLEMENTARY TABLES AND FIGURES

Hock, R., A., Bliss, R. Giesen, B. Marzeion, Y. Hirabayashi, M. Huss, V. Radic, A. Slangen (2019). GlacierMIP - A model intercomparison of global-scale glacier mass-balance models and projections. *J. Glaciol*.

Supplementary Tables

Supplementary Figures

Table S1. General Circulation Models (GCM) used by participating glacier models identified by their references and short names. The numbers 2.6, 4.5, 6.0 and 8.5 refer to the emission scenarios RCP2.6, RCP4.5, RCP6.0 and RCP8.5, respectively. The last four columns denote the number of glacier models forced by the same GCM and emission scenario (highlighted in bold if number >= 4). In total there are 214 model runs.

GCM	Slangen and others (2012)				Marzeion and others (2012)				Giesen and Oerlemans (2013)				Hirabayashi and others (2013)				Radic and others (2014)				Huss and Hock (2015)				Number of glacier models			
	SLA2012				*MAR2012*				*GIE2013*				HYOGA2				*RAD2014*				GloGEM				2.6	4.5	6.0	8.5
ACCESS1-0		4.5		8.5																					0	1	0	1
BCC-CSM1-1	2.6	4.5	6.0	8.5	2.6	4.5	6.0	8.5										4.5		8.5	2.6	4.5		8.5	3	4	2	4
BNU-ESM									2.6			8.5													1	0	0	1
CanESM2		4.5		8.5	2.6	4.5		8.5								8.5		4.5		8.5	2.6	4.5		8.5	2	**4**	0	**5**
CCSM4					2.6	4.5	6.0	8.5	2.6			8.5				8.5		4.5		8.5	2.6	4.5		8.5	3	3	1	**5**
CNRM-CM5		4.5		8.5	2.6	4.5		8.5	2.6			8.5				8.5		4.5		8.5	2.6	4.5		8.5	3	**4**	0	**6**
CSIRO-Mk3-6-0	2.6	4.5	6.0	8.5	2.6	4.5	6.0	8.5	2.6			8.5						4.5		8.5	2.6	4.5		8.5	4	**4**	2	**5**
GFDL-CM3					2.6	4.5	6.0	8.5										4.5		8.5		4.5		8.5	1	3	1	3
GFDL-ESM2G		4.5		8.5					2.6			8.5				8.5									1	1	0	3
GFDL-ESM2M		4.5		8.5																					0	1	0	1
GISS-E2-R		4.5		8.5		4.5	6.0	8.5										4.5		8.5	2.6	4.5		8.5	1	**4**	1	**4**
HadGEM2-AO									2.6			8.5													1	0	0	1
HadGEM2-CC		4.5		8.5																					0	1	0	1
HadGEM2-ES	2.6	4.5	6.0	8.5	2.6	4.5	6.0	8.5										4.5		8.5	2.6	4.5		8.5	3	**4**	2	**4**
INM-CM4		4.5		8.5		4.5		8.5								8.5		4.5		8.5		4.5		8.5	0	**4**	0	**5**
IPSL-CM5A-LR	2.6	4.5	6.0	8.5	2.6	4.5	6.0	8.5	2.6			8.5						4.5		8.5	2.6	4.5		8.5	**4**	**4**	2	**5**
IPSL-CM5A-MR		4.5		8.5					2.6			8.5													1	1	0	2
MIROC-ESM		4.5		8.5	2.6	4.5	6.0	8.5	2.6			8.5						4.5		8.5	2.6	4.5		8.5	3	**4**	1	**5**
5MIROC-ESM-CHEM		4.5		8.5					2.6			8.5													1	1	0	2
MIROC5	2.6	4.5	6.0	8.5	2.6	4.5	6.0	8.5	2.6			8.5													3	2	2	3
MPI-ESM-LR		4.5		8.5	2.6	4.5		8.5	2.6			8.5				8.5		4.5		8.5	2.6	4.5		8.5	3	**4**	0	**6**
MPI-ESM-MR		4.5		8.5					2.6			8.5													1	1	0	2
MRI-CGCM3		4.5		8.5	2.6	4.5	6.0	8.5	2.6			8.5				8.5		4.5		8.5	2.6	4.5		8.5	3	**4**	1	**6**
NorESM1-M		4.5		8.5	2.6	4.5	6.0	8.5	2.6			8.5				8.5		4.5		8.5	2.6	4.5		8.5	3	**4**	1	**6**
NorESM1-ME		4.5		8.5					2.6			8.5													1	1	0	2
Number of model runs	5	21	5	21	13	15	11	15	16	0	0	16	0	0	0	8	0	14	0	14	12	14	0	14	46	64	16	88

Table S2. **Initial regional glacier area (km^2) in 2015 for five glacier models**. Values refer to arithmetic mean ± standard deviation of all model runs with the same glacier model forced by each model's set of GCM and RCP. Areas in 2015 vary for the same model since model simulations start before 2015, and the evolving area depends on the climate scenario. *Mean* refers to the arithmetic mean of all six models' multi-scenario means (± their standard deviation). *Min* and *Max* refers to the minimum and maximum area of the models' multi-scenario means. Global area, global area excluding the Antarctic periphery (A), and global area excluding the Antarctic and Greenland periphery (A+G) are also given. Area data for SLA2012 are not available.

