




Mediating Science in the Mountain: Rethinking the Historian's Craft through Digital Public Humanities

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Abstract

This article provides critical feedback on the design, development, and use of a multimedia website dedicated to a project on the history of science in the Alps during the Enlightenment. At the crossroads of the history of science and technology, experimental history, public history, and the digital humanities, this project serves as a good case study to explore the implications of the digital turn on the practice and dissemination of history. We show how our emphasis on eighteenth-century practices and materiality of science-in-the-making enabled us to reconceptualise historiography in the digital context. This approach encouraged us to produce our own archive for the project: a public website interweaving media and periods allowing visitors to reassemble materials according to their interests, thereby producing their own reflexive narratives and arguments. After presenting the website in detail, we analyze how a selected group of users engaged with it, raising core issues for the digital humanities. Conceptually, we discuss how this was achieved by aligning the mountain-as-a-milieu and the digital-as-a-medium to produce an ecology of media for a “public digital history”.

Introduction

Taming Mont Buet in the 18th Century

Located in the Haut-Giffre, twenty kilometres north of Mont Blanc as the crow flies, Mont Buet, formerly known as Glacier du Buet, is a geological gateway to the Alps as well as a forgotten threshold to scientific, literary, and artistic alpine expeditions. In 1770, two savants from Geneva, the Deluc brothers, achieved the first recorded ascent of this summit. In a quest to find fossils to document their history of the Earth, they used the Buet as a field for geology and mineralogy, as well as a laboratory for atmospheric physics and meteorology, conducting experiments with portable instruments such as a thermometer and a barometer [Middleton 1968]; [Sigrist and Heilbron 2011]; [Mihailescu et al 2025]. In 1775, the Genevan musician, writer, and engraver Marc-Théodore Bourrit in turn climbed the mountain. Imbued with the post-baroque culture of fieldwork observations, Bourrit brought back sketches of the mountains that were later transformed into engravings and published in various books. Bourrit brought order to a world once thought chaotic and untamable through his many depictions, thereby elating a new aesthetic sensibility of sublime and harmony, a peculiar “*sentiment de la nature*” [Joutard 1998]; [Moussa 1995]. Eventually, Horace-Bénédict de Saussure’s empirical and systematic study of the formation of the Earth also benefited from many expeditions on Mont Buet from 1776. Sending Bourrit back on the summit the following year with specific instructions and a dedicated drawing instrument, Saussure was able to publish the very first panorama (see fig. 1). In contrast with the early modern impression of mountains as permanent and immutable, this iconography sheds light on its slow but incessant metamorphosis, its movements and dynamics. In 1778, yet another expedition around Mont Blanc brought Saussure, accompanied by Genevan physicist Marc-Auguste Pictet, back on top of Buet. Conducting topographic surveys, Pictet was able to draw the first map of the surroundings of Mont Blanc solely based on the observation and measurement of empirical data, which was published in Saussure’s *Voyages dans les Alpes* in 1786. Thus, Mont Buet was gradually domesticated into a “laboratory of nature”, a controlled environment — framed by cartography, instrumentation,



Figure 1. The construction of the first “circular view”: Saussure’s first sketch, his instructions to Bourrit, and Bourrit’s published engraving in Saussure’s *Voyages dans les Alpes*.

Reconstructing Historical Expeditions in the 21st Century

Following the archival work, we launched the project *The peak that hides the mountain*. Between 2020 and 2023 we 1) assembled an interdisciplinary team of scholars (historians, anthropologists, sociologists [3]), two museum curators [4] , artists (a photographer, a drawing artist, and a sound artist [5]), a journalist [6] , and the broader public, all willing to engage with history in the wild and document, each in their own way, their ascent of Mont Buet; 2) replicated the mercury barometer carried on the slopes of Buet by the Genevan savants and reproduced the gestures they once made to measure the atmospheric pressure on different points of their paths; 3) reconstructed the expeditions, along with the observations, drawings, and measurements, carried out by the Genevan savants Jean-André and Guillaume Deluc, Marc-Théodore Bourrit, Horace-Bénédict de Saussure, and Marc-Auguste Pictet on Mont Buet in the late eighteenth century; 4) produced our own archive for the project in the form of a public website, montbuet.net, that interweaves media and periods, allowing visitors to reassemble materials according to their interests and thus construct their own reflexive narratives and arguments. The timeline of the whole project is illustrated in fig. 2 which can be read chronologically from bottom to top. It shows how the trajectories of a multiplicity of actors (represented by colors) crossed in diverse venues and events (represented by geometric shapes).

At the crossroads of the history of science and technology, experimental history, public history, and the digital humanities, we approached the mountain not only as a subject of study, but also as an actor which can shape the ways in which it is experienced and represented through narratives, images, quantitative measurements, and textual descriptions. Our goal was to convey this experiential thickness of the mountain in ways that would allow the scholarly community and the broader public alike to question and enrich our contemporary view of this space. Consequently, this research project led us to rethink the role of archives and media in the historian’s craft. [7] The ontological reappraisal of the physical environment as both a

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historical actor in the past and a historical source in the present critically challenges the traditional role of historians solely as narrators. If, indeed, a digital interface can be considered an “integral part of the argument” in digital humanities projects [Andrews and van Zundert 2018], the goal of montbuet.net was specifically to show the mountain’s historical agency, albeit without enforcing one specific narrative over another — or even the narrative genre in general. Acknowledging that historical practice involves intelligible mediation through collaboration with other disciplines, *we aimed to broaden the production of historical meaning by complementing the interpretation of existing media — a hermeneutics of the archive — with the creation of a new and reflexive multimedia archive.*

Le sommet qui cache la montagne

How to blend art, science, and history to capture the essence of Mont Buet? This project describes the reconstruction of a scientific expedition to Mont Buet in the Alps, undertaken by Genevan scientists at the end of the 18th century. In 2021, historians reproduced this experience using replicas of scientific instruments,

accompanied by researchers and artists to document their ascent. This new ascent of Mont Buet brought back different artistic, literary and scientific sensibilities. Today, a multimedia platform offers the opportunity to revisit this experience, combining various media to better understand the mountain.

