



*Supplement of*

## **Constraining regional glacier reconstructions using past ice thickness of deglaciating areas – a case study in the European Alps**

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Table S 1 Calibration glaciers with in-situ thickness observations in the Swiss and Austrian Alps. Lat/Long coordinates indicate center coordinates of respective glacier polygons.  $N_{in-situ}$  shows the number of thickness observations per glacier (selected by 30m circular buffer). Original ID refers to IDs of the Swiss (Müller et al., 1976; Maisch et al., 2000) and Austrian (Patzelt, 1980) inventories while RGIId is the respective glacier ID of the Randolph Glacier Inventory (Pfeffer et al., 2014).

	<i>Long</i>	<i>Lat</i>	<i>Area [km<sup>2</sup>]</i>	<i>N<sub>in-situ</sub></i>	<i>Original ID</i>	<i>RGIId</i>
1	9.0222	47.0085	0.19	12	A50j-13	RGI60-11.00536
2	9.3907	46.9619	0.29	81	A50d-1	RGI60-11.00638
3	10.1636	46.8485	0.29	4	E52-2/13019	RGI60-11.00781
4	8.8549	46.8434	0.4	25	A50j-5/A50j-7/A51d-10	RGI60-11.00857
5	8.9345	46.7923	0.29	26	A14m-5	RGI60-11.00995
6	8.8392	46.7904	0.54	41	A14l-11	RGI60-11.00998
7	8.7728	46.7507	0.52	34	A51d-18/A51d-15	RGI60-11.01104
8	8.4206	46.6876	0.29	3	A51f-16/A54e-12	RGI60-11.01144
9	8.9607	46.6354	0.65	29	A14f-12	RGI60-11.01266
10	8.6114	46.6065	0.27	52	A51e-10	RGI60-11.01344
11	8.602	46.5995	0.44	51	A51e-12	RGI60-11.01367
12	8.6137	46.5966	0.18	6	A51e-8	RGI60-11.01376
13	7.9976	46.5735	0.16	10	A54m-25	RGI60-11.01421
14	7.8938	46.4768	0.61	6	B31-2	RGI60-11.01770
15	7.7834	46.4545	0.43	23	A55b-13/A55b-30/B30-15/A55b-14	RGI60-11.01848
16	9.8894	46.426	0.36	38	E23-2	RGI60-11.01945
17	9.8255	46.421	0.48	24	E24-5/E23-18	RGI60-11.01962
18	8.3091	46.4336	0.23	1	B45-4/B45-35	RGI60-11.01876
19	9.942	46.3984	0.61	21	E22-3	RGI60-11.02069
20	7.5533	46.42	0.6	50	A55d-5	RGI60-11.01949
21	7.852	46.4053	0.36	10	B32-4/B34-2/B32-5/B32-6	RGI60-11.02006
22	7.3794	46.3603	0.68	57	B23-3/A55f-11	RGI60-11.02187
23	8.0431	46.1278	0.53	28	C01-3	RGI60-11.02552
24	7.6861	46.1258	0.31	19	B60-9/B62-28	RGI60-11.02549
25	7.7072	46.074	0.32	11	B58-27/B58-2/B58-26	RGI60-11.02635
26	7.6091	46.065	0.08	1	B64-2/B63-23/B72-6	RGI60-11.02584
27	7.4428	46.0557	0.65	20	B73-24	RGI60-11.02663
28	7.868	46.048	0.07	7	B55-16	RGI60-11.02695
29	7.9175	46.0256	0.29	10	B52-29/B52-26	RGI60-11.02704
30	7.4614	45.9941	0.33	8	B73-16/B73-15/B73-34	RGI60-11.02755
31	9.7009	46.5394	0.58	29	A12i-3/E35-26/E35-18	RGI60-11.01516
32	7.3222	46.0868	0.47	21	B75-9	RGI60-11.02599
33	9.8244	46.4162	0.25	35	E24-5/E23-18	RGI60-11.01962
34	9.7258	46.5121	0.55	31	E35-15/E35-13	RGI60-11.01607
35	10.7818	46.9089	0.57	7	14018/7015	RGI60-11.00677
36	11.115	47.0747	0.42	4	3058/3060/1002	RGI60-11.00295
37	11.0303	47.104	0.46	1	2009/2008/2007	RGI60-11.00221
38	12.4109	47.0504	0.25	22	6058	RGI60-11.00319
39	9.1717	46.8766	1.4	67	A14p-1/A50h-3	RGI60-11.00752
40	8.8201	46.8349	0.89	49	A51c-2	RGI60-11.00881

