

# Encountering the Geological Live

## Temporalization in the Age of Natural Media

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### A New Version of the Present

A major aspect of the struggle with climate change concerns matters of temporal imagination. From the seminal essay of Dipesh Chakrabarty on “The Climate of History” from 2009, and through the following decade, many have argued that the arrival of the Anthropocene requires new modes of scaling and visualizing historical times and temporalities. One side of this argument is that the temporal scope of the climate crisis is abstract and hard to fathom, and therefore needs to be translated and sensitized to become a motivating force in political action. This view emphasizes the importance of cultural work for affecting change and creating an increased awareness of the impact of human societies on the physical environment. According to Bruno Latour, we have to “*generate alternative descriptions*” to overcome what he and many others refer to as a “deficit of representation” in politics for comprehending, and acting on, the collapse of geohistorical scales.<sup>1</sup>

The broad engagement with temporality in the context of anthropogenic climate change has lessened the divide between history and geology, with scholars in both fields asking how their timescales interact, and developing a commitment to forms of integrative knowledge that resonate with eras of convergence in the past.<sup>2</sup> For instance, as has been demonstrated throughout this volume, this has activated strands of historical thinking that deal with historical times, speeds and layers in plural, reestablishing the connection between the time-binding techniques and imaginaries of seventeenth- and eighteenth-century natural historians, and the work of twentieth-century historians such as Fernand Braudel and Reinhart Koselleck.<sup>3</sup>

But despite this focus on rethinking temporal scales, rhythms, and durations, and reconciling natural and historical times, the understanding and

cultural reception of climate change continue to be deeply conflicted between rapid change and slow continuity, or, in terms of historical experience, between rupture and repetition. This tension emerges from the simultaneous perception of climate change as a sudden event, which was only discovered in the late twentieth century, and through deep time perspectives. When translated into cultural critique, this “schizo temporality” is typically represented by a mix of fossil poetry and presentism, juxtaposing current events with processes rooted in a very distant past. Some writers try to bridge this divide by arguing for the radicalism of deep time perspectives, and how they provides a means for reimagining the present and building a sense of intertemporal responsibility and connection stretching over millions of years.<sup>4</sup> Others, however, claim that to become a political object the Anthropocene needs to be turned into an historical event, which appeared under different names but was integrated with the struggles and conflicts of Western capitalism in the last 250 years.<sup>5</sup>

However, as much as the abstraction of the climate crisis continue to dwell in the chasm between the conflicting scales of earth history and presentism, this cannot be explained by a lack of representations of the complexity of climate change temporalities. To the contrary, in global news media the multiple and extended timescales of climate change have become increasingly visible in the last two decades in an overwhelming amount of images and emerging news formats that connect contemporary emergencies with temperature records and long-term planetary change. The clash between temporalities has also been reflected in numerous exhibitions, art works, and cross-institutional educational efforts around the world, joining in an ongoing global effort to create an active sense of human impact on abstract atmospheric and geological processes.<sup>6</sup> Indeed, given the scope of the political and cultural engagement with climate times since the formation of the Intergovernmental Panel on Climate Change (IPCC) in 1988, it is now possible to sketch the historical contours of how the issue of anthropogenic climate change entered the mainstream of public discourse in the 1980s and 1990s, which also prepared for the introduction and widespread use of the concept of the Anthropocene in the early 2000s.<sup>7</sup>

In the early twenty-first century, cultural and scientific contexts for working on and visualizing climate change temporalities merged with a digital monitoring culture. The affordances and news styles of online environments favor a mode of imagining global warming through continuous updates on fast and slow emergencies in real-time templates. It has also created an open-ended relation between public and scientific records of climate change, installing a sense of urgency and flux in diagrams and abstract numbers, and a sense of objectivity and elementality in political and cultural matters.<sup>8</sup> The digital shift has thus reinforced the perception of the Anthropocene as an ongoing event that is composed of different speeds and durations, creating an abundance



**Figure 12.1** Live streaming of erosion of the mountain Mannen (The Man) in Rauma, Norway, from an around the clock camera. Norwegian Broadcasting Corporation. Screen capture by Anders Ekström.

of image genres and media habits that link temporalities of local floods and seasonal storms with deep time frames and planetary prognosis.<sup>9</sup>

Digital media infrastructures and monitoring systems also enable new modes of viewing deep time unfold, emphasizing the event character of geological processes. For example, in online environments, the monitoring of volcanic activities that registers change in millenium-long intervals easily slips into news stories about forecasted hazards and risks. Likewise, the live streaming of erosion and expected landslides adds a sense of reality and suspense to slow geological time.

An empirical study of mainstream online news sites, which I conducted between 2011 and 2016, established an increasing trend of connecting current events with the long-term.<sup>10</sup> It showed that the climate crisis was an established, and increasingly important, common frame of reference in a growing number of news postings on four types of events: 1) climate-related disasters such as heatwaves, floods, storms, fires, and landslides; 2) geological events such as earthquakes and volcanic eruptions; 3) reports and prognostications of melting glaciers and rising sea levels, carbon emissions, and record temperatures; and 4) slow and accelerating processes of landscape change, for example deforestation and habitat loss. It was concluded from this study that by drawing the different events and their durations closer together, and associating them to the overall theme of human interaction with earth systems, mainstream news frames told stories of the temporal complexity of



**Figure 12.2** Satellite image of the cyclone Idai approaching Mozambique in March 2019. Captured by NASA’s Aqua satellite. Source: EOSDIS Worldview, public domain.

climate change on an almost daily basis. It means that for at least a decade now, we have been surrounded by a new version of the global present, which is defined by an ever-increasing number of images and reports of climate-related emergencies.<sup>11</sup>

This view of the present was further accentuated by a language of *extreme* weather events and *record* temperatures, which expanded notions of acceleration and interacting temporalities to atmospheric systems, and framed changes in temperatures and weather patterns as historical events. The term “extreme weather” was introduced in several languages in the mid-1990s and has become widely used in both public and institutional contexts in the last fifteen years.<sup>12</sup> Another set of increasingly common metaphors in headlines and captions merged natural and cultural phenomena by referring to storms and rainfalls as “weather bombs” and “monster hurricanes.” Indeed, it is characteristic of modern discourses on crisis to turn to nature for descriptions of social and economic calamities—making “financial storms” and “debt storms” the weather of capitalism—and to culture for descriptions of emergencies in nature.

Alongside the linguistic overlaps between cultural and natural realms, climate change temporalities were also typically mediated by visual technologies that extended the sense of urgency from on-the-ground experiences to abstract satellite images and drone overviews. The profusion of survey images in online news of damaged landscapes and ruined habitats reinforce the monitoring mode of the contemporary reception of climate change. But it also points to a long-standing connection between (elemental) media and meteorology, which goes back to early warning systems for sharing knowledge about signs in the skies.

Taken together these emerging genres and visual responses shape and reflect the ongoing struggle to comprehend the staggering complexity of climate change temporalities, encompassing multiple entanglements between past and present, sudden feedback loops, and a reversal of natural and cultural rhythms. There is in the context of mainstream online news no “deficit of representations” of the collapsing divide between geological and historical timescales. Rather, as global news audiences have been steered toward small screen outlets in the twenty-first century, climate emergencies and weather disasters have become matters of topical repetition, feeding the economy of live streams and continuous updates.

