

Percorsi di ricerca

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Presentazione

Il presente numero di Percorsi di ricerca del Laboratorio di Storia delle Alpi (LabiSAlp) è il primo che vede la luce dopo la pandemia che ha colpito il mondo intero, determinando innumerevoli lutti e producendo conseguenze inaspettate in tutti i settori.

Anche il mondo della ricerca è stato colpito perché la chiusura generalizzata di archivi e biblioteche ha danneggiato il lavoro delle ricercatrici e dei ricercatori che si occupano di storia e di altri settori delle scienze umane.

È con particolare piacere, quindi, che presentiamo il terzo numero della Seconda Serie dei working papers del LabiSAlp.

Come sempre i contributi sono diversi per epoche e tematiche e con un'ampia varietà di temi anche se con una prevalenza di quelli legati al mondo del lavoro (Marco Bettassa, Nicoletta Rolla e Caterina Franco). Altri due contributi si concentrano sull'epoca moderna in modo diverso: uno esaminando l'opera di epigrafista di un importante umanista comasco, Benedetto Giovio (Dell'Era) e l'altro studiando la classe dirigente di Ägeri nell'Ancien Régime. Infine, il lavoro a cavallo tra scienza e storia di Mauricio Nicolas Vergara propone una interessante lettura di uno dei fronti alpini più tormentati della Prima guerra mondiale.

Luigi Lorenzetti, Vanessa Giannò, Roberto Leggero

Mauricio Nicolas Vergara

Avalanches in the Alpine front (First World War)
Preliminary study

Introduction

For more than two and a half years during the First World War (WWI), over an approximately 600 km long front in the Alpine range, hundreds of thousands of soldiers lived and fought in many places where battles had never occurred and, in some cases, where no human being had ever set foot. Fighting the war in such a geographical context brought the armies face-to-face with an unexpected enemy – the natural environment –, which often became even more lethal than the weapons of the opposing forces. Nature inflicted casualties on both the Italian and Austro-Hungarian armies in a variety of ways (e.g., frostbite, lightning, landslides, etc.). Among these, avalanches played a particularly critical role. The estimations found in literature of the number of avalanche-related casualties on the Alpine front are remarkable and range from 40,000 to 80,000 casualties¹.

Despite their critical importance, the causes and consequences of avalanche accidents in the war have rarely been the focus of

¹ See, for example, D. C. Angetter, *Dem Tod geweiht und doch gerettet: die Sanitätsversorgung am Isonzo und in den Dolomiten 1915–1918*, Wien 1995; A. Berti, *1915–1917, Guerra in Ampezzo e Cadore*, Milano 1996; C. Fraser, *L'enigma delle valanghe*, Bologna 1970; C. Hämmerle, «Eroi sacrificati? Soldati austro-ungarici sul fronte sud», in: N. Labanca, O. Überegger (Eds.), *La guerra italo-austriaca (1915–1918)*, Bologna 2014; V. H. Lichem, *Der einsame Krieg*, Munich 1974 and A. Roch, *Neve e valanghe: struttura e origine delle valanghe, le opere di soccorso; tecnologia della protezione contro le valanghe*, Milano 1980.

in-depth studies². Indeed, for example, none of the published estimations of the number of avalanche-related casualties are supported by any research.

At present, our knowledge about the role of avalanches on the Alpine front is principally founded on the information contained in war narratives that are, to varying degrees, based on individual experiences. These sources include the many first-hand accounts written during the war, such as diaries and letters, and works composed after the war, such as biographies, autobiographies, memoirs and narrative histories³. The reason such narratives are our principal source of knowledge for this topic is primarily owing to their availability. WWI is often called the «literary war» because it was documented extensively by its participants. No diary omitted to record avalanche accidents, suggested Diego Leoni⁴.

