Spot the Fire, Amuse the Alpinist.
The Toposcope, an *in situ* Panoramic Device (1790–1910)

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Initially designed at the end of the 18th century to identify the exact location of a fire during the dark hours of the night, the toposcope became in the following decades a tourist attraction device. Thanks most of all to the work of Alpine and Touring Clubs, the presence of these instruments spread throughout Europe under many names (*Toposkop, Indicateur des Alpes, Table d'orientation*). Alpine regions have been their crib, but they rapidly reached other environments. Wherever there was a good 360° vision of the surroundings, a toposcope could be placed. They constitute a universe that is as connected as varied. The deep time of their technology and their applicative variations also testify a migratory path which resembles many other panoramic devices. The article aims therefore to media-archaeologically trace the major dynamics of the toposcope. Not to uniform them under a homogeneous history, but to reflect upon its role in defining the modern meanings of mobility and virtuality. In that, the toposcope represents an interesting point of view since, unlike many other panoramic devices, it provides for an *in situ* mediated experience. Sharing some features with Augmented Reality, the toposcope elaborates a different approach to optical immersive experience.

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Returning from a holiday in the Schinznach Bad spa in Switzerland, the French illustrator René Lacker published an article in 1895 in which he describes a device that was installed a few steps from the village and extremely captivating for passing tourists: the *Indicateur des Alpes* [Fig. 1]. As Lacker explains:

> *The utility of this* indicateur *is to give tourists the names of the mountains they see in the distance, whose uninterrupted extension over almost half of the horizon offers a majestic sight. The system consists of a semicircular table with the round part facing the panorama. On this table there is a ruler that rotates around an axis located in the center of the straight side, forming the radius of the circumference in which the table is inscribed. On this ruler, above the pivot point, there is a viewfinder and at the other end, in the direction of the circumference, there is a sight. On the table and in the respective directions are engraved the names of the main visible mountains. The spectators who want to consult the* indicateur *must stand on the straight side of the table, facing the panorama. With the ruler rotating around the axis, they aim at the peak whose name*

Fig. 1
Indicateur des Alpes près Aarau (R. Lacker 1895).

they want to know, as with a rifle, using the viewfinder and the sight; in this way they find a name on the table next to the sight: it is that of the targeted peak (Lacker 1895, 101–02; my translation).

Nowadays this kind of device has become widely used all over the world and can be seen in both mountainous areas and cities, as long as the instrument is positioned in a panoramic spot from which one can view a large portion of the surroundings. However, these devices are no longer called *Indicateur des Alpes*, but it is customary to refer to them as Toposcopes or *Table d'orientation* (Orientation Tables).

Throughout the course of this article, we shall endeavor to show how the dual terminology of the apparatus is not accidental, but rather refers to what, after taking up Siegfried Zielinski's media (an) archaeological terminology, are its two main variants: the surveillance form (the toposcope) and the tourist form (the *Table d'orientation*) (Zielinski 2019). An extensive part of the essay is devoted to reconstructing the geographical, as well as the applied and formal, trajectories of these devices throughout the 19th century. Some significant conclusions emerge: despite the versatility of their appearances and the fragmentary nature of the sources, toposcopes show a basic coherence that is built not on technological characteristics but on the relationships that are established between the observer and the environment being observed. In a similar manner to other 19th century devices, such as stereoscopes, toposcopes alter perceptions of a place by bridling the viewer's vision in order to provide iconographic coordinates for surveillance, entertainment, and education purposes (Crary 1990).

Additionally, this scopic dynamic is intimately linked to the ways in which multiple coeval panoramic devices virtualize the environment in order to reconstruct an immersive spatial unity (Oettermann 1980; Huhtamo 2013). A significant distinction exists, however: the toposcope lingers, despite its worldwide spread, a device utterly rooted in its real location. Its characteristics always depend primarily on the morphology and climate in which it is installed. A toposcope is thus perceived as a panoramic device that gives an impression of virtualizing an environment while remaining unmistakably *in situ*: it cannot be erratic; it can only be native.

The *in situ* tag is used in various disciplines (geology, archaeology, surgery…) to define a phenomenon or a procedure inextricably linked to its context of origin. Thus, by adopting this definition for toposcopes, we want to place the emphasis not only on their situated trait, but also on the connection they have with these disciplines. Particularly with geology, which has repeatedly proved to be a fertile ground from which to draw for media archaeology. From its German origins (Kittler 1985; Zielinski 2002) up to present-day reinterpretations of Jussi Parikka for alternative materialism and deep time of the media (Parikka 2015).

