

Some aspects of the wartime work underground in the Southeastern Alps (Italy) during World War I and carried out mainly on the Marmolada and Adamello mountain ranges and on the Trentino highlands (Lavarone, Pasubio, Asiago), but also on the so-called backward front such as the Cadorna Line

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Abstract

This paper presents a significant and fundamental aspect related to the military endeavors that characterized the operations carried out during World War I (1915-18) between the Italian kingdom and the Austro-Hungarian power and that took place predominantly in the southeastern sector of the Alpine range. The military operations by the two opposing armies took place in a midand high-mountain environment that often exceeded 3,000 meters in elevation and was also characterized by a considerable extent of snow cover in the winter months and in year-round glacial cover beyond 2,500 meters in elevation. Military operations by both armies, in order to avoid openair movements, had to proceed with the excavation of specially dug-out, trenches and tunnels also to facilitate shelter for troops during the colder and snowier seasons. The most suitable and evocative place to reconstruct the conditions under which the military operations between the two armies forced to fight even against the difficulties of the environment took place in the harsh winters of those years, was certainly the majestic natural complex of the Marmolada glacier, today unfortunately greatly disfigured by numerous collapses due to glacial melting. In addition to the Marmolada, the war of position over snow and ice was also fought on the Adamello massif (which served as the border between Lombardy and Trentino, that is, between Italy and Austria). At the Passo della Lobbia alta, over 3,000 meters above sea level stands today a refuge named after the Fallen that can be reached by a cable car going up from the Val di Genova. The border that then divided Italy from Austria also ran over elevations located at lower altitudes, such as the karst plateaus of Bainsizza, dominated by the 682 meter of Mount Santo and etched by the course of the Isonzo River, which washed over the city of Gorizia before heading toward the Adriatic coast. When we speak of "war on the plateaus", we mean mainly the high lands stretching southeast and south of Trent (Lavarone and Pasubio plateaus). On the former were located as many as seven Austro-Hungarian fortresses, still interspersed with numerous remains of entrenchments, fortified positions, tunnels, and traces of old military roads. Greater notoriety, however, belongs to the Pasubio plateau overlooked by the peak of the same name (2235 m), possession of which would have favored the route of the Austrians to the Po Valley. During World War I, the Italian military authorities, in anticipation of a feared enemy offensive through Switzerland, decided to set up a system of fortifications that ran along the Italian-Swiss border from Mont Blanc to the Stelvio Pass. Even today, the remains of this structure, known as the "Cadorna Line", can be easily visited.

Keywords: wartime works, World War I, southeastern Alps.

The Great War

Today, after the experience of the bloody wars that dominated the first half of the 20th century, the State-Territory relationship is considered differently by geopolitical science. However, the memory of what the peoples of Europe, and beyond, represented those conflicts, with their articulated motivations, remains

a particularly precious heritage that every nation that took part in them cannot afford to disperse, on pain of obliterating a part relevant to its history.

This is especially true for the First World War, the Great War, from whose events it detaches us already a century that contributes, with the temporal distance, to cover its events with a mixed aura, between the romantic and the legendary. Perhaps the same could

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happen, in about thirty years, but even earlier, for the Second World War, whose painful wounds are still felt as deeply burning, showing all their raw realism, while the conflicts and hatreds that arose, they still agitate the minds of the nations.

This is perhaps one of the reasons why a very copious literature has flourished around the events of the Great War, fed right from the start by its most authoritative protagonists (army corps commanders and generals of the various armies), followed by journalists, politicians, writers, poets, historians and simple actors of those long 41 months. And the bibliography of this conflict, far from being exhausted, instead seems to intensify further.

With it, other initiatives have been developing, initially guided by pity for the hundreds of thousands of fallen soldiers (at least on national soil alone) with the erection of monuments and ossuaries (from Pasubio to Redipuglia), generally a destination for veterans and relatives, but today also of ordinary citizens as well as tourists or interested visitors. Gradually they were followed by the creation of museums and then the rearrangement of many places that saw the coming to life of those dramatic events: forts, trenches, tunnels, communication trenches, fortification roads, etc.