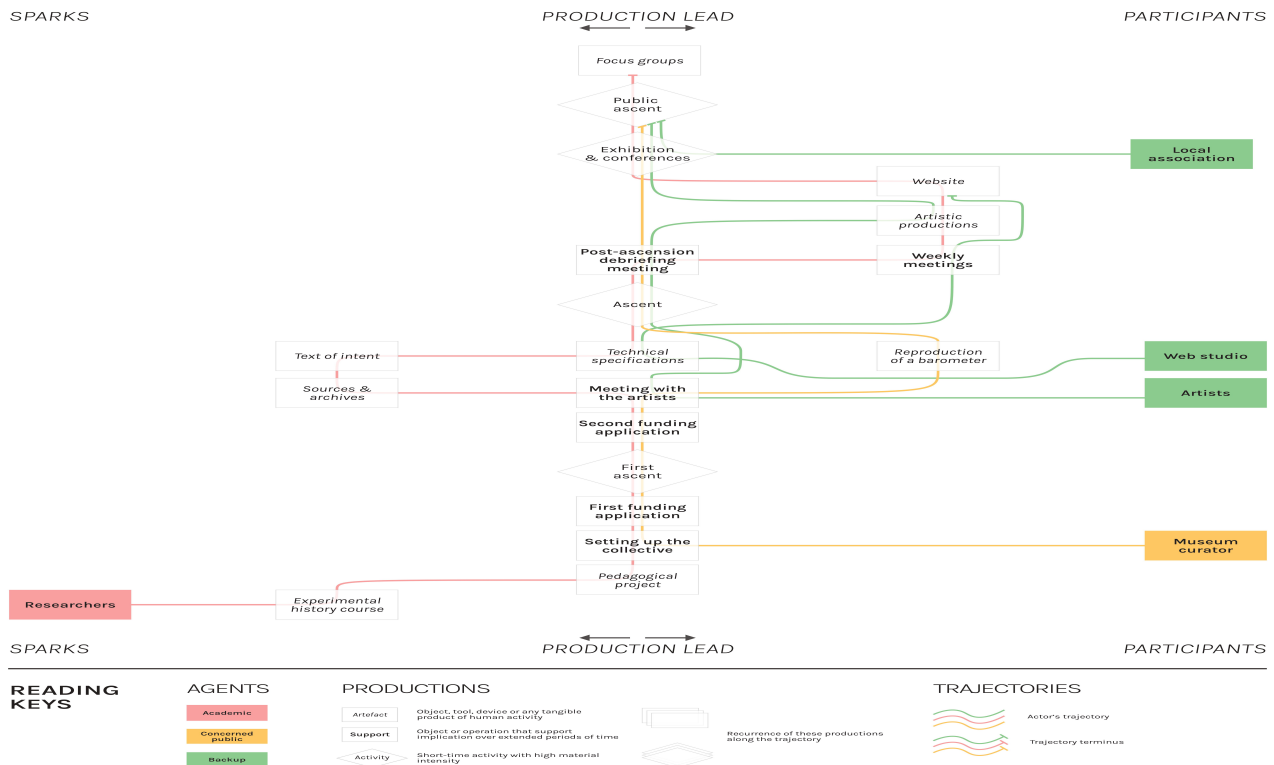


Figure 2. Timeline of *The peak that hides the mountain* according to the project “Trajectories of engagement” (<http://trajectories.sciencespo.fr>). It can be read chronologically from bottom to top. It shows how the trajectories of a multiplicity of actors (in color) crossed in diverse venues and events (geometric shapes). Severo M., de Mourat R., Ricci D. (eds.). *Trajectories of engagement*, Editions Annexes, forthcoming. Diagrams realised by Alex Pellier and Robin de Mourat.

Critical Feedback on a Digital Public History Project

This project serves as a good case study to explore the implications of the digital turn on history. Reflecting on almost two decades of digital humanities, [Noiret 2018] assessed the effects of the “digital turn” on the practice and dissemination of history. Seeking to rethink the historian’s craft in this context, Noiret coined the term “digital public history” to designate the new forms of interaction with the public that can emerge through contact with digital sources, new media, and computational methods and visualisations. In this spirit, we collaborated with a digital art studio [8] to create a dedicated website to host and display, employing various navigation patterns, all archival materials gathered and produced during the project — prints, manuscripts, drawings, engravings, sketches, sounds, photographs — as well as contributions from subsequent public participation. The design and development of such a website raises a host of issues for the “digital public humanities”, and for DH at large: How to design a digital tool that goes beyond the genre of historical narrative, allowing visitors to build their own path through history? How does the digital medium blur the boundaries between archive, museum, exhibition, and

repository? How do historical content and the historiographical approach — the mountain as space — allow us to rethink, by analogy, the role of the digital medium?

In the present paper, we provide critical feedback on the design, development, and use of the project's multimedia website <https://montbuet.net>. We first detail this peculiar project of "history in the wild" and dwell on the role played by various media in conveying scientific discourse — both for eighteenth-century physics and for contemporary history — and show how our emphasis on the practices and materialities of science-in-the-making allowed us to reconceptualise historiography in the digital context. We then present in detail the website and provide critical feedback about its use and perceived status by a group of users who participated in a focus group. Finally, we conceptualise the mountain as a lived and living space that is at the same time a past historical actor and a current historical source; a *milieu* that can be navigated and made sense of by seizing traces and clues along the way, and by assembling them according to one's own narrative or logic. The navigation of a digital milieu thereby becomes one way of seizing this mountainous space in its anthropological and environmental thickness: matching the mountain-as-a-milieu and the digital-as-a-medium, it becomes possible produce an ecology of media for a "public digital history".

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1. History in the Wild [9]

As we have seen, the experience of Mont Buet has always been highly mediated using many different forms of material representation from texts and images to experimental practices that yielded diagrams and charts. Many different media that have always been woven together by the actors themselves in a ceaseless effort to convey their experience of the physical environment in the most faithful way. Many different media that the very agency of Mont Buet has always shaped, to the extent that some actors complained about the limits of their media — such as Jean-André Deluc in the epigraph of this paper —, while others invented new forms of media — such as Saussure's circular view engraved by Bourrit —, or coined specific terms to designate previously unobserved geological formations — such as the concept of "glacier" systematically defined for the first time by the Delucs and Saussure.

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Building on this history and the digital humanities, our perspective helped us reflect on the nature and function of media and their weaving — be they textual descriptions, drawings, charts, photographs, sounds — in the communication of scientific, literary, artistic, and touristic experiences, as well as in the collective production of the mountain space. In this first part, we show how specific attention given to the materialities and practices of media allowed us to rethink historiography in a digital context.

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An experimental history

Research on the history of mountain spaces has produced nuanced accounts that offer new perspectives about the cultural [Dora 2016]; [Reichler 2013], political [Hansen 2013]; [Mathieu 2013], artistic [Mark et al 2017]; [Oettermann and Schneider 1997], environmental [Mathieu 2019], and scientific [Sigrist 2011]; [Felsch 2009] aspects of mountain explorations. While some studies have highlighted how mountains influenced the forms of knowledge produced there [Felsch 2009]; [Becker 2009]; [Gal 2018], the mountains themselves are often approached only through the narratives of the historical actors. Yet, mountains in general, and the Alps in particular, were long considered dangerous and barren lands, if not simply an uninteresting and remote void. For good and for ill, the scientific expeditions undertaken by the Genevan savants at the end of the eighteenth century greatly contributed to the taming of Mont Buet and its surroundings, paving the way for both scientific and touristic activities and practices.

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For several decades, historians have drawn attention to the material practices and objects involved in the production of knowledge. In the past few years, historians of science have also started engaging directly with material practices and scientific objects by reconstructing experiments in laboratories (see [Fors, Principe, Sibus 2016]). Though insightful, these reconstructions of past experiments have focused on the controlled and purified environment of the laboratory. However, as a vast literature in the history of science shows, the practice of science outside the laboratory confronted the practitioner with distinct issues (e.g. [Kohler 2002]; [Vetter 2011]). Special practices (e.g. note taking), instruments (sturdy, portable), or people (e.g. local informants) had to be deployed to navigate wild and unpredictable environments. We designed this project to develop and test a new approach for engaging directly (and complementary to traditional historical sources) with the material agency of physical environments to reveal the role they played in shaping new practices, scientific instruments or objects, forms of knowledge, even soundscapes [Valsangiacomo and Chanteloup 2023] and taste [Valsangiacomo and Mathieu

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From this “experimental history” perspective, we reassembled an interdisciplinary team of scholars and artists, we replicated one of the mercury barometers preserved at the History of Science Museum in Geneva (see fig. 3), we reenacted the expeditions of the Deluc brothers, and of Bourrit and Saussure, and we produced our own multimedia archive of the project. The reenactment of past experiences and experiments helped us capture the subjectivity of the actors beyond the written and visual traces they have left of their action. This, in turn, deepened our understanding of their situated accounts and revealed why some experiences may escape certain media while yielding to others. We therefore aimed to reconstruct how the mountain space previously experienced as a wild and frightening world was tamed through scientific measurements, narratives, and images. While relying on the considerable amount of notes, publications, and instruments left by the Genevan savants, the reconstruction of the expeditions let us better understand the tacit skills, instruments, and procedures employed in producing these descriptions of Mont Buet.

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Drawing from this experience of the physical environment as a historical source, as well as from recent ontological developments in history and humanities at large (e.g. [Knappett and Malafouris 2008]; [Ingold 2011]), we aimed to conceptually reappraise the physical environment as a non-human actor which it has become necessary to take into account as such. Ascending Mont Buet therefore allowed us to go beyond the more modern representation of mountain space as an immutable mineral obstacle to overcome, or as wild heights to domesticate [Simpson 2019]. In opposition to that physicalist view, we conceptualised the mountain as a lived space that shapes the experience of its visitors and the knowledge and narratives they bring back from it. By depicting Mont Buet as a living space as well, an ever-changing milieu, we intended to re-endow it with its very specific agency.