The gap that is therefore shaped between the virtualizing instance and the adherence to the real place is relevant not only as a key dynamic for understanding toposcopes, but also as a parallel to some emerging contemporary phenomena, i.e. Augmented Reality. As we will see, both of these instances convey an idea of virtual environment that does not operate by substitution—removing the actual place—but rather by a superimposition of otherwise invisible data and elements over the observer's direct view.

Lacker's article is a valuable starting point for studying the phenomenology of toposcopes since it offers a first trace and starting point for the contextualization of their variants in the technological panorama of the time: returning to the passage in which he deals with other devices encountered during his Swiss tour, Lacker describes the one located on the Lausanne bell tower as follows: "It had been installed so that night watchmen could recognize in the darkness the village or farm where a fire had just broken out, in order to send help there" (Lacker 1895, 102; my translation).

What Lacker believed to be an isolated case was the result of a much more complex historical dynamic. This represents the keystone for understanding the origin and characteristics of these apparatuses from a media archaeological perspective. It begins with the development of night surveillance and fire detection instruments, generally known as toposcopes, at the end of the 18th century. In the following decades, however, their original function would be abandoned and they would be readapted for new uses, mainly of a touristic nature, which was then followed by a new nomenclature: *Indicateur des Alpes* in Switzerland and *Table d'orientation* in France. But under these variations, we will see a common, hidden thread: that of the virtualization of environments, understood as an enhancement—an "augmentation"—of the human eye's capabilities.

THE *TOPOSKOP*: A NOCTURNAL SURVEILLANCE DEVICE

The first traces of the diffusion of the toposcope came around 1790 (Krügelstein 1799). In the German regions, and in particular in Leipzig, it was thought to exploit the combination of a map and a telescope from an elevated position. The aim was to solve a longstanding problem: the difficulty of pinpointing, during the night, the place of origin of a fire. The basic idea was to build a system capable of automatically providing the coordinates of the burning place, simply by correctly orienting a viewer towards the light source. It would seem that Lorenz Pansner was the first to make such an instrument, which he called the *Pyrotelegraph*.

For the device to work properly, it was advisable to choose a panoramic position, so as to be able to observe the territory undisturbed even from many kilometers away. Once the observation point was decided, the instrument had to be securely fixed so that it could not move during use. The next phase was the transcription of the points of interest in the surrounding landscape on a sheet fixed to the quadrant. If these procedures were followed, the observer could thus have determined the location of the fire.

The technology described by Pansner was the same which would later be used by other toposcope manufacturers. However, the *Pyrotelegraph* itself still presented too many technical limitations to be of any practical utility. It was presumably the numerous difficulties encountered in development that discouraged Pansner from continuing his research. His fellow citizen Friedrich W. Voigt took on the task, changing the name of the instrument from the less incisive *Pyrotelegraph* to the more pertinent ones of *Nachtfeuerkunde* or *Toposcop* (Voigt 1803).

While a still predominantly theoretical study was being carried out in Leipzig, Christoph Kunißß, a Lutheran pastor from the small village of Schwerstedt in Thuringia, built a personal variant capable of providing relatively satisfactory results (Krügelstein 1799, 95–99). Kuniß was forced to adopt a novel approach when he realized it would be impossible to accurately identify a point without the risk of mistaking it for another one, especially at considerable distances. He then installed four toposcopes in his study at the top of the bell tower, one pointing out of each window. Under them, he affixed a composite map not according to a single scale, but to a progressive relationship. This allowed him to keep more track of the farthest spots. Despite being satisfied with his accomplishments, Kuniß was also aware of the unrealized potential of the toposcope and suggested two critical innovations: the first was the introduction of a telescope that could facilitate remote observation; the second was the adoption of a topographical map to immediately find the corresponding place indicated by the instrument.

It took about thirty years to build a device that was convenient and precise enough to be used systematically; not on German territory, but in Vienna, the capital of the Habsburg Empire (Huysbenz 1879, 20–24). The project was carried out by the astronomer Karl Ludwig von Littrow who in 1833 established a system of four toposcopes on the highest tower of Vienna's St. Stephen's cathedral, in the heart of the city [Fig. 2].

