Supplement of

The Glaciers of the Dolomites: last 40 years of melting

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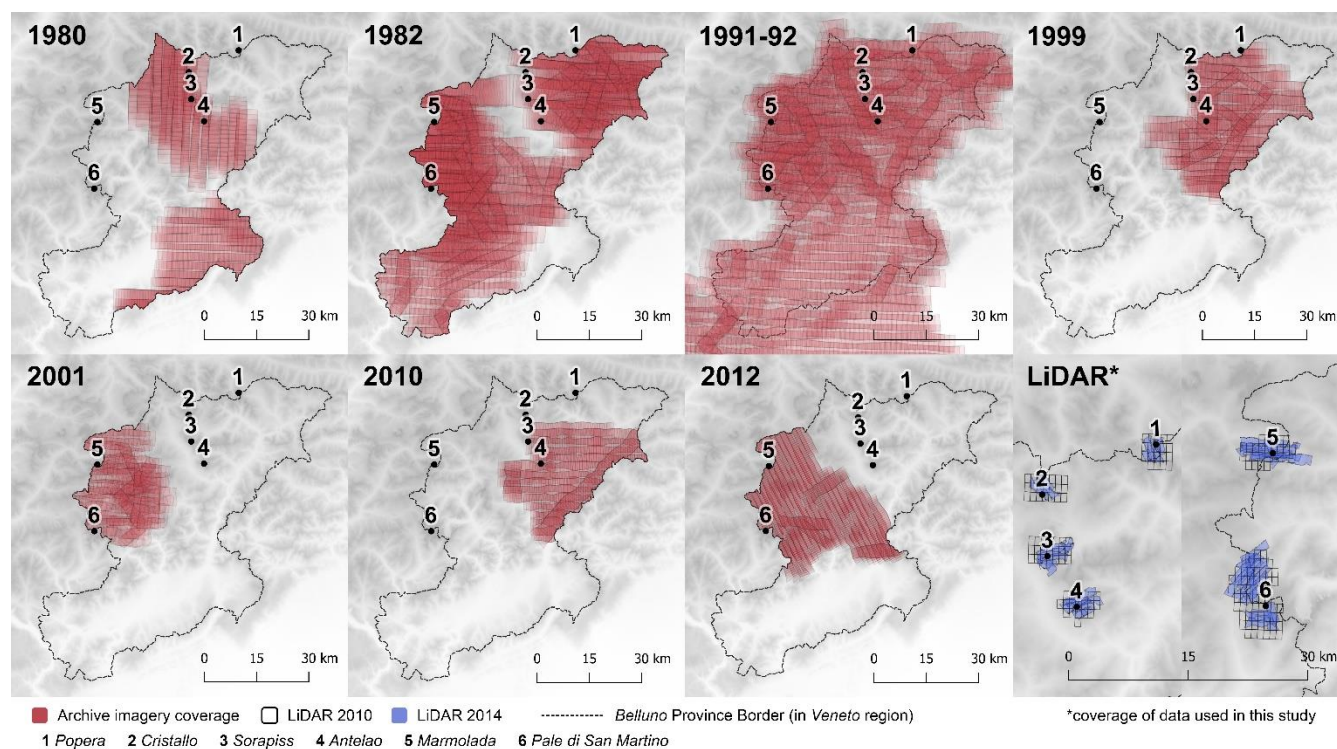
Figure S1: Archival imagery (1980, 1982, 1991-92, 1999, 2001, 2010,2012) and LiDAR (2010, 2014) data coverage in the Veneto Region (Bolzano province, black line). Most of the archival imagery extends with some frames across the administrative border. Reference dates and data description are available in Table 2.