After two decades of coexploration of climate change temporalities and digital infrastructures, floods, storms, and heatwaves are typically related as “news” in three temporal registers. The first is prognostic, both in the sense of meteorological forecast—monitoring storms from coast to coast—and in the sense of media buildup on expected events, which is what media scholar Richard Grusin refers to as “premediation.”<sup>13</sup> The second is historical, referring back through genre and mode of address to similar events in the past as well as to atmospheric and geological processes of a much longer duration. Such comparative and connective practices within the interpretive framework of anthropogenic climate change have created online media archives packed with stories about extreme nature events. The third temporal register, more akin to traditional forms and meanings of “live,” is oriented toward an intensified now, which is simultaneously ascribed to the events themselves and to the news styles that are developed to represent them.<sup>14</sup>

Certain aspects of online temporalities embrace crisis with so little friction that it becomes invisible. In a perspective of decades this effect is conditioned and enhanced by the affordances of digital infrastructures. In a perspective of centuries it coincides with a deep seated tendency in modernity of dealing with catastrophe through cultural repetition. Indeed, this new version of the present maintains continuities with notions of catastrophic time that are commonly described as early or premodern. One of its most striking aspects is the extent to which the future is understood to be conditioned by a past that the present can no longer influence. This notion points back in history to

eschatological conceptions of the future. It means that droughts, fires, floods, and hurricanes are routinely referred to as premonitions of future events. For example, when the cyclone Idai caused massive flooding and destruction on the east coast of Africa in March 2019, it was broadly covered as an *exemplum* of the expected severity of similar events in the future.<sup>15</sup> This way of seeing and representing the future through ongoing disasters has become increasingly common over the last decade and is widely reflected in global news streams. Simultaneously, however, the temporal line between present and future tense in the premediation of climate change has got thinner, making ongoing and expected events coalesce in a continuous process, providing the present with a strange and yet undisputable sense of geohistorical directionality.

In terms of historical experience, this reflects an ongoing subversion of the modern divide between natural and historical times. Through this reversal, long-standing ideas about the speed and scale of change in modern societies slip into descriptions of processes in the earth and atmosphere. Landscapes and geological events are losing their background identity in human history and take on a new agency.<sup>16</sup> Nature is no longer externalized and perceived in terms of surroundings or mere resources, but it accelerates and is eventalized.<sup>17</sup> Emerging climate change temporalities also challenge more advanced theories of historical time. For example, and as discussed in the introduction to this volume, Fernand Braudel's tripartite division of the layers and rhythms of the human past is turned on its head.<sup>18</sup> In his epic work of the history of the Mediterranean, Braudel distinguished the rush of the history of events from that of conjunctural time, which was located within social patterns and slow infrastructures, economic cycles, and the history of civilizations. The third layer was referred to as "a history slower still." It was, according to Braudel, the almost immobile "history of man in his intimate relationship to the earth." This aspect of the past was cyclical, static, and repetitive; it was "beyond time's reach and ravages."<sup>19</sup> But today it is precisely what Braudel described as a history without time that is increasingly perceived as eventful, constantly changing and accelerating, while progress in its modern guise appears to slow down and is stalled.

In this process of reimagining natural and historical times, slow geological and atmospheric processes are fuelled with real-time expectations. Also, it has become widely accepted that the acceleration of earth-historical time is conditioned by a past in which natural and historical archives became increasingly entangled. There is in this sense no *empty* geological time—rather, geological time is turned into a historical moment and imagined on a human scale.<sup>20</sup> Emerging from this shift in cultural imagination, I argue, is an experience of the present as being increasingly played out in what we might think of as *the geological live*. It is a hybrid experience in the sense that it is shaped both by the frantic visualization and technological monitoring of climate change

temporalities, and an increased sense of being *in situ* witnesses to accelerating planetary changes. A part of this shift is also reflected in a different role and definition of media and historical events, which John Durham Peters has described as an elemental turn in media theory.<sup>21</sup> In this perspective, the weather of digital clouds and streams is not representing but rather signalling a new configuration of landscapes, infrastructure, and human society.<sup>22</sup>

The experiential aspect of this shift in temporal sensibilities is also reflected in the way that the concept of the Anthropocene is currently used as a designation both for the present and a new geohistorical epoch. Humans never lived in the Holocene. But in the early twenty-first century historical experience is shaped on the level of geological epochs.<sup>23</sup> This conflation of cultural and natural times also conditions contemporary politics, which cannot avoid an awkward sense of the geological (or geobiological) as an acting presence. Bruno Latour proposes to call this new actor the Terrestrial. The concept of geopolitics, he argues, usually refers to geology as a mere framework for political action. But today the prefix “geo” “designates an agent that participates fully in public life.”<sup>24</sup>

In online news and monitoring culture, the presence of a terrestrial voice echoes in the revival of elemental media in the communication of the climate crisis. It is an historical irony that in an era when the planet is incessantly measured, monitored, and mediated by technological infrastructures, the importance of clouds, sea, and ice as messengers of past and future events is becoming more profound than ever.<sup>25</sup> And yet it repeats a cultural pattern well-known from the human past: “The sky, like the sea and earth, becomes a medium in emergencies.”<sup>26</sup> This late modern attachment to elemental media can therefore be seen as forming part of a long-lasting *natural media history*. As exemplified in the next two sections, this points both to the contingency of the nature of media and historical events, and the means used for scaling and imagining abstract temporalities. It also coincides with a long-standing history of nature emergencies and geological disasters as cultural sources for conceptualizing the interaction and conflation of temporal scales and durations.

## Stretching the Sense of Time

As this volume demonstrates, what I have described as a new version of the present is not without a history. A productive wave of historical critique followed the early versions of the Anthropocene narrative, tracing the Great Acceleration of human impact on earth systems to the cultural and economic struggles of Western capitalism in the last 250 years.<sup>27</sup> Both political and historical scholars have resisted the idea that climate change temporalities are beyond human imagination, pointing to the possibilities of alternative

descriptions not on the metaphysical level of cosmology but on the scales of decades and centuries. Duncan Kelly, who refers to the plurality of time frames as the major challenge of the Anthropocene, warns against the fatalism of the notion that its timescales are incommensurable with modern political institutions. Instead, he suggests that abstract and accelerating temporalities of geological and environmental processes can be made comprehensible through a generational time frame of political and economic issues that became a growing concern from the 1960s and 1970s.<sup>28</sup>

Historian of science Deborah Coen also objects to the notion of climate change as developing in scales beyond the reach of human capacities. She points to the general contingency of temporality in human life and societies, and how different measurements and proportions have always been a subject of practices of scaling. Coen interestingly suggests, however, that at certain junctures in time “scaling may require an imaginative leap,” in order to recalibrate temporal perspectives and other measurements to “encompass phenomena that were previously unimaginably large or small.”<sup>29</sup> Following Jordheim, we might think of such junctures as historical moments of intensified synchronization.<sup>30</sup> Coen’s observation also adds further detail to the synthesizing description in Sörlin’s chapter of three waves of temporal synchronization in the modern era: the first centering on the introduction of progressive historical time around the turn of the eighteenth century; the second focusing on standardizing practices and infrastructures for universalizing time that developed from the second half of the nineteenth century; and the third emerging from the ongoing recalibration of time frames and temporal proportions in the context of climate change.<sup>31</sup>

The history of scaling is equally crucial to, and in many ways overlaps, these three phases of temporalization. As Coen notes, the nineteenth century was an era of great flexibility in scalar imagination.<sup>32</sup> In relation to time, this is evident from the introduction of a wide range of textual and visual genres that quite literally stretched temporal imaginations, and enabled new descriptions of abstract timescales and durations. From the early nineteenth century and onwards, various modes and models for visualizing time were key in the development of “historical” disciplines such as geology and archaeology, and carried images and ideas about times in history and nature between them. Some of these genres, such as stratigraphy and map making, had a long history, as did timelines and tabular knowledge.<sup>33</sup> Other visual forms and media, including statistics and advanced charts and graphic models, were more recent and developed across different branches of knowledge. Also, a sense of visual experimentation and elaborative ways of representing distance in time and space flourished in nineteenth-century public culture. A broad range of urban visual entertainments and educational media were explicitly oriented towards stretching scalar imaginations. For example, visitors to nineteenth-century

world's fairs were expected to move between abstract overviews, miniature models, and visions of the globe from an elevated distance. The idea of scalar flexibility was key to their overall aesthetic of attraction.<sup>34</sup>