Region	MAR2012	GIE2013	HYOGA2	RAD2014	GloGEM	Mean	Min	Max
Alaska*	84,549±956	747,69±10768	89,732±768	85,699±2247	85,049±873	83,959±5530	7,4769	89,732
W Canada & US	12,754±640	107,86±1709	13,717±287	11,859±610	12,535±488	12,330±1090	10,786	13,717
Arctic Canada N	103,941±316	108,569±13978	104,667±207	104,068±278	103,639±403	104,977±2043	103,639	108,569
Arctic Canada S	39,425±494	39,526±4782	40,610±223	39,590±708	39,913±320	39,813±482	39,425	40,610
Greenland	85,878±1530	116,918±12574	-	87,653±1139	87,729±724	94,545±14940	85,878	116,918
Iceland	10,910±82	10,389±1077	10,835±91	10,942±199	10,567±228	10,728±240	10,389	10,942
Svalbard	32,833±644	31,961±4675	33,356±303	32,786±307	33,548±329	32,897±618	31,961	33,548
Scandinavia	2,545±120	2,481±398	2,693±36	2,618±155	2,515±157	2,571±85	2,481	2,693
Russian Arctic	50,670±582	50,149±5416	51,855±34	51,434±66	50,134±354	50,849±773	50,134	51,855
North Asia	3,008±79	2,515±421	2,667±32	2,181±109	2,491±101	2,573±301	2,181	3,008
Central Europe	1,640±147	1,479±288	1,985±49	1,811±92	1,756±80	1,734±189	1,479	1,985
Caucasus	1,150±41	940±170	1,108±14	769±63	965±51	986±151	769	1,150
Central Asia	475,17±1262	55,371±8530	60,176±582	64,452±1511	60,118±1381	57,527±6453	47,517	64,452
South Asia W	29,162±517	28,236±4731	31,198±368	3,4311±1424	32,192±768	31,020±2421	28,236	3,4311
South Asia E	188,87±435	15,243±2686	20,858±254	20,157±841	20,328±750	19,095±2271	15,243	20,858
Low Latitudes	1,721±97	4,908±798	4,198±171	1,959±115	1,852±145	2,927±1507	1,721	4,908
Southern Andes	27,928±339	30,392±3419	29,572±506	30,095±364	27,500±504	29,097±1305	27,500	30,392
New Zealand	723±81	1,438±240	850±114	1,028±65	1,215±30	1,051±285	723	1,438
Antarctic periphery	-	160,029±19,223	-	122452±758	122381±468	134,954±21,716	122,381	160,029
Global excl. A+G	469,363±44,59	469,153±63,373	500,077±2892	495,758±6,281	486,315±3,255	484,133±14,463	469,153	500,077
Global excl. A	555,241±57,13	586,071±75,933	-	583,411±7,248	574,045±3,769	574,692±13,956	555,241	586,071
Global	-	746,100±95,095	-	705,863±7,317	696,425±3,915	716,129±26,381	696,425	746,100

*including adjacent glaciers in the Yukon Territory and British Columbia.

Table S3. Initial regional glacier mass (mm sea-level equivalent, SLE) in 2015 for all six glacier models. Values refer to arithmetic mean ± standard deviation of all model runs with the same glacier model forced by each model's set of GCM and RCP. Volumes in 2015 vary for the same model since model simulations start before 2015, and the evolving volume depends on the climate scenario. *Mean* refers to the arithmetic mean of all 6 models' multi-scenario means (± their standard deviation). *Min* and *Max* refers to the minimum and maximum mass of the models' multi-scenario means. Global volume, global volume excluding the Antarctic periphery (A), and global area excluding the Antarctic and Greenland periphery (A+G) are also given.

