Supplementary material to
'Global application of a surface mass balance model using gridded climate data'

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This supplementary material contains information on the 80 glaciers that were used to examine the applicability of the mass balance model in different regions. We selected all glaciers for which both winter and annual mass balance profiles were available from the World Glacier Monitoring Service (WGMS). At the time the data was requested from WGMS (June 2010), the most recent year with available mass balance measurements was 2008. The characteristics and parameter values listed for all 80 glaciers are described in Table 1, the list of glaciers is given in Table 2.

Table 1: Description of variables listed for the 80 glaciers in Table 2.

Variable	Unit	Description
lat	°N	glacier latitude
lon	°E	glacier longitude
#		number of years with both winter and annual mass balance profiles
period		period of calendar years spanned by the available profiles
ELA	m a.s.l.	equilibrium-line altitude
z_{CRU}	m a.s.l.	elevation of the nearest CRU climate data gridpoint
γ	mm a^{-1} m^{-1}	vertical precipitation gradient
p		precipitation multiplication factor
τ		atmospheric transmissivity
ψ_{min}	W m^{-2}	minimum temperature-dependent flux
c	W m^{-2} K^{-1}	slope of the temperature-dependent flux
T_{tip}	°C	tipping point in the temperature-dependent flux equation
T_{corr}	°C	air temperature correction
C_T	m w.e. K^{-1}	mass balance sensitivity to changes in temperature
C_P	m w.e. [10%]$^{-1}$	mass balance sensitivity to changes in precipitation
C_τ	m w.e. [0.05]$^{-1}$	mass balance sensitivity to changes in atmospheric transmissivity

Table 2: The 80 glaciers with winter and annual mass balance profiles available from WGMS. Given are the glacier name and all attributes described in Table 1. The values for γ, p, C_T, C_P and C_τ are the median values for the three calibration cases τ-cal., T-cal. and ψ-cal. The AWS parameter set used in combination with the calibrated parameters is given in brackets after the region name. This parameter set is used as a basis, combined with calibrated values for either τ (case τ-cal.), the parameters in the temperature-dependent flux $\psi_{\min}$,c and $T_{\rm tip}$ (case ψ-cal.) or the temperature correction $T_{\rm corr}$ (case T-cal.).