41	8.7885	46.8125	1.13	102	A51d-6/A51c-8	RGI60-11.00924
42	8.9199	46.7932	0.7	60	A14l-22	RGI60-11.00988
43	8.4308	46.7804	1.01	21	A51h-15/A51h-25	RGI60-11.01019
44	10.0056	46.6999	1.55	93	E44-4	RGI60-11.01165
45	9.0631	46.5233	1.64	107	A14d-10/A14d-9/A14d-15	RGI60-11.01557
46	9.7111	46.5143	0.85	37	E35-15/E35-13	RGI60-11.01603
47	9.0321	46.4971	0.86	25	C44-2/A14d-17/A13n-6	RGI60-11.01635
48	7.8598	46.4731	1.31	137	A54m-19/B30-22/B30-19	RGI60-11.01678
49	7.7885	46.4472	1.15	74	A55b-13/B30-16/A55b-30/B30-15/A55b-31/B30-12	RGI60-11.01857
50	9.8908	46.4184	1.02	131	E23-3	RGI60-11.01968
51	9.8954	46.4085	0.78	56	E23-4/E22-15	RGI60-11.02011
52	7.7092	46.4226	0.92	5	A55b-16/B30-4	RGI60-11.01928
53	9.9935	46.3932	1.72	123	C93-9/C93-8	RGI60-11.02075
54	7.5656	46.387	0.79	88	A55c-11	RGI60-11.02095
55	7.3718	46.3639	0.75	78	A56d-1/B23-3/A55f-11	RGI60-11.02168
56	7.2117	46.328	0.69	95	B16-1/B22-1	RGI60-11.02244
57	7.2026	46.3094	1.04	5	B22-1/B16-9/B21-5	RGI60-11.02249
58	7.8419	46.0891	1.42	124	B55-8/B55-9	RGI60-11.02607
59	7.8355	46.0831	1.25	101	B55-9	RGI60-11.02627
60	7.8536	46.0721	0.99	109	B53-4/B55-12/B55-11	RGI60-11.02596
61	7.4701	45.9973	1.47	123	B73-15/B73-34/B73-33	RGI60-11.02771
62	7.0498	45.9486	1.29	4	B85-16/B85-26/B85-8/B85-7	RGI60-11.02793
63	7.0621	45.9197	1.71	13	B85-7/B85-4	RGI60-11.02909
64	9.2568	46.9154	0.84	28	A15b-4/A14p-3	RGI60-11.00689
65	9.0832	46.482	1.09	6	A13n-4/C45-3/C51-2	RGI60-11.01766
66	9.1012	46.4841	1.43	12	A13n-2/A13n-4	RGI60-11.01769
67	8.0183	46.0828	1.22	69	B52-6/B52-46	RGI60-11.02628
68	7.6581	46.029	1.29	60	B57-10/B57-11/B57-12	RGI60-11.02726
69	9.1688	46.8822	1.19	41	A14p-1	RGI60-11.00752
70	13.6338	47.4703	0.86	74	11001/11002	RGI60-11.00006
71	10.9286	46.9189	1.32	48	2143	RGI60-11.00674
72	11.1151	46.9734	0.71	26	2039/2037	RGI60-11.00584
73	11.1129	46.9849	1.72	39	3035/3036	RGI60-11.00518
74	11.1017	46.9917	1.47	42	3035/3036/2022	RGI60-11.00518
75	11.1119	47.0276	0.7	2	2018	RGI60-11.00450
76	11.672	47.0541	1.22	41	3002/9097/9110	RGI60-11.00311
77	8.9916	47.0021	2.1	112	A50k-4/A50k-3	RGI60-11.00539
78	10.0751	46.8526	3.25	134	A10g-5/E50-7/12008	RGI60-11.00804
79	8.9794	46.8134	2.35	129	A50i-6	RGI60-11.00915
80	8.405	46.7019	2.25	89	A54e-13/A54e-19/A51f-15/A54e-12	RGI60-11.01144
81	8.1277	46.6438	1.87	68	A54j-2/A54j-3/A54j-8	RGI60-11.01222
82	8.9333	46.6272	1.77	17	A14f-15/A14g-2/A14f-20/C42-3	RGI60-11.01268
83	7.9713	46.5547	1.98	88	A54m-5/B36-26/A54m-6/A54m-27	RGI60-11.01445
84	7.954	46.5478	2.13	46	A54m-5/A54m-6/A54m-7	RGI60-11.01462
85	9.1404	46.5353	2	82	A14c-3/A14d-3	RGI60-11.01527
86	7.9056	46.4772	1.85	50	A54m-15/A54m-17/B31-2/B31-3	RGI60-11.01729