Region	SLA2012	MAR2012	GIE2013	HYOGA2	RAD2014	GloGEM	Mean	Min	Max
Alaska	77.2±0.4	59.8±0.7	46.8±1.2	57.6±0.4	73.3±1.4	47.9±0.5	60.4±12.6	46.8	73.3
W Canada & USA	4.7±0.1	2.5±0.1	4.1±0.1	4.9±0.1	2.5±0.2	2.3±0.1	3.5±1.2	2.3	4.9
Arctic Canada N	*224.7±0.4**	80.2±1.7	87.9±0.2	153.1±0.2	150.1±1.0	74.6±0.4	128.5±58.7	74.6	153.1
Arctic Canada S	-	17.4±0.6	36.8±0.2	26.4±0.1	24.2±0.7	20.8±0.2	25.1±7.4	17.4	36.8
Greenland	42.9±0.1	50.3±1.1	133.1±0.5	-	45.2±0.8	37.6±0.3	61.8±40.1	37.6	133.1
Iceland	13.3±0.0	6.8±0.6	12.8±0.2	11.8±0.1	6.8±0.4	8.7±0.2	10.0±3.0	6.8	12.8
Svalbard	27.7±0.1	16.0±1.3	17.8±0.2	25.1±0.2	23.7±0.4	21.9±0.3	22.0±4.4	16	25.1
Scandinavia	0.5±0.0	0.4±0.0	1.0±0.0	0.7±0.0	0.5±0.0	0.3±0.0	0.6±0.2	0.3	1.0
Russian Arctic	47.5±0.2	28.3±0.9	56.5±0.2	111.0±0.1	47.7±0.3	33.4±0.3	54.1±29.7	28.3	111
North Asia	0.4±0.0	0.2±0.0	0.6±0.0	0.9±0.0	0.6±0.0	0.3±0.0	0.5±0.3	0.2	0.9
Central Europe	0.4±0.0	0.3±0.0	0.3±0.0	0.6±0.0	0.3±0.0	0.3±0.0	0.3±0.1	0.3	0.6
Caucasus	0.2±0.0	0.2±0.0	0.2±0.0	0.4±0.0	0.1±0.0	0.1±0.0	0.2±0.1	0.1	0.4
Central Asia	*33.0±1.1***	9.8±0.3	25.6±0.5	23.2±0.2	16.5±0.5	10.9±0.6	19.8±9.1	9.8	25.6
South Asia W	-	8.9±0.2	9.0±0.3	14.8±0.2	11.8±0.4	8.0±0.3	10.5±2.8	8	14.8
South Asia E	-	3.5±0.1	3.5±0.2	7.4±0.1	4.4±0.2	3.0±0.2	4.3±1.8	3	7.4
Low Latitudes	0.7±0.1	0.2±0.0	1.7±0.1	1.1±0.1	0.2±0.0	0.2±0.0	0.7±0.6	0.2	1.7
Southern Andes	19.1±0.2	12.6±0.2	32.7±0.3	13.4±0.2	17.8±0.2	14.3±0.2	18.3±7.5	12.6	32.7
New Zealand	0.2±0.0	0.1±0.0	0.4±0.0	0.3±0.1	0.2±0.0	0.2±0.0	0.2±0.1	0.1	0.4
Antarctic periphery	164.2±0.6	-	151.5±1.4	-	126.6±0.8	115.6±0.6	139.5±22.3	115.6	151.5
Global excl. A+G	449.8±2.0	247.3±4.8	337.5±1.6	452.6±1.4	380.7±3.8	247.2±1.5	352.5±92.4	247.2	452.6
Global excl. A	492.7±2.1	297.5±5.7	470.6±1.8		426.0±4.5	284.8±1.7	394.3±97.3	284.8	492.7
Global	656.9±2.2	-	622.1±2.4		552.6±4.5	400.4±1.9	558.0±113.4	400.4	656.9