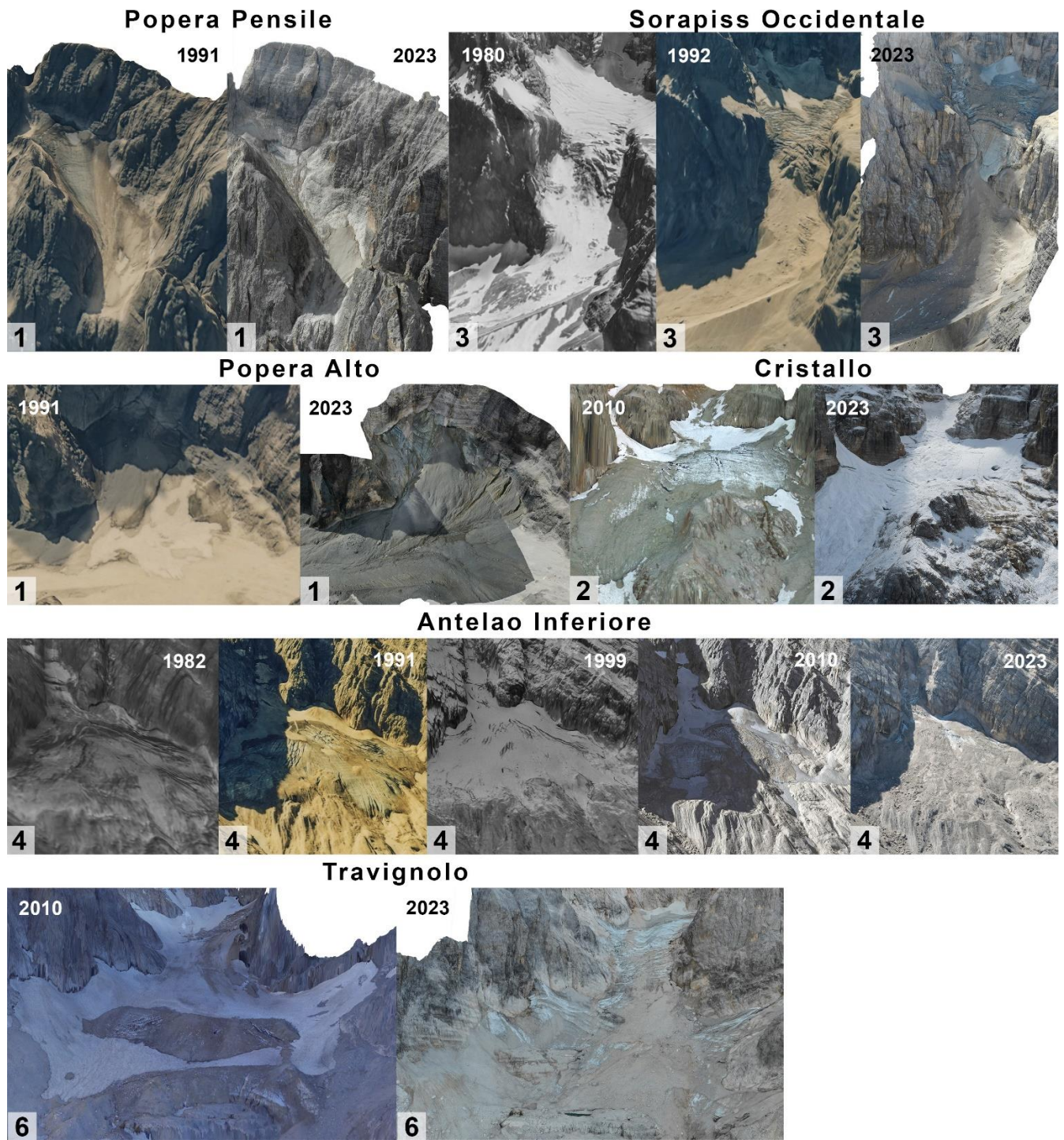
Figure S2. Examples of the reconstructed 3D textured models (i.e., triangular meshes derived from dense point clouds) of the Dolomites glaciers during different decades. Missing reconstructions from Marmolada, Fradusta and Antelao are shown in the manuscript (Fig. 3).