Inspired by the functioning of a theodolite, Littrow manufactured his own *Toposkop*, equipping it with a telescope connected to two indicators, which—when the telescope was pointed towards a surrounding location—moved, identifying two different digits. Two unique coordinates which, if the device was

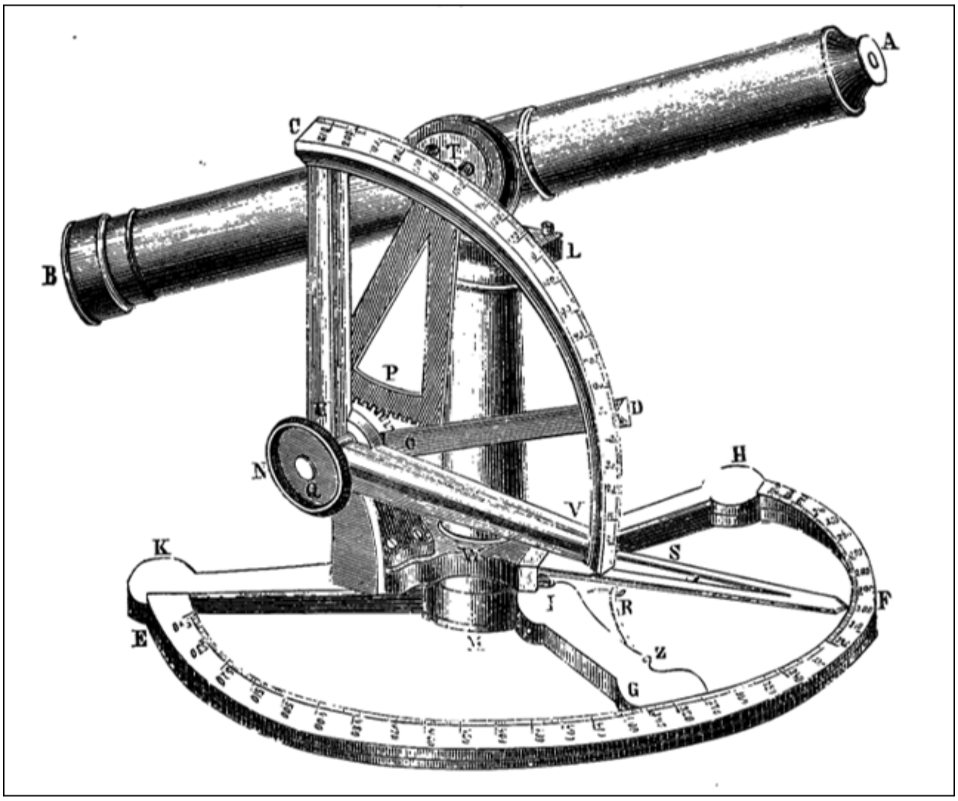

Fig. 2
Sketching of Littrow's *Toposkop* (Huysbenz 1879).

correctly anchored to the base, provided the exact combination of a street in the city or a place in its neighborhood. With the transition from a single indicator to two representing no longer a straight line but a single point, the toposcope was finally able to precisely define every visible district.

Therefore, it was necessary to create a register that indicated an exact address, which corresponded to each pair of coordinates. This was done so that, when the fire was spotted, the watchman could immediately read the location's name and send the alarm to the nearest fire station.

The device's coverage was exceptional and it was said that its only limit was the alpine horizon itself. The *Toposkop* remained the pride of the city for several decades. From 1855 the use of the electric telegraph was introduced to communicate directly with the authorities. In addition, starting in 1864, the tower was connected by telegram to eight peripheral branches (*Vienna, guida illustrata della città e suoi dintorni* 1873, 160–61). Unfortunately, the installation—which over the years had also become a tourist attraction—did not survive the bombings during the Second World War.

Although the Littrow version was the most famous and most prominent example, toposcopes were also adopted during the 19th century in other European locations, such as Strasbourg and Munich. In the Alsatian city, Jean-Baptiste and Charles Schwilgué filed the patent for their *Toposcope* or *Chercheur des lieux* in 1845 but, from the extant sources, it would seem that the apparatus did not arouse great enthusiasm (Schwilgué 1857, 115–20).

An example closer to that of Vienna is to be found in Munich. The device, here called the *Pyroskop*, was designed by the physicist and astronomer Karl August Steinheil in 1844. As in the previous cases, the *Pyroskop* was also placed on top of a church tower, in this instance the basilica of St. Peter. This version consisted of eight pieces due to the particular architecture of the room, equipped with two pairs of windows on each side. Each instrument was aimed at the surrounding landscape, using an orientation that allowed it to cover the entire horizon (Bachmann 1991, 135–36).