The war on the Marmolada glacier

The majestic natural complex of the Marmolada glacier, with its circle of rugged mountains, is certainly the most suitable and at the same time suggestive place to reconstruct the conditions in which military operations between two armies took place in the harsh winters of those years forced to fight also against the difficulties of the environment. Until recently it was possible to climb the northern side of the Marmolada from Lake Fedaia, with a comfortable chairlift that took tourists to Pian dei Fiacconi, i.e. directly to the front of the glacier. At the base you can still visit an interesting Museum of the First World War where you can find evidence of Italian and Austrian participation in common. Another interesting Museum of the Great War, inaugurated in June 1990, is located at over 2900 meters above sea level, at the Serauta station of the cable car that goes up the eastern side of the Marmolada, directly from Malga Ciapela. It was recently renovated after the catastrophic event of last year (Fig. 1) and inaugurated in 2023 with the name of "Museo Marmolada Grande Guerra - 3000 m".

The most interesting aspect was certainly represented by the interventions carried out during the conflict, initially on the Austrian side by Lieutenant Leo Handl who had the idea of using the thick frozen covers to provide for their excavation in order to obtain large spaces to use as a shelter for soldiers and equipment. In total it was possible to obtain a series of tunnels for a total length of about 12 km. This was the so-called *Eisstadt* (Fig. 2) of which a significant structure is reported here. It should be remembered



Fig. 1 – Plan of the Galleria Vittorio Emanuele III on the top of the Grappa. Detachment of part of the glacier (photo from the press).

here that something similar was also achieved on the Italian side but with a very small extension due to the smaller amount of ice. Today very little of all this remains, both due to poor maintenance and to the continuous movements to which the glacial mass is subjected, which is very sensitive, moreover, to the



Fig. 2 – Plan of the Galleria Vittorio Emanuele III on the top of the Grappa. The city of ice when it was installed in the Marmolada glacier.

