

FORNI GLACIER

We are going to admire the "white giant" of the Stelvio National Park!

Forni Glacier, or "del Forno" as Antonio Stoppani wrote, is one of the largest Italian glaciers, second in area only to the Adamello-Mandrone complex. It can be classified as a "valley glacier with compound or confluent basins" and is - or rather it was - made up of three collector basins which flow into a single valley tongue. However, between 2015 and 2018 the fragmentation into three separate bodies was completed, which led to the formation of three distinct and no longer interacting glaciers.

Forni Glacier is one of the best witnesses of the ongoing climate change! From the end of the Little Ice Age around 1860 it has moved back by 2km! Where once there was a majestic glacier tongue there is now a valley largely colonized by Larches and firs and crossed by a great stream!

The glacier tongue is clearly visible if you go up at least to the terrace of the Branca refuge, at 2493 m above sea level. It is marked by three median moraines, also called floating moraines, which can be well appreciated even by an observer who is not expert in glaciers, since they appear as dark bands of rocky debris, at a higher altitude compared to the surrounding surface of the glacier. The difference in height between the median moraines and the rest of the surface of the glacier tongue is at places even 10 meters and is a consequence of "differential ablation". By this term, researchers refer to the different melting rate of ice covered by rock debris compared to that of the surrounding clean ice. In fact, ice protected by debris, if this is present with thickness of at least 5-10 cm, melts more slowly than that directly exposed to solar radiation and hot summer temperatures. The altitude difference between the debris-covered ice (the floating moraine) and the surrounding areas is due to this different melting speed.

Observing the glacier, large crevasses are clearly visible, as fractures present on the surface of the glacier. These are fragile deformations, clear evidence that Forni glacier is not a static form of the landscape but moves a few tens of meters a year. Folds of white ice alternating with gray and blackish ice are also clearly visible. These are called ogives and are ductile deformations of the ice subjected to stress as a result of movement and represent the glacier equivalent of the rocky folds that can be observed in different areas of our Alps!

The tongue of Forni glacier represents an extremely dynamic area from a geomorphological point of view. Its evolution is rapid and accelerating. In recent years, particularly since 2003, the tongue has further reduced in thickness and length, the fine debris cover has expanded (which makes the ice darker and darker, a phenomenon called darkening in the international literature), circular crevasses have formed which, collapsing, gave rise to epiglacial lakes and glacier contact ephemeral lakes, and increasingly large emergences of bedrock that can expand to isolate glacier edges and cause fragmentation.

The whole area of the glacier tongue and above all of the terminus represents one of the best Alpine examples of transition from a glacier system to a paraglacial one, characterized by an intense reworking of the glacier debris by the melt water. In the areas surrounding the tongue we can identify the moraine systems deposited by the previous expansion phases, in particular that of 1965-1985 with very evident ice cores, which originate phenomena of instability such as mud flows and debris flows, dominated by the imposing lateral moraine, often sharp, of the Little Ice Age (PEG, period of generalized advance of glaciers, between 1550 and 1850) with pseudocalaniche forms of erosion.

On the valley floor there are also strips of moraines deposited during the '20s of the twentieth century.

Forms of glacier erosion, such as the so-called roches moutonnées, smoothed and rounded rocks, are also widespread.

Glacier bibliography, since Stoppani's time, considers it one of the most representative glaciers in the Alps, not only in Italy. In recent years, the attention of researchers from all over Europe has made it a site of considerable scientific interest where it is possible to observe among the clearest morphological evidences of the present deglaciation with its various processes (glacial, torrential, gravitative, periglacial).

Since 2005, two permanent automatic meteorological stations, installed by the University of Milan and managed in collaboration with Stelvio National Park, have been placed on the glacier surface. The stations continuously detect the seven weather parameters as required by the World Meteorological Organization and have allowed quantifying the glacial energy balance and the resulting melting with hourly resolution and describing snow accumulation and its seasonal and inter-annual variability. The weather stations of the Forni glacier have also shown that in some months of the year a katabatic wind blows on this great glacier absolutely comparable to that known on the great Antarctic and Greenlandic glaciers which often exceeded 130km / h in intensity. Finally, this glacier was the first in Italy to be studied also with the help of drones, which allowed quantifying the geometric and volumetric variations resulting from climate change at very high resolution. It is therefore a real open-air scientific laboratory.