As natural phenomena were part of the authors' everyday lives, they were featured and treated widely and in detail in the narrative accounts of war. This makes the individual accounts and descriptions inside war narratives a crucial source for many of the aspects (psychological, social, military, etc.) of the role of the environment on this front. However, these sources have some disadvantages: they present local information, are extremely heterogeneous, and are not completely reliable. Because of these characteristics, these sources are scarcely

² The few exceptions of research studies on the role of avalanches in the Alpine front include D. Leoni, *La guerra verticale. Uomini, animali e macchine sul fronte di montagna 1915–1918*, Torino 2015 and Y. Brugnara et al., «December 1916: Deadly Wartime Weather», *Geographica Bernensia*, G91, 2016.

³ Different examples of such literature and its importance for the study of this topic can be found in D. Leoni, *La guerra verticale. Uomini, animali e macchine sul fronte di montagna 1915–1918*, cit., pp. 157–211.

⁴ *Ibid.*, pp. 166–167.

suitable for conducting collective studies to gain a comprehensive understanding of the role avalanches played during the war.

Given historiography's lack of interest in this topic and the sources on which our understanding of it has been based, current knowledge of the role played by avalanches on the Alpine front is rather uncertain and incomplete. This is particularly true not just for the actual extent of the consequences of the avalanche accidents (e.g., number of casualties and psychological impact on soldiers) but also for the factors that led to the causes of these accidents. Specifically, regarding the causes of the accidents, it is still unclear to what degree these were related to environmental or human factors. According to the Italian High Command⁵, among the environmental factors, the exceptional extreme weather conditions caused a large number of avalanches that often led to accidents. On the other hand, with regard to human-related factors, for Leoni⁶, the incompetence and haughtiness on the part of the armies and commanders were often the causes of avalanche accidents. For example, in his book, Leoni⁷ presented the memoir of the Kaiserjäger Francesco Laich, which suggests that the extended mountainside deforestation caused by the armies was responsible for avalanche-related accidents.

With the intention of filling some of the many gaps that currently exist in historiography concerning the causes and consequences of the avalanche accidents on the Alpine front, I am developing an interdisciplinary research project. Its aim is to create a complete picture that considers the whole Alpine front during

⁵ Report of 23 March 1917 that can be found partially in the web address: <https://www.cronologia.it/storia/a1917c.htm> (consulted on 13 July 2020).

⁶ D. Leoni, *La guerra verticale. Uomini, animali e macchine sul fronte di montagna 1915–1918*, cit., pp. 166–167.

⁷ *Ibid.*, pp. 166–167.

the entire war and the many historical aspects related to the role of this natural phenomenon on this front (e.g., psychological, social, military, etc.).

To achieve this objective, this project is based on the information of the Geodatabase of Avalanches and Avalanche Accidents on the Alpine Front (GAAAF). This geodatabase is being created with the information found not just in war narratives based on individual experiences but also in military documents. Statistical and geographical analyses of this geodatabase are conducted mainly using Geographic Information Systems (GIS). This paper presents some results of the statistical analyses of part of the geodatabase.

Materials and methods

The information for the creation of the GAAAF has been obtained from literature and military documents. Military materials like diaries, technical reports, studies and maps from military units and military offices, published or not, represent a crucial source for this research project. This kind of documents in comparison to accounts based on individual experience present the advantage that the information contained about avalanches and avalanche accidents has been collected for larger parts of the front with more standardized and systematic methods. These characteristics of the armies' historical documents foster their collective and statistical study.

Currently, the creation of the geodatabase is a process in progress. Information is still being added in regard to new and to already existing entries. Alike it cannot be considered complete, it also presents some not homogenous information for a part of the entries and this hinders the analysis of the entire geodatabase. For this reason, in this paper I present some partial results that stem from the statistical analysis of just a part of the entries in the geodatabase, whose information can be considered uniform. This part corresponds to the 188 entries of avalanches

that were extracted from the *Monografia delle Valanghe*⁸ (Comando scuola militare alpina, 1966) compiled by the Command of Alpine Military School, a section of the Italian Army. As some of these 188 avalanches that are registered in the geodatabase occurred multiple times, this part of the geodatabase considered in this paper counts 245 avalanche events that occurred in the Alpine front.

The analyses of this part of the geodatabase focussed on the spatial and temporal study (figures 1 and 2) and on descriptive univariate and bivariate statistics. The programs that were used for this analysis were ArcGIS and Excel.