Contrary to the previous examples, the telescopes were no longer linked to a system of indicator hands. Instead, they were connected to a system of mirrors. These mirrors, by reflecting the light of a candle, projected a light beam on a panoramic image made with a camera lucida and placed just behind the viewer. There, the landscape covered by the instrument was represented according to a precise ratio. This meant that the point marked by the light beam coincided with that observed by the viewer.

Given the scarcity of sources, it is difficult to get a precise idea of the diffusion of toposcopes for night surveillance. Sporadic traces are found in various European cities and towns around the middle of the 19th century, but already at the end of it we see that they have fallen into disuse. The spread of communication tools such as the telephone seems to have made their application obsolete and superfluous. Nonetheless, several of these devices remained in panoramic spots and a new use was already outlining for them.

THE *INDICATEUR DES ALPES*: A MOUNTAIN TOURISTIC DEVICE

The first and most evident case that attests to the presence of toposcopic devices in the regions of the Swiss confederation is the *Toposkop* built in Lucerne by Louis Meyer, one of the city's esteemed entrepreneurial figures and the builder of the *Diorama Meyer* in 1856 [Fig. 3] ("Das Toposkop des Hrn. Ludwig Meyer in Luzern" 1852, 75; Schlinke 1853, 84–86). Valuable and detailed testimony of this instrument has remained:

> *Those who wish to reach their destination faster and easily can use the toposcope constructed by Captain Louis Meyer of Lucerne and placed under the signal post of Kulmes. The invention is so ingenious and of such great value for many purposes that it should not be overlooked, and a brief description may not be unpleasant to the reader. On two tables, one facing south, the other in the northern semicircle, is displayed the entire panorama of Rigi, with precise outlines and names, the indication of the height above the sea, and the distance in a straight line. A mobile telescope is fixed above the two tables, to which a pointer in the form of a sliding ruler is connected […]. In the future, the toposcope can play an important role in military reconnaissance and land surveying. Together with the circular color drawn on the board, it conveys simple orientation in a very eye-catching way. When we have pointed through the telescope at any place and want to know what it is, we only need to look at the table, where the pointer tells us what we want to know. A similar device on fire watch towers would be of great use. On the other hand, if we want to examine more closely a place we*

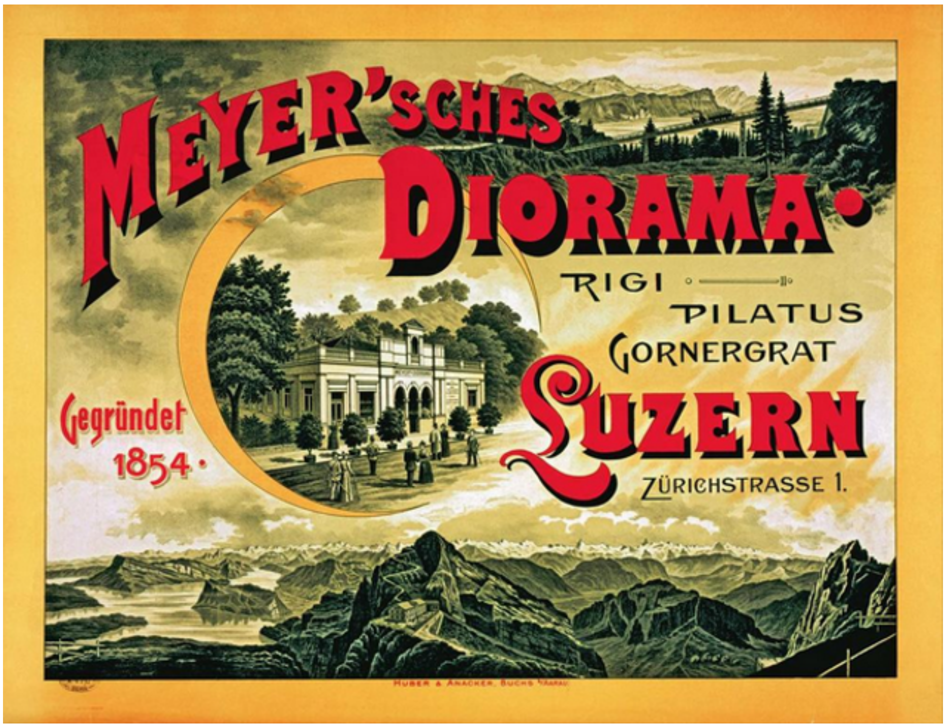

Fig. 3
Poster advertising Meyer's diorama (Swiss National Library).

know, we position the needle on the point marked there on the table. In this way, the telescope is aimed with the utmost precision (Schlinke 1853, 84–85; my translation).