Another productive area for thinking about historical and natural times in the early nineteenth century was the intersection between science and literature. The work by literary historians such as Rosalind Williams and Adeline Buckland demonstrates how nineteenth-century geology was shaped by literary imagination.<sup>35</sup> Time travel more generally developed into a prominent theme in nineteenth-century literature, spanning from the invention of the historical novel in the beginning of the century to the increasingly popular genres of future-looking social critique and technological fantasy from mid-century and onwards.<sup>36</sup> Literary travel into the distant past represented the other side of modern utopian temporality. It developed in close affinity with new and emerging knowledge practices in fields such as history, archaeology, and geology. The expanding chronologies and narratives of the history of earth also drew on literary genres and were vividly displayed in nineteenth-century panoramas, exhibitions, and museums. This is richly exemplified by Ralph O'Connor in a comprehensive study of the public history of geology in Britain in the first half of the nineteenth century. O'Connor's study shows how theatrical and spectacular media both introduced large audiences to natural history, and played an important role in shaping new forms of temporal knowledge within the emerging discipline of geology.<sup>37</sup>

From these episodes in the early nineteenth-century history of knowledge we can conclude that the ability of imagining the long-term in a variety of time frames was not in opposition to but integral to modern temporal sensibilities. It is also evident from these and other examples of nineteenth-century knowledge practices that they presupposed an understanding of the radical malleability of human perception of distances and connections across time and space. The history of scaling thus points to the contingency not only of temporality but also of abstraction more generally, and a longer history of exploring the boundaries between different spatial and temporal registers through various media and visual languages.

The idea of the plasticity of the human mind and imagination was also elaborated in nineteenth-century pedagogical and epistemological discourses on sensory training. As I have discussed elsewhere, different ways of seeing in an abstract and survey manner was a matter of intense concern in the context of nineteenth-century pedagogical reform and civic training. New spectacular technologies and visual strategies, for example aerial photography, enabled perspectives that turned familiar views into grids and vertical abstractions. The act of seeing in a survey manner was also much discussed in relation to statistical knowledge and representation. Most importantly, this broader history of abstract sensibility was not confined to the formation of scientific

concepts. Issues of sensorial training, virtual affect, and self-distancing forms of reflexivity became increasingly important to broader discourses on civic responsibility in the nineteenth century, and were eventually inscribed into the requirements of modern citizenship.<sup>38</sup>

Scalar imaginations are shaped in the interface of aesthetics in its ancient and modernist sense, merging embodied perception and technological mediation. As we have seen, the period from the late-eighteenth through the mid-nineteenth century was tremendously productive in combining emerging visual genres and knowledge practices for imagining new versions of the history of the earth and human societies. It was also in this period that the notion of modernity started to gain ground as a self-designation of Western industrial societies. As a temporal concept, it referred to a predominant orientation towards the present in contemporary society, and an inherent striving of the modern world to break with the past.<sup>39</sup> From this time on, Reinhart Koselleck notes, “historiography increasingly speaks of a *neue Zeit*.”<sup>40</sup> In fact, the idea of a distinctively modern shape of time was part of a whole family of concepts that functioned as tools for formulating universalizing models of historical development in the decades around 1800. Common to increasingly elaborate notions of “culture,” “civilization,” “progress,” and “evolution” in the nineteenth century was that they enforced a chronological hierarchy between human history and nature. Increasingly, “nature” came to designate the less advanced or that which was left behind, the “lower and slower” stages of progress, or simply the past. The externalization of nature from modern society thus comprised a temporal as well as spatial dimension.

Nicholas Mirzoeff suggests that an Anthropocene aesthetic, in the conventional meaning of an aesthetic as “beautiful,” was inserted into the mainstream of Western art already from the mid-nineteenth century. It is visible, he argues, in the artistic perception of landscapes increasingly affected by industrial pollution and the burning of coal in Western metropolises. For example, Claude Monet’s widely reproduced painting of the port of Le Havre from 1873, *Impression: Sun Rising*, “at once reveals and aestheticizes anthropogenic environmental destruction.” The painting’s light effects and stunning colors are created from the rising sun shimmering through the coal smoke from the steamers. The human-dominated seascapes, foggy skies, and dirt black water of urban environments were perceived by the modern artist as “natural, right, then beautiful.” What Mirzoeff describes as the aesthetization of environmental degradation, and the impact of impressionism as an “anaesthetic to the actual physical conditions,” thus takes the meaning of visual evidence of how the history of the Anthropocene was built into modern perceptions and sensory experiences.<sup>41</sup>

Human impact on landscapes and natural surroundings influenced a vast field of unconscious visibility in the nineteenth century. And yet, the sensorial

regime of industrial modernity and coal-burning cities was anything but uncontroversial in nineteenth-century Europe. It was shaped in the context of violent struggles, local disagreements and public debates about issues of capitalist production, the organization of work, and the interaction between human societies and their surroundings. As Christophe Bonneuil and Jean-Baptiste Fressoz remark, the period from 1770 to 1830 was characterized by an intensified awareness of the interdependence of society and nature in Europe, for example in relation to issues of deforestation, pollution, and the influence of industrial structures on climate and health. Eventually, these and other controversies were played out in conflicting ideas about, on the one hand, the externalization of nature from society, and, on the other, the reciprocal and “systemic” concepts of “milieu” and “environment” that developed from the mid-nineteenth century.<sup>42</sup>

## A Natural Media History

Another instance of human–nature interaction in the late eighteenth and nineteenth century that resonates with Anthropocene debates about the convergence of geological and historical time frames, and at the same time testifies to a broader history of complex temporalities, concerns the reception of major nature events. Earthquakes and volcanic eruptions evoke a stunning range of temporal experiences and reactions, which cut across distinctions of cultural and natural time as well as various speeds, timescales, and layers of historical time. In short, they are events with an extraordinary capacity to make the coexistence of temporal rhythms and durations visible. The interpretation of natural disasters by geologists and archaeologists was crucial to the expansion of historical and geological time frames in the period between 1750 and 1850.<sup>43</sup> But it was also part of a broader shift in cultural attentions, as indicated by the spectacular recreations of floods and eruptions, both historical and biblical, that attracted large crowds to nineteenth-century fairgrounds and exhibitions.<sup>44</sup>

Major geological events and natural hazards were also a powerful source for reflections on affinities and identification across large distances in time and space in the early nineteenth century. As the perception of weather disasters and geological extremes as occurrences external to human history is changing, we may explore a range of emotions strictly avoided by modern historicism with greater seriousness but without falling into the trap of moral reflection on species level. It concerns the morality of scale and the universalizing impulse that is triggered by major nature events. There is a pattern of revolt against conventional historical dimensions in the cultural reception of earthquakes and volcanic eruptions. It is reflected in a general sense of collapsing scales in

the face of elemental emergencies, which manifests in a tendency of imagining and drawing times together in ways that would otherwise seem awkward and anachronistic.

Let us consider, for example, the vast school of Vesuvius painters in the decades around the turn of the nineteenth century. Ignoring any emerging divisions between natural and human history, these artists combined and moved between a variety of time frames. Their work conveyed an intense understanding of Vesuvius as a living mountain. This is visible in images that merge past and present versions of the volcano, and draws on historical sources as much as onsite observations of contemporary eruptions.<sup>45</sup> Among the many artists who witnessed Vesuvius erupt in 1779, 1794, 1822, or any other year of increased activity, were historical landscape painters from across Europe, for example Jacob More, Pierre-Henri de Valenciennes, and Johan Christian Dahl. Despite their different styles and temperaments, they all approached the eruptions through cultural meanings that had piled up around the mountain over the centuries. Geological details from recent eruptions were inserted into scenes from antique history, most of them extracted from the testimony of Pliny the Younger in the two letters he wrote to the historian Tacitus on the destruction of Pompeii and Herculaneum in 79 AD.<sup>46</sup>

It is difficult to detect any hierarchy between cultural and natural influences in the volcano paintings. Neither is past and present contrasted to each other in ways that can provide chronological lessons, explaining one time frame through another. Rather, these images collect an historical experience of closeness and communication between distant epochs, which is evoked and mediated by the rumbling mountain. In this sense, the paintings form a conjuncture of different rhythms and durations, which are drawn together in a time-transcending historical moment. This version of the idea of coexisting historical times is different from Koselleck's notion of the "contemporaneity of the noncontemporaneous" as it lacks the historicist impulse of measuring "temporal strata" against each other in terms of progress or chronology.<sup>47</sup> The prognostic element of this composition of historical times lies in the repetition of events, not in their progression.