Results

The spatial distribution of the avalanches (Fig. 1) in the analysed set of data shows that 34% of the avalanches in the Alpine front happened on the western side of the Tyrol salient (from Stelvio Pass to Garda Lake), 15% on the southern side of the Tyrol salient (from Garda Lake to the Valsugana), 40% on the eastern side of the Tyrol salient (from the Valsugana to Mount Peralba) and 11% in the Carnic and Julian Alps (from Mount Peralba to Mount Canin).

The black line indicates the borders before the war. The circles of dashed lines with the numbers inside indicate the percentage of avalanches over the total amount that occurred in each of the areas: western side of the Tyrol salient (from Stelvio Pass to Garda Lake), southern side of the Tyrol salient (from Garda Lake to the Valsugana), eastern side of the Tyrol salient (from the Valsugana to Mount Peralba) and the Carnic and Julian Alps (from Mount Peralba to Mount Canin). The largest amount of avalanches was registered on the eastern side of the Tyrol salient.

⁸ Comando scuola militare alpina, *Monografia delle valanghe*, 1966.

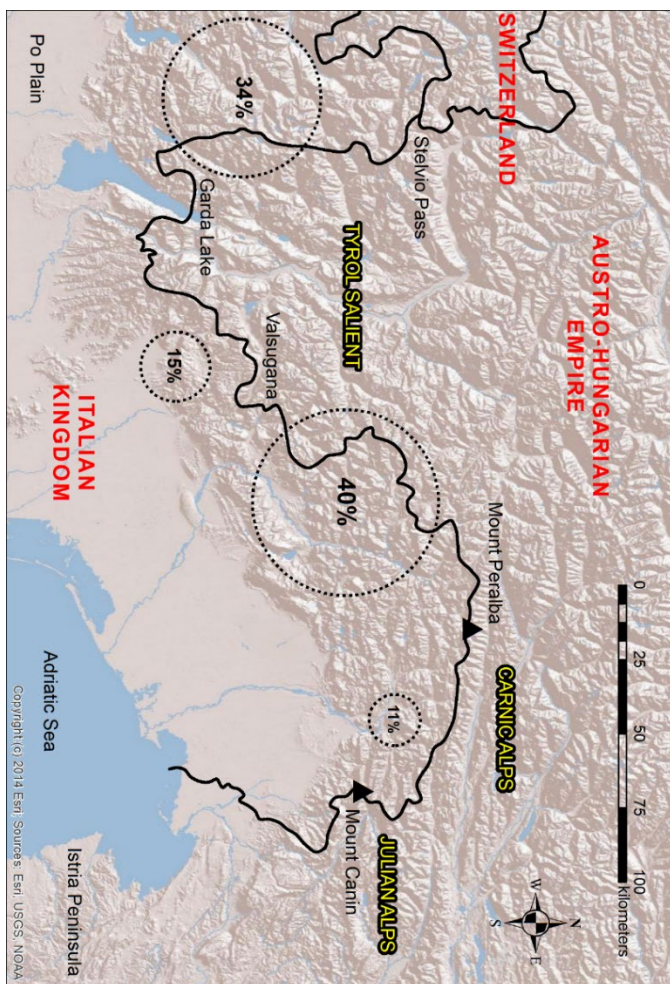


Fig. 1. Spatial distribution of the avalanches during WWI.

Concerning their consequences, the statistical analyses of the 188 avalanches in the dataset show that 68% of the avalanches caused one or more accidents. Avalanche accidents involved persons, animals, infrastructure and other man-made objects. Almost 89% of the accidents resulted in human victims, military and civilians⁹. The victims registered in the dataset are 1678. These are persons that were engulfed by an avalanche during the war. Among these, the military dead and wounded were, respectively, 891 and 495. Much lower was the number of civilian victims, 55 dead and 11 wounded. Civilians were frequently employed by the armies for working, for example, as bricklayers or as carriers for supplying the first line. The total number of dead is 946 and the death rate among the victims was 56%.

