

> Abstract

In this work we analyze the evolution of the Arguerey and Breuil glaciers (La Thuile, Aosta Valley), from the end of the Little Ice Age (LIA) to the years 2000s.

For this purpose, the glacier areas at specific time steps (1850, 1929, 1961, 1975, 1999, 2005) have been derived from topographic maps, from data collected by the Italian Glaciological Committee (CGI), and from the outputs of the GlaRiskAlp Alcotra project. Using GIS techniques, it was possible to identify clearly the glacial areas and estimate their reduction through time (Table 1).

At the end of the LIA the Arguerey and Breuil glaciers had an areal extent of respectively 2.26 and 3.39 km², in 2005 these areas had become about 0.44 and 0.69 km², with a reduction of 81 and 80%.

During the last glaciological survey (September 2013), the signals used since the 1920s for the measurements of the snout distance and for the photographic surveys were precisely located, by means of a GPS receiver (Table 2).

This work aims to contribute to the knowledge of glacier evolution in the northwestern Italian Alps, also in support of studies on the impacts of climate change in high-altitude environments in the southwest sector of the Greater Alpine Region.

> The Arguerey glaciers



< Fig 1
 Arguerey Meridionale Glacier
 WGI code: I-4L01316024
 CGI code: 200
 Latitude N: 45.6920
 Longitude E: 6.8514
 Type: mountain glacier
 Form: cirque
 Photo by: M. Chiarle, 2013.09.05



Fig. 2 >
 Arguerey Settentrionale Glacier
 WGI code: I-4L01316025
 CGI code: 201
 Latitude N: 45.7021
 Longitude E: 6.8443
 Type: mountain glacier
 Form: cirque
 Photo by: G. Nigrelli, 2013.09.05

> The Breuil glaciers



< Fig. 3
 Breuil Meridionale Glacier
 WGI code: I-4L01316027
 CGI code: 202
 Latitude N: 45.7059
 Longitude E: 6.8347
 Type: mountain glacier
 Form: simple basin
 Photo by: M. Chiarle, 2013.09.05

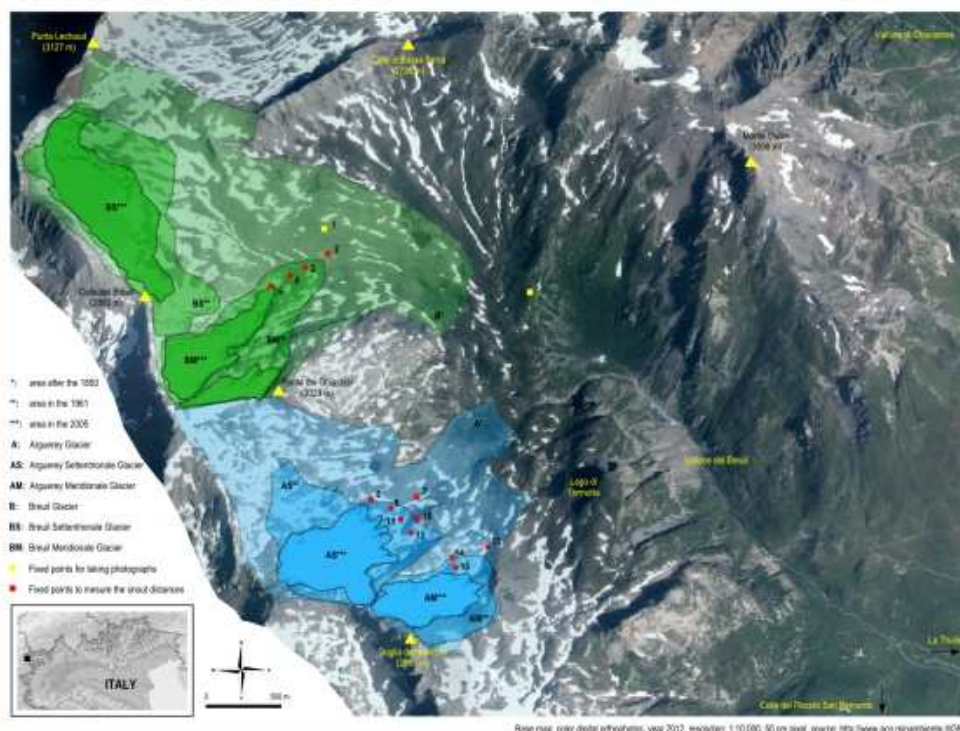
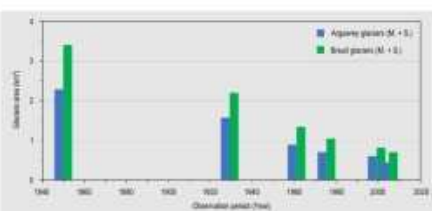