The device was very similar to the Vienna toposcope from a technological point of view. Moreover, the instrument was placed on a similar panoramic spot from which the observer could monitor the surroundings. In that setting, though, the landscape was no longer the streets and quarters of a city, but the Alpine panorama. Unfortunately, the Lucerne toposcope suffered the same fate as the others. On July 28, 1852, some mountain guides destroyed the two boards and the lack of measures to protect the instrument by Swiss authorities prompted Meyer to suspend its restoration.

Here, however, the emphasis was not at all on the surveillance potential of the instrument, but rather on its ability to make the observer appreciate the beauty of the landscape. We see a sort of historical reversal: according to this and other testimonies, the nocturnal use of the device goes from being its main practice to one of its possible reuses. In this new perspective, a toposcope can be employed not only to locate fires, but also to sketch panoramas and to study the terrain in topographical as well as military terms. The whole Swiss experience of these devices is precisely described as one that breaks away from their original application, as they become instruments of visual enhancement for admiring the Alps. Following this revised meaning, the Swiss variants would represent a further "step forward" compared to the Littrow and Steinheil toposcopes, since they were characterized by an easier system that allowed for the immediate orientation of the viewer and provided the specific name of or data about a mountain.

The redesign of the toposcope for tourist uses and the simplification of the device are the two turning points for the diffusion of these instruments in numerous Swiss locations during the second half of the 19th century under the new name of *Indicateur des Alpes*, which emphasizes their clear affinity with both the Alpine territory and their illustrative function in providing information to an observer standing at the foot of the Swiss peaks. The term itself is almost coeval with that of the toposcope—at least in the Helvetic context. The lexical mixture between *Toposcope* and *Indicateur* is also evidenced by a number of examples in which the two terms alternate as synonyms (Tschudi 1899).

In 1882, one of the most significant of these new devices was installed in Neuchâtel, near the French border. It was an operation considered to be of public value, carried out by the Conseil général de la municipalité. However, the construction of it was also entrusted to an expert body: the Swiss Alpine Club. In summary, the municipality initially bought the land and then made it available to the Club, which was responsible for building, installing, and maintaining the *indicateur*. You can get an idea of the meaning that was attributed to the device in the report on the inauguration ceremony, on April 18, 1882:

Placed on a charming semicircular pedestal, the orientation table dominates the area in this place of Chaumont, from which the view

> *is the widest and most pleasing to the eye […]. What feeling does not seize you when you recognize in the distance, by means of landmarks engraved on the table, the peaks on which you have set foot, the glaciers you have crossed, the snow-free slopes you have climbed. We immediately forget the worries and dangers and think only of the radiant horizons of purple snow, the invigorating air that we breathe with full lungs, the wonderful carpets of flowers with which nature has so richly decorated our Alps, the joyful meals that end the days of arduous climbs ("Indicateur des Alpes" 1882, 3; my translation).*

Judging from the sources found for other Indicateur constructed during that period, the method adopted in Neuchâtel, with the cooperation of local authorities and the Swiss Alpine Club, was the standard procedure (*L'Echo des Alpes* 1894, 41).

It can be said that, towards the end of the 19th century, the phenomenon spread widely in the alpine regions that were popular tourist destinations, with particular frequency in the French-speaking ones. The main reason for the discrepancy between the high number of devices present in Switzerland and the few that were recorded in neighboring countries is probably to be found not in a hypothetical technological gap, but rather at a different organizational level: the high costs and the low (or nonexistent) remunerability of the devices required the initiative of entities able to cover the costs as well as effective coordination with local authorities which, initially, was only seen in the territories of the Confederation. It's worth noting that there are quite a few notable exceptions, as exemplified by the Novara *Indicatore*, the first Italian example ("Speciali deliberazioni della Direzione Centrale" 1878, 9–10).