*Volume includes both Arctic Canada N and S

** Volume includes all three regions in High Mountain Asia (Central Asia, South Asia W, South Asia)

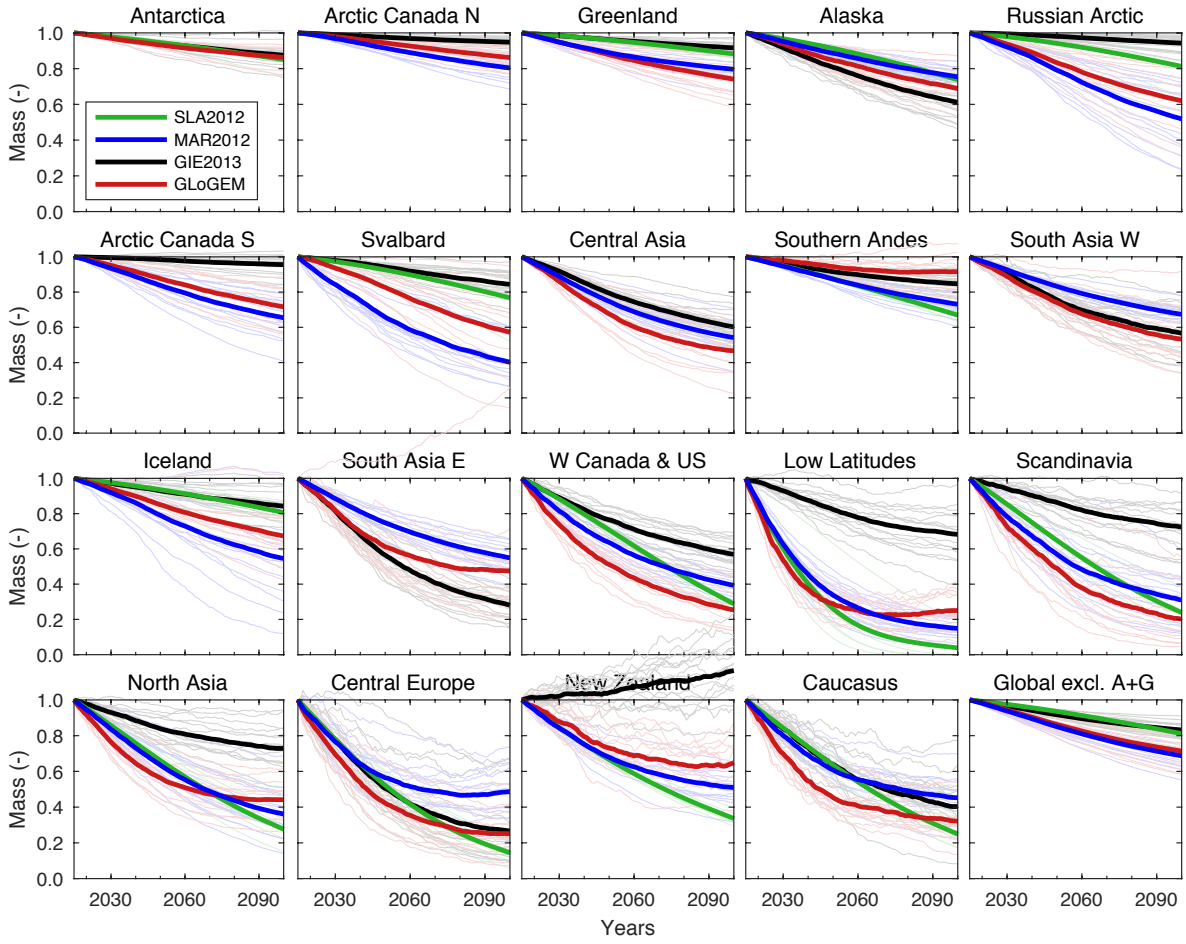

Fig. S1. Projected time series of glacier evolution 2015 – 2100 for 19 regions, and globally excluding the Antarctic and Greenland periphery (A+G), based on RCP2.6. Glacier mass is normalized to mass in 2015. Thick lines show multi-GCM means and thin lines mark the results from individual GCMs. Projections for the two Arctic Canada and three High Mountain Asia regions are not available spatially differentiated from SLA2012. Regions are sorted according to initial glacier mass in 2015.

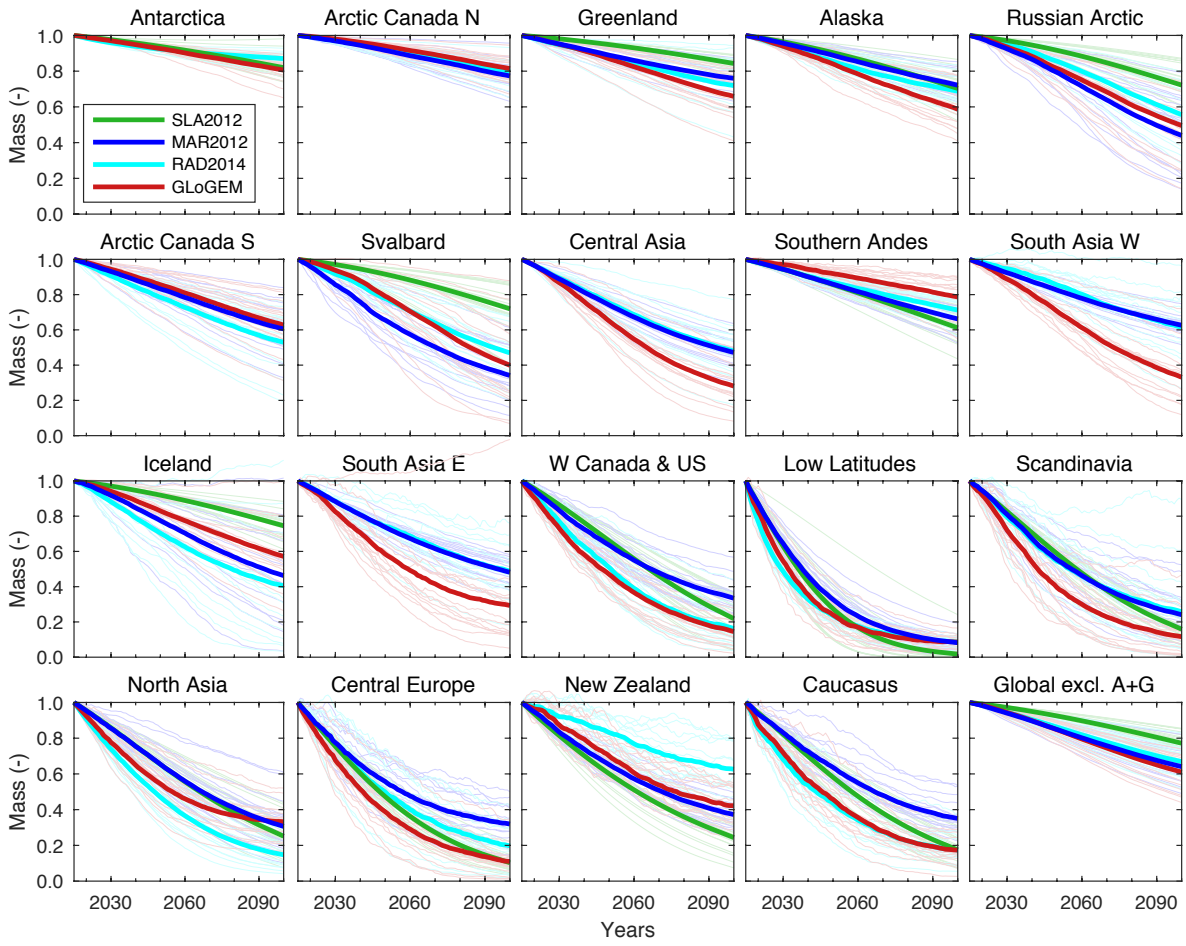

Fig. S2. Projected time series of glacier evolution 2015 – 2100 for 19 regions, and globally excluding the Antarctic and Greenland periphery (A+G), based on RCP4.5. Glacier mass is normalized to mass in 2015. Thick lines show multi-GCM means and thin lines mark the results from individual GCMs. Projections for the two Arctic Canada and three High Mountain Asia regions are not available spatially differentiated from SLA2012. Regions are sorted according to initial glacier mass in 2015.