87	7.8445	46.469	1.78	144	B30-22/B30-19/B30-18	RGI60-11.01702
88	7.825	46.4618	2.3	259	A55b-13/B30-19/B30-18/B30-16	RGI60-11.01702
89	8.4812	46.4161	2.32	159	C14-11/C14-10	RGI60-11.01952
90	7.8936	46.4063	1.94	84	B32-9/B34-3	RGI60-11.01986
91	7.5459	46.4016	3.34	210	A55c-25/A55f-7/A55c-13	RGI60-11.01990
92	9.6134	46.2993	1.87	119	C85-6/C84-17	RGI60-11.02293
93	7.8466	46.1074	3.45	310	B55-4/B55-5/B55-7	RGI60-11.02569
94	7.8366	46.0977	2.17	138	B55-4/B55-7	RGI60-11.02569
95	7.4391	46.0746	1.89	74	B73-26/B74-1/B73-38/B73-37	RGI60-11.02623
96	7.9148	46.055	2.39	68	B53-4/B52-32	RGI60-11.02624
97	10.0934	46.839	2.12	6	A10g-5/A10g-8/E50-7/E51-3	RGI60-11.00804
98	9.9777	46.6958	3.24	158	E45-8	RGI60-11.01165
99	8.0838	46.2494	2.01	108	B47-4	RGI60-11.02366
100	7.6891	46.0332	2.15	96	B57-14/B57-23	RGI60-11.02718
101	13.6161	47.4826	3.35	99	11001/11002	RGI60-11.00002
102	10.8619	46.7756	2.82	41	2111/2110	RGI60-11.00992
103	10.7958	46.8913	2.5	15	14016/2133/14015	RGI60-11.00697
104	10.867	46.9214	1.83	15	14010/14008	RGI60-11.00670
105	10.9331	46.9342	1.83	100	2144/14007/2150	RGI60-11.00648
106	10.7131	46.8551	2.9	38	7022/7023	RGI60-11.00746
107	10.1056	46.8519	2.59	37	A10g-5/12008	RGI60-11.00797
108	11.1347	46.9786	1.94	92	3034	RGI60-11.00541
109	11.1285	47.0455	3.7	40	3055	RGI60-11.00376
110	11.0758	47.0735	2.35	30	2012	RGI60-11.00323
111	11.1218	47.0845	3.28	38	3060/1002	RGI60-11.00295
112	12.3587	47.0943	3.63	44	6054/6053/6077/5123	RGI60-11.00135
113	12.3708	47.1269	2.47	31	6077/6078/6079/5123	RGI60-11.00068
114	11.8198	46.9987	3.06	35	9076/9074/9075	RGI60-11.00459
115	8.8964	46.8426	5.82	343	A50i-19/A51d-10	RGI60-11.00817
116	8.8532	46.8185	13.77	574	A50i-19/A51c-2/A50j-7/A51d-10/A50i-18	RGI60-11.00857
117	8.1501	46.6448	6.14	294	A54j-2/A54j-3/A54i-22/A54i-10/A54i-4/A54i-5	RGI60-11.01222
118	7.9459	46.5186	4.21	112	B36-26/A54m-12/A54m-39	RGI60-11.01450
119	7.9312	46.4722	9.52	693	B36-26/A54m-15/B31-4/A54m-44	RGI60-11.01450
120	7.9592	46.4345	21.61	2018	B36-26/B31-6/B36-1/B31-25/B34-7/B36-35/B35-1	RGI60-11.01450
121	9.8842	46.3895	7.03	325	E23-6/E23-9	RGI60-11.01946
122	7.5118	46.3841	9.09	1371	A55f-3/B24-4/B23-9	RGI60-11.02072
123	9.7022	46.3117	8.87	348	C83-12	RGI60-11.02245
124	7.7329	46.1093	4.8	218	B60-9/B58-8/B58-6	RGI60-11.02507
125	7.6779	46.0819	6.35	278	B62-10/B58-2/B63-13/B63-5	RGI60-11.02593
126	7.8725	46.0359	5.32	381	B53-4/B52-29/B55-18/B56-13	RGI60-11.02624
127	7.5482	46.0076	11.09	215	B72-15/B72-11/B72-16/B72-12/B57-5	RGI60-11.02709
128	7.5801	46.0118	9.9	217	B72-15/B72-11/B72-10/B57-5	RGI60-11.02709
129	7.9282	46.0079	5.48	465	B52-24/B52-22	RGI60-11.02746
130	7.4226	46.0039	4.55	354	B74-8/B73-16/B82-14/B82-19	RGI60-11.02749
131	7.87	45.9972	18.61	1499	B52-29/B56-3/B52-80/B56-4/B56-7	RGI60-11.02704
132	7.2917	45.9661	17.79	1132	B83-3/B83-9/B83-10/B83-6/B84-2/B84-4/B82-64/B82-40/B84-8	RGI60-11.02766

133	7.3886	45.992	5.85	520	B74-8/B82-14/B74-25	RGI60-11.02774
134	7.4195	45.9699	9.96	419	B74-8/B73-16/B82-19/B82-18/B82-23	RGI60-11.02749
135	7.4503	45.9507	16.64	515	B73-16/B73-14/B82-27/B73-33	RGI60-11.02755
136	7.5237	45.9698	5.81	236	B73-14/B73-12	RGI60-11.02787
137	7.6881	45.9697	5.37	103	B56-31/B56-30	RGI60-11.02819
138	8.3956	46.622	17.44	1741	A54e-23/A54e-24/B43-3/A54f-7	RGI60-11.01198
139	8.1184	46.6143	9.42	238	A54j-2/A54l-23/A54l-4/A54i-5/A54g-11	RGI60-11.01222
140	8.0991	46.5637	8.67	152	A54l-19/A54l-27/A54l-55/A54l-56/A54l-32/A54l-29/A54l-33/A54g-11/A54l-31/B40-7	RGI60-11.01328
141	8.1228	46.5156	32.65	650	B36-26/A54l-35/A54g-3/A54g-49/B36-52/B40-6/A54g-11/A54l-31/B40-7	RGI60-11.01328
142	9.0588	46.4893	4.57	102	C44-2/C45-2/A14d-17/A13n-6	RGI60-11.01635
143	7.8018	45.951	57.75	1397	B56-3/B56-30/B56-7/B56-24	RGI60-11.02819
144	8.4333	46.6988	6.56	266	A54e-13/A51f-16/A54e-12	RGI60-11.01144
145	12.6994	47.0973	19.9	148	4026/6110/6108/6107/4028/5093/4027/5051/5073	RGI60-11.00067
146	10.7573	46.8499	17.95	300	2127/7022/2128/2129/2132/7023	RGI60-11.00719
147	10.9889	46.7882	11.17	88	2107/2075/2072/2074	RGI60-11.00887
148	10.7919	46.8416	4.16	173	7022/2128/2129/2132	RGI60-11.00746
149	10.8516	46.896	6.67	84	2135/2136/14013/14008/2133/14015/14014	RGI60-11.00666
150	10.1609	46.8588	4.14	52	E52-2/12007/12006/13017/13019/13020	RGI60-11.00778
151	11.1602	46.9739	4.76	23	2040/3032	RGI60-11.00541
152	11.8563	47.0153	4.69	57	9073/9064	RGI60-11.00399