Glacier	lat	lon	#	period	ELA	$z_{\rm CRU}$	γ	p	τ	$\psi_{\min}$	c	$T_{\rm tip}$	$T_{\rm corr}$	$-C_T$	C_P	$-C_\tau$
Caucasus (Mort)																
Tbilisa	43.13	42.47	13	68–80	3435	2123	-3.0	6.4	0.53	-105	50.5	5.0	1.1	0.69	0.43	0.52
Djankuat	43.20	42.77	38	68–05	3213	2777	1.5	3.6	0.46	-25	19.0	6.6	-0.2	0.72	0.43	0.44
Garabashi	43.30	42.47	22	84–05	3840	3148	-1.5	2.4	0.33	-100	64.0	7.2	-2.4	0.48	0.29	0.48
Central Asia (Mort)																
Abramov	39.63	71.60	29	68–98	4231	3984	1.5	1.9	0.26	-105	64.5	10.0	-4.7	0.43	0.26	0.48
Suyok Zapadniy	41.78	77.78	2	84–89	4280	3820	1.0	7.1	0.27	-50	0.5	-6.0	-2.9	0.51	0.37	0.69
No. 131	41.85	77.77	2	88–89	4258	3938	-1.0	7.4	0.24	-75	22.0	8.8	-3.5	0.65	0.32	0.61
No. 356 (Sary-Tor)	41.83	78.18	5	85–89	4260	4214	2.0	6.6	0.17	-75	0.0	-5.0	-4.2	0.35	0.24	0.52
Golubin	42.47	74.50	10	81–90	3874	3540	1.0	2.0	0.17	-100	69.5	11.4	-7.4	0.34	0.16	0.42
Ts. Tuyuksuyskiy	43.05	77.08	40	65–07	3824	3068	-1.0	6.7	0.19	-100	64.0	10.0	-4.2	0.54	0.20	0.45
Shumskiy	45.08	80.23	24	68–91	3728	3343	-0.5	2.9	0.22	-100	52.5	8.8	-6.0	0.43	0.21	0.49
Leviy Aktru	50.08	87.72	7	88–95	3197	2747	0.5	4.3	0.32	-75	59.5	8.2	-2.9	0.36	0.20	0.34
Praviy Aktru	50.08	87.73	2	88–89	3110	2747	2.0	4.6	0.32	-50	2.0	-3.8	-2.7	0.38	0.26	0.34
Maliy Aktru	50.08	87.75	12	88–00	3177	2747	1.0	3.5	0.30	-80	18.0	5.2	-3.5	0.35	0.20	0.34
No. 125 (Vodopadniy)	50.10	87.70	12	88–00	3227	2747	-0.5	2.8	0.18	-100	29.5	8.0	-8.1	0.44	0.18	0.48
New Zealand (Stor)																
Brewster Glacier	-44.07	169.43	4	05–08	1923	1058	0.5	2.9	0.36	0.0	2.0	-1.0	-1.1	1.35	0.63	0.54
Central Europe (Mort)																
Maladeta	42.65	0.64	16	92–07	3112	2042	4.0	0.0	0.62	-95	40.0	3.2	2.1	0.92	0.45	0.54
Basodino	46.42	8.48	2	06–07	2978	2289	-0.5	1.6	0.52	-100	17.5	-2.0	0.6	0.84	0.32	0.64
Careser	46.45	10.70	12	71–07	3282	2314	-0.5	2.8	0.48	-25	20.5	4.6	0.1	0.69	0.39	0.56
Fontana Bianca	46.48	10.77	12	96–07	3351	2314	-2.0	4.1	0.58	-25	2.00	-13.0	1.7	0.81	0.44	0.64
Rhonegletscher	46.62	8.40	3	80–82	2891	2474	1.5	2.9	0.70	15	18.0	2.4	2.6	0.90	0.50	0.40
Ochsentalergletscher	46.85	10.10	4	92–95	2937	2214	-0.5	3.1	0.61	-25	2.5	-12.0	1.4	0.89	0.46	0.51
Vermuntgletscher	46.85	10.13	5	91–95	3029	2214	-2.5	3.3	0.51	-50	36.0	3.6	0.5	0.96	0.38	0.63
Jamtalferner	46.87	10.17	13	91–07	2965	2368	-1.5	2.7	0.52	-25	23.5	-3.8	0.7	0.91	0.38	0.57
Malavalle	46.95	11.12	1	05	3119	2376	4.0	0.0	0.49	-50	3.00	-10.6	0.40	0.56	0.31	0.51
Pendente	46.96	11.23	4	05–08	3002	2217	2.5	2.0	0.65	-25	3.00	-12.0	1.90	1.01	0.53	0.60
Goldberg Kees	47.03	12.47	6	01–07	2995	2424	-2.5	3.4	0.55	-25	2.0	-12.6	0.7	0.92	0.44	0.53