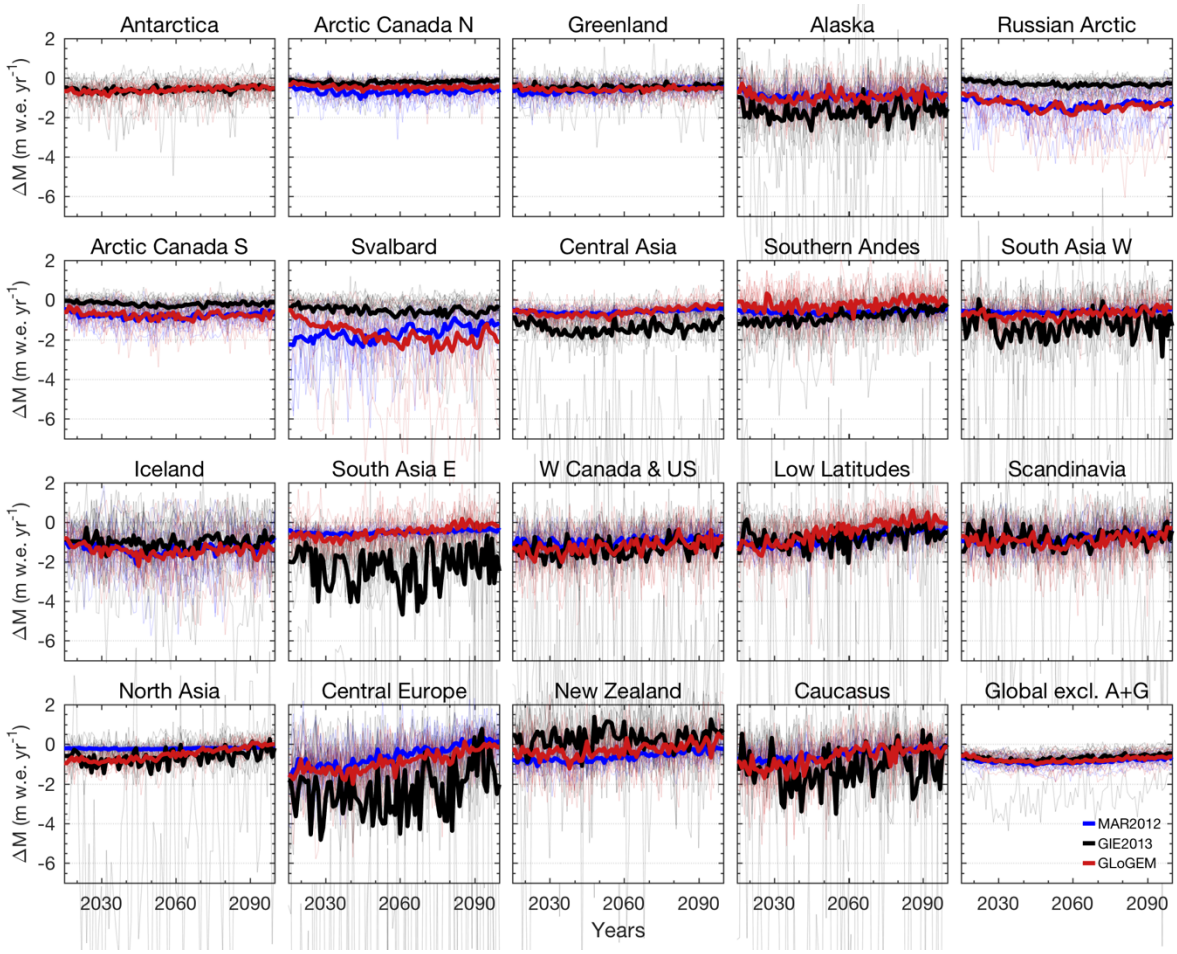

Fig. S3. Projected rates of mass change in m w.e. a^{-1} (specific mass balances) 2015 – 2100 for 19 regions, and globally excluding the Antarctic and Greenland periphery (A+G), based on RCP2.6. Thick lines show multi-GCM means and thin lines mark the results from individual GCMs. Regions are sorted according to initial glacier mass in 2015.