Table S 2 Validation glaciers with in-situ thickness observations in the Swiss and Austrian Alps. Lat/Long coordinates indicate center coordinates of respective glacier polygons.  $N_{in-situ}$  shows the number of thickness observations per glacier (selected by 30m circular buffer). Original ID refers to IDs of the Swiss (Müller et al., 1976; Maisch et al., 2000) and Austrian (Patzelt, 1980) inventories while RGIId is the respective glacier ID of the Randolph Glacier Inventory (Pfeffer et al., 2014).

	<i>Long</i>	<i>Lat</i>	<i>Area [km<sup>2</sup>]</i>	<i>N<sub>in-situ</sub></i>	<i>Original ID</i>	<i>RGIId</i>
1	8.8263	46.8211	0.36	15	A51d-8	RGI60-11.00907
2	8.9136	46.8186	0.37	14	A50i-17	RGI60-11.00920
3	8.9059	46.8157	0.55	8	A50i-17	RGI60-11.00930
4	8.923	46.8141	0.4	37	A50i-12/A50i-13	RGI60-11.00931
5	8.9178	46.8137	0.04	5	A50i-12/A50i-13	RGI60-11.00931
6	8.9269	46.8091	0.21	19	A50i-13	RGI60-11.00931
7	8.9669	46.801	0.67	60	A14n-5	RGI60-11.00976
8	9.9361	46.6905	0.28	9	E42-8	RGI60-11.01182
9	8.9746	46.6355	0.49	38	A14f-11	RGI60-11.01263
10	9.6899	46.548	0.19	17	A12i-4/A12j-2	RGI60-11.01497
11	9.6994	46.5453	0.34	38	A12i-3/E35-26	RGI60-11.01503
12	8.4188	46.5504	0.57	64	B44-3	RGI60-11.01492
13	9.7638	46.4926	0.13	9	E33-1	RGI60-11.01732
14	7.7746	46.4395	0.56	15	B30-15/A55b-32/B30-12	RGI60-11.01891
15	7.96	46.4384	0.54	14	B36-11	RGI60-11.01906
16	9.8247	46.408	0.47	60	E23-16	RGI60-11.02024
17	7.572	46.4122	0.68	62	A55c-14/A55c-26	RGI60-11.01971
18	7.5596	46.4141	0.05	4	A55f-1/A55d-8/A55c-25	RGI60-11.01943
19	7.5538	46.4124	0.13	5	A55f-1/A55d-8/A55c-25/A55c-13	RGI60-11.01943
20	7.5248	46.4072	0.55	39	A55f-1/A55f-7/A55c-13	RGI60-11.02000
21	7.544	46.3824	0.41	34	A55f-3/B24-4	RGI60-11.02072
22	7.4817	46.3798	0.37	10	A55f-3/B23-9	RGI60-11.02131
23	9.6232	46.2897	0.06	3	C85-6/C84-17	RGI60-11.02332
24	8.0793	46.2415	0.34	18	C05-2/B47-20/C04-2	RGI60-11.02385
25	8.0255	46.1746	0.64	36	C02-2	RGI60-11.02458
26	8.024	46.1637	0.4	14	C01-10	RGI60-11.02478
27	7.8808	46.1013	0.44	5	B53-4	RGI60-11.02583
28	7.8463	46.0755	0.55	44	B55-12	RGI60-11.02643
29	7.4414	46.0619	0.58	10	B73-24	RGI60-11.02663
30	7.6027	46.058	0.47	15	B64-2/B63-23/B72-6	RGI60-11.02584
31	7.52	46.0474	0.16	45	B73-1	NA
32	7.8692	46.0176	0.35	3	B55-19/B56-1	RGI60-11.02742
33	7.3276	46.0796	0.51	19	B75-7	RGI60-11.02620
34	7.3818	46.3686	0.46	59	A56d-1/B23-3/A55f-11	RGI60-11.02168
35	9.8924	46.6353	0.27	6	A12e-4/E42-17	RGI60-11.01260
36	9.9343	46.6935	0.2	14	E42-8	RGI60-11.01182
37	11.1017	46.9769	0.47	25	2039/2037/2036	RGI60-11.00518
38	11.1013	47.0229	0.58	2	2019	RGI60-11.00457
39	8.8363	46.8386	1.51	103	A51c-2/A51d-10	RGI60-11.00865
40	8.8114	46.8219	0.99	87	A51d-7	RGI60-11.00906