In France, a new phase would start with the entry of a new player: the French Touring Club, which was able to be active in that country in a very similar way to the Swiss Alpine Club in Switzerland. As a result, the production and installation of *Indicateur*—now mainly referred to as *Table d'orientation*—drastically accelerated (Berthelot 1901).

THE *TABLE D'ORIENTATION*: A GEOGRAPHICAL EDUCATIONAL DEVICE

Returning to the article written by Lacker, we can now analyze the reactions that the text aroused in various readers of "La Nature". A response was that of a French traveler, H. Anot, who cited an example of an already existing table on French territory: in Lyon, at the Fourvière observatory, and which was by far the most beautiful he had ever seen (Anot 1895). The device is still visible nowadays, but a detailed description of its original form was provided by an anonymous citizen of Lyon in a booklet entitled *L'observatoire panoramique de la Basilique de Fourvière* (1896).

The author opens his pamphlet starting with a reflection on Lacker's article and on the responses aroused to justify his illustrative volume on what he called a *Panoramic observatory*, which was installed as soon as the construction of the basilica was completed in 1884. The church had been erected on the top of the Fourvière hill, a place historically known for the incomparable landscape that could be admired from there. The device was placed on the top of one of the four towers that stand at the corners of the church. At the tower's summit, it was possible to accommodate up to one hundred and fifty people between the cross fixed in the center and the external parapet. That was where the finely decorated circular table was placed [Fig. 4].

Contrary to the previous examples, the panoramic drawing was the result of a very elaborate artistic operation. However, beyond its particular aesthetic value, the table showed the surrounding landscape as usual, accompanied by the customary cartographic information (altitude of the mountains, bird's-eye distances, and points of general interest; not to mention the direction of the main cities of the world, from New York to Beijing and from London to Rome).

But, if there was no significant compositional difference, the Fourvière table could boast a more sophisticated technological apparatus than the devices generally found in the French territories. Rails were placed above the circular table and a large telescope could roll along them enabling even the most distant peaks to be seen clearly. This powerful device seems to have been so successful that, soon after the inauguration, the administration offered visitors the possibility of renting binoculars from the guards so that they would no longer have to wait their turn at the powerful telescope.

In the final pages of the booklet, the author recounts the experience of the panoramic observatory during the Exposition universelle, internationale et coloniale held in Lyon in 1894. Approximately one hundred fifty thousand people climbed to the top of the tower to enjoy the view. However, he explains, with results that were not always satisfactory: "Too often it [the landscape] hides itself under an impenetrable veil of mist, which no telescope can pierce and which offers only its uniformly grey surface to the disappointed curious" (*L'observatoire panoramique de la Basilique de Fourvière* 1896, 33; my translation). Therefore,

Fig. 4
Portion of a 360° image of the *Observatoire panoramique de la Basilique de Fourvière* nowaday.

despite the fact that it represented the most sophisticated and refined example of a toposcopic device, the panoramic observatory of Fourvière cannot be said to have been the most successful since the meteorological conditions represent a *sine qua non* for this type of instrument to be properly appreciated.

The dependence of the usefulness of a toposcope on the surrounding climatic and morphological factors is further confirmed by the next example. Another important response to Lacker's article was, in fact, that of Charles Alban Fournier, then president of the Vosges Alps section of the French Alpine Club. Fournier retorted by pointing out that there were already five different *Table d'orientation* installed in France, thanks to his section. He explains the many difficulties involved in installing these tables:

> *It was not easy to find a practical solution for this type of tables: in Switzerland, where tourists come in droves, especially at well-known points, you can make these installations, like the one described by Mr. R. Lacker; you can put a guard to watch them and charge a fee […]. In the Vosges, you needed a table that could be left and was strong enough to withstand the climate, the rain, the snow, the cold, the cattle and also—unfortunately—the man! So, it was out of the question to put these delicate apparatuses there. It had to be solid, massive, indestructible, so to speak, and free for the passersby (Fournier 1895, 170; my translation).*

In the Vosges, the devices are completely isolated and exposed to severe weather conditions that alter their characteristics. This is why that dynamic of apparent "simplification" which we witness in the variations from the surveillance *Toposkop* to the *Table d'orientation* is best defined as a process of eliminating the most vulnerable technical elements. Another fundamental aspect was the impossibility of obtaining any remuneration from the tourists who used the tables: this aspect inevitably affected the economic possibilities for the construction and preservation of the devices.