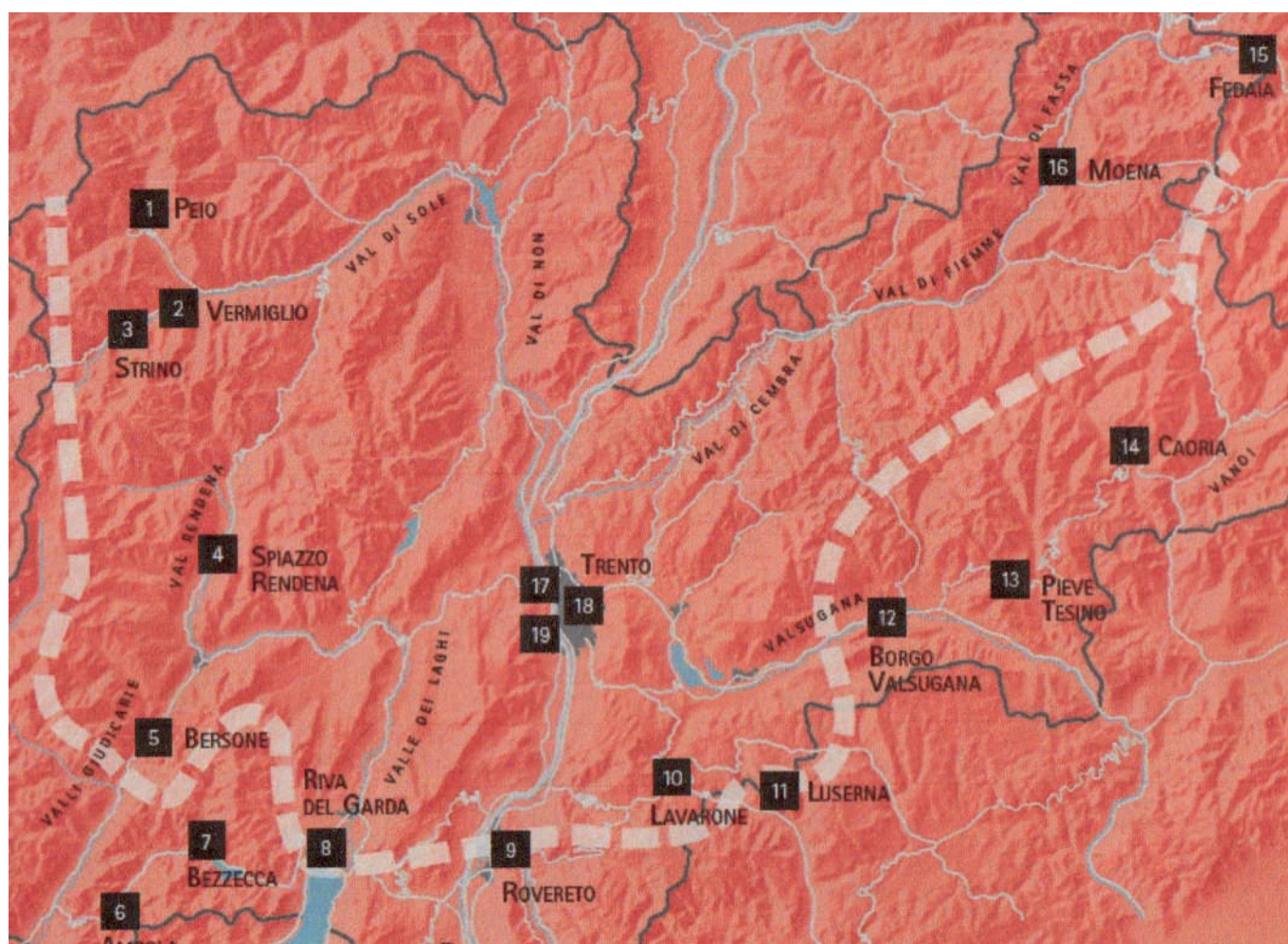


Fig. 3 – Plan of the Galleria Vittorio Emanuele III on the top of the Grappa. The network of museums of the Great War in Trentino region, by care of the Museo Storico Italiano della Guerra in Rovereto.

ever more frequent variations in the thermal conditions of the atmosphere. This is demonstrated by the sensational event that occurred in July of last year, 2022, with the atmospheric temperature of around 11°C, causing the detachment of a considerable mass of water, ice and debris for a total of around 64,000 tonnes. Unfortunately, this event also caused the death of 11 people. This fact was dealt with by a colleague of mine, Prof. Aldino Bondesan, who, in collaboration with other researchers from the Universities of Padua and Parma, recently published an interesting study in the journal “Geomorphology” (Bondesan *et al*, 2023).

The battles on the Adamello and the harsh winters on Ortles and Cevedale

In addition to the Marmolada, the war of position on the snow and ice, the so-called “white war”, was fought on the Adamello massif, also crossed at the time by the Italian-Austrian border. At the Passo della Lobia Alta, at over 3000 meters above sea level, today stands a refuge dedicated to the Fallen of Adamello.

It can be reached by a cable car that goes up from the Bedole refuge to the head of the Val di Genova, on the eastern side of the massif. The visit to what remains of the military posts on the Adamello is made more complex due to the particular environment in which the military operations took place, always at high altitudes, on the ridge which, in a north-south direction, winds from Carè Alto (3462 meters above sea level) to Corno di Cavento (3402 meters) and Crozzon di Folgarida (3079 meters).

The Italian position, well attested to the Garibaldi Refuge on the eastern slope of the Adamello, was also separated from the enemy formations by the intense glacial cover which closed to the north with the Presanella block which also reached an altitude of 3500 metres. Initially covered by their grey-green uniforms, only later were the Italian soldiers (mainly made up of Alpine troops from the Aosta Valley) dressed in white overalls which allowed them to blend in with the snow cover of the ground, thus facilitating their movements. The conquest of the Corno di Cavento was certainly a strong stimulus that also spread to the other fronts of the conflict. Here too, like what had occurred on the Marmolada,