41	8.8874	46.8172	0.92	10	A51d-10/A50i-18	RGI60-11.00872
42	8.7448	46.8056	0.88	50	A51d-4	RGI60-11.00954
43	8.9495	46.793	0.93	100	A14m-9	RGI60-11.00979
44	8.423	46.775	0.83	13	A51h-15/A51h-25	RGI60-11.01019
45	8.9118	46.6273	1.58	66	A14f-15/A14g-2/C42-3	RGI60-11.01280
46	8.1785	46.6372	1.02	5	A54j-2/A54i-22/A54i-10/A54i-7	RGI60-11.01257
47	8.8862	46.6179	1.56	40	A14g-2	RGI60-11.01293
48	7.8045	46.4552	1.35	163	A55b-13/B30-18/B30-16/B30-15	RGI60-11.01702
49	8.0188	46.437	1.09	23	B36-18	RGI60-11.01902
50	7.5409	46.4169	1.17	94	A55f-1/A55d-8/A55c-25/A55f-7	RGI60-11.01943
51	7.3445	46.3533	1.17	63	A56d-4	RGI60-11.02191
52	7.3692	46.3535	1.06	82	A56d-1/B23-3	RGI60-11.02168
53	7.3233	46.349	0.83	43	A56d-5	RGI60-11.02207
54	9.6783	46.3187	0.98	97	C84-9	RGI60-11.02268
55	9.6678	46.3096	1.56	116	C84-13/C84-14	RGI60-11.02245
56	6.9383	46.1665	0.74	4	B93-6	RGI60-11.02448
57	8.0163	46.158	0.77	33	B51-9/C01-9	RGI60-11.02474
58	8.0161	46.1443	0.94	45	C01-7	RGI60-11.02512
59	7.8894	46.1295	1.33	9	B54-3/B53-8	RGI60-11.02495
60	7.6967	46.0972	1.56	38	B62-8	RGI60-11.02580
61	7.7159	46.0878	1.48	157	B58-4/B58-30/B62-9	RGI60-11.02594
62	7.3588	46.0699	1.22	70	B74-18/B75-6	RGI60-11.02634
63	7.7069	46.0545	1.07	70	B58-2/B57-19	RGI60-11.02645
64	7.8628	46.052	1.19	57	B53-4/B55-16/B55-17	RGI60-11.02624
65	7.3982	46.0096	0.88	48	B74-9	RGI60-11.02760
66	7.0527	45.9966	1.55	76	B90-2/B85-23	RGI60-11.02740
67	7.8334	45.9549	1.75	24	B56-7	RGI60-11.02822
68	9.2487	46.9091	0.87	70	A15b-4/A14p-3	RGI60-11.00689
69	9.9523	46.6885	0.93	34	E42-10	RGI60-11.01173
70	9.7053	46.5279	1.06	85	E35-17	RGI60-11.01549
71	9.038	46.5066	1.4	41	A14d-17/A13n-14/C44-2/A13n-6	RGI60-11.01635
72	8.0377	46.1078	1.35	57	C00-8/C00-7	RGI60-11.02575
73	7.3081	46.0854	1.12	331	B82-1/B75-12	RGI60-11.02600
74	10.9161	46.9286	1.58	25	14007/2150	RGI60-11.00648
75	11.0675	46.8278	1.38	29	2060	RGI60-11.00836
76	10.7836	46.8819	0.82	9	7020/2133	RGI60-11.00698
77	8.8684	46.8524	1.85	132	A50j-6/A50j-3	RGI60-11.00826
78	8.9346	46.8069	2.89	235	A50i-12/A50i-13	RGI60-11.00931
79	8.4363	46.7621	1.91	106	A54e-6/A54e-30/A51f-43/A54e-10	RGI60-11.01067
80	8.789	46.7375	3.02	154	A51d-18/A51d-16/A51d-15/A14j-4	RGI60-11.01104
81	8.8998	46.6188	2.18	92	A14g-2/C42-2	RGI60-11.01280
82	8.4328	46.6118	3.2	201	A51e-37	RGI60-11.01296
83	7.9893	46.5671	2.13	74	A54l-19/A54m-3/A54m-64	RGI60-11.01346
84	8.2033	46.5148	2.83	194	B41-7/B41-5	RGI60-11.01576
85	7.8669	46.4881	3.42	129	A54m-21/A54m-19/A54m-16/B30-22	RGI60-11.01622
86	9.8173	46.359	2.53	138	E25-4/E25-6	RGI60-11.02195
87	9.771	46.3439	2.57	111	E26-1	RGI60-11.02208