With the entry of the French Touring Club, the spread of tables experienced a significant uptick. At the beginning of the 20th century, the discussions about the toposcopic phenomenon shifted from proving the legitimacy and value of constructing these devices, aspects now ascertained given the numerous appreciations from tourists and Club members, to questioning the most correct methodology for creating them. For example, the adoption of more systematic procedures for the construction of the devices began to be proposed. Far from a simple request precisely because, as we have seen, each location had different possibilities and different criticalities. Another query was whether or not to use panoramic photography for the creation of the tables: was it advantageous to use a photogrammetric method to translate a shot with devices such as the *Panoram Kodak* or the *Périgraphe instantané* into a geographically valid circular image or was it preferable to stick to the traditional topographic drawing operations (Eydoux 1905, 84–87)?

Among the various discussions of these years, perhaps the most significant was that presented by the French geologist Philippe Glangeaud. He wrote an article in 1912 in which he reflected on the nature of the *Table d'orientation*, questioning above all their informative value and the idea of geography they conveyed. He pointed an accusing finger primarily at the habit of accompanying the image exclusively with merely notional information:

> *It does not seem to me necessary at first to give and keep the names of all the mountains or hills that are seen, nor their heights. Both are generally too numerous on any table, which leads to unnecessarily clogging it up. It would be better to emphasize above all the main points of the landscape, which are often drowned in the midst of secondary points. It is not appropriate, of course, to eliminate all memory issues; but they must be reduced to the proper level and arouse more of a spirit of curiosity, observation, thought, and discussion in the public. The current tables do not accomplish this goal; nor do the guides generally provide the documentation needed to understand what one is seeing. Above all, the tables offer only a cold enumeration of names and numbers (Glangeaud 1912, 251; my translation).*

The geologist believed that these kinds of tables reflected a contemporary tendency to teach geography merely through the enumeration of information and names. This was when it should instead emphasize the salient characteristics of a region, including its historical, geological and mineralogical aspects. As a result, a morphology of the invisible should be superimposed on the visible, creating not only surplus data (i.e., the height of a visible mountain) but also a way of seeing the landscape in which we can compare current and past forms visually, re-presenting the elements (forests, glaciers…) that have disappeared. To achieve this aim, the tourists must be first of all amazed and then they must

Fig. 5
Banne d'Ordanche's *Table d'orientation.*

be made to understand clearly a country's essential characteristics and not so much a list of names and numbers.

The suggestion was not only valid on a theoretical level, but had already been put into practice with the installation of a *Table d'orientation* in Banne d'Ordenche in 1911, designed by Glangeaud himself and financed by the Touring Club. On it one could see not only the infographic description of the visible panorama, but also the geological one with hatched areas indicating the location of the ancient and now extinct and eroded volcano of Cantal [Fig. 5].

In the early 1910s the production of toposcopic devices can ultimately be said to have reached a new phase: from the many purposes that had characterized their history in the previous century, a didactic-recreational use was now emerging that still characterizes them today. From production issues, we therefore moved on to reflect on the most effective tools to be used (drawing or photography) and, most of all, on the type of data to be entered (infographic digits or visual dynamics).

AN *IN SITU* VIRTUALITY

The media archaeological reconstruction carried out so far does not claim to cover everything there is to say about such a rich topic. It merely tries to elaborate the main features of this multilayered class of dispositives by showing the resilient properties that constitute a toposcope and, secondly, by using them to situate it in the constellation of virtuality. From this perspective, we can now contextualise the toposcopic phenomenon in the paradigm of the *virtual gaze* as defined by Anne Friedberg: "Not a direct perception, but one *received* through representation" (Friedberg 1993, 2).

There is a clear tension of *re-presenting* a landscape in the toposcopic visual experience, based mainly on a set of practices typical of other panoramic devices: the use of circular, all-encompassing images and the privilege accorded to the position of the observer. On this second point, it should be noted that many of the problems seen for the toposcope resemble those found in many contemporary (e.g., air balloon observation) and subsequent (drone strategy in modern warfare) aerial experiences pointed out by numerous recent studies (Kurgan, 2013; Kaplan, 2018). Indeed, it is the careful positioning of the observer in a dispositive, that let him contemplate and monitor the surroundings, that promptly define them as panoramic. Towers, peaks, open-air valleys… all these sites became part of a virtual architecture of the gaze that stimulates an enhanced, expanded, and undisturbed way of seeing (Berger, 1972).