Compared to the Marmolada and the Adamello-Pre-

The attached map, drawn up at the time, shows the



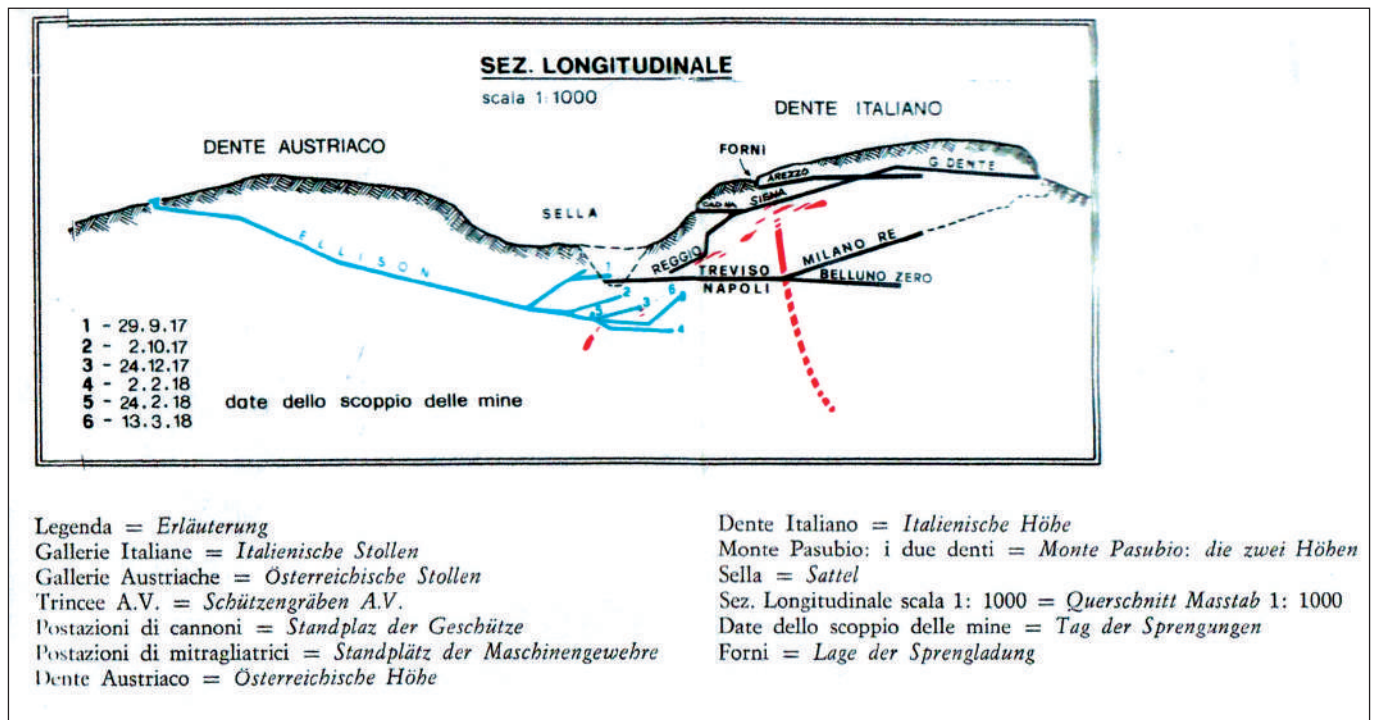


Fig. 6 – Plan of the Galleria Vittorio Emanuele III on the top of the Grappa. Longitudinal section of the Italian and Austrian Dents on Pasubio.

we are referring more specifically to the “tablelands” that extend southeast and south of Trento (plateaus of Lavarone and Pasubio).

On the Lavarone plateaus, which extend on average between 1200 and 1400 meters above sea level, seven Austro-Hungarian fortresses were located over a length of about 30 km, from the Cima di Vezzana (1908 meters above sea level) to the locality of Serrada (1250 meters, on the Folgaria plateau), still today interspersed with numerous remains of entrenchments, fortified posts, tunnels and traces of old military roads, a real “heritage of history and culture among the most interesting of all the alpine arc”, as can be read on the website dedicated to *The Great War on the Plateaus*.