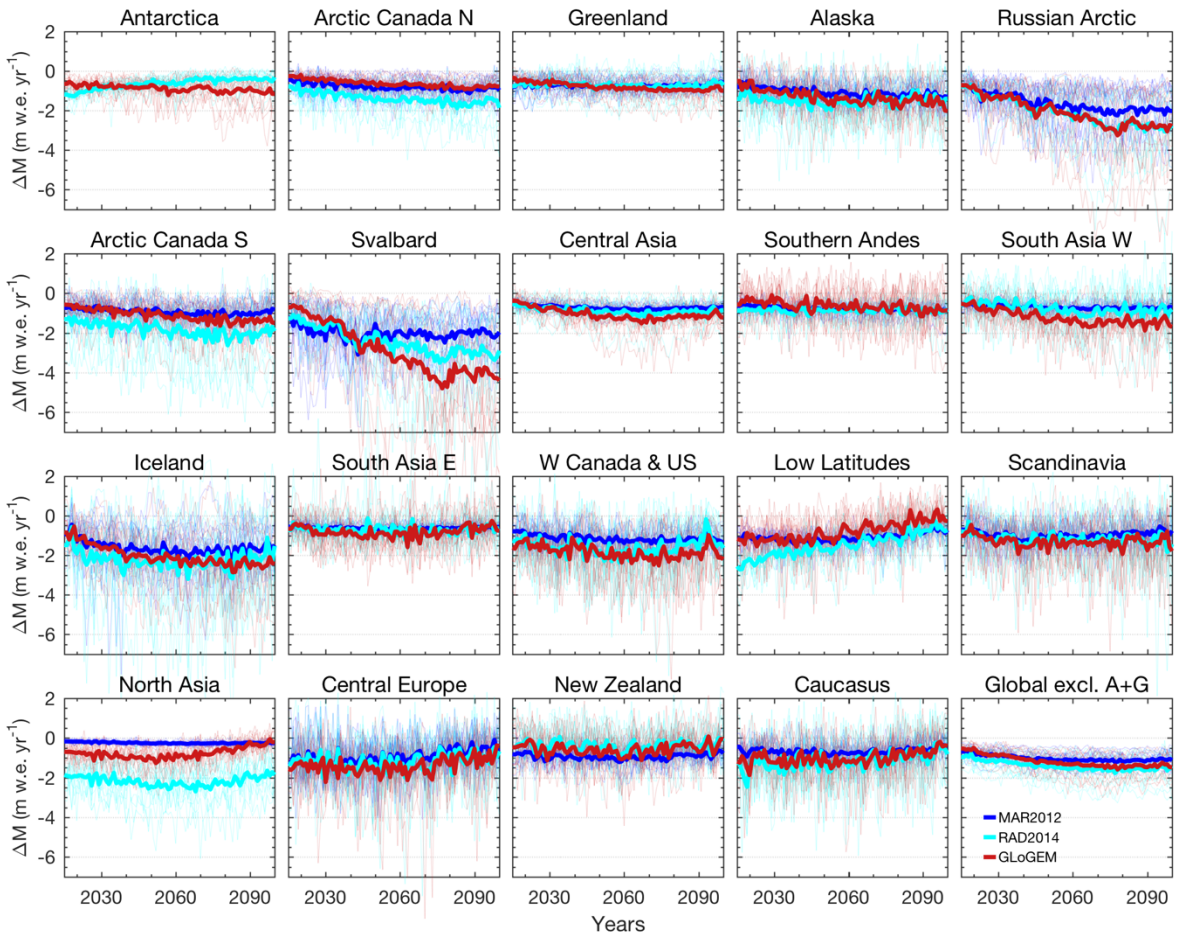

Fig. S4. Projected rates of mass change in m w.e. a^{-1} (specific mass balances) 2015 – 2100 for 19 regions, and globally excluding the Antarctic and Greenland periphery (A+G), based on RCP4.5. Thick lines show multi-GCM means and thin lines mark the results from individual GCMs. Regions are sorted according to initial glacier mass in 2015.