A fundamental corollary of this kind of virtuality is the close relationship that intertwines between the technological constitution of toposcopes and the morphological and climatic characteristics of the environment where they are located. A toposcope design changes more based on their place of operation than it does for any of their applications: the complex devices of the first cities became simpler once they reached mountainous terrain, which was less sheltered and less controlled. It is a device to define specifically as *in situ* to emphasize the need to deal with circumstances case by case. This is due to their nature as objects that cannot be moved, even by a few centimeters. As Kunifß already understood at the end of the 18th century, toposcopes must always be oriented correctly and then firmly welded into place.

In this regard, the *in situ* qualities of toposcopes complicate the process of representation typical for other panoramic experiences since they do not align in terms of creation of immersive environments. Despite conveying an all-embracing vision of the landscape, toposcopes do not evoke in the observer the same sense of immersion as the coeval pictorial panoramas, in which the elements of presence and distance appeared to be confused, as if the real place had been swapped for the depicted one.

Diverging from this, toposcopes compensate for the shortcomings of the human gaze in the same environment that the observer can still see with the naked eye. It is not about creating a new setting, but about making a series of otherwise imperceptible characteristics visible. The distinctive trait of toposcopes remains the same whether used for surveillance, entertainment, or education: they do not create from scratch, but rather enhance the observer's ability to see. The recurring features in our examples illustrate the will to overcome the limits of the human eye to see into the distance (telescopic lenses), to recognize the identity of places (names of peaks, glaciers...) and to orient oneself (beyond the horizon references). It is indeed a process of visual representation by superimposition.

Taking the precautions that every historical parallel demand, the duality of pictorial panorama and toposcope seems to be reminiscent of Virtual Reality and Augmented Reality today. Two particularly significant phenomena in the

Fig. 6
PeakVisor Mountain Identification System.

contemporary media and artistic context (Chan 2014; Pinotti 2021). We refer to the latter as a set of techniques that use computer-generated information to enhance or increase our perception of the immediate environment. In Julie Carmignani and Borko Furht words: "While Virtual Reality (VR) technology [...] completely immerses users in a synthetic world without seeing the real world, AR technology *augments* the sense of reality by superimposing virtual objects and cues upon the real world in real time" (Carmignani and Furht 2011, 3). As evidenced by many smartphone applications, Augmented Reality makes you "leave the house" and explore a place firsthand. In particular, there is a number of AR apps dedicated to identify on-spot mountain profiles, such as *PeakVisor*, *PeakFinder*, and others. They provide a digital translation of the toposcopic mechanism, rendering terrain model and labeling the peaks around [Fig. 6].

There is a fundamental difference, though: where toposcopes are confined in one, fixed spot, these apps are linked to a movable device. The *in situ* characteristics so far delineated change now: where the necessary presence of the observer in the panoramic spot remains, alongside the superimposing dynamic, the accuracy of the dispositive is no longer granted by its unmovable quality, but by the ability of photo-cameras to recognize the location. We should then speak for this kind of AR apps still of a *in situ* way of seeing, but no more of an *in situ* support.

Nevertheless, AR and toposcopes both prove the *potentiality* inherent in the concept of virtuality, not so much as an alternative to reality (creating worlds, eliminating distances), but as a strengthening, yielding visual force. Glangeaud's reflections at the beginning of 1910s moved precisely along this axis. As the geologist pointed out, adding data and names is only the simplest way to achieve this enhancement. Toposcopes can be much more. They can provide a radically different visual approach to landscapes and, consequently, to image geography and cartography (Castro, 2011). As in the Banne d'Ordenche table, even the past can thus be present: the observer no longer sees the territory in its current aspect, but also in its inner and past dynamics. Although no specific cases have yet been found, it is easy to imagine how these AR apps can serve the same purpose by linking not only to practices of geographical visualisation, but also to climatic and ecological emergencies.

Considering all, the toposcopic phenomenology could really provide many insights for the contemporary visual scenario. The AR analogy should not be read from a genealogical perspective: not only is there no evidence of a direct filiation, but also numerous differences persist between them. The juxtaposition is quite significant in providing yet another example of how the perceived virtualization of environments is not exclusive to the digital present-day realm, but appears in analogous forms in a not-so-recent past. A dynamic that, to take up another term of geological origin dear to Zielinski, emphasizes the deep time of a media; the non-linearity and the recursion of both technological solutions and ways of seeing.

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