Fig. 4 >
 Breuil Settentrionale Glacier
 WGI code: I-4L01316028
 CGI code: 203
 Latitude N: 45.7151
 Longitude E: 6.8229
 Type: mountain glacier
 Form: simple basin
 Photo by: G. Nigrelli, 2013.09.05

Glacial extension

> Table 1 - Glacier area (km²)

	LIA (1850)	1929	1961	1975	1999	2005
Arguerey	2.26	1.56	-	-	-	-
Arguerey M.	-	-	0.29	0.21	0.19	0.16
Arguerey S.	-	-	0.59	0.48	0.40	0.28
Breuil	3.39	2.19	-	-	-	-
Breuil M.	-	-	0.52	0.42	0.35	0.27
Breuil S.	-	-	0.81	0.62	0.46	0.42



> Table 2 - Fixed points position

No.	CGI code	Latitude (N)	Longitude (E)	Elevation (m)
1	FCC71	45°43'24"	6°50'01"	2631
2	AM29	45°43'19"	6°50'02"	2576
3	L53	45°43'16"	6°49'55"	2576
4	VT92	45°43'14"	6°49'51"	2586
5	P.Q. 2566	45°43'12"	6°51'02"	2565
6	AV07	45°43'12"	6°50'01"	2599
7	VT85.1	45°42'29"	6°50'30"	2586
8	VT88	45°42'28"	6°50'17"	2675
9	VT89	45°42'26"	6°50'23"	2643
10	IRS	45°42'24"	6°50'31"	2684
11	AA99	45°42'24"	6°50'26"	2649
12	VT86	45°42'22"	6°50'29"	2691
13	ARM1	45°42'19"	6°50'52"	2628
14	VT87	45°42'17"	6°50'41"	2708
15	VT85	45°42'15"	6°50'42"	2724

A view from P.Q. 2566



In this panoramic photo are visible 3 of the 4 studied glaciers (the Breuil m. Glacier is hidden behind the Punta del Ghiacciaio). Under the glacier snouts are evident periglacial areas (A*) and IV glacial extensions at the end of the LIA (in the map above), containing some snowfields, some stony moraines, and some small areas with pioneer vegetation. In the foreground, the high-elevation herbaceous meadows (Photo by G. Nigrelli, September 1, 2013).

> Some historical photos



< Fig. 5
 Arguerey M. and S.
 photo by L. Peretti
 August 21, 1935
 from Colle di Bassa Serra
 Source: CGI



^ Fig. 7
 Breuil Meridionale
 photo by C. Clerici
 September 6, 1971
 from FCC71 fixed point
 Source: A. Viotti



Fig. 8 >
 Breuil Settentrionale
 photo by C. Lesca
 September, 1953
 from P.Q. 2566 fixed point
 Source: CGI



< Fig. 6
 Arguerey M. and S.
 photo by C. Lesca
 September 27, 1969
 from Colle di Bassa Serra
 Source: CGI



Fig. 9 >
 Breuil Settentrionale
 photo by A. Viotti
 August 31, 1988
 from P.Q. 2566 fixed point
 Source: A. Viotti

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<http://nextdata.sharegeonetwork.evik2cnr.org>