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Figure 3. Contemporary replica of Deluc's barometer on the summit of Mont Buet (Assembled by Stéphane Fischer; Photograph © Olga Cafiero).

A public history

These trends in the history of science and technology that approach past knowledge in an “experimental” manner also helped us rethink the role of public engagement in the historian’s profession. One of the major consequences of moving the practice of history outside of its traditional, rather secluded enclosures, into the wild, is to move the writing of history further into the public sphere. The same was true for the knowledge pursued on the slopes by the Genevan scholars of the 1770s, who cared deeply about the communication of their research not only to their colleagues but also to the wider public. Prior to the advent of modern touristic guidebooks, these savants published their own experiences and experiments using a very specific genre that let their readers undertake their very own expeditions to the summit of Mont Buet. Providing the curious readers with travel directions, distances and toponyms, caveats, even the names of local guides and how to pronounce them, Deluc, Bourrit, and Saussure fostered the birth of tourism in the region [Mihailescu et al 2022].

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In following their path through the historical reconstruction of their expeditions, we also aimed to create a vast and reflexive multimedia archive that can add to and be contrasted with the historical archive. To this end, we collaborated with artists who joined us on the field and produced multimedia material for a series of outreach events. While the historians and the curator reproduced past experiments with the replica of a barometer and other instruments, the media artists recorded the life of the mountain, the reenactment of the experiments, and the social and psychological dimensions of the expeditions. Along the course of the project, this public history took many shapes, and the website is only one element in a constellation of multiple mediations. Besides specialised and generalist publications [Mihailescu et al 2022]; [Dumas Primbault et al 2022]; [Mihailescu et al 2025]; [Baudry et al 2026], as well as a radio show [Dumas Primbault and RTS 2022], a series of public exhibitions were organised in different venues between December 2021 and February 2023. To explore the potential of visitors’ navigation conceived as sense-making, as well as to take advantage of the specific materialities of the digital, a dedicated website was developed jointly with a digital art studio and aimed at making the past and contemporary archives accessible to anyone. The goal was to allow visitors to navigate, manipulate, and reassemble this source material according to their interests and perspectives; as well as to garner and preserve the private archives of visitors willing to share their own experience of Mont Buet.

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A digital history

Putting archival production at the heart of the historian’s craft, the main outcome of this project was the creation of a multimedia archive documenting the whole endeavour. The collected material was curated on a multimedia website (<https://montbuet.net>) where users can steer their own course through the material, commentaries of it, and external resources. Different levels of engagement are made possible: from visiting a digital exhibition, centred on the materiality of the documents gathered and on the material produced, to exploring links pointing toward the institutional archives and other more academic resources; ^[10] from mere consultation to interaction with the material exhibited and the team behind it. Symmetrically, the website is participative and allows anyone to contribute their own material: all the data collected is made open for visitors to seize and transform into other meaningful arrangements.

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Instead of depicting the mountain through a single lens as the passive object of a representation, we employed the website to interweave the different media representations so that the agency of the mountain in shaping the representations of one media is observed through the lens of another. To this end, rather than conceiving this archive as a mere database with a search engine, we endeavoured to develop a “generous interface” [Whitelaw 2015] allowing visitors to display the multimedia material according to four different frameworks — geographical, temporal, topical, and archival — and to reassemble it using tags and filters related to the types of documents, the time periods, and their content. Conceiving of the digital interface as the locus of coupling between the multimedia material and the users, the goal was to provide them with affordances allowing for a guided navigation through the corpus [Ruecker, Radzikowska, and Sinclair 2011]; in our eyes, a necessary condition for “relationality [...] to emerge from the data” [Drucker, Polack, and Santachiara 2022]. As such, the montbuet.net website can be understood as a “middleware” [Drucker and Svensson 2016] *i.e.* a digital medium whose materiality and structure shape the kind of argument one can make using the material it displays or, in other words, how one may think with and through the interface and the underlying architecture of the digital device. Not only does this mediatic *dispositif* allow for a more direct public mediation to and involvement of the wider public by circumventing the ivory tower effect, it also pries open the black box of historiography, to the extent that hikers on Mont Buet as well as visitors of the website can write their own narrative either by reassembling the archive their own way, or by participating in its construction.

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2. A Museum, an Archive, or a Repository?

Rather than striving at a panoptical view from nowhere synthesising the mountain in an immersive totality, the website, as a criss-crossing of media, highlights the partiality of each perspective while revealing the intersubjective dynamics at play in the representation of such complex situations. By producing multimedia records of all the material and social practices entailed by the expeditions on Mont Buet, including the recording practices themselves, this approach relied on the entanglement of perspectives: seeing one medium practice through the lens of another medium — e.g. drawing the photographer at work — helped us to shed light on the intricacies of such a mediated experience of mountain as a lived space.

The website in brief

The visitor reaching the homepage of the montbuet.net website first encounters a very short description of i) the historical scientific expeditions, ii) their multiple contemporary reenactments, and iii) the role and function of the website. Upon clicking “Enter”, this introductory text disappears while the mountainous background fades in and exhibits the first elements contained in the repository on the right-hand side (see fig. 4, that shows a series of photographs, taken higher up in altitude, shared by a visitor). Before dwelling on the three possible ways to navigate the multimedia archive, let us go through the upper menu. Under “Digital Museum”, the “List of the Archives” page — or archival view — allows visitors to simply scroll through all the content hosted on the website, display each element with its metadata, open the full screen view, reorder the list by title, date, altitude, or media type, or follow the linked media by clicking on the chain links depicted after the title (see fig. 5). The “Submit an archive” page allows visitors to upload their own files by describing and locating their submission on the map. The “About” page contains a more detailed explanation of the whole project, together with the biographies of all artists. The “Events” page hosts announcements for all future, ongoing, or past events related to the project. Finally, there is a contact form and a button to switch between French and English.