One of the Austro-Hungarian fortresses that is recommended to visit, where an interesting museum is also set up, is that of Forte Belvedere (1177 meters above sea level), a short distance from Lavarone, built to guard the underlying Val d’Astico and the nearby Asiago plateau and today curated by the Belvedere-Gschwent Foundation. Considered “the best of military engineering of the time”, these mighty constructions were then known as “the Emperor Fortresses”.

Ma, forse l’altipiano più noto della Grande Guerra è quello sovrastato dalla cima del Monte Pasubio (2235 meters above sea level). As we read in the 2nd volume of the *Guida Rapida d’Italia* (AA. VV., 1994): “its total possession would have opened the way for the Austrians to the Vicenza plain and allowed them to take the Italian formation from behind, first on the Isonzo, and then on the Piave”. Therefore, bloody battles were fought on its rocky outcrops. For the military needs of such an environment, it was

necessary to proceed with the construction of numerous cableways for the transport of weapons and materials. Furthermore, it was necessary – as in its the hiking-mountaineering guide Cesco Zaltron describes in great detail (Zaltron, 1976) – to dig dozens of tunnels in the living rock for the passage of daring fortification roads, such as the road of the Prima Armata (also known as the *Strada degli Scarrubbi* due to the deep ravines it had to overcome), from the Bocchetta di Campiglia (1210 meters above sea level) to the Porte di Pasubio (1934 metres), and above all the famous *Strada degli Eroi* which from the Pian delle Fugazze pass (1160 meters above sea level) also leads to the Porte di Pasubio. The name of this road, already sadly known as the “Path of the Dead”, because those who went up it hardly came down it, recalls 15 gold medals awarded to as many fallen soldiers (officers and soldiers) who sacrificed themselves in the places it crossed.

Still on the Pasubio plateau, the “Road of the 52 tunnels” should be mentioned, today well equipped with ample parking at the Xomo Pass (1056 meters). In fact it is a mule track that winds uphill for just over 6 km and can only be traveled on foot up to the Gen. le Papa refuge (1934 meters). In its layout, 52 tunnels must be overcome which allowed shelter from enemy troops. From the Rifugio Papa it is then possible to descend after about ten km through the Val di Fieno to Pian delle Fugazze (1162 meters) along the *Strada degli Eroi* up to the Galleria del Generale d’Havet and passing three other tunnels. As for the Adamello and Ortles glaciers, here too the need arose to dig mine tunnels especially for the control of two reliefs called