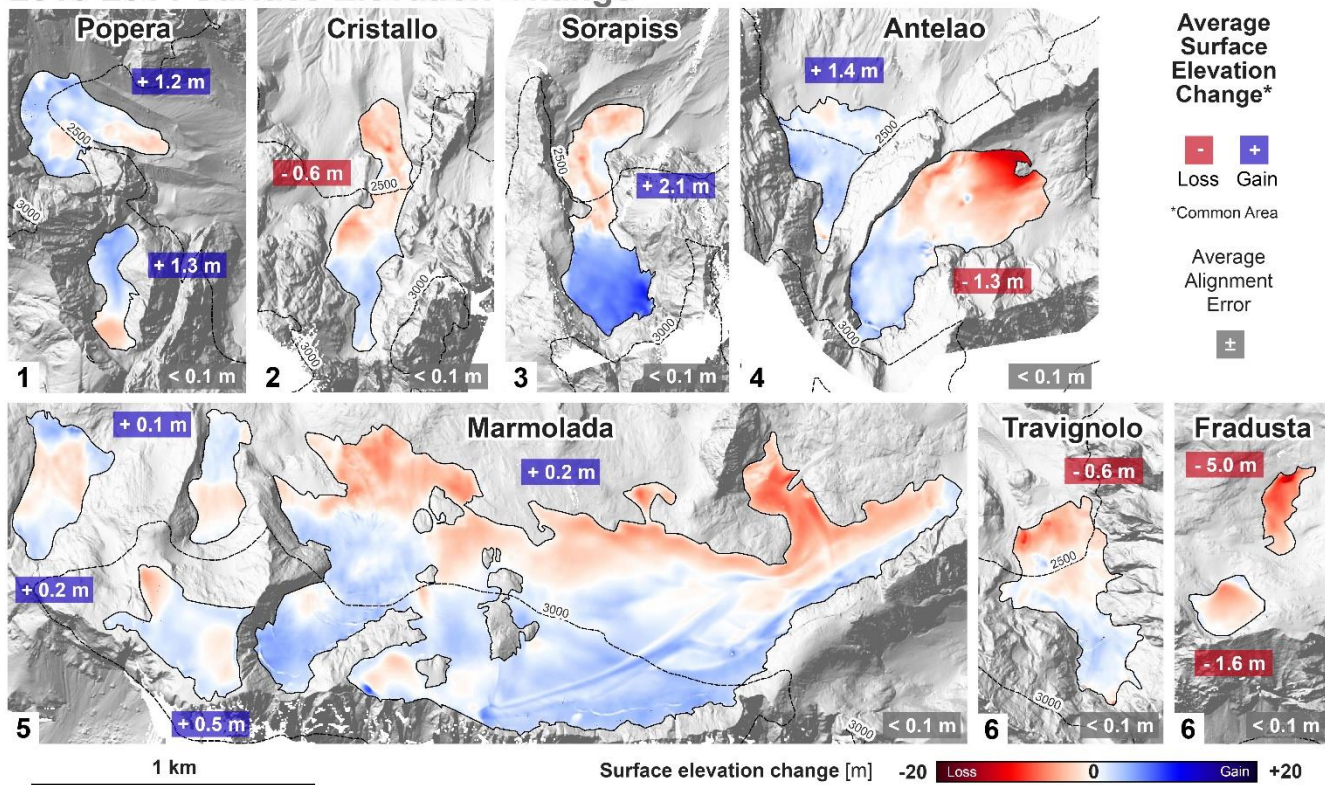
Figure S3. Surface elevation change (m) measured across the Dolomites glaciers from 2010 to 2014. Average surface elevation change is reported for every glacier using common area.