In the accidents, also different kinds of infrastructure and man-made objects were involved. 42 accidents concerned one or more infrastructures or man-made objects. These accidents determined, for example, interruptions of routes (e.g., paths and streets) and damages of buildings, cableways and telephone lines. These consequences of avalanche accidents were very important because they could determine the fighting capabilities of the armies and the living conditions of the soldiers. The category of infrastructure that was mainly involved in these accidents were *military shelters and huts* with 48% of the engulfed infrastructure belonging to this category. The second most frequent categories of engulfed infrastructure were *military telephone lines, civilian buildings* (e.g., huts, dairies and farms)

⁹ M. N. Vergara, *GIS Study of Avalanche Accidents in the Alps during First World War*, in: J. Kocián, J. Mlynář, P. Hoffmannová (Eds.), *Malach Center for Visual History on its 10th Anniversary: Compendium of Papers of the Prague Visual History and Digital Humanities Conference 2020*, Prague 2020, pp. 17–21.

and *military emplacements and weapons* (e.g., fortifications and observatories); each of these categories correspond respectively to the 12%, 12% and 10% of the engulfed infrastructure. Lastly, of the total amount of infrastructure involved in avalanche accidents 8% were *routes* (e.g., paths and local and national roads), 6% *military cableways*, 4% *military buildings and means related to logistics* (e.g., stables and storage facilities) and 2% *military buildings related to hospitalization*.

In addition to the useful information about the consequences of avalanche accidents, the developed analyses offered also valuable results for a better understanding of the causes of the accidents. In particular, the temporal analysis of avalanche events, accidents and victims shows the relevance of environmental factors. In this analysis, we observe that March 1916, December 1916 and April 1917 were the months with the largest amount of avalanche events, accidents and victims. Moreover, it can be seen that an increase of avalanche events corresponded often to an increase of the accidents and also of victims (Fig. 2). Specifically, for the relationship between avalanche events and victims, the analysis of 20 months of war in which avalanches occurred confirms that there is a very good correlation between these two variables. Indeed, the coefficient of determination (R^2) between them resulted 0.88 and the linear regression shows that for every one more avalanche event per month there are around 6.2 more victims. For each month of war in which were registered avalanches, this graphic shows the number of avalanche events and accidents and the percentage of victims over the total amount. March 1916, December 1916 and April 1917 were the months with the largest amount of avalanche events, accidents and victims.

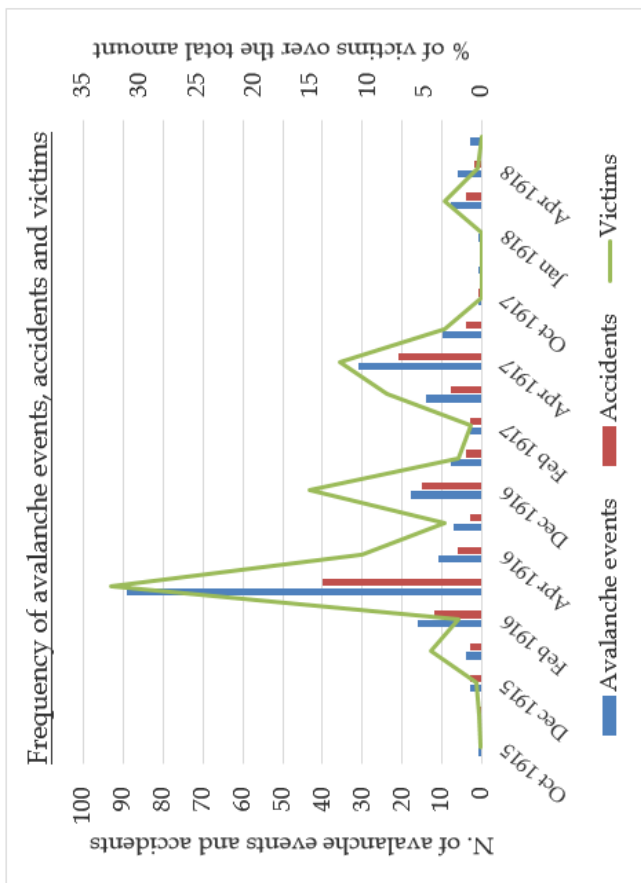


Fig. 2. Frequency of avalanche events, accidents and percentage frequency of victims