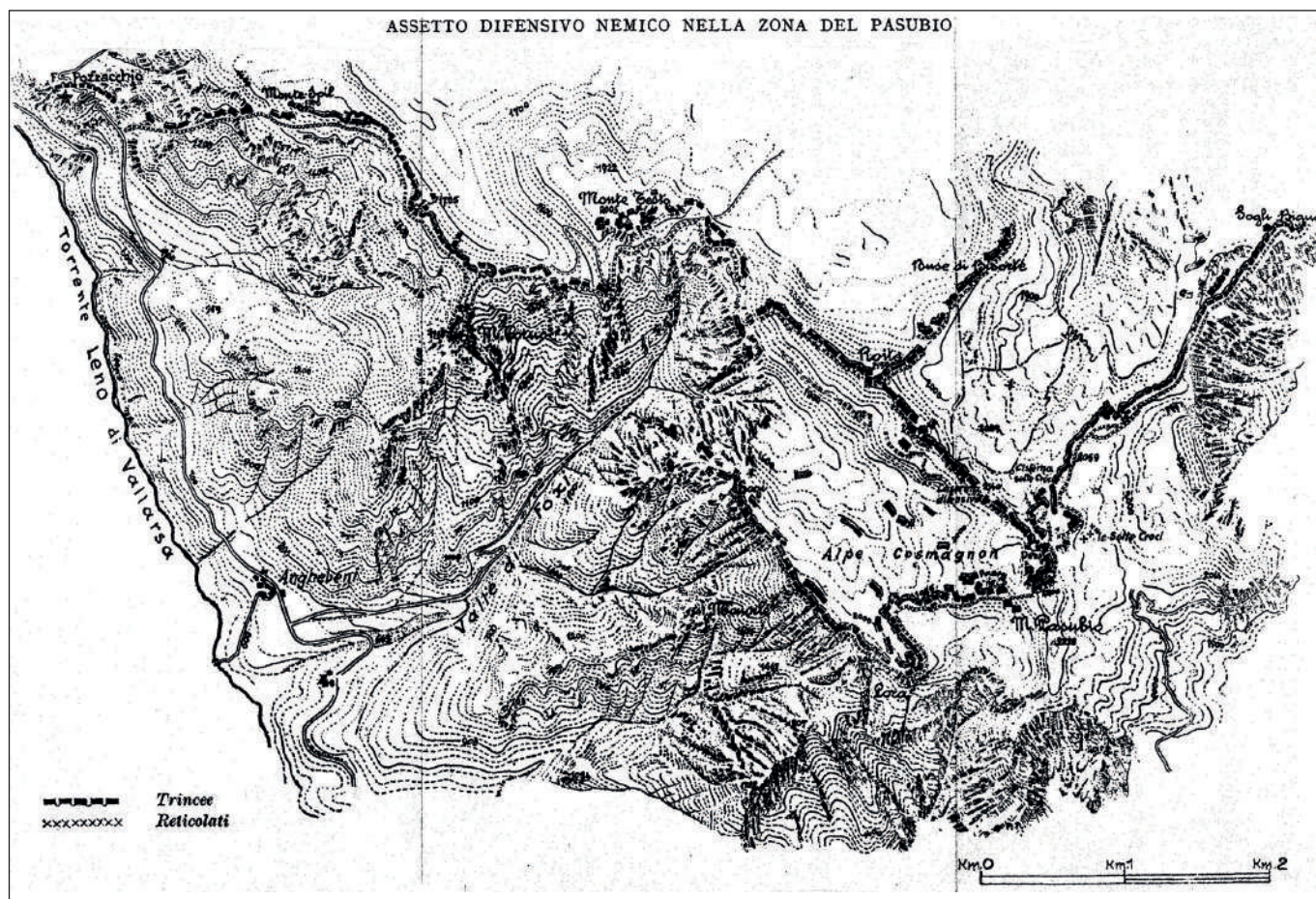


Fig. 7 – Plan of the Galleria Vittorio Emanuele III on the top of the Grappa. Defensive structure of the enemy in the Pasubio area, in the attached map (on page 310) from the fine volume by Gen. Schiarini published in 1926.

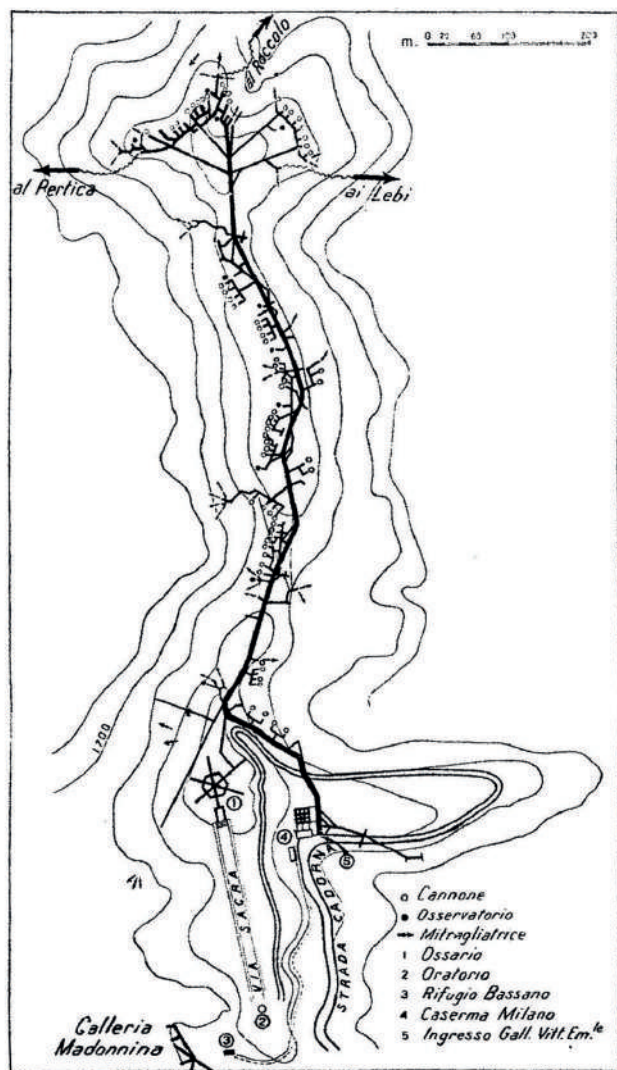
Dente Austriaco (2203 meters) and Dente Italiano (2220 meters) (Fig. 6), just north of the highest peak of Pasubio (Cima Palon, 2232 meters). The profile attached here shows the situation very well. Even on the surface, along the entire summit plateau of Pasubio there were also the traditional entrenchments and barbed wire fences as shown (Fig. 7).