88	9.6436	46.3015	3.76	166	C84-16	RGI60-11.02285
89	7.2281	46.3197	3.81	363	B16-1/B22-1/B16-9/B21-5	RGI60-11.02244
90	8.0986	46.2402	3.04	139	C05-2/B47-20	RGI60-11.02385
91	8.0087	46.1801	1.98	40	C02-4/B51-5/B51-9	RGI60-11.02442
92	7.88	46.1482	2.25	21	B53-11/B53-10	RGI60-11.02496
93	8.0297	46.1343	2.34	190	C01-4	RGI60-11.02529
94	7.8826	46.1133	1.97	38	B54-3/B53-7	RGI60-11.02495
95	7.6919	46.1106	2.04	128	B62-7	RGI60-11.02570
96	7.3428	46.0704	1.89	51	B74-18/B75-6	RGI60-11.02640
97	7.6906	46.0477	2.46	137	B57-16	RGI60-11.02676
98	7.6422	46.0218	2.54	155	B57-10/B63-5/B57-11	RGI60-11.02630
99	7.8577	46.0227	2.2	139	B55-19/B56-1/B56-19	RGI60-11.02742
100	7.3853	46.017	1.91	49	B74-11	RGI60-11.02743
101	7.4494	45.9978	3.2	283	B74-8/B73-16/B73-34/B82-19/B82-27/B73-33	RGI60-11.02749
102	7.7107	45.9616	3.38	180	B56-31/B56-30/B56-7	RGI60-11.02819
103	7.0524	45.9338	2.38	35	B85-8/B85-7/B85-4	RGI60-11.02884
104	9.8806	46.6289	2.35	144	A12e-4/E42-17	RGI60-11.01260
105	13.3362	47.0191	3.14	119	21011	RGI60-11.00303
106	12.6513	47.1103	2.26	66	5094	RGI60-11.00124
107	12.683	47.1963	1.88	46	5080/5081	RGI60-11.00014
108	12.5989	47.1315	1.76	70	6092/5097	RGI60-11.00080
109	11.0197	46.7846	3.62	39	2072/2074	RGI60-11.00887
110	11.0484	46.8153	3.18	40	2068/2062/2063	RGI60-11.00871
111	9.6978	47.0591	2.19	11	12029	RGI60-11.00403
112	10.1299	46.8537	2.28	34	12007/13019	RGI60-11.00781
113	12.3783	47.0839	3.52	28	6066/6054/6053/6077	RGI60-11.00135
114	11.7921	47.0008	3.9	24	9076/9075/9078	RGI60-11.00459
115	8.0435	46.572	11.3	305	A54l-19/A54l-38/A54l-32/A54m-3/B36-26/A54l-31	RGI60-11.01346
116	8.0213	46.5003	86.62	3376	A54l-19/A54m-5/B36-26/A54m-3/A54l-17/A54m-27/A54m-26/A54m-11/A54m-12/A54m-37/A54m-39/B36-28/B31-4/B36-48/B31-20/B36-25/B36-21/B31-6/B36-46/B36-1/B40-7	RGI60-11.01346
117	8.1995	46.5319	5.18	759	A54g-10/A54g-3/A54g-11/B40-7	RGI60-11.01478
118	7.8366	46.4941	6.19	258	A54m-21/A54m-19/A55b-13	RGI60-11.01622
119	7.802	46.4748	13.76	868	A54m-21/A55b-13/B30-18/B30-16/A55b-30/B30-15	RGI60-11.01622
120	8.0177	46.4583	8.31	268	B36-26/B36-21/B36-46	RGI60-11.01450
121	8.3333	46.4397	6.43	269	B45-4/B45-35	RGI60-11.01876
122	9.9425	46.3937	16.84	848	E22-3/E22-5	RGI60-11.01946
123	9.848	46.3744	8.78	333	E23-11/E23-12/E23-9	RGI60-11.02119
124	9.9797	46.3682	6.63	355	C93-4/C93-1	RGI60-11.02144
125	7.8682	46.3978	4.84	239	B32-2/B34-2/B32-11/B32-5/B32-6	RGI60-11.01985
126	7.8588	46.1303	8.31	147	B54-3/B53-8/B55-27/B53-7/B55-3	RGI60-11.02495
127	7.6956	46.1313	5.99	343	B60-9/B62-28/B58-8	RGI60-11.02490
128	7.719	46.1346	6.75	267	B60-9/B58-8	RGI60-11.02490
129	7.5958	46.0776	5.77	517	B64-2/B63-21/B63-22/B63-23/B72-6	RGI60-11.02584
130	7.8885	46.0731	16.61	303	B53-4/B55-12/B55-11/B52-33/B52-32/B55-16/B55-17/B55-18	RGI60-11.02596