In some respects, this way of superimposing different times and temporalities can be compared to other non-historicist approaches to the past. One example was the dramatic genre of the tableau. It was defined by Denis Diderot in the 1750s as a genre for nonchronological historical composition.<sup>48</sup> The increasing popularity of the dramatic tableau carried the idea of the *timelessness* of major events into the nineteenth century. Contrary to what is often thought, the "premodern" construction of the past through a rhetoric of *exemplum* was not outdated by the idea of progress.<sup>49</sup> The influence of the tableau can be traced across visual and textual genres, both fictional and nonfictional; it also flourished in the context of spectacular and



**Figure 12.3** *Eruption of Vesuvius with Destruction of a Roman City*, Sebastian Pether, 1824. Museum of Fine Arts, Boston. Wikimedia Commons, public domain.

theatrical entertainments in the second half of the nineteenth century. One such example was the immensely popular genre of large-scale stage tableaux of historical and contemporary natural disasters, which were displayed in European and North American cities between 1870 and 1914.<sup>50</sup>

But what I want to draw attention to here is also how the work of the volcano painters reflects the nature of the mountain itself as a time-binding medium.<sup>51</sup> The temporality of repeated eruption mediated between historical and geological time frames. It created an experience that was equally conditioned by the past and included a heightened sense of the present. A certain sublimity of scale was simultaneously ascribed to the vastness of geological and cultural records. Among writers and painters, this translated into a sense of Vesuvius as a living archive. Early nineteenth-century visitors to the excavations of Herculaneum and Pompeii also testified to an experience of temporal copresence emerging from the encounter with rocks and bones. Indeed, while stratigraphic models construed the past in vertical piles of time, more or less closed off from each other, the volcano images conveyed ideas about reciprocity and openness between distant eras. It is visible in depictions of the

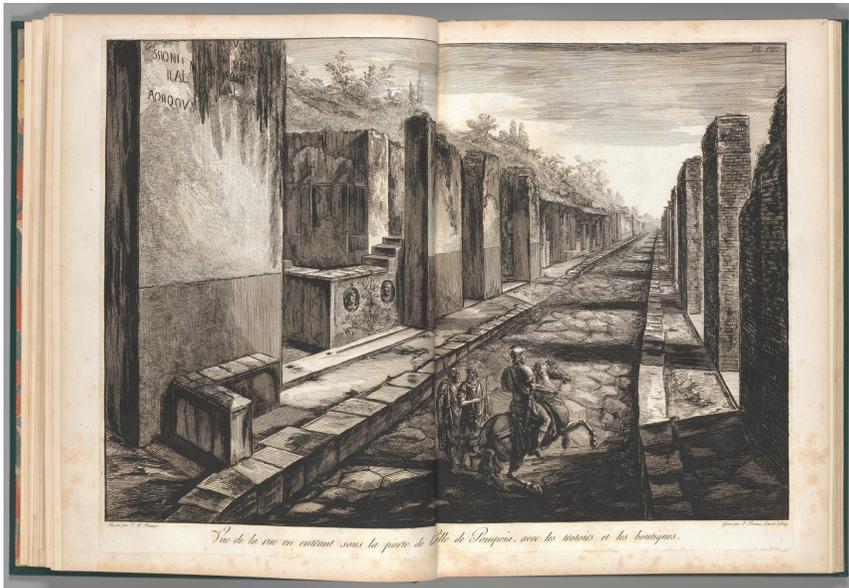
ancient and contemporary landscape surrounding Vesuvius as two adjoining rooms, open to and equally illuminated by each other.

For example, the British landscape artist Sebastian Pether completely dissolved the distance between ancient and modern history. This is apparent already from the temporally vague title of his work, *Eruption of Vesuvius with Destruction of a Roman City*, from 1824. The geological details in the painting cannot be attributed to any particular eruption, but the city being destroyed by the lava stream is possibly ancient Herculaneum. However, in the lower left corner, positioned on the trunk of a hugh pine tree, two people dressed in nineteenth-century clothing are watching the disaster unfold from a safe distance. The inclusion of contemporary witnesses in the ancient motif emphasizes the spectacular reception of natural disasters. It also appealed to a broader movement of living history in the early nineteenth century.

A similar urge to reanimate the distant past is found in Francesco Piranesi's engravings of the repopulated ruins of Pompeii, which were published in *Antiquités de la Grande Grèce* in 1804. Piranesi worked from sketches made by his father Giovanni Battista Piranesi in the 1770s and his own visits to the site, carefully documenting the excavations in a series of maplike etchings. At some stage of his work, however, Piranesi started to insert fictional characters in the historical setting. As in Pether's painting, two different eras merge in one scene, only in this case it was ancient figures who became present in a contemporary landscape.

The way these early nineteenth-century artists superimposed past and present, and engaged with geological and historical time frames, contrasted sharply with the modern notion of an accelerating gap between past and present. In its approach to history, their work was closer to the rhetorical ethos of *phantasia*, calling upon the power of imagination to engage all senses in literally reviving the past.<sup>52</sup> As I have argued elsewhere, this can be seen in the context of a broader move towards reanimation of the past in the early nineteenth century, which was further boosted by the emerging genre of the historical novel and the immensely popular work by writers such as Sir Walter Scott and Edward Bulwer Lytton.<sup>53</sup> The volcano painters document how a sense of living history was shaped in relation to perceptions of historical landscapes and geological time frames as anything but a static background to human history. Rather, the experience of watching geological time unfold evoked emotions of identification across vast distances in time.

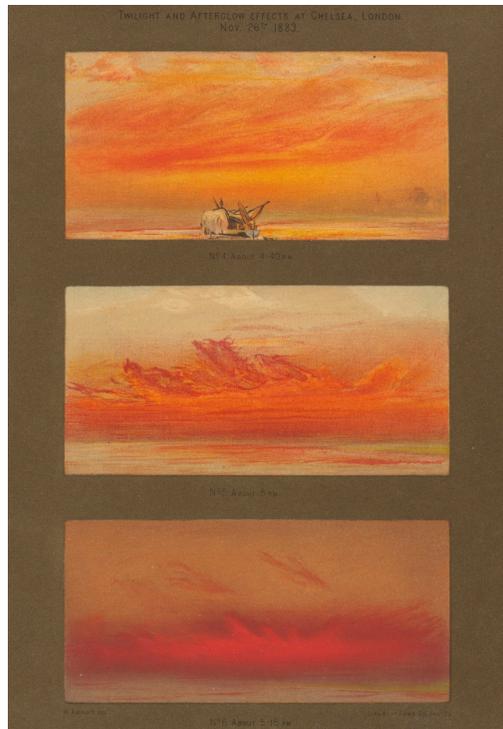
Later in the nineteenth century, other major geological events visualized ongoing temporal and spatial recalibrations on a global scale. The global repercussions of the 1883 Krakatoa eruption in the Sunda Strait between Sumatra and Java (then the Dutch East Indies) had a twofold character. One was connected to its rapid communication through telegraph networks and news agencies with an imperial reach.<sup>54</sup> The other was the climatic and



**Figure 12.4** Etchings of the ruins of Pompeii. Francesco Piranesi, published in *Antiquités de la Grande Grèce*, vol. 1, plate 8 (1804). The Met, public domain.

atmospheric impact of the eruption. Several communities in the immediate surroundings were erased by pyroclastic flows and tsunami waves. At larger distances, the sheer magnitude of the event turned the volcano into its own messenger and the sky its global stage. The ash cloud covered an area of more than fifty kilometers, with the blast wave from the final explosion reaching around the globe. In the following decade, changing weather patterns and cooler temperatures were registered on a global scale. For several years following the eruption, spectacular light and coloring effects from the ash and pumice in the atmosphere could be watched from different parts of the world. Among the painters who depicted the glowing red skies was the British artist William Ashcroft, whose crayon sketches of afterglows from Krakatoa dated November 26, 1883 were reproduced as the frontispiece to the 1888 Royal Society geological report on the Krakatoa eruption.<sup>55</sup>