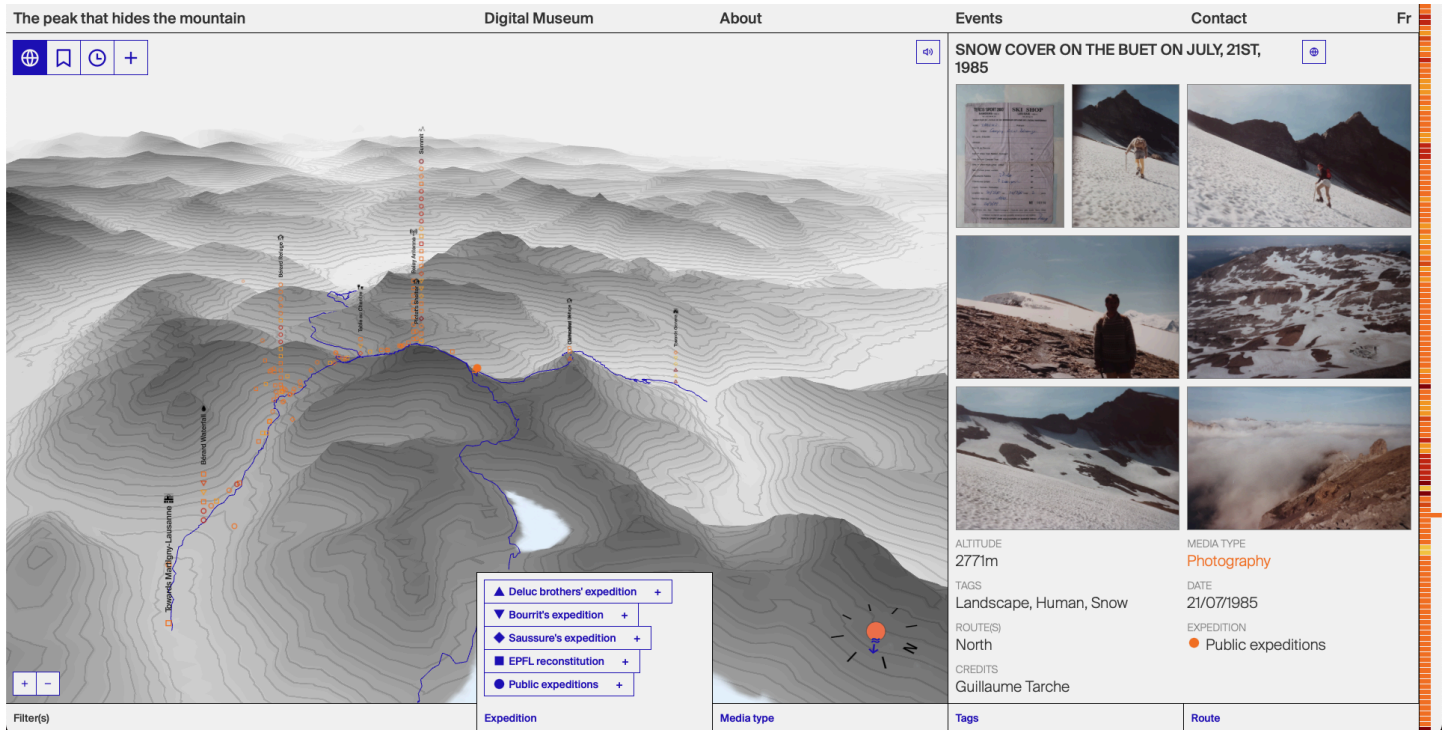


Figure 4. Screenshot of the geographical view of https://montbuet.net










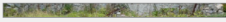

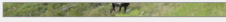
The peak that hides the mountain	Digital Museum	About	Events	Contact	Fr
TITLE		DATE	ALTITUDE	MEDIA TYPE	
RUMEX ALPINUS IN FRONT OF BÉRARD VALLEY  Watercolor and Indian Ink on Paper 40x50cm			ALTITUDE 1927m TAGS Landscape, Flower ROUTE(S) South CREDITS Pascale Favre	MEDIA TYPE Drawing DATE 27/08/2021 EXPEDITION ■ EPFL reconstitution	
LEPORELLOS AT THE REFUGE		27/08/2021	1927M	DRAWING	
LAURA		03/09/2022	1927M	SOUND	
ROXANE		03/09/2022	1927M	SOUND	
ROXANE AND LAURA		03/09/2022	1927M	SOUND	
BÉRARD REFUGE		13/07/2022	1927M	PHOTOGRAPHY	
MONT BUET		13/07/2022	1927M	PHOTOGRAPHY	
HELICOPTER TRANSPORT OF GOODS FOR THE BÉRARD REFU...		13/07/2022	1936M	PHOTOGRAPHY	
TÊTE DU RET		13/07/2023	1936M	PHOTOGRAPHY	
AIGUILLE DE SALENTON		13/07/2022	1936M	PHOTOGRAPHY	
ROCAILLES ET VÉGÉTATIONS AUTOUR DU REFUGE DE LA PIER...		13/07/2022	1936M	PHOTOGRAPHY	
RUINS OF THE BUET CHALET-HÔTEL		03/09/2022	1955M	PHOTOGRAPHY	
AIGUILLE MORRIS ET DE MESURE		13/07/2022	1955M	PHOTOGRAPHY	
ALPINE IBEX		03/09/2022	1964M	PHOTOGRAPHY	
BOILING WATER EXPERIMENT, GRENAIRON		12/09/2020	1974M	PHOTOGRAPHY	
Filter(s)	Expedition	Media type	Tags	Route	

Figure 5. Screenshot of the archival view of <https://montbuet.net>

Behind the scenes, the content management system (CMS) is the free and open-source software ProcessWire. The informational structure is seemingly flattened: all menus (back and front), pages, archival content, tags, routes, and media types are entries in the tree structure. Of specific interest for us here are the “Data” pages: one page is created for each entry in the database — one entry can either be only one media file (e.g. a text or a sound) or several media files of the same media type (e.g. a group of photographs taken at the same location). All entries have (see fig. 6):

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- A title (En/Fr)
- A geographical location (either a specific stage along one of the paths, or a set of lat long coordinates)
- A route among four (North, South, East, and West)
- A textual description (En/Fr)
- A date and a date format (Year/Month/Day, Year/Month, or just Year)
- A media type (text, print, photography, drawing, engraving, sound, painting)
- A set of attached files of the defined media type
- A selection of tags
- A selection of references, i.e. other linked entries in the database (e.g. between different stages of the making of the circular view: from instructions, to sketches, to the engraving)
- An external URL (when relevant)
- A username and email for content submitted by external visitors

Note that the submitted content is manually curated: it first appears as unpublished in the backend and awaits moderation, during which the team members also specify tags and references.