131	7.7177	46.0657	5.51	301	B62-10/B58-2/B58-26/B57-19	RGI60-11.02593
132	7.911	46.0344	9.98	688	B52-29/B55-18/B52-27/B52-26/B56-3	RGI60-11.02704
133	7.0267	45.9978	6.4	84	B90-2/B90-4/B85-23	RGI60-11.02740
134	7.4887	45.9754	6.18	318	B73-14/B82-27/B73-12	RGI60-11.02787
135	7.0405	45.9692	7.76	135	B85-16/B85-17/B85-13/B85-8	RGI60-11.02793
136	7.324	45.9243	7.62	355	B82-39/B82-36/B84-11	RGI60-11.02889
137	8.3731	46.6616	17.18	1211	A54e-25/A54f-5/A54e-24/B43-3/A54f-6/A54f-7	RGI60-11.01198
138	8.176	46.6095	13.76	1166	A54j-2/A54i-3/A54i-4/A54i-5	RGI60-11.01222
139	8.1681	46.5661	27.15	1924	A54l-4/A54g-47/A54g-10/A54g-3/A54g-49/A54g-11/A54l-31/B40-7	RGI60-11.01270
140	7.6458	46.0522	15.7	783	B62-10/B63-16/B63-17/B63-15/B57-24/B57-10/B63-5	RGI60-11.02593
141	7.6169	45.9918	16.85	776	B72-15/B72-11/B57-5	RGI60-11.02709
142	10.9436	46.7835	8.46	87	2108/2107/2110/2074	RGI60-11.00945
143	10.8222	46.7871	7.93	118	2121	RGI60-11.00919
144	10.8931	46.7767	5.38	44	2111/2107/2110	RGI60-11.00945
145	10.8914	46.9074	11.05	127	2136/14010/14008/14014	RGI60-11.00663
146	10.8188	46.8756	9.6	55	2135/14016/7020/2133/14015/14014	RGI60-11.00687
147	11.0796	46.9989	4.16	48	2034/3036/2022/2036	RGI60-11.00487
148	12.245	47.0557	5.2	101	6041/6043/6039/6040/6045/5141	RGI60-11.00264
149	12.3838	47.1074	9.68	64	6066/6054/6053/6077/6078/5123	RGI60-11.00068
150	12.3097	47.111	12.16	107	6048/5141/6052/5129/5123	RGI60-11.00068
151	12.3463	47.1317	3.96	56	6053/6077/5129/6078/5124/5123	RGI60-11.00068
152	11.6642	47.067	4.17	88	3002/9097/9099/9109/9110	RGI60-11.00311

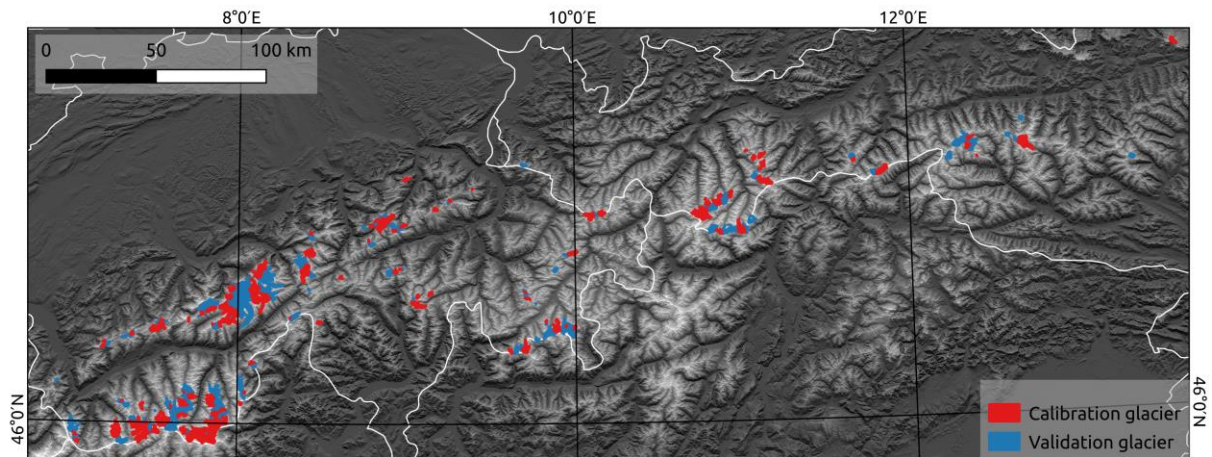


Figure S 1 Spatial distribution of glaciers with in-situ thickness observations in the Swiss and Austrian Alps, red outlines indicate glaciers used for calibrating the viscosity scaling factors. Thickness observations of glaciers with blue outlines are used to validate the ice thickness distribution of the different reconstruction setups.

