

Geological evidence of the existence of the paleolandslide: fracturing and folding

There were numerous geological and geomorphological “clues” that Edoardo Semenza was able to read and interpret, that led him to document a large paleolandslide on the north slope of Monte Toc. We summarize them here, but recommend that anyone interested in the details delve deeper into the arguments by reading Semenza’s book*.

The main clues were: a) the presence of “anomalous” rock masses in the valley (Punta del Toc and Colle Isolato); b) the irregular morphology of the north slope of Monte Toc, including changes in the gradient of the slope, large undulations of the terrain, extended terraces and depressions (Pian del Toc and Pian della Pozza); c) intense fracturing of the above rock masses; d) the existence of deep groundwater circulation, suggested by the presence along the whole Monte Toc slope of only one surface stream (the Massalezza Stream) that was almost always dry ; e) the presence of springs emerging from the debris at the base of Monte Toc; f) the distribution of the folds and of the deformed state of the rock mass; g) the presence of an “epigenetic” or new channel of the Vaiont Stream; and h) identification of the ancient movement plane of the paleolandslide.

The photographs on this panel illustrate the degree of fracturing and folding of the mass.



6 and 7 - The West Wall of Punta del Toc

Photo Edoardo Semenza, April 1960 | from Le foto della frana del Vajont - GS_31 and GS_30



Punta del Toc was a peculiar morphological element in the valley because it clearly stood out from the rest of the south valley wall. It was bounded by very steep rocky walls, which differed from neighbouring outcrops due to their peculiar structural characteristics.

The steep west wall exposed folds with axes running in an E-W direction and several large vertical cracks also with E-W orientations.

Towards the south (right in the photograph), fracturing and folding increased to the point that it was difficult to identify the attitude of the strata (photograph 6).

Only the wall overlooking the valley (to the left in the photograph 7) showed regular structure that appeared, from a distance, unfractured. This regular structure and the continuity of bedding planes was characteristic of most of the sub-vertical rock walls that constituted the lower part of the south slope of the valley (see photograph 8).

8 - The bottom of the south slope of the valley: the North Wall

Photo Cesare Manarin, 6 March 1960 | from Le foto della frana del Vajont - GS_37



The layers had a weak but constant dip towards the east and, from a distance, appeared unfractured. Along the sub-vertical walls are outcrops of the Socchèr Limestone and, below a large steep talus, the Fonzo Formation and the Vaiont Limestone. Numerous springs were present within the steep talus, emerging over a distance of 1 kilometer along the valley. The westernmost of these springs was characterised by high discharge. It were precisely observations from a distance of the regularity of these walls that led the greatest landslide Italian experts of that time (Dal Piaz, Penta) to reject the existence of the paleolandslide identified by Edoardo Semenza. The massive and apparently “undisturbed” character of the frontal part of the mass was interpreted by Semenza to be the result of secondary carbonate cementation that developed over a long period after the ancient landslide happened. At the top of Castelletto, light-colored, freshly exposed wall with rock strata visible at summit over snow-covered alluvial fan is evidence of a recent rock slide. See also photograph 17 of panel 8.

9 - The North Wall and its northeast edge

Photo Edoardo Semenza, 1 September 1959 | from Le foto della frana del Vajont - GS_40



Note the intense fracturing of the rock mass and the irregular dips of the sedimentary layers.

* Edoardo Semenza (2010). *The Story of Vaiont Told by the Geologist Who Discovered the Landslide*. Ferrara, Italy: K-flash [www.k-flash.it]

Original version: Edoardo Semenza (2005). *La Storia del Vaiont raccontata dal geologo che ha scoperto la frana*. Ferrara: K-flash Ed.