The combined technological and elemental impact not only defined how the eruption was perceived from a distance in space but also its temporal character. In the reception of the Krakatoa eruption, the speed of news left no doubt about the origin of the strange skies. With the globalization of audiences through telegraphic infrastructures a new common time emerged in the late nineteenth century, dividing the temporalities of the eruption into event and aftereffects. This was different from the reception of earlier large-scale natural



**Figure 12.5** *Aftereffects*. Frontispiece to the 1888 Royal Society Report on Krakatoa. Crayon sketches by W. Ashcroft, November 26, 1883. 71–1250, Houghton Library, Harvard University, public domain.

disasters. For example, in connection with the Lisbon earthquake in 1755 reports from remote places in Northern Europe told about high waves rising from a windless sea. In the mid-eighteenth century, such phenomena were likely to be interpreted as foreboding oncoming events rather than as echoes of events occurring somewhere else. Following the pace of physical travel, it took about a month before news about the Lisbon earthquake arrived in the North. Once it did, the meaning of earlier events had already been fixed.<sup>56</sup>

The common time of technological communication therefore promoted a less eschatological and more linear sense of historical time. Electrical signals enabled a juncture of major temporal recalibrations. By the end of the nineteenth century, the earth, sea, and sky were literally crisscrossed by the infrastructure of telegraphic time. The acceleration of news emphasized the difference between the event time of the eruption and the temporalities of the atmosphere. But the increasing speed and synchronization of technological media did not make elemental shapes of time less visible or impressive.

When mediated through the earth system, the Krakatoa eruption unfolded in multiple scales and durations that exceeded the technological mediation of the event. This prompted an engagement with temporalities that were slower, more abstract and of planetary magnitude. Ashcroft's pastels of the atmospheric afterglows capture this fascination with the expanding spatial and temporal frames of the geological live, and its inescapable position of human detachment.

## Temporalization Beyond Modernity

Climate change brings an increasing temporal complexity to life in the twenty-first century. When compared to long-established discourses on modern temporality and historical time, there are four major aspects that make climate change temporalities stand out. The first aspect is the emerging realization of the sheer multiplicity of time frames and durations that contemporary societies both influence and are conditioned by. The second is the reversal of familiar rhythms and paces of historical and natural times, which affect deep-seated temporalities of process and event, fast and slow, repetition and acceleration. The third is the unprecedented scope of the entanglement of processes in human and natural history that is revealed by anthropogenic climate change. The final aspect is a growing sense of the past as a living archive, which expands into and acts on present and future societies in multiple ways, for example through the sudden release of emissions that have gathered for centuries.

This constellation of temporalities is fundamentally different from any notion of the modern time regime.<sup>57</sup> It creates a chasm in historical experience that can neither be bridged by a shift to longer timescales in historical studies or by a flight from chronology.<sup>58</sup> The temporalities of climate change corrupt the notion of progress, shatter the experience of modern presentism, and subject the future to forces of the past. This shift entails major temporal recalibrations affecting all aspects of society. The incessant monitoring of nature emergencies in contemporary global society document the increasing anthropogenic impact on the earth and atmosphere. But it also displays the struggle to reimagine the temporal configuration of the present. The abstraction of climate change is often located in the clash between long, slow, and deep times, on the one hand, and accelerating, urgent, and disruptive times, on the other. But today, it is precisely these temporalities that are combined in the emerging sense that geological time, in the shape of the Anthropocene, is unfolding in real time.

When Koselleck writes about *Verzeitlichung* it refers to something seemingly simple and yet fundamental, namely the temporalization of Western societies in the late eighteenth century through the idea of the progressive

nature of history. As a consequence, the past and present were increasingly separated in modernity, Koselleck and others have argued, creating an ever-increasing gap between experience and expectation in modern societies. Here, I have suggested that since the last three or four decades, we are experiencing an equally pervasive but different process of temporalization, precisely two centuries after the period Koselleck refers to as *Neuzeit*. How and when did the modern configuration of past, present, and future become inadequate for comprehending contemporary society? By the end of the twentieth century, the tradition of critical thought on presentism in Western modernity reached a point where a major contribution declared “the end of temporality.”<sup>59</sup> However, at that time, a different historical experience of the temporal composition of the present was already beginning to take shape. Since then, an increasing number of aspects of human activity have become imbued with the intensities of climate change temporalities. This is reflected, for example, in the formation of social and political movements for which matters of time frames and intergenerational inequalities are the principal concern.

We have only started to think historically about contemporary temporalization. In this chapter, I have tried to indicate how one important aspect of this endeavor might be to look closer at the cultural reception of major nature events as instances of alternative configurations of historical and natural times. In a media historical perspective this also involves revisiting the distinction between technological and elemental media. As we know from the increasing interest in the material ecology of media, there are important links between the history of media and weather. But to uncover the genealogy of climate change temporalities we should also reconsider the modern emphasis on technological and infrastructural determinations of the nature of media. As the acceleration of nature changes the understanding of the character and duration of historical events, the notion of media is transformed through the present emphasis on elemental media in the communication of past and future events. These changing definitions concern fundamental aspects of modern historical thinking, and yet they reflect experiences that are shared over vast distances in time.

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## NOTES

1. Bruno Latour, *Down to Earth: Politics in the New Climatic Regime*, trans. Catherine Porter (Cambridge, UK: Polity, 2018), 94 (emphasis in original).
2. See, for example, Dipesh Chakrabarty, “Anthropocene Time,” *History and Theory* 57, no. 1 (2018): 5–32. In the human sciences, the convergence between historical and geological thinking is also expressed by an increasing historical interest and theoretical influence of earth system thinking. It is also supported by a notable trend of co-writing between earth scientists and humanities scholars, providing a sign of a shared commitment to integrative knowledge production in the intersection between the study of historical and natural times. See, for example, Bruno Latour and Timothy M. Lenton, “Extending the Domain of Freedom, or Why Gaia Is So Hard to Understand,” *Critical Inquiry* 45 (Spring 2019): 659–80. I have previously discussed this in a Scandinavian context together with geologist and earth scientist Henrik Svensen; see Anders Ekström and Henrik H. Svensen, “Naturkatastrofer i menneskets tidsalder: Mot en tværfaglig forståelse av antropocen-begrepet,” *Tidsskrift for kulturforskning* 13, no. 3 (2014): 6–21.
3. Helge Jordheim, “Introduction: Multiple Times and the Work of Synchronization,” *History and Theory* 53, no. 4 (2014): 498–518. It is telling of the current direction of this strand of historical theory that the most recent translation of Koselleck’s writings into English gives his concept of layers of historical time—*Zeitschichten*—a more pronounced geological twist by emphasizing its relation to geological concepts of time such as “strata” and “sediment.” Reinhart Koselleck, *Sediments of Time: On Possible Histories*, trans. Sean Franzel and Stefan-Ludwig Hoffmann (Stanford: Stanford University Press, 2018).
4. See, for example, Robert Macfarlane, *Underland: A Deep Time Journey* (London: Hamish Hamilton, 2019), 15.
5. Christophe Bonneuil and Jean-Baptiste Fressoz, *The Shock of the Anthropocene: The Earth, History and Us*, trans. David Fernbach (London: Verso 2017), xiii, *passim*. See also J. R. McNeill and Peter Engelke, *The Great Acceleration: An Environmental History of the Anthropocene since 1945* (Cambridge, MA: The Belknap Press of Harvard University Press, 2014).
6. See, for example, Nina Möllers, “Cur(at)ing the Planet—How to Exhibit the Anthropocene and Why,” *RCC Perspectives* 3 (2013): 57–66; Dag Avango and Libby Robin, “Displaying the Anthropocene in and beyond Museums,” in *Curating the Future: Museums, Communities and Climate Change*, ed. Jennifer Newell, Libby Robin, and Kirsten Wehner (New York: Routledge, 2017), 252–66; Gil Oliveira et al., “The Anthropocene in Natural History Museums: A Productive Lens of Engagement,” *Curator: The Museum Journal* 63, no. 3 (2020): 333–51; Bergsveinn Thorsson, “Walking through the Anthropocene: Encountering Materialisations of the Geological Epoch in an Exhibition Space,” *Nordisk Museologi* 28, no. 1 (2020): 103–19.
7. It remains an empirical question to pinpoint in time when this topic became a major theme in public debate, and any answer will depend on historical outlook and local context. But given current knowledge, and how emerging debates on human-induced