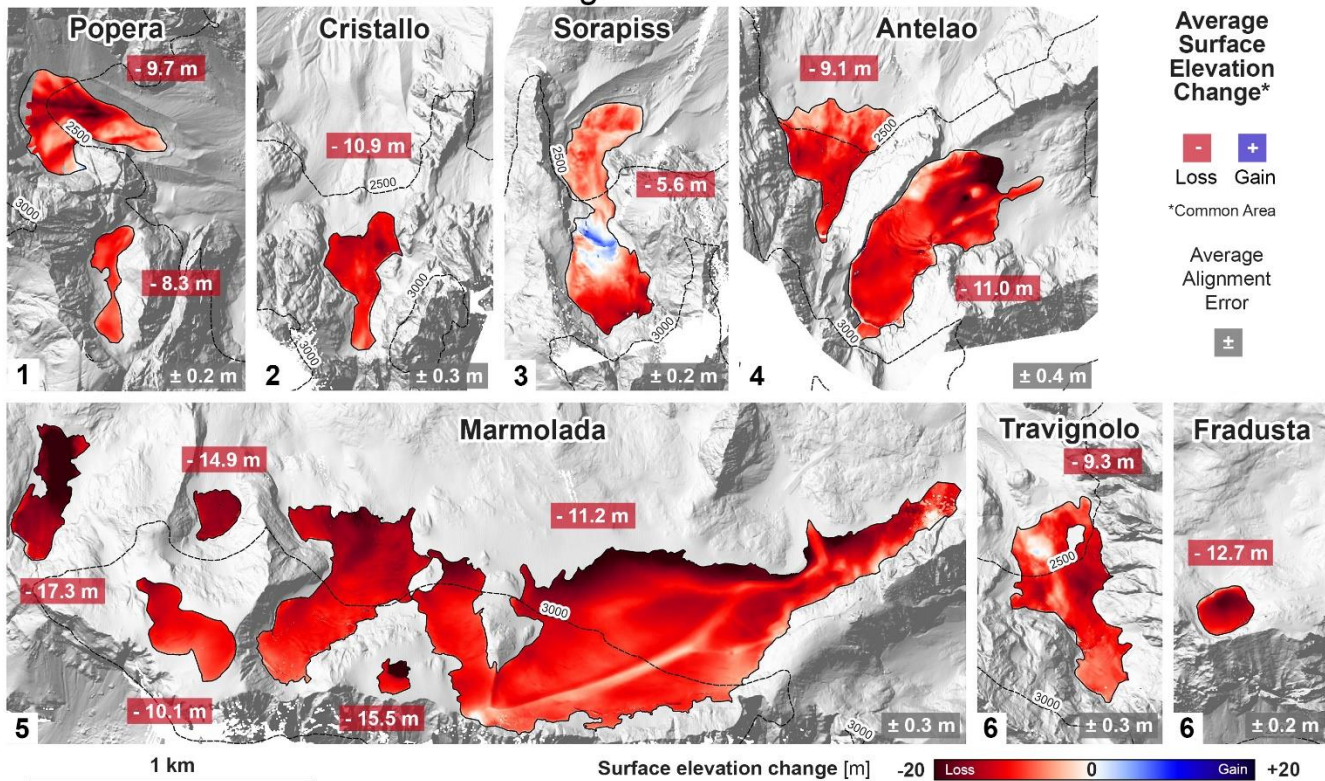
Figure S4. Surface elevation change (m) measured across the Dolomites glaciers from 2014 to 2023. Average surface elevation change is reported for every glacier using common area.