A well-maintained bulwark by the Italian forces consisted of the calcareous-dolomitic relief of Monte Grappa (1775 meters), squeezed between the valleys of the Brenta to the west and the Piave to the east, whose control would have rapidly favored the Austro-Hungarian descent on the underlying plain padana thus constituting the keystone for determining the conclusion of the conflict. Indeed, in the autumn of 1917 the enemy forces managed to get considerably close to the important center inhabited area of Bassano crossed by the waters of the Brenta and dominated to the north by the bulk of the Grappa, but the residues of the Fourth and Second Armies reinforced by the new recruits of the “boys of ‘99” managed to block the enemy advance a few days before the eve of Christmas. Taking advantage of the winter break by the Italian troops, the excavation of a system of tunnels was started on the top of

the Grappa (at an altitude of 1700 meters) (fig. 8) with a central axis of about one km from which it was possible to dominate the low altitudes that surrounded Grappa itself with artillery. The following year the situation did not seem to improve, always towards the end of October, when the advance of the Italian troops, also reinforced by allied forces, towards Vittorio Veneto and Pordenone, risked isolating the Habsburg units, so their commander of the The Army of Belluno, General Ferdinand Goglia, issued the immediate return from all positions within the national borders on 30 October.

The trenches of the Karst

If in the winter season, especially at high altitudes, the construction of cavities inside the glacial masses was obvious, at lower altitudes, such as the plateaus, present between the high Alpine hills and the hills overlooking the Po valley, it was necessary to proceed to the excavation of real tunnels in the living rock (bunkers), with a considerable expenditure of muscular energy and explosion of mines. In territories affected by karstic phenomena, such as the Bainsizza



PIANTA DELLA GALLERIA VITTORIO EMANUELE III E DELL'OSSARIO SULLA CIMA DEL GRAPPA

Fig. 8 – Plan of the Galleria Vittorio Emanuele III on the top of the Grappa. Plan of the Galleria Vittorio Emanuele III on the top of the Grappa.

plateau, mainly made up of calcareous rocks, it was easier to make use of the presence of underground cavities, differently sized and therefore easily adaptable to military uses as well.

A more concrete idea of how the need for military confrontation was faced in a typical karst environment is provided by a chapter inserted in that large volume that all speleology enthusiasts should know: the “Two Thousand Caves” by Bertarelli and Boegan, published almost a century ago and containing an interesting chapter – written by the then colonel Italo Gariboldi who had headed the Italian delegation from 1920 to 1925 for the definition of the borders with Yugoslavia (Gariboldi, 1926) – on the use of natural caves in the context of a military conflict, obviously based on the techniques in use at the beginning of the last century. At the outbreak of the Great War, the Austro-Hungarian army had already adapted the rich heritage offered by the karst morphology of the territory im-

mediately east of the course of the Isonzo for military purposes. It was therefore very demanding for the Italian military contingent to face the enemy in unequal conditions, as later resulted from the frequent battles which culminated in the disastrous defeat of Caporetto. The difficulty encountered during the persistence of the conflict in this part of the chessboard is moreover highlighted by the high number of battles fought in the Isonzo basin: no less than twelve.