- climate change was different from Western globalization debates in the 1960s and 1970s, this provisional generalization is reasonable. For a similar dating, see Dipesh Chakrabarty, "Postcolonial Studies and the Challenge of Climate Change," *New Literary History* 43, no. 1 (2012): 1–18.
8. Marit Ruge Bjærke describes a similar sense of constant and rapid change and accumulating knowledge as an affordance of open-ended databases and digital archives of species extinction; see Chapter 5, this volume.
  9. Anders Ekström, "When Is the Now? Monitoring Disaster in the Expansion of Time," *International Journal of Communication* 10 (2016): 5342–61.
  10. I conducted this case study as part of a larger research project entitled "From Pompeii to Fukushima: Time, Intermediality and Transregional Imaginaries in Disaster Discourse," which was funded by Riksbankens Jubileumsfond.
  11. This is discussed at further length in Ekström, "When Is the Now?"
  12. This builds on a Norwegian case study, but there are many examples that point to a similar development in other languages. Yngve Nilsen, "Da vesle Agnar ble ekstrem: Norsk meteorologi fra stormvarsel til ekstremvarsel," *Tidsskrift for kulturforskning* 13, no. 3 (2014): 22–35. The circulation of temporal concepts and visual genres between public, institutional, and scientific contexts is also reflected in the IPCC reports, which is discussed in Nina Wormbs contribution to this volume, Chapter 11.
  13. Richard Grusin, *Premeditation: Affect and Mediality After 9/11* (Basingstoke: Palgrave Macmillan, 2010).
  14. Ekström, "When is the Now?" On televisual meanings of "live" as a mode of news, see Paddy Scannell, *Television and the Meaning of "Live": An Enquiry into the Human Situation* (Cambridge, UK: Polity, 2014).
  15. See, for example, Matthew Taylor, "Climate Change Making Storms Like Iday More Severe, Say Experts," *The Guardian*, March 19, 2019, retrieved October 12, 2021 from <http://www.theguardian.com/world/2019/mar/19/climate-change-making-storms-like-idai-more-severe-say-experts>. The early history of the rhetoric of example is discussed by John D. Lyons in *Exemplum: The Rhetoric of Example in Early Modern France and Italy* (Princeton: Princeton University Press, 1990).
  16. Compare Bruno Latour, "Agency at the Time of the Anthropocene," *New Literary History* 45, no. 1 (2014): 1–18.
  17. I use this term with Foucault in mind who argued for a methodology of "eventalization" as a way of making visible the historical forces at play in that which at a given moment in time was established as self-evident and universal. Michel Foucault, "Questions of Method," in *The Foucault Effect: Studies in Governmentality*, ed. Graham Burchell, Colin Gordon, and Peter Miller (Chicago: University of Chicago Press, 1991), 76–77.
  18. Ekström and Svensen, "Naturkatastrofer i menneskets tidsalder," 14–15.
  19. Fernand Braudel, "The Situation of History in 1950," in *On History*, trans. Sarah Matthews (Chicago: Chicago University Press, 1980), 12.
  20. See the discussion on earth-historical time as "simply time" in Chakrabarty, "Anthropocene Time," 6–7. For examples of the turn to geology as a condition for reflection in contemporary art and cultural critique, see Elisabeth Ellsworth and

- Jamie Kruse, eds., *Making the Geological Now: Responses to Material Conditions of Contemporary Life* (Brooklyn: Punctum Books, 2013); Heather Davies and Etienne Turpin, eds., *Art in the Anthropocene: Encounters Among Aesthetics, Politics, Environments and Epistemologies* (London: Open Humanities Press, 2015).
21. John Durham Peters, *The Marvelous Clouds: Toward a Philosophy of Elemental Media* (Chicago: University of Chicago Press, 2015).
  22. On the increasing critical interest in media infrastructure, see, for example, Lisa Parks and Nicole Starosielski, eds., *Signal Traffic: Critical Studies of Media Infrastructures* (Champaign: University of Illinois Press, 2015); Jean-Christophe Plantin and Aswin Punathambekar, "Digital Media Infrastructures: Pipes, Platforms, and Politics," *Media, Culture & Society* 41, no. 2 (2019): 163–74.
  23. This shift of existentialism's scale is also exemplified by the understanding of "the planet *as such* . . . as a site of existential concern." Dipesh Chakrabarty, "The Planet: An Emergent Humanist Category," *Critical Inquiry* 46 (Autumn 2019): 4.
  24. Latour, *Down to Earth*, 40–41.
  25. For a comprehensive history of climate modeling and weather data, see Paul N. Edwards, *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming* (Cambridge, MA: MIT Press, 2013). On ice cores as time-binding media, see for example Alessandro Antonello and Mark Carey, "Ice Cores and the Temporalities of the Global Environment," *Environmental Humanities* 9, no. 2 (2017): 181–203.
  26. Peters, *Marvelous Clouds*, 243.
  27. See, for example, Bonneuil and Fressoz, *Shock of the Anthropocene*; McNeill and Engelke, *Great Acceleration*; Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (London: Verso, 2013).
  28. Duncan Kelly, *Politics and the Anthropocene* (Cambridge, UK: Polity, 2019), 4–5.
  29. Deborah R. Coen, "Big Is a Thing of the Past: Climate Change and Methodology in the History of Ideas," *Journal of the History of Ideas* 77, no. 2 (2016): 312.
  30. See, for example, the discussion on Herder in Jordheim, "Introduction," 517–18.
  31. See Chapter 3 by Sverker Sörlin in this book.
  32. Compare Coen, "Big Is a Things of the Past," 314–15.
  33. See, for example, Denis Cosgrove, *Geography and Vision: Seeing, Imagining, and Representing the World* (London: I.B. Tauris, 2008); Daniel Rosenberg and Anthony Crafton, *Cartographies of Time: A History of the Timeline* (New York: Princeton Architectural Press, 2010).
  34. I have previously discussed these topics in several articles and books on nineteenth-century exhibitionary media; see, for example, Anders Ekström, "'Showing at One View': Ferdinand Boberg's 'Statistical Machinery' and the Visionary Pedagogy of Early Twentieth-Century Statistical Display," *Early Popular Visual Culture* 6, no. 1 (2008): 35–50; Anders Ekström, "Walk-In Media: International Exhibitions as Media Space," in *The Routledge Handbook of Museums, Media and Communication*, ed. Kirsten Drotner et al. (New York: Routledge, 2019), 17–30.
  35. Rosalind Williams, *Notes on the Underground: An Essay on Technology, Society and the Imagination* (Cambridge, MA: MIT Press, 1992); Adeline Buckland, *Novel Science:*