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Area ID	Year	Date	Photos	Resolution [m/pix]	Tie Points	Dense Cloud points	GCP number
1 (Popera)	1992	21 Aug.	10	0.88	61,444	10,329,170	6
1 (Popera Alto)	2023	12 Sept.	144	0.05	99,047	63,057,487	12
1 (Popera Pensile)	2023	12 Sept.	66	0.14	13,634	11,108,717	12
2 (Cristallo)	1992	21 Aug.	6	0.87	28,503	17,319,719	6
2 (Cristallo)	2023	24 Sept.	218	0.13	94,549	50,806,741	12
3 (Sorapiss)	1980	23 Jul.	11	0.91	45,642	2,482,055	6
3 (Sorapiss)	1992	20 Aug.	12	1.01	133,237	12,785,764	15
3 (Sorapiss)	2023	9 Sept.	177	0.11	47,987	30,558,608	12
4 (Antelao)	1980	25 Jul.	7	1.57	109,269	10,832,894	8
4 (Antelao)	1992	19 Aug.	7	0.65	51,292	17,122,069	13
4 (Antelao)	1999	14 Oct.	4	0.83	45,538	14,662,362	17
4 (Antelao)	2010	21 Sept.	7	0.41	233,167	44,645,484	22
4 (Antelao Superiore)	2023	10 Sept.	553	0.06	729,420	192,905,021	12
4 (Antelao Inferiore)	2023	10 Sept.	138	0.15	23,018	23,174,756	12
5 (Marmolada)	1982	-	17	1.50	196,459	5,005,926	10
5 (Marmolada)	1992	19 Aug.	12	0.85	64,420	16,352,851	6
5 (Marmolada)	2001	15 Oct.	13	0.65	121,102	18,865,131	9
5 (Marmolada)	2012	20 Aug.	17	0.22	292,028	126,682,805	14
5 (Marmolada)	2023	10 Oct.	250	0.35	23,053	61,140,047	12
6 (Pale di S.M.)	1982	-	32	1.59	448,348	35,196,925	13
6 (Pale di S.M.)	1992	9 Aug.	28	0.71	494,427	45,856,617	18
6 (Fradusta)	2001	15 Oct.	16	0.74	210,548	25,732,223	16
6 (Travignolo)	2023	30 Sept.	130	0.09	43,916	31,107,078	12
6 (Fradusta)	2023	30 Sept.	71	0.06	30,193	25,419,814	12

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Table S1. Structure from Motion export report and dates divided by areas (see Fig. 1 for reference): Popera (1), Cristallo (2), Sorapiss (3), Antelao (4), Marmolada (5), Pale di San Martino (6); years of aerial acquisition and number of photos processed per year; Ground Resolution; Tie Points of the first alignment phase; GCP number used in the SfM pipeline, sometimes some of them have lately been excluded as not recognizable with precision in the aerial photos; RMSE error in m for Z only and XYZ (total) as
50 **computed by Metashape for the entire area, including poorly covered borders where photo coverage is less high (see Fig. S1).**

Glacier	Area [km^2]				
	1980-82	**1991-92**	**1999-2001**	**2010**	**2023**
Popera Alto	-	0.11	-	0.10	0.10
Popera Pensile	-	0.05	-	0.05	0.03
Cristallo	-	0.19	-	0.11	0.06
Sorapiss Occidentale	0.27	0.19	-	0.18	0.17
Antelao Superiore	0.31	0.28	0.25	0.24	0.19
Antelao Inferiore	0.20	0.16	0.13	0.11	0.09
Marmolada [a]	2.52	2.28	-	1.64	1.00
Travignolo	0.24	0.23	-	0.17	0.14
Fradusta [a]	0.27	0.24	-	0.09	0.03

Table S2. Areas of the Dolomites glaciers during different intervals (km^2). [a] Marmolada and Fradusta Glaciers are treated as one even after segmentation.

Glacier	Total Ice Mass Loss [Mt]	% of the Total
	Entire Period available in this study	Dolomites Loss
Popera Alto	0.95	1.6
Popera Pensile	0.43	0.6
Cristallo	1.36	2.1
Sorapiss Occidentale	5.08	5.3
Antelao Superiore	6.07	7.9
Antelao Inferiore	3.57	4.0
Marmolada	54.41	65.7
Travignolo	4.37	5.5
Fradusta	6.86	7.3

Table S3. Total ice mass loss (Mt) during the observation period available in this study and % of the dataset.