The back front and the Cadorna Line

During the First World War, the Italian military authorities, in anticipation of a feared Austrian offensive through Switzerland and aimed at attacking the national territory, decided to set up a system of fortifications that wound along the Italian-Swiss border from Mont Blanc to the Stelvio Pass. The remains of this which is locally known as the Cadorna Line (from the name of the then supreme commander, General Luigi Cadorna) can still be vis-

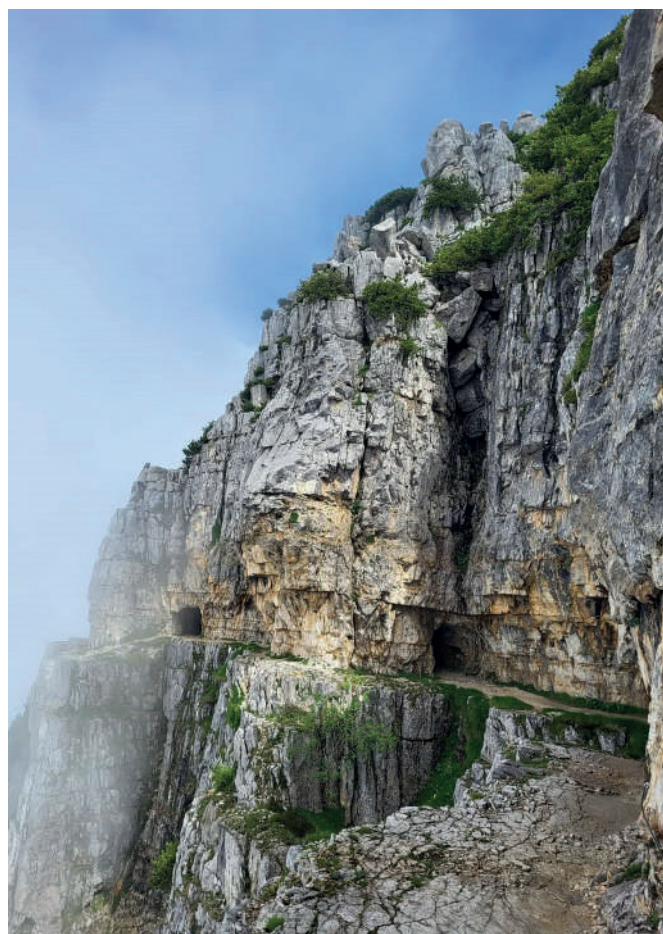


Fig. 9 – The “Strada delle 52 gallerie del Pasubio” (road of the 52 tunnels of Mount Pasubio). A route of about 6.5 km that overcomes a height difference of over 700 meters. Dug out of the rock in 1917 by the Italian Army engineers. It allowed safe and continuous supplies to our front line sheltered from Austrian artillery (CSS archive – photo S. Saj).

ited today, being generally quite well preserved despite the inevitable wear and tear of time and also because the places where they are located were not the site of military operations. Indeed, some of these installations were reused during the Second World War, such as Forte Montecchio, located at the mouth of the Valtellina, at the north-eastern end of Lake Como, whose cannons prevented the passage of the German column which was trying to transport Mussolini to Swiss territory.

Even these structures are currently being studied by enthusiasts who have organized specific visit itinerar-

ies and written interesting guides – among the most notable are those published by the Varese publisher Macchione (Corbella, 1998, Minola e Ronco, 1999) – full of historical and environmental references. In one of these Ambrogio Viviani (Viviani e Corbella, 2017) observes how “walking along these itineraries, the eye will be able to recognize, under the now predominant vegetation, the old communication trenches, the winding trenches, the paths, the mule tracks and the ruined military roads, the scary eye sockets of the caves and shelters, the dark and empty artillery emplacements”.

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