- Fiction and the Invention of the Nineteenth-Century Geology* (Chicago: University of Chicago Press, 2013).
36. See, for example, Brian R. Hamnett, *The Historical Novel in Nineteenth-Century Europe: Representations of Reality in History and Fiction* (Oxford, UK: Oxford University Press, 2011).
  37. Ralph O'Connor, *The Earth on Show: Fossils and the Poetics of Popular Science, 1802–1856* (Chicago: University of Chicago Press, 2007).
  38. Anders Ekström, "Seeing From Above: A Particular History of the General Observer," *Nineteenth-Century Contexts: An Interdisciplinary Journal* 31, no. 3 (2009): 185–207.
  39. The genealogy of the modern preoccupation with the category of the contemporary—or "today," as he also phrases it—is discussed by Michel Foucault in his essay on Immanuel Kant's 1784 essay *Was ist Aufklärung?* Here Foucault identifies the departure point for what he refers to as an "attitude of modernity," not an epoch or period, which focused critical reflection on its own actuality and introduced the idea of the contemporary as a distinctive temporality of modernity. Michel Foucault, "What Is Enlightenment?" in *The Foucault Reader*, ed. Paul Rabinow (New York: Pantheon Books, 1984), 38–39 (my italics).
  40. Reinhart Koselleck, "Neuzeit": Remarks on the Semantics of Modern Concepts of Movement," in *Futures Past: On the Semantics of Historical Time*, trans. Keith Tribe (New York: Columbia University Press, 2004), 224.
  41. Nicholas Mirzoeff, "Visualizing the Anthropocene," *Public Culture* 26, no. 2 (2014): 220–23.
  42. Bonneuil and Fressoz, *Shock of the Anthropocene*, chapter 8. See also Chapter 4 by Julia Nordblad in this volume, on forest policies in early nineteenth-century France.
  43. Martin J. S. Rudwick, *Earth's Deep History: How It Was Discovered and Why It Matters* (Chicago: University of Chicago Press, 2014).
  44. Anders Ekström, "Exhibiting Disasters: Mediation, Historicity and Spectatorship," *Media, Culture & Society* 34, no. 4 (2012): 472–87.
  45. For a selection of works, see for example Victoria C. Gardner Coates, Kenneth Lapatin, and Jon L. Seydl, *The Last Days of Pompeii: Decadence, Apocalypse, Resurrection* (Los Angeles: J. Paul Getty Museum, 2012).
  46. For a more thorough discussion of the millenia-long remediation of the ancient eruption of Vesuvius, see Anders Ekström, "Remediation, Time and Disaster," *Theory, Culture & Society* 33, no. 5 (2016): 117–38.
  47. Reinhart Koselleck, "History, Histories, and Formal Time Structures," in *Futures Past: On the Semantics of Historical Time*, trans. Keith Tribe (New York: Columbia University Press, 2004), 93–104. For a discussion of the critique of the concept of *die Gleichzeitigkeit des Ungleichzeitigen* as a version of modernization theory, see Jordheim, "Introduction," 504–5.
  48. For an introduction to Diderot's writings on the tableau, see Romira Worvill, "From Prose *peinture* to Dramatic *tableau*: Diderot, Fénelon and the Emergence of the Pictorial Aesthetic in France," *Studies in Eighteenth-Century Culture* 39 (2010): 151–70.

49. On the early modern tradition, see Lyons, *Exemplum*.
50. Ekström, "Exhibiting Disasters."
51. I borrow this term from Harald Innis's distinction between time-binding and space-binding media. See Harold A. Innis, *Empire and Communications* (Toronto: Dundurn Press, 2007).
52. John D. Lyons, *Before Imagination: Embodied Thought from Montaigne to Rousseau* (Stanford: Stanford University Press, 2005), 24–26.
53. Ekström, "Remediation, Time and Disaster," especially 128–29; Hamnett, *The Historical Novel*.
54. On the nineteenth-century globalization of news agencies and telegraph networks, see Dwayne R. Winseck and Robert M. Pike, *Communication and Empire: Media, Markets, and Globalization, 1860–1930* (Durham, NC: Duke University Press, 2007); Simon J. Potter, "Webs, Networks, and Systems: Globalization and the Mass Media in the Nineteenth- and Twentieth-Century British Empire," *Journal of British Studies* 46, no. 3 (2007): 621–46; Gordon M. Winder, "London's Global Reach? Reuters News and Network, 1865, 1881, and 1914," *Journal of World History* 21, no. 2 (2010): 271–96. On the politics of common time, see also Vanessa Ogle, "Whose Time Is It? The Pluralization of Time and the Global Condition, 1870s–1940s," *The American Historical Review* 118, no. 5 (2013): 1376–1402.
55. The most comprehensive contemporary report on the Krakatoa eruption and its after-effects was G. J. Symons, ed., *The Eruption of Krakatoa, and Subsequent Phenomena: Report of the Krakatoa Committee of the Royal Society* (London: Trubner & Co., 1888). For a recent account, see Simon Winchester, *Krakatoa: The Day the World Exploded: August 27, 1883* (New York: Harper Perennial, 2004).
56. Peter Gould, "Lisbon 1755: Enlightenment, Catastrophe, and Communication," in *Geography and Enlightenment*, ed. David N. Livingstone and Charles W. J. Withers (Chicago: University of Chicago Press, 1999), especially 399–400.
57. Compare François Hartog, *Regimes of Historicity: Presentism and Experiences of Time*, trans. Saskia Brown (New York: Columbia University Press, 2015).
58. See, for example, Stefan Tanaka, "History without Chronology," *Public Culture* 28, no. 1 (2015): 161–86; Jo Guldi and David Armitage, *The History Manifesto* (Cambridge, UK: Cambridge University Press, 2014).
59. Fredric Jameson, "The End of Temporality," *Critical Inquiry* 29, no. 4 (2003): 695–718.

## BIBLIOGRAPHY

- Antonello, Alessandro, and Mark Carey. "Ice Cores and the Temporalities of the Global Environment." *Environmental Humanities* 9, no. 2 (2017): 181–203.
- Avango, Dag, and Libby Robin. "Displaying the Anthropocene in and beyond Museums." In *Curating the Future: Museums, Communities and Climate Change*, edited by Jennifer Newell, Libby Robin, and Kirsten Wehner, 252–66. New York: Routledge, 2017.
- Bonneuil, Christophe, and Jean-Baptiste Fressoz. *The Shock of the Anthropocene: The Earth, History and Us*. Translated by David Fernbach. London: Verso, 2017.

- Braudel, Fernand. "The Situation of History in 1950." In *On History*, translated by Sarah Matthews, 6–22. Chicago: University of Chicago Press, 1980.
- Buckland, Adelene. *Novel Science: Fiction and the Invention of the Nineteenth-Century Geology*. Chicago: University of Chicago Press, 2013.
- Chakrabarty, Dipesh. "Anthropocene Time." *History and Theory* 57, no. 1 (2018): 5–32.
- . "The Planet: An Emergent Humanist Category." *Critical Inquiry* 46 (Autumn 2019): 1–31.
- . "Postcolonial Studies and the Challenge of Climate Change." *New Literary History* 43, no. 1 (2012): 1–18.
- Coen, Deborah R. "Big Is a Thing of the Past: Climate Change and Methodology in the History of Ideas." *Journal of the History of Ideas* 77, no. 2 (2016): 305–21.
- Cosgrove, Denis. *Geography and Vision: Seeing, Imagining, and Representing the World*. London: I.B. Tauris, 2008.
- Davies, Heather, and Etienne Turpin, eds. *Art in the Anthropocene: Encounters Among Aesthetics, Politics, Environments and Epistemologies*. London: Open Humanities Press, 2015.
- Edwards, Paul N. *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming*. Cambridge, MA: MIT Press, 2013.
- Ekström, Anders. "Exhibiting Disasters: Mediation, Historicity and Spectatorship." *Media, Culture & Society* 34, no. 4 (2012): 472–87.
- . "Remediation, Time and Disaster." *Theory, Culture & Society* 33, no. 5 (2016): 117–38.
- . "Seeing From Above: A Particular History of the General Observer." *Nineteenth-Century Contexts: An Interdisciplinary Journal* 31, no. 3 (2009): 185–207.
- . "'Showing at One View': Ferdinand Boberg's 'Statistical Machinery' and the Visionary Pedagogy of Early Twentieth-Century Statistical Display." *Early Popular Visual Culture* 6, no. 1 (2008): 35–50.
- . "Walk-In Media: International Exhibitions as Media Space." In *The Routledge Handbook of Museums, Media and Communication*, edited by Kirsten Drotner, Vince Dziekan, Ross Parry, and Kim Christian Schröder, 17–30. New York: Routledge, 2019.
- . "When Is the Now? Monitoring Disaster in the Expansion of Time." *International Journal of Communication* 10 (2016): 5342–61.
- Ekström, Anders, and Henrik H. Svensen. "Naturkatastrofer i menneskets tidsalder: Mot en tverrfaglig forståelse av antropocen-begrepet." *Tidsskrift for kulturforskning* 13, no. 3 (2014): 6–21.
- Ellsworth, Elisabeth, and Jamie Kruse, eds. *Making the Geological Now: Responses to Material Conditions of Contemporary Life*. Brooklyn: Punctum Books, 2013.
- Foucault, Michel. "Questions of Method." In *The Foucault Effect: Studies in Governmentality*, edited by Graham Burchell, Colin Gordon, and Peter Miller, 73–86. Chicago: University of Chicago Press, 1991.
- . "What Is Enlightenment?" In *The Foucault Reader*, edited by Paul Rabinow, 32–50. New York: Pantheon Books, 1984.
- Gardner Coates, Victoria C., Kenneth Lapatin, and Jon L. Seydl. *The Last Days of Pompeii: Decadence, Apocalypse, Resurrection*. Los Angeles: J. Paul Getty Museum, 2012.