Wurten Kees	47.04	13.01	24	83–07	3042	1910	-2.5	4.2	0.59	-25	2.5	-10.6	1.5	0.93	0.51	0.60
Kleinfleiss Kees	47.05	12.95	6	01–07	2983	2118	1.5	1.6	0.58	-75	22.0	-0.4	1.3	0.93	0.36	0.52
Coast and Rocky Mountains (Mort)																
South Cascade	48.37	-121.05	16	65–80	1970	1522	1.5	2.6	0.45	-105	68.5	8.6	-0.4	0.77	0.46	0.48
Sentinel	49.90	-122.98	18	66–89	1828	1659	1.5	2.9	0.46	-25	49.0	8.8	-0.2	0.77	0.47	0.45
Helm	49.97	-123.00	8	82–89	2090	1659	2.0	1.5	0.40	-45	38.0	7.6	-1.0	0.74	0.35	0.52
Place	50.43	-122.60	21	65–95	2266	1551	1.0	2.2	0.40	-25	11.0	6.6	-1.3	0.63	0.35	0.48
Zavisha	50.80	-123.42	5	81–85	2282	1794	0.5	2.3	0.37	-25	2.0	-2.4	-1.8	0.58	0.40	0.48
Bridge	50.82	-123.57	5	81–85	2207	1568	1.0	2.1	0.37	-110	26.0	4.6	-1.6	0.51	0.29	0.42
Sykora	50.87	-123.58	5	81–85	2188	2047	1.0	2.5	0.29	-100	31.5	6.8	-2.7	0.52	0.28	0.40
Woolsey	51.12	-118.62	9	66–74	2268	1471	3.0	1.3	0.45	-25	2.5	-8.8	-0.2	0.63	0.40	0.42
Tiedemann	51.33	-125.05	5	81–85	1954	1343	0.0	3.0	0.35	-25	70.0	14.2	-2.2	0.62	0.34	0.45
Bench	51.43	-124.92	5	81–85	1893	1544	1.5	2.0	0.29	-25	70.0	14.0	-3.5	0.52	0.32	0.45
Peyto	51.67	-116.53	27	66–95	2720	2267	2.0	1.1	0.33	-100	55.0	7.2	-3.2	0.44	0.24	0.45
Ram River	51.85	-116.48	8	66–74	2838	2151	2.5	0.1	0.27	-50	40.0	11.4	-5.2	0.35	0.29	0.43
Andrei	56.93	-130.97	4	81–84	1519	1181	1.5	2.0	0.31	-25	27.0	11.2	-2.5	0.55	0.31	0.40
Yuri	56.97	-130.68	4	81–84	1817	1161	1.0	1.3	0.33	-50	2.50	-5.6	-3.0	0.44	0.30	0.43
Alexander	57.10	-130.82	4	81–84	1737	1220	1.0	2.2	0.37	-25	2.0	-4.8	-1.5	0.58	0.37	0.46
Northeastern Russia (Stor)																
Kozelskiy Glacier	53.23	158.82	8	88–95	1351	1118	2.0	4.8	0.81	20	2.5	-16.8	4.10	0.80	0.56	0.35
Koryto Glacier	54.68	161.00	2	96–97	646	511	9.0	10.0	0.71	0	17.0	2.4	2.4	0.91	0.77	0.37
Scandinavia (Stor)																
Bondhusbreen	60.03	6.33	4	77–80	1513	901	3.5	1.6	0.49	-80	18.5	-0.2	-0.1	0.91	0.37	0.39
Breidalblikkbrea	60.10	6.40	3	03–05	1528	1253	-0.5	4.5	0.57	0	4.50	-2.8	0.8	0.97	0.46	0.46
Gråfjellsbrea	60.10	6.40	3	03–05	1482	1253	4.5	3.3	0.52	0	2.5	-6.2	0.4	0.93	0.41	0.44
Rembesdalsskåka	60.53	7.37	23	71–05	1663	1514	3.5	2.8	0.44	-25	11.0	1.6	-0.5	0.69	0.32	0.30
Jostefonn	61.43	6.55	3	96–98	1303	1514	0.5	4.0	0.41	0	10.5	5.2	-0.7	0.79	0.39	0.40
Vestre Memurubreen	61.53	8.45	5	68–72	1942	1684	2.0	1.7	0.38	-25	1.5	-5.2	-1.5	0.53	0.32	0.39
Austre Memurubreen	61.55	8.50	5	68–72	2025	1700	1.5	1.7	0.42	-25	7.0	0.6	-1.0	0.52	0.30	0.40
Storbreen	61.57	8.13	16	90–05	1773	1466	2.5	1.9	0.38	-25	2.5	-3.8	-1.3	0.52	0.29	0.34
Hellstugubreen	61.57	8.43	30	71–05	1921	1684	2.5	1.5	0.32	-20	70	8.8	-2.3	0.43	0.26	0.34