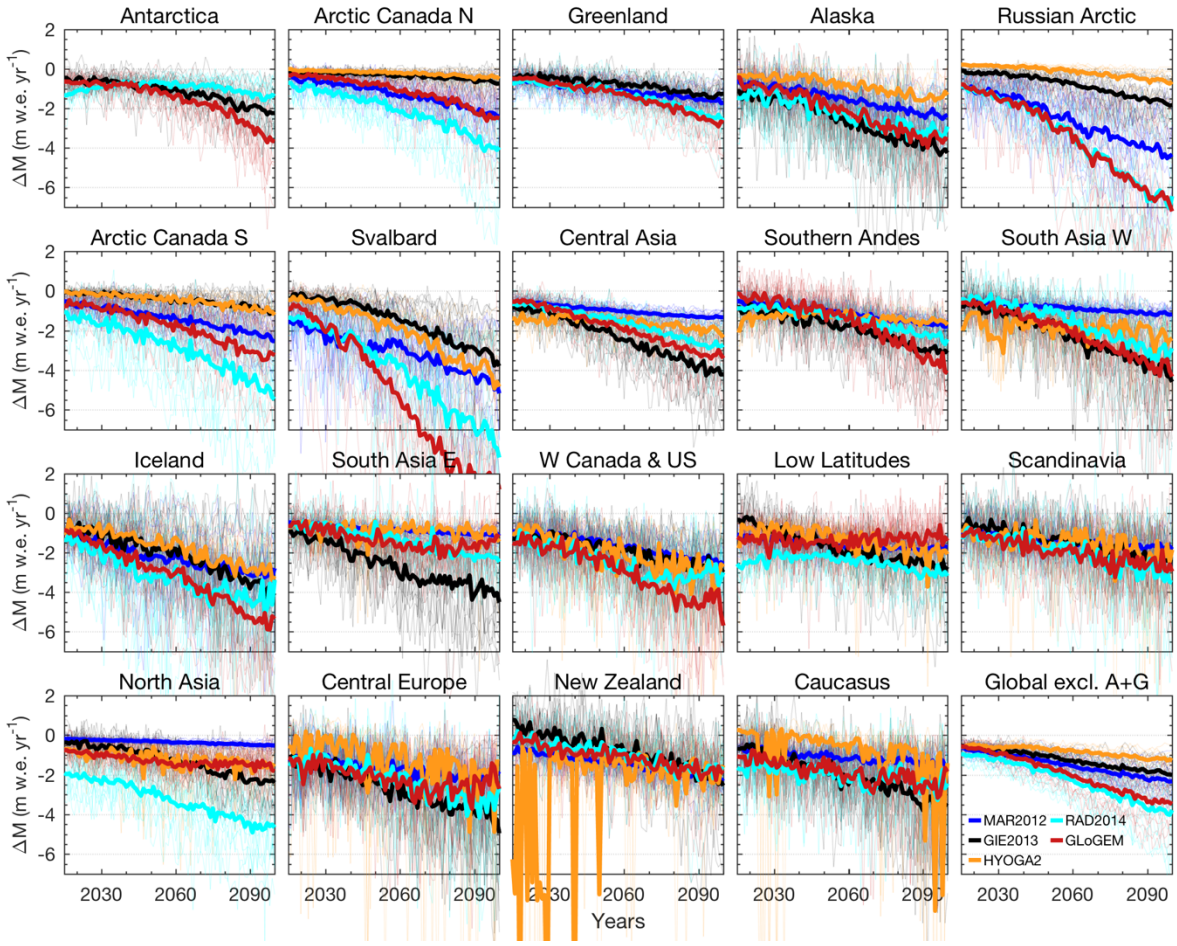

Fig. S5. Projected rates of mass change in m w.e. a^{-1} (specific mass balances) 2015 – 2100 for 19 regions, and globally excluding Antarctica and Greenland periphery (A+G), based on RCP8.5. Thick lines show multi-GCM means and thin lines mark the results from individual GCMs. Regions are sorted according to initial glacier mass in 2015.