- Gould, Peter. "Lisbon 1755: Enlightenment, Catastrophe, and Communication." In *Geography and Enlightenment*, edited by David N. Livingstone and Charles W. J. Withers, 399–410. Chicago: University of Chicago Press, 1999.
- Grusin, Richard. *Premediation: Affect and Mediality After 9/11*. Basingstoke: Palgrave Macmillan, 2010.
- Guldi, Jo, and David Armitage. *The History Manifesto*. Cambridge, UK: Cambridge University Press, 2014.
- Hamnett, Brian R. *The Historical Novel in Nineteenth-Century Europe: Representations of Reality in History and Fiction*. Oxford, UK: Oxford University Press, 2011.
- Hartog, François. *Regimes of Historicity: Presentism and Experiences of Time*. Translated by Saskia Brown. New York: Columbia University Press, 2015.
- Innis, Harold A. *Empire and Communications*. Toronto: Dundurn Press, 2007.
- Jameson, Fredric. "The End of Temporality." *Critical Inquiry* 29, no. 4 (2003): 695–718.
- Jordheim, Helge. "Introduction: Multiple Times and the Work of Synchronization." *History and Theory* 53, no. 4 (2014): 498–518.
- Kelly, Duncan. *Politics and the Anthropocene*. Cambridge, UK: Polity, 2019.
- Koselleck, Reinhart. "History, Histories, and Formal Time Structures." In *Futures Past: On the Semantics of Historical Time*, translated by Keith Tribe, 93–104. New York: Columbia University Press, 2004.
- . "'Neuzeit': Remarks on the Semantics of Modern Concepts of Movement." In *Futures Past: On the Semantics of Historical Time*, translated by Keith Tribe, 222–54. New York: Columbia University Press, 2004.
- . *Sediments of Time: On Possible Histories*. Translated by Sean Franzel and Stefan-Ludwig Hoffmann. Stanford: Stanford University Press, 2018.
- Latour, Bruno. "Agency at the time of the Anthropocene." *New Literary History* 45, no. 1 (2014): 1–18.
- . *Down to Earth: Politics in the New Climatic Regime*. Translated by Catherine Porter. Cambridge, UK: Polity, 2018.
- Latour, Bruno, and Timothy M. Lenton. "Extending the Domain of Freedom, or Why Gaia Is So Hard to Understand." *Critical Inquiry* 45 (Spring 2019): 659–80.
- Lyons, John D. *Before Imagination: Embodied Thought from Montaigne to Rousseau*. Stanford: Stanford University Press, 2005.
- . *Exemplum: The Rhetoric of Example in Early Modern France and Italy*. Princeton: Princeton University Press, 1990.
- Macfarlane, Robert. *Underland: A Deep Time Journey*. London: Hamish Hamilton, 2019.
- McNeill, J. R., and Peter Engelke. *The Great Acceleration: An Environmental History of the Anthropocene since 1945*. Cambridge, MA: The Belknap Press of Harvard University Press, 2014.
- Mirzoeff, Nicholas. "Visualizing the Anthropocene." *Public Culture* 26, no. 2 (2014): 213–32.
- Mitchell, Timothy. *Carbon Democracy: Political Power in the Age of Oil*. London: Verso, 2013.
- Möllers, Nina. "Cur(at)ing the Planet—How to Exhibit the Anthropocene and Why." *RCC Perspectives* 3 (2013): 57–66.
- Nilsen, Yngve. "Da vesle Agnar ble ekstrem: Norsk meteorologi fra stormvarsel til ekstremværsvarsel." *Tidsskrift for kulturforskning* 13, no. 3 (2014): 22–35.

- O'Connor, Ralph. *The Earth on Show: Fossils and the Poetics of Popular Science, 1802–1856*. Chicago: University of Chicago Press, 2007.
- Ogle, Vanessa. “Whose Time Is It? The Pluralization of Time and the Global Condition, 1870s–1940s.” *The American Historical Review* 118, no. 5 (2013): 1376–1402.
- Oliveira, Gil, Eric Dorfman, Nicolas Kramar, Chase D. Mendenhall, and Nicole E. Heller. “The Anthropocene in Natural History Museums: A Productive Lens of Engagement.” *Curator: The Museum Journal* 63, no. 3 (2020): 333–51.
- Parks, Lisa, and Nicole Starosielski, eds. *Signal Traffic: Critical Studies of Media Infrastructures*. Champaign: University of Illinois Press, 2015.
- Peters, John Durham. *The Marvelous Clouds: Toward a Philosophy of Elemental Media*. Chicago: University of Chicago Press, 2015.
- Plantin, Jean-Christophe, and Aswin Punathambekar. “Digital Media Infrastructures: Pipes, Platforms, and Politics.” *Media, Culture & Society* 41, no. 2 (2019): 163–74.
- Potter, Simon J. “Webs, Networks, and Systems: Globalization and the Mass Media in the Nineteenth- and Twentieth-Century British Empire.” *Journal of British Studies* 46, no. 3 (2007): 621–46.
- Rosenberg, Daniel, and Anthony Crafton. *Cartographies of Time: A History of the Timeline*. New York: Princeton Architectural Press, 2010.
- Rudwick, Martin J. S. *Earth’s Deep History: How It Was Discovered and Why It Matters*. Chicago: University of Chicago Press, 2014.
- Scannell, Paddy. *Television and the Meaning of “Live”: An Enquiry into the Human Situation*. Cambridge, UK: Polity, 2014.
- Symons, G. J., ed. *The Eruption of Krakatoa, and Subsequent Phenomena: Report of the Krakatoa Committee of the Royal Society*. London: Trubner & Co., 1888.
- Tanaka, Stefan. “History without Chronology.” *Public Culture* 28, no. 1 (2015): 161–86.
- Taylor, Matthew. “Climate Change Making Storms Like Idai More Severe, Say Experts.” *The Guardian*, March 19, 2019. Retrieved October 12, 2021 from <http://www.theguardian.com/world/2019/mar/19/climate-change-making-storms-like-idai-more-severe-say-experts>.
- Thorsson, Bergsveinn. “Walking through the Anthropocene: Encountering Materialisations of the Geological Epoch in an Exhibition Space.” *Nordisk Museologi* 28, no. 1 (2020): 103–19.
- Williams, Rosalind. *Notes on the Underground: An Essay on Technology, Society and the Imagination*. Cambridge, MA: MIT Press, 1992.
- Winchester, Simon. *Krakatoa: The Day the World Exploded: August 27, 1883*. New York: Harper Perennial, 2004.
- Winder, Gordon M. “London’s Global Reach? Reuters News and Network, 1865, 1881, and 1914.” *Journal of World History* 21, no. 2 (2010): 271–96.
- Winseck, Dwayne R., and Robert M. Pike. *Communication and Empire: Media, Markets, and Globalization, 1860–1930*. Durham, NC: Duke University Press, 2007.
- Worvill, Romira. “From Prose *peinture* to Dramatic *tableau*: Diderot, Fénelon and the Emergence of the Pictorial Aesthetic in France.” *Studies in Eighteenth-Century Culture* 39 (2010): 151–70.