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THE BRENVA GLACIER (MT. BLANC, ALPS) HAS LOST ITS GREAT VALLEY TONGUE

ABSTRACT: CERUTTI A.V., *The Brenva Glacier (Mt. Blanc, Alps) has lost its valley tongue.* (IT ISSN 1724-4757, 2005).

The Brenva Glacier, one of the largest and most well known glaciers of Italy, has lost its valley tongue. In September 2004 there was the complete depletion of the flow of seracs which had joined the upper basin to the valley tongue, which was longer than 3 km. On the valley bottom of the Val Veny there now remains a large mass of ice, whilst the active front of the Glacier has settled at 2350 m a.s.l., about 1000 m higher. The Brenva Glacier has become a glacial cirque. Already subject to strong fluctuations in the Holocene, the frontal variations have always shown a strict relation with meteorological recordings. This is the most typical case of the strong contraction being undergone by the alpine glaciers. (KEY WORDS: Deglaciation, Brenva Glacier, Alps).

RIASSUNTO: CERUTTI A.V., *Il Ghiacciaio della Brenva (M. Bianco, Alpi) ha perduto la sua lingua valliva.* (IT ISSN 1724-4757, 2005).

Il Ghiacciaio della Brenva, uno dei più grandi e conosciuti ghiacciai delle Alpi, ha perduto la sua lingua valliva. Nel Settembre 2004 si è esaurita la colata di seracchi che congiungeva l'alto bacino con la sottostante lingua valliva, che era lunga più di 3 km. Sul fondo della Val Veny resta una grande massa di ghiaccio, mentre la fronte attiva del Ghiacciaio si è posizionata a 2350 m s.l.m., circa 1000 m più in alto. Il Ghiacciaio della Brenva è divenuto un ghiacciaio di circo. Già soggetto a forti fluttuazioni nell'Olocene, le variazioni frontali hanno sempre mostrato una stretta relazione con le registrazioni meteorologiche. È questo il caso più emblematico della fortissima contrazione dei ghiacciai alpini. (TERMINI CHIAVE: Deglaciazione, Ghiacciaio della Brenva, Alpi).

The most typical case regarding linear and volumetric contractions occurring in recent years to glacial bodies is that of the Brenva, one of the largest and most well known glaciers of Italy.

In September 2004 there was the disappearance of the flow of seracs that joined the high basin to the valley tongue below: the two sectors are now completely split and in this way the Brenva has lost its typical valley glacier features which had characterised the body for centuries.

The highest point of this glacier is the summit of Mt. Blanc and therefore its source basin is at a very high altitude: about 350 hectares of the glacial body is at an altitude greater than the average limit of the perpetual snows. Exposed to the humid Atlantic winds, the area receives a great quantity of solid precipitation, amounting to an equivalent of 3000 mm of water. The volume of ice forming in the glacier, until a short time ago, was able to supply

a glacial system with a surface area of almost 800 hectares with a valley tongue extending down into the bottom of the Val Veny, at an altitude of less than 1400 m a.s.l., the lowest of the glaciers on the Italian side of the Alps.

The valley tongue was about three kilometres long, with a mean width of 400 metres, well supplied also in the recent past. Between 1960 and 1988 the ice flowed at about 50 metres per year and despite the strong melting due to its low altitude, it maintained a considerable linear and volumetric expansion. This was assessed by Corrado Lesca as a mean annual increase corresponding to around three million cubic metres of water.

The feeding of the valley sector was guaranteed by large falls of seracs which descended from the high basin along the steep walls of the *Pierre a Moulin*, the great rocky crag that marked the boundary of the bed of the valley tongue. This crag until recently had the appearance of a *rocky window* surrounded on all sides by impressive glacial lobes.

These large seracs began their depletion towards the end of the 1980s when the new climatic warming phase

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FIG. 1 - The Brenva Glacier from the Pré-Pascal - September 1996. Three months later a large landslide fall from the above «Sperone» into the glacier. The dark - ice glacier snout is fed by frequent ice avalanches and by a glacial stream flowing down from the high basin located on the «Pierre à Moulin» rockwall.

initiated, but since 1997 the phenomenon accelerated and became more complex.

On 18 January 1997, from 3500 m of the rocky ridge of the spur *Sperone della Brenva* a large landslide broke away involving the glacial basin below. It is estimated that about two million cubic metres of rocky debris collapsed onto the glacier, sweeping away about five million cubic metres of ice and snow.

A large mass of debris settled over a wide area of the upper basin and with its great weight accelerated the descent of the glacial cover. This is shown by frequent and large ice avalanches which fell from the threshold of the *Pierre à Moulin* involving also the seracs. The regular avalanches of ice mixed with rocky detritus continued to sweep across the great rocky window in summer and win-

ter for seven years, whilst occurred a constant impoverishment of the surrounding glacial lobes.

The upper part of the debris of the great landslide which in January 1997 had settled at the foot of the *Sperone della Brenva*, at an altitude of 3300 m, in the summer of 2004 could be found at the threshold of the *Pierre à Moulin* at a distance of more than 2000 metres from where the initial impact had occurred. In that long time period the mean speed of the glacial cover, which acted as a transporting layer, had been effectively 300 metres per year.

The descent of the newly formed ice flowing from the highest areas of the supply basin is a great deal slower. The new covers were therefore unable to effectively replace the ice that, pushed by the weight of debris, flowed rapidly



FIG. 2 - The Brenva Glacier from the Pré-Pascal - September 2005. The ice stream that was feeding the glacial snout since Fall 2004 is now interrupted. Currently, it corresponds to a dead ice accumulation, which will be rapidly melted. Hence, the Brenva Glacier is becoming a cirque glacier with the actual front located at 2,350 m on the «Pierre à Moulin» rock threshold that splits the glacial system into two distinct sectors.

valleywards. Therefore in the area covered by the landslide the feeding deficit due to the speed of descent generated a rapid thinning out of the glacial blanket. Along the *Pierre à Moulin* from year to year the area of seracs became more thin and more fragile, gradually separating the valley tongue from the upper basin.

On 3 August 2004 due to a sudden fracture of a large water pocket in the higher area, the seracs were subjected to violent waterfalls which tried sorely their resistance. Only few weeks later, in fact, they were totally depleted and so the thin band of ice uniting the upper basin with the valley tongue finally disappeared completely. In this way there was a definitive split between the two sectors.

On the valley bottom of the Val Veny it now remains a large mass of regenerated ice, covered with morainic debris, which occupies an area of around 2000 metres. Until a short time ago this was the valley tongue of the glacier. Now, this ice, abandoned by its supply flow, will undergo rapid melting.

The active front of the glacier has settled at the threshold of the *Pierre à Moulin* at 2350 m a.s.l., that is at an altitude of almost a thousand metres higher than that of the margin of the valley tongue and at a distance from the tongue of 2700 metres. The glacial body, which in 1988 had a length greater than 7800 metres, today extends linearly for no more than 4500 metres. The Brenva, for years a valley glacier, has become a cirque glacier.

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