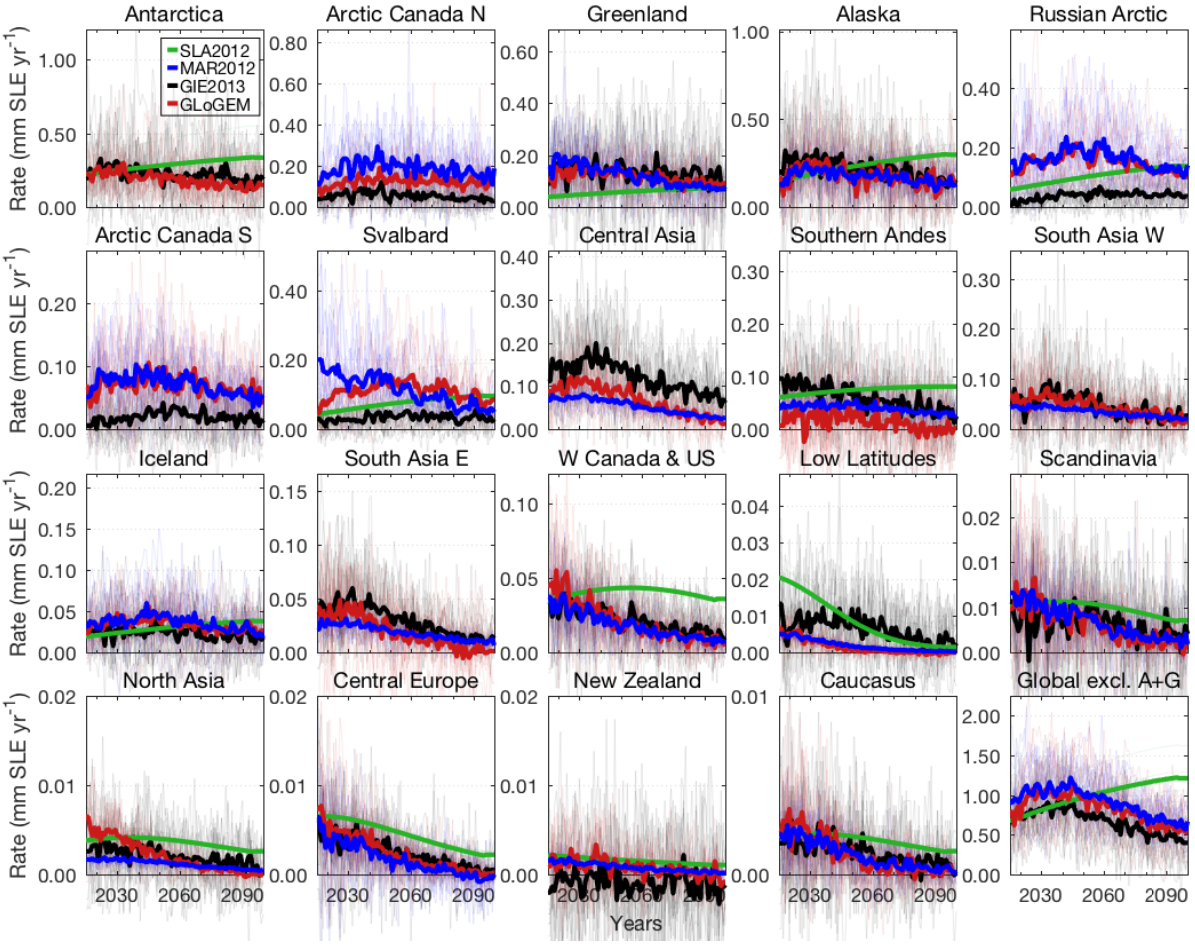

Fig. S6. Projected rates of glacier net mass loss (m SLE a^{-1}) 2015 – 2100 for 19 RGI regions from six glacier models using RCP2.6. Also shown are global mass losses excluding the Antarctic and Greenland periphery (A+G), based on RCP2.6. Projections for the two Arctic Canada and three High Mountain Asia regions are not available spatially differentiated from SLA2012. Regions are sorted according to initial glacier mass in 2015.

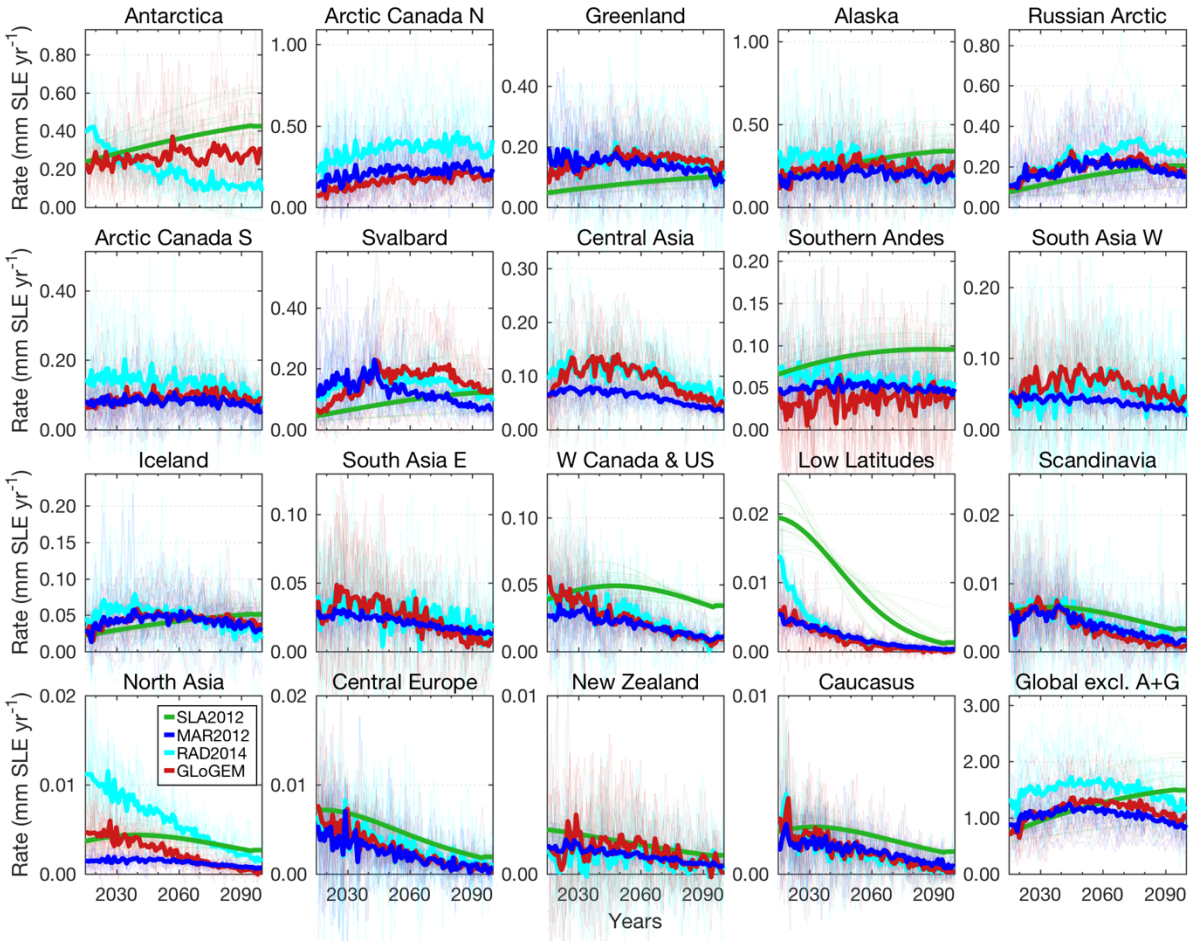

Fig. S7. Projected rates of glacier net mass loss (m SLE a^{-1}) 2015 – 2100 for 19 RGI regions from six glacier models using RCP4.5. Also shown are global mass losses excluding the Antarctic and Greenland periphery (A+G). Projections for the two Arctic Canada and three High Mountain Asia regions are not available spatially differentiated from SLA2012. Regions are sorted according to initial glacier mass in 2015.