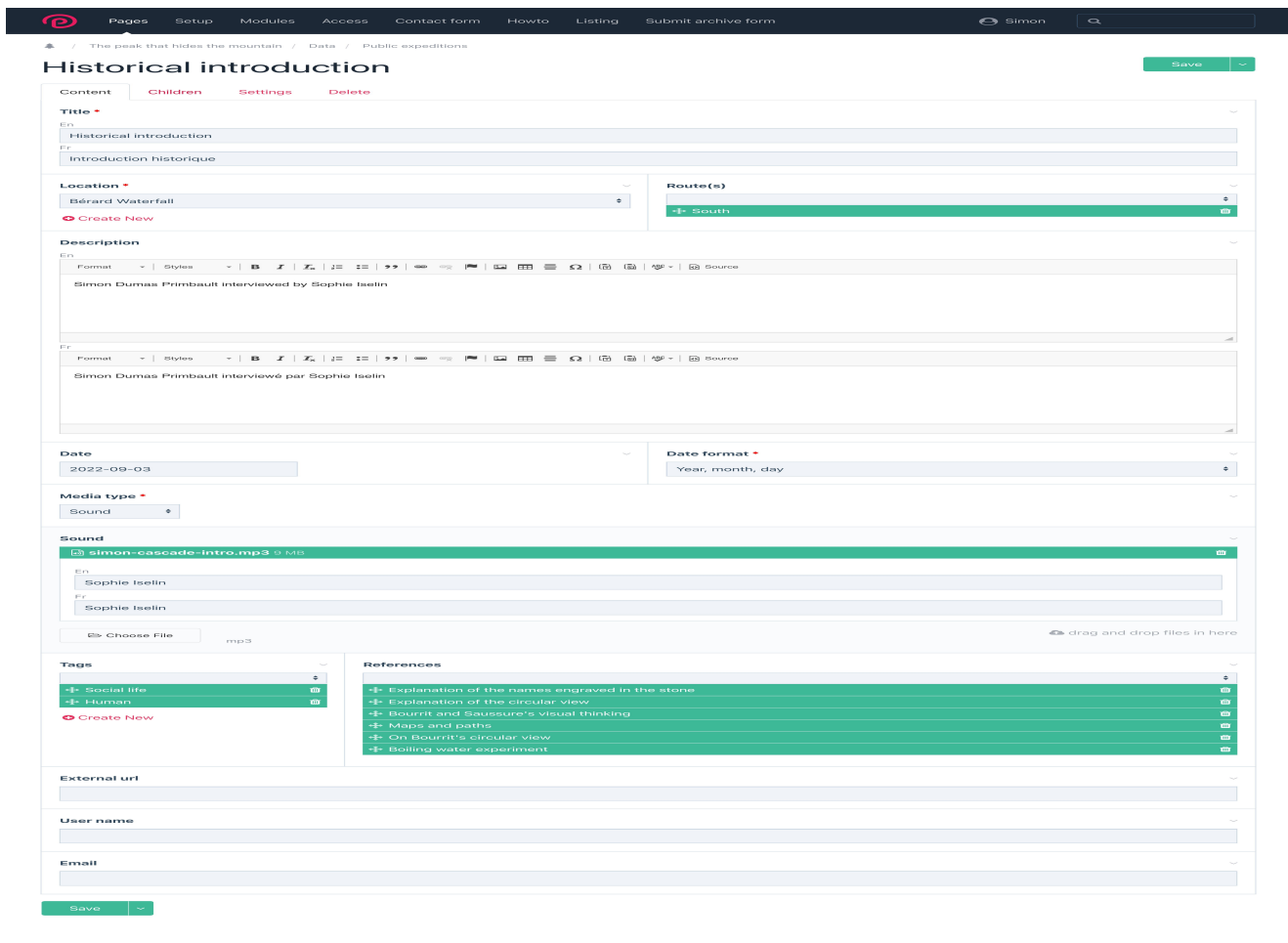


Figure 6. Screenshot of one “Data” page in the backend of <https://montbuet.net>

Navigating the interface

Let us go back to the geographical view provided to the visitor who just entered the website (see fig. 4). On the left-hand side, the first space offered for navigation is an impression of the geographical surroundings of Mont Buet in shades of grey. While for our historical actors, the topographical specificities of the Buet milieu were first experienced through engagement with the field itself and with the help of locals (there was no detailed map of the region at the time), we decided to provide digital visitors with this geographical view — albeit not a precise map — as it is the most common and enticing type of affordance. This first deviation from supposed historical experience is not only necessary, it is advisable as the aim of the website is not to offer an expedient to the real thing, but rather to organise, within a given space, the available material, and allow for its manipulation. Therefore, the different paths leading to the summit are traced on the relief, important stages — such as departure points, refuges, other nearby summits, and points of interest mentioned in the historical texts — are indicated by pictograms and toponyms, and elements of the archives are geolocalised by their representation with a specific icon — denoting the time period of the expedition — and a colour-code — depending on their media type. Visitors can zoom in and out of this geographical view, select a new piece of archive by clicking on its icon, or circle around the selected element by clicking-and-dragging the background. One can also simply follow the path up or down by scrolling through the right-hand side column. Along the path, rushes from Joell Nicolas’s sound recordings accompany the visitor and make up for a soundscape that changes according to the altitude.

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The second space is topical. By clicking on the bookmark pictogram in the top left corner, all icons of the archival material are seamlessly reorganised into a 2D point cloud clustered around keywords (see fig. 7). All archival elements are hand-tagged with *ad hoc* categories — such as infrastructure, social life, instrument, and landscape —; a simple PCA (principal component analysis) on all the elements then produces this plane visualisation. Icons of material are closer together when their tags are similar, with a minimal distance allowing for legibility of the visualisation. Again, it is possible to zoom in or out

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and click on a specific icon to centre the view on it and display the corresponding element on the right. In this view, the right-hand side column is now ordered by media types. Thus, scrolling through it, the visitor may, for example, display successive photographs, while hopping from one point in the cloud to another, regardless of topics. Note that this view evolves every time a new piece of archive is added to the database.

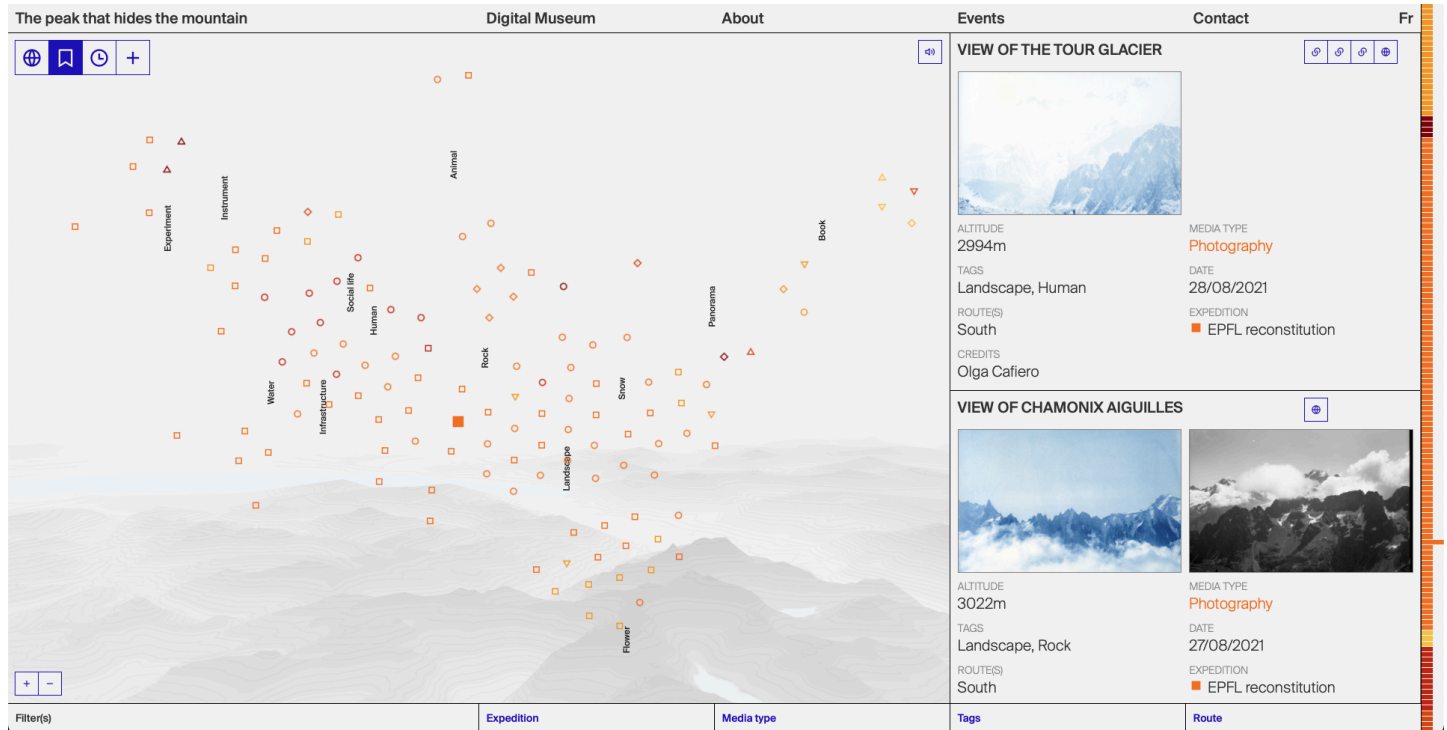


Figure 7. Screenshot of the topical view of <https://montbuet.net>

The third navigational space is chronological. A click on the clock in the top left corner rearranges all material on a linear timeline starting in 1765 — with the textual testimonies of the Delucs’ first attempt at climbing Mont Buet — and ending with the most recent shared material — Spring 2024 as of now (see fig. 8). Visitors can zoom in or out and scroll the right-hand side column which is now ordered by date. Therefore, it is only possible to move linearly through the timeline by scrolling. Nonetheless, linked content is signalled by broken lines going from point to point, reminiscent of mountain peaks. One can also click on the chain links next to the content title to hop non-linearly through the timeline.

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Finally, further affordances allow for transversal navigation within all views. Linked content was already mentioned. The coloured “thermometer” on the right side of the interface is a clickable representation of the whole right-hand side column; one can therefore hop directly to other elements, guided by the colours of media types. Furthermore, a set of filters — by expeditions, media types, routes, and tags — can be activated and deactivated on the bottom menu. Filters are conserved when switching from one view to another. Finally, there are several outgoing hyperlinks throughout the database that may take the visitors to the websites of the institutional archives and libraries that preserve some of the historical content which was digitised and is displayed on the website.