In addition, the obtained results provide some evidence that human-related factors also played a major role in determining the large amount of accidents. Indeed, the analysed data shows that, among the avalanches that determined accidents, a same avalanche caused almost 1.2 accidents in media. This recurrence is not irrelevant, when the media of victims per accident was 11.1, and leads to think of a lack of sufficient preventive measures by the commanders of the armies¹⁰.

Discussion

The interest for studying the relationship between WWI and the environment has grown lately, particularly during the last centenary of the war¹¹, however rarely these studies have been based on quantitative methodologies or materials and methods associated to the study of the environment. GIS, in particular, offers the possibility to integrate historical and geographical information. This allows to get a deep understanding of the relevance of geographical aspects in history and thus, in some cases, to gain a fresh perspective and to reconsider the military historiography based on more traditional methodologies¹².

This paper presented some results that were obtained using quantitative and digital methodologies and sources never considered before in the historiography of the Alpine front.

¹⁰ *Ibid.*, pp. 19–20.

¹¹ See, for example, J. Bürgschwentner, M. Egger, G. Barth-Scalmani (eds.), *Other Fronts, Other Wars?*, Leiden 2014; S. Daly, M. Salvante, V. Wilcox (eds.), *Landscapes of the First World War*, Cham 2018; F. Jacob, S. K. Danielsson (eds.), *War and Geography*, Leiden 2017 and R. P. Tucker et al. (eds.), *Environmental Histories of the First World War*, Cambridge 2018.

¹² See, for example, M. N. Vergara, A. Bondesan, F. Ferrarese, «GIS analysis of the trafficability determined by slope in the eastern Tyrol front (WWI, Eastern Alps): a military history reading», *Cartography and Geographic Information Science*, 45, 6, 2017, pp. 477–494.

These results, although they cannot be considered comprehensive and conclusive, provide some information valuable to the historiography of this front concerning this topic, where so far, the systematic studies have been few.

In particular, from this study we know the spatial and temporal distribution of a substantial number of avalanches and avalanche events during the war. In addition, some of the consequences that avalanches had during the war were quantified for the first time through a systematic methodology. Specifically, the kind of victims and of infrastructure and man-made objects that were involved in avalanche accidents were characterized. Particularly interesting are the results that could give some clues about the causes of the avalanche accidents. Indeed, the fact that, among the avalanches that determined accidents, a same avalanche caused almost 1.2 accidents in media is an important information. The relevance of this information is high because it leads to think of a lack of sufficient preventive measures by the commanders of the armies. In fact, this result seems to support Leoni's suggestion concerning the importance of human-related factors as the origin of avalanche accidents in the Alpine front¹³. In a nutshell, we can say that the results yielded so far confirm that this research project: can provide a picture at large scale that would be impossible to achieve without digital methods; can complete the information of the narrative accounts based on individual experiences and, lastly, can support or reject some suggestions that are present in the literature of this front in regard to the causes and consequences of avalanche accidents.

In addition to continuing with the creation of the geodatabase, this research project aims to develop different kinds of studies in the future. For instance, it aims, with the support of GIS, to study the spatial and temporal relationships of our dataset of

¹³ D. Leoni, *La guerra verticale. Uomini, animali e macchine sul fronte di montagna 1915–1918*, cit., pp. 166–167.

avalanches and avalanche accidents with other datasets. In particular, in our future analyses datasets concerning historical aspects, such as those of military emplacements, and datasets concerning geographical aspects, such as those of meteorological conditions during the war and topography, will be included. It is expected that the study of these spatial and temporal relationships will lead to a deeper knowledge particularly with regard to the causes of the avalanche accidents¹⁴.

¹⁴ I would like to thank Scribendi© (editor EM825), B.Sc. Hanna Möller and Ph.D. Iván Vergara Dal Pont for their help with English and statistics.