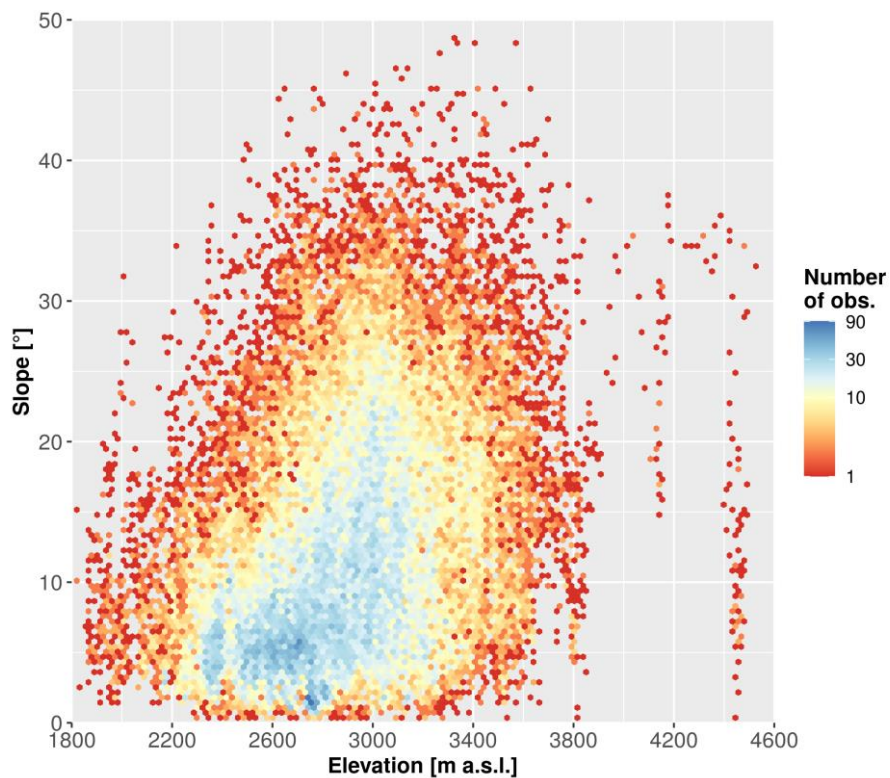


Figure S 2 Topographic distribution of all in-situ thickness observations (GlaThiDa Consortium, 2020; Grab et al., 2021) used in this study.

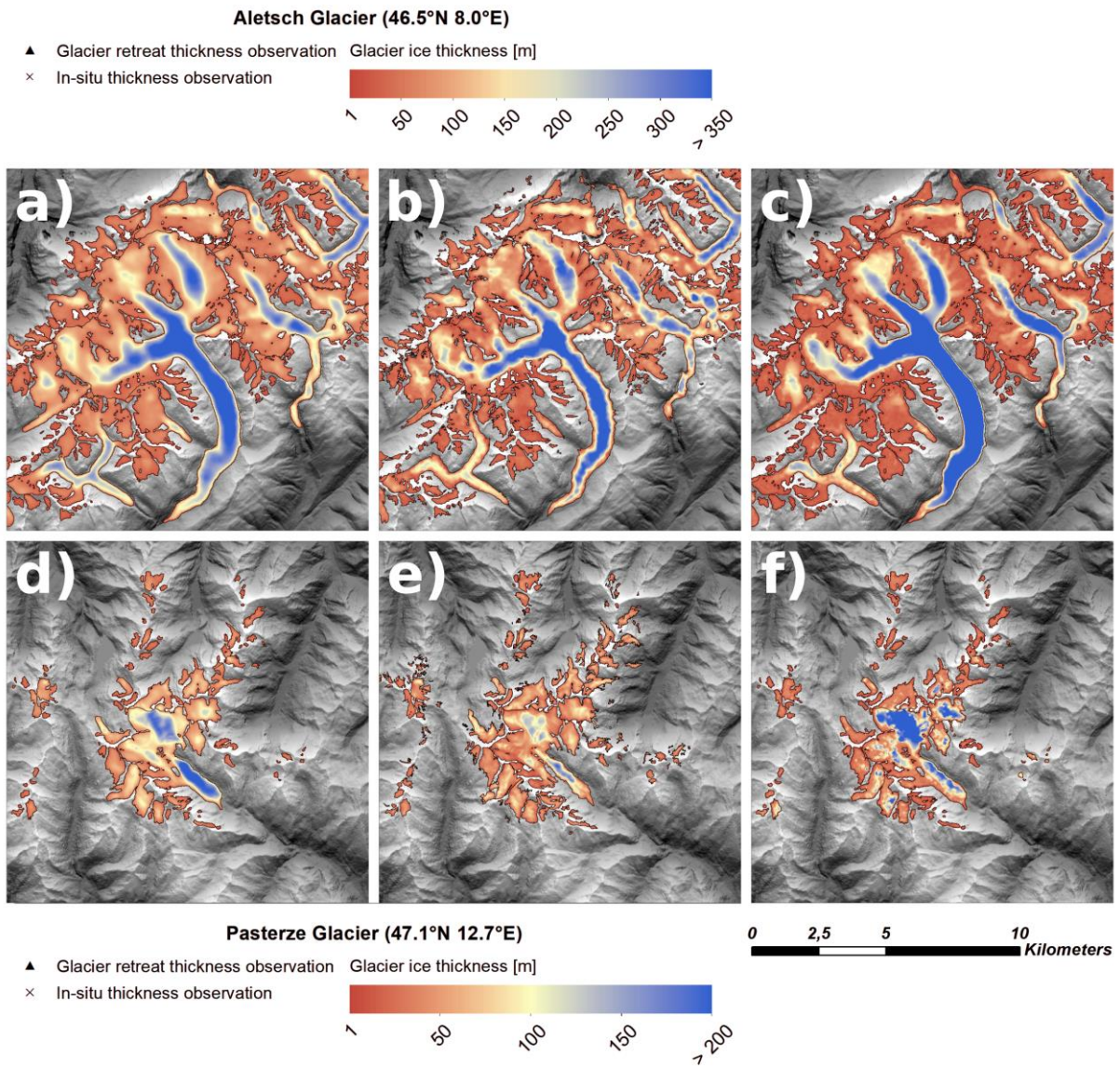


Figure S 3 Reference maps of ice thickness distribution from previous publications of Aletsch (a-c) & Pasterze (d-f) glaciers: (a,d) Farinotti et al. (2019); (b) Grab et al. (2021); (c,f) Millan et al. (2022) & (e) Helfricht et al. (2019).

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