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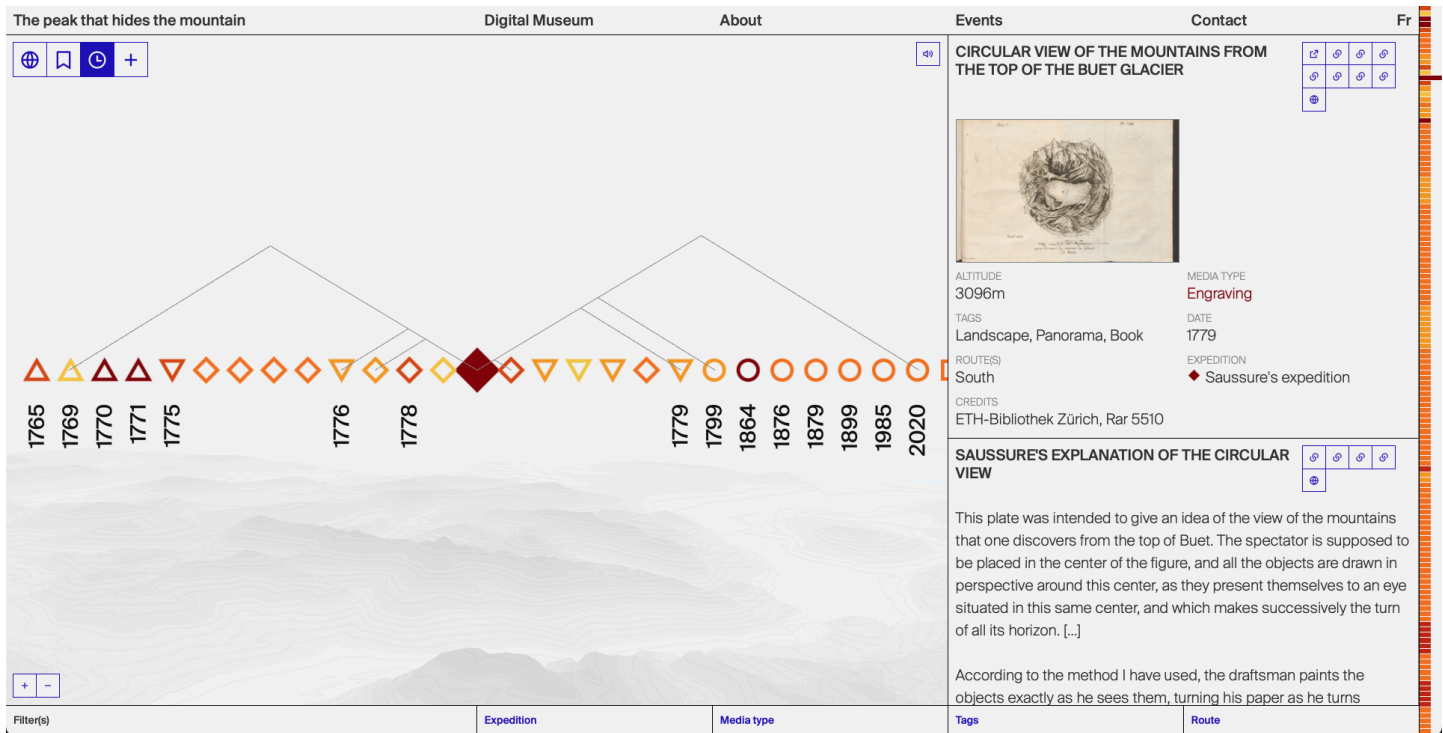


Figure 8. Screenshot of the chronological view of <https://montbuet.net>

On the status and function of the website (Users' feedback #1)

On October 11th, 2023, the project team organised a two-hour long focus group with users from EPFL, the University of Lausanne (Unil), and the History of Science Museum in Geneva: one assistant professor in digital humanities (thereafter PrDH), one museum curator and head of institution (thereafter Cur), one art historian and head of culture (thereafter ArtH), one postdoctoral researcher in the history of technology (thereafter HoT Postdoc), and one PhD student in UX/UI and game studies (thereafter PhD UX). The focus group was organised in two consecutive parts. During the first part, after a brief introduction about the protocol — but no explanation on the project —, participants were asked to use the website freely for about ten minutes. After a first go around the table to let everyone share their initial impressions, free discussion was led by the project team around three points, inspired by Johanna Drucker's work (notably [Drucker 2009], [Drucker 2014], and [Drucker2020]): 1) Form and content; 2) Ideology; 3) Use. ^[11] During the second part, participants were asked to imagine specific ways of improvement. The discussions shed light on a few bugs that we quickly corrected, as well as on the skewed understanding of the introductory text which was therefore rewritten.

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Generally, the users embraced the website in the first seconds of interaction, and more specifically the freedom that was offered to them as a result of not imposing a single historical narrative, but rather providing a space to roam, where things happen quickly and draw the attention of the visitors: "One quality of the site is that there's never any explanation. They never bother us to click here, do this, do that." (PhD UX) This lack of explanation did not hinder user experience as the interface seemed easy to pick up for most of them: "it's easy to do. It's easy to find your way around" (ArtH). This was also the case for one user who found the website counterintuitive at first: "Once I'd got into the logic of things, I'd actually click on the various links. It was easy to see which archives were linked, to be curious to see what was actually linking them." (PhD UX).

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Note that while all users intuitively learned the meaning of pictograms and icons, they also all had their own entry points into the content. The relief in shades of grey had a strong impact on the users most accustomed to digital interfaces and video games, and triggered their "desire to explore" (PhD UX): "I clicked on the link and this relief map appeared. It's a wow effect. [...] you realise that you're physically visiting the site. You travel with the people. [...] They're almost like stories. You want to go and see what's in the other valleys." (PrDH) Another user preferred the thermometer on the right-hand side: "the little coloured bar on the far right. That's where everything is. I've always had a lot of fun with that too, the randomness, going to that coloured, non-graduated, ruler, to see what comes out." (ArtH) The use of tags and filters was favoured by one user: "I

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also manipulated the tags to see what they actually showed. It also allows you to navigate from point to point. [...] There, I feel something to manipulate, it's something I find interesting." (HoT Postdoc) Finally, the archival view was highlighted: "to be able to sort them the way you want to sort them or in ways that are more immediately... I'd like to say, coherent for my brain, typically by date." (Phd UX).

Most importantly, the word "archive" questioned the participants who raised the issue of the status and function of the website, as well as the parallel issue of the target audience. For those who knew already of the project, even participated in part of it, it evoked *memories*: notably "a very faithful reflection of the project as I understood it [...] I'm very touched by what I've seen because it brings back so many memories" (Cur); or "there is a memory of the summit [...] one can participate in the construction of a memory" (HoT Postdoc). This memory is also triggered for the external contributors: three contacted us to explain they were touched by such an endeavour, and were glad their own photographs could take place among others'. In contrast, for the users who took no part in the project, the content of the website is understood more as a form of testimony: "It's also the testimonies of the people who are there and who talk about everything that was done at the time." (PrDH)

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For the curator and the head of culture, interrogations revolving around the denomination of the website prompted them to raise the "museum issue" of its target audience: is it meant for (amateur) historians, mountain enthusiasts, geeks, scientists, or artists? Consequently, is this digital object a repository, an archive of the reenactments, of the project itself, a memory (or heritage) for people who once climbed the Mont Buet, a testimony of these people, or is it a digital exhibition, a museum? All users were struggling to find the right denomination for the experience they had, and no one was content with a single definitive word. For communicational matters, we settled on the term "Digital Museum" to qualify this polymorphous object, but we now turn to elucidating the relationship between the mountain space and the digital medium to better understand the nature of the montbuet.net website.

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3. The mountain space and the digital medium

The heart of this project lies in the operation of properly aligning the mountain — a-space with the digital — as-a-medium and allowing for navigation within the digital to make sense of the mountain. This was achieved by using the overarching concept of milieu to understand both the mountain and the digital; to match them, *mutatis mutandis*, without pretending to have created a digital twin; to create a partial and biased interactive digital representation of the mountain, instead of an immersive and totalizing synthetic experience. Indeed, complete immersion, or supposed im-mediacy, is not only impossible, but also not desirable as a critical perspective can only emerge from the right distance, a certain estrangement [Ginzburg 1998]. What matters most in both spaces — the mountain and the digital — is the ability to navigate, to move between and through media, to follow the path or to stray away, and to find the right distance. The montbuet.net website can then be conceived of as an ecology of media representing an ecological milieu, within which the practice of navigation becomes a hermeneutics. In this final part, we untangle the relationship between the mountain and the digital, both understood as milieux, and shed light on how the navigation practices within said milieux can be understood as sense-making.