Table 2: (continued)

Glacier	lat	lon	#	period	ELA	z_{CRU}	γ	p	τ	ψ_{min}	c	T_{tip}	T_{corr}	$-C_T$	C_P	$-C_\tau$
Tunsbergdalsbreen	61.60	7.05	7	66–72	1449	1250	2.0	2.5	0.35	-25	6.5	2.0	-1.7	0.57	0.31	0.35
Spørteggbreen	61.61	7.47	1	91	1528	1298	2.0	1.5	0.21	-50	1.5	-2.6	-3.6	0.45	0.24	0.32
Gråsubreen	61.65	8.60	30	71–05	2147	1700	-2.0	2.0	0.31	-75	35.5	2.8	-3.2	0.54	0.23	0.41
Nigardsbreen	61.72	7.13	32	71–07	1507	1396	2.0	2.5	0.40	-25	21.0	4.6	-0.7	0.66	0.33	0.31
Ålfotbreen	61.75	5.65	36	65–05	1163	727	-0.5	3.1	0.59	0	5.0	-2.0	1.0	1.05	0.53	0.37
Hansebreen	61.75	5.68	11	91–05	1178	807	3.0	2.5	0.55	0	7.5	0.6	0.7	1.07	0.52	0.42
Austdalsbreen	61.80	7.35	13	88–05	1478	1330	5.0	2.6	0.34	-25	67.5	7.8	-1.4	0.69	0.32	0.34
Okstindbreen	66.23	14.37	7	90–96	1345	556	3.5	0.5	0.49	-105	20.5	-1.6	0.1	0.59	0.32	0.30
Høgtuvbreen	66.45	13.65	7	71–77	847	653	3.0	2.4	0.46	0	11.5	4.0	-0.2	0.82	0.43	0.36
Svartisheibreen	66.55	13.77	4	91–94	975	866	1.5	2.5	0.41	-25	65.0	7.0	-0.8	0.74	0.38	0.31
Engabreen	66.65	13.85	30	71–05	1095	838	5.0	1.8	0.49	0	14.5	4.6	0.1	0.73	0.40	0.30
Storglombreen	66.67	14.00	5	88–05	1274	707	6.0	0.7	0.52	0	46.5	6.2	0.4	0.78	0.37	0.37
Trollbergdalsbreen	66.72	14.45	10	70–94	1094	987	2.5	2.5	0.46	0	20.5	5.6	-0.3	0.77	0.37	0.37
Partejekna	67.17	17.67	4	97–00	1703	1137	1.0	4.0	0.40	-25	2.0	-9.4	-0.9	0.58	0.30	0.34
Rabots Glaciär	67.90	18.55	15	86–06	1442	1245	5.5	3.0	0.36	-25	1.5	-8.2	-1.5	0.48	0.26	0.32
Storglaciären	67.90	18.57	32	71–07	1486	1245	10	2.0	0.42	-25	2.5	-8.2	-0.4	0.52	0.30	0.31
Tarfalaglaciären	67.93	18.65	7	00–07	1514	1245	0.5	4.5	0.52	0	1.5	-5.2	0.4	0.65	0.36	0.36
Riukojietna	68.08	18.08	10	96–07	1381	1153	-0.5	3.4	0.43	-25	32.0	5.2	-0.6	0.63	0.26	0.37
Cainhavarre	68.10	18.00	4	65–68	1347	1153	0.0	3.7	0.39	-25	2.0	-7.8	-1.0	0.58	0.30	0.33
Storsteinsfjellbreen	68.22	17.92	9	65–95	1317	1019	4.0	2.0	0.37	-25	1.5	-9.2	-1.1	0.49	0.27	0.27
Blåisen	68.33	17.85	4	65–68	1063	1019	6.5	3.6	0.27	-25	1.5	-1.8	-2.4	0.50	0.27	0.33
Marmaglaciären	68.83	18.67	14	95–08	1616	749	2.5	0.0	0.48	-25	5.5	-3.0	0.0	0.48	0.27	0.35
Langfjordjøkelen	70.12	21.77	9	91–05	889	548	2.5	4.6	0.50	0	6.0	1.0	0.2	0.74	0.34	0.35
Arctic (Kong)																
Devon Ice Cap	75.42	-83.25	3	96–98	1125	1489	0.0	0.8	0.20	-75	0.0	-11.4	-7.3	0.16	0.06	0.16
Hansbreen	77.08	15.67	15	91–07	364	299	2.5	4.2	0.35	-30	0.0	-9.0	-1.8	0.53	0.20	0.26
Austre Brøggerbreen	78.88	11.83	5	90–95	428	215	1.5	2.1	0.38	-30	40.0	6.8	-1.6	0.51	0.18	0.27