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Navigating the Mountainous Milieu

Navigating the mountain space was at the heart of the scientific expeditions undertaken in the eighteenth century by the Genevan savants and their teams. There was no detailed map of the region yet, the summit had not yet been reached — of archival memory — , no beaten path could draw on the ground the "normal route". In fact, between 1765 and their first successful ascent in 1770, the Deluc brothers tried many different routes, following the locals' indications — monks of the Sixt abbey, farmers of Anterne, and a pastor of Commune. The same happened to Bourrit who believed there existed another path, from Vallorcine, although the summit he aimed was named Mortine there. The route he opened, which is rather close to the contemporary hiking path, took him quite a few attempts and he recounts in his testimonies encountering walls of ice and precipices that only opened on the wind and the void. Only when the patrician Saussure arrived, was the path beaten for the savant on his mule, and the Bérard shelter, now a refuge, furnished with his bed.

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Not only did this navigation and roaming on and around the slopes of Mont Buet allowed the savants to reach the summit, it also enabled them to make sense, in their own specific way, of the *milieu* they were then part of. The savants met local dwellers on many occasions and gathered precious information about the weather forecast, the equipment needed — notably spikes and Alpenstocks — , or what shelter they would find on the way. On multiple occasions, they also were accompanied by chamois hunters who would take them on their tracks and give them detailed directions. Moreover, this navigation through

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the milieu was a way to gather traces and clues to document it. The Deluc and Saussure were carrying, or had someone carry, a mercury barometer and thermometer to measure the atmospheric pressure. This had to be done at very specific *loci*, not only for reproducibility, but also because they had to have a line of sight on a neighbouring summit of known altitude. For Bourrit as well, navigating this space to find the right place was an important endeavour as he was commissioned to draw specific landscapes together with geological and botanical information. The alpine milieu that these expeditionary teams were part of was wild and untamed to them, unknown folds and creases on the surface of the Earth that needed to be roamed in order to be scientifically understood and appraised. This navigation helped them gather information, traces, clues, and enabled them to mark the territory as well as represent it; it also paved the way, for better and for worse, for the infrastructuralisation and domestication of a milieu into a place.

To document this process, we reverted to the concept of space in contrast with place, in that the latter results from the domestication of the former through practices that we just highlighted. Our experimental perspective helped us go beyond the current state of the domestication of Mont Buet — detailed topographic maps, refuges, fixed paths, hikers' traffic, meteorological forecast — to try and recover the agency of the mountain as a lived and living space, or, better yet, the *milieu* of knowledge behind the domesticated space [Dumas Primbault et al 2021]. As we have seen, recovering this aspect of Mont Buet could not be achieved merely through archival work — although it was a crucial preliminary — but was undertaken through the material engagement with both instruments and the field. Reciprocally, communicating such aspects cannot be achieved solely through textual description and narratives as is often the case in historiography. Indeed, the complexity and dynamics of milieux, as well as their intersubjective appraisal, cannot be exhausted in the traditional forms of writing. This is why we decided to resort to the digital as a medium.

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Navigating the Digital Medium

The concept of milieu has a long history and many meanings in a vast array of disciplines [Feuerhahn 2017]. In the present case study, rather than a mere place, the *milieu* is a dynamic and organic space that both surrounds the subjects and is in a dialectical relationship with them. Thus conceived, the mountain can become a historical actor endowed with its own agency. But *milieu* may also very literally mean *mi-lieu*, or what stands in the middle between a subject and an object — in other words: a *medium*. Media studies or *Medientheorie* broadly define a *medium* as anything that connects two alterities that would otherwise remain essentially disjointed. As such, the medium is the condition of possibility of a relationship: it allows the relationship while simultaneously shaping it. As such, the digital can be conceived of as a medium that may embed other media into a broader signifying system [Dumas Primbault 2022]; as well as a *milieu*, that is, an environment able to create a partial and biased interactive digital representation of the mountain surrounding its user, rather than creating an immersive and totalizing synthetic experience.

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Our endeavour to conceive of the mountain as a milieu thus met our conception of the digital as a medium, and the website is an attempt to embody this correspondence. Indeed, conceptually matching two spaces — the mountain as a milieu and the digital as a medium, and a receptacle of media — it becomes possible to try and seize part of the organic dynamic of Mont Buet in a digital interface and repository and communicate it in ways that mere textual narratives cannot. Although the embodied and intersubjective experience of climbing the slopes of Buet with a mercury barometer, pencil and paper, a camera and its lenses, or a sound recorder could never be im-mediately shared — just as, for the same reasons, it is epistemologically and ontologically impossible to step in the shoes of past actors in the proper sense —, the website understood as a navigational space nonetheless allows us to steer a middle course that allows to go beyond the traditional narrative format, albeit not doing away with it, and convey a thicker understanding — if not analytical — of the many materialities, gestures, embodied practices, and sociabilities of a lived and living space that cannot be reduced to a place now, and was being domesticated then.

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Indeed, navigation is still an important part of sense-making in everyday life, and particularly within the digital milieu. Already in the early days of the Internet when it could not yet be considered a milieu but rather a big database, “berrypicking” was identified as a way to find, select, and collect information [Bates 1989]. Today, beyond the use of ubiquitous search engines, beyond mere queries to databases, research in information studies have shown that most users *navigate* from content to content, from information to data to document to traces and clues, to the extent that they may go down the “rabbit hole” and make discoveries and new associations of ideas by losing themselves in this vast digital stretch [Dumas Primbault 2023]. This analogy in dynamics and practices between the mountain milieu and the digital medium, and the navigation thereof, prompted us to conceive the montbuet.net website with no search engine and, more importantly, no a *priori* historical

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narrative to be followed, no prescribed beaten track, and to incentivise visitors to stray off the path through a diversity of media accessible through multiple entry points. Contra the datafication of all source materials, the interface and structure of the website were conceived to enable a multiplicity of access modalities to the diversity of media stored and displayed. Thus, visitors can criss-cross a wide variety of media types across time periods, geographical locations, and topics so as to navigate through the corpus and pick up clues, compare, connect, contrast documents and create their own narrative, thereby mimicking the historiographical operations of historians in the archive.

A media ecology for an ecological milieu? (Users' feedback #2)

As we have seen before, the tests have shown that, beyond the hesitation on the status of the website — archive, museum, memory, testimony, or repository —, users have thoroughly engaged with the medium, interacting with the many affordances of the interface: “it’s really very interesting. You get into it. You do a lot of research. You make associations. You get completely caught up in it.” (ArH) Users literally get to grips with the interactive elements of the website, making it their own: “There’s also a way of appropriating certain elements. In other words, appropriating in the almost physical sense of extracting.” (HoT Postdoc)

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The intended goal was to allow visitors to assemble the content of the repository in their own way by manipulating it, free of any pre-framed historical narrative. One risk though would be to provide too few affordances and signs, such that users could not perceive, let alone construct, any meaning from the start. To avoid this “cold start” issue, or “white cube” effect, the choice was made to provide visitors with a geographical background representing the relief and hiking paths in the area surrounding Mont Buet. The choice made to represent the topographical environment in shades of grey and not overload it with geographical indications proved interesting for most visitors. In line with the fact that historical actors had no detailed map of the region — “it was an opportunity to discover a geography that is completely foreign to me” (Curator); “What’s interesting is that we’re following a path rather than an identifiable, or even identified, geographical space.” (HoT Postdoc) This mountainous background — albeit lacking a broader geographical context — is indeed a space within which the content is organised and that can be navigated: “At the end of the day, I use the map to go for a walk. I don’t use it to locate myself at all.” (PrDH)

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The way most respondents of the focus group made use of these spaces was indeed to couple a diversity of medias, thereby constructing themselves a path through the corpus: “The fact that different media are brought together in this way also means that we can build visit paths that I find a little atypical.” (HoT Postdoc) One user specifically detailed the effect of perceiving one single object — the Cantor’s Table — through successive media of different types; how the articulation between text, drawing, and photographs, creating a path from one medium to another of a different type, created a certain effect on him and generated both meaning — an interpretation of the object — and emotion: “I set off on a mini-tangent to explore this place called the Cantor’s Table. [...] As there are several ways of exploring and seeing these different objects, these different places, all of a sudden, for me personally, it was a bit WOW.” (PhD UX) Assenting to this description, another user emphasised that such a subjective path could be somewhat confirmed by an oral explanation gleaned in one of the radio rushes of the public expedition, thereby reinforcing the operation of sense-making made possible by the navigation: “there’s someone who gives a voice to what we think we should think but aren’t sure we can think. There are several levels of reading.” (PrDH)

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Yet another user described in more details the kind of navigation they endeavoured through the material in the chronological view. This user, rather than looking at the same object through multiple media, juxtaposed more similar media throughout time:

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when you click on a point, it takes you back to elements which, in turn, take you back to others which were not indicated by the first occurrence, by the first iteration. As a result, you can both navigate and realise that you can create continuities through the media, over time. For example, you can link the end of the 18th century with the 2020 expedition through specific elements, and not just through purely artificial constructions. (HoT Postdoc)

This user’s testimony is interesting for another reason as it may help us understand better what this website is. Indeed, they insist on links and iterations being not artificial, that is, in this case, the product of historical echoes rather than mere relational properties of the database. The collection of links between elements of content makes up for a “coherent”, thereby “consolidated”, website (HoT Postdoc) — that is a whole that is greater than just the sum of its parts: a whole that can be

navigated rather than merely queried. Finally, this gave this user a spatial impression, that of an “environment” where things are not only linked, but also “coordinated”, and “act in parallel” (HoT Postdoc). This general idea of a complex and coherent, yet fragile, totality put in tension by the interrelations between its parts is essentially that of an ecological milieu. A milieu that one can roam along the dedicated paths, or experience off the beaten tracks. A milieu prone to change throughout time depending on the submitted material. In other words, a small media ecology for an ecological milieu [McLuhan 1964]; [Postman 1985]; [Fuller 2005].

Conclusion

In recent years, glaciers, and more generally mountains, have been placed at the centre of both the scientific research and the public debate on the global issue of climate change. Spectacular images of receding glaciers have captured the public's attention, especially in a country like Switzerland, where, for obvious geographic but also for social and cultural reasons, the construction of national identity has been uniquely tied to the space of the mountain. Countless newspaper and magazine articles have proposed before-and-after visualisations that show how, in the last two centuries, the melting of glaciers has dramatically altered the landscapes of Alpine and other mountainous regions. In becoming either the perfect metric (on the side of scientists) or the ultimate symbol (on the side of the public) of today's climate change and increased degradation of the environment, the transformation of glaciers has strikingly shown us how, over the past centuries, mountains have been gradually reduced to places, thereby losing their contextual richness as thick spaces made of human practices, imaginations and constant negotiations with nature. Concurrently, before-and-after snapshots of the mountains betray how much our understanding of both natural and human time has been reduced to mere chronology.

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Besides these journalistic and natural-scientific endeavours, history has a role to play in raising awareness on this crisis. As one of the users mentioned while navigating through the website, one can become aware that the mountain is indeed a lived and living space at risk by linking historical engravings of glaciers during the Little Ice Age, to digitised photographs of a 1985 ascent submitted by an Internet user, to born-digital pictures of the 2022 public expedition:

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there's also a whole reflection on glaciers, on the evolution of the area, the retreat [of glaciers], the effects of climate change. And I find that interesting, because it goes beyond the expedition itself or the reconstitution to offer a place where you can put documents, photos and so on. Which also allows you to see the evolution. This illustrates very well [the notion of a lived and dynamic space]. (HoT Postdoc)

This experience results from the users' practices: the active criss-crossing, in a dedicated digital milieu, of situated representations produced by specific actors in their own historical context. Furthermore, this critical assemblage of diverse media allowed this user to go beyond the expedition itself, and project themselves into a lived and living space thanks to a matching ecology of media.

Essentially building on the inherent hypertext structure of the Internet, the montbuet.net website succeeds in going beyond the mere relational representation of data and offers users the practical means to actively engage with media and assemble them to shed light on the (re)production of space, and to perceive the historical echoes of climate change, but also of tourism, science, female alpinists, and the politics of Geneva. While professional historians are accustomed to assembling source material in such a manner, the digital — in this case study — amplifies, disseminates, and facilitates the possibilities of manipulating a variety of materials, thereby providing an experience that goes beyond the traditional genre of historical narrative or the setting of a museum and enables users to navigate freely to make sense by themselves. Therefore, this “digital public history” not only mediates science in the mountain but also the very craft of the historian — a craft renewed by the digital turn and consisting in the creation of an ecology of media that the public can navigate.

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We are grateful to all the persons involved in this project, their names and trajectories are detailed in the paper.

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Notes

[1] On mountains as “laboratories of nature”, see [Bigg et al 2009].

[2] Space rather than place was the term that allowed us to better articulate our historical argument. Indeed, rather than thinking of *space* in abstract terms as [Gieryn 2000] or [Ingold 2008] did, we followed Henri Lefebvre (1974) who defined cities as “lived spaces”, produced by usages and experienced by its inhabitants. More recently, Augustin Berque (2018), opposed “place (topos) as inert matter absolutely detached from the subject, [to] milieu (chora), presented as a set of ecological, technical and symbolic interrelations forming an open and diffuse space, in constant reformation, from which the subject emerges” [Dumas Primbault et al 2021].

[3] Comprising the three authors as well as Nicolas Chachereau, Marianna Fenzi, Yohann Guffroy, Véronique Mauron-Layaz, and Nicolas Nova.

[4] Stéphane Fischer and Laurence-Isaline Isaline Stahl-Gretsch from the History of Science Museum (Geneva).

[5] Respectively, Olga Cafiero (<https://olgacafiero.com>), Pascale Favre (<http://www.pascalefavre.ch>), and Joell Nicolas.

[6] Sophie Iselin (RTS)

[7] Written in the interwar period and posthumously published in 1949, Marc Bloch’s treatise *The Historian’s Craft* placed archival material and source analysis at the centre of historiography for the whole second half of the twentieth century. According to Bloch, the sources understood as traces allowing for the indirect observation of the past must be at the heart of the craft of the historian, who should submit them to internal and external criticism before assembling a narrative that should be useful for society. Without challenging the central role of sources, this project aims at prolonging the practice of history outside the archive rooms and *complement* source materials with experience of the field (see later).

[8] INT Studio (<https://int.studio>)

[9] In his 1942 study, Lucien Febvre made a distinction between “armchair geographers [géographes de cabinet]” and “geographers in the wild [géographes de plein vent]” during the Renaissance [Febvre 1942]. By analogy with these past geographers, we came to call our own strand of historiography “*histoire de plein vent*”, or “*history in the wild*”.

[10] A recent example is the website for the exhibition *Jean Starobinski. Relations critiques* (<http://expo-starobinski.ch>) designed by EPFL+ECAL Lab. Other projects include: <https://atlantecalvino.unige.ch> which provides with three “itineraries”, subdivided each in three steps, through the work of Italo Calvino [Trocchianesi and Bollini 2023]; or <https://lieux-georges-percec.seuil.com> which allows one to create their own path through George Pérec’s *Lieux*.

[11] The full protocol and transcription were uploaded on a data repository [Dumas Primbault 2025a].

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