ENVIRONING MEDIA

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EDITORS' INTRODUCTION

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Over the past decades, we have come to see the divide between nature and culture as an illusory construction. Consequently, there is at present more need than ever for detailed analysis of how the human-Earth relationship is shaped.[1] Media, often associated with society and humans, can and should be understood in a broader sense as the technical enabler of knowledge *about*, and interventions *into*, the environment. Environing was first suggested as a theoretical concept in environmental history a decade and half ago as a way to overcome the problem of the separation between a natural environment – nature *out there* – and a human-induced environment, like farmlands. By showing how these borders were in fact continuously produced rather than given, thinking in terms of environing as a historical process was conceived of as way to integrate the natural environment into the social.[2]

With the concept "environing media" we want to zero in on the role played by various media forms – from early modern rutters registering global wind patterns to remote sensing satellites and artificial intelligence – in shaping the human-Earth relationship. The chapters of this book are divided into three analytical categories – colonial, planetary and elemental – that each helps explain how our world came to be environed through media at different historical phases. Starting in the early modern colonial environing and continuing into the 20th century, we get an idea of how the environing media of the first globalization changed conceptions of nature and society. The 20th century also saw the steady rise of the planetary perspective as new ecological concepts and material realities emerged which we now recognize as biosphere, Earth system, global environment and technosphere. A different view of environing media is afforded by focusing on the elemental, which in this volume are represented by air, climate and ocean in the final section of the book.

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The etymological meanings of media and environment are in fact not dissimilar. Environment, from the word *environ*, historically meant "in the middle of" or "surroundings," while the strong nature connotation of this word is largely a modernist conception.[3] Media is derived from the Latin word *medius* meaning "middle" or "in between." It shares etymology with "milieu" that stems from *medius locus* – a place in the middle.[4]

Both the natural connotation of environment and the cultural connotation of media are thus modernist conceptions of the 20th century that we may benefit in overcoming today at the onset of the Anthropocene. This new geological epoch names humanity as a species with the word *Anthropos*, although a particular form of Western human culture associated with colonialism, capitalism and extractivism are the primary drivers of this global environmental change.[5] However, the material conditions of possibility for the Anthropocene are environing media, without which the shifting scale and Great Acceleration, which is its hallmark, could not have happened. In this way, the analytical juxtaposition of media and environment can become an impasse to study the varying expressions of an ever-changing environment at a given moment in history.[6] Environmental epistemologies are contingent upon – but not determined by – the media technologies at hand. The concept offers insight into the conditions of possibility for knowing the Earth as well as the complex feedback loop that is generated continuously by new knowledge that enables new interventions and alterations of the environment. In the Anthropocene, being on and knowing the Earth have become so tightly intertwined that they are now inseparable.

Simply put, knowing and doing environment since the early modern era have presupposed a technologically complex interface. It allowed for changing scales from direct human observation and intervention *in situ* to instead interact at a mediated level, separated in both space and time. The aim of this volume on environing media is to propose new perspectives on how that separation took place. In brief, the volume raises and addresses new questions about how we entered into the Anthropocene, as modern environmental epistemologies grew out of ever more efficient forms of exploitation and extraction built on new markets of labor and consumption over the last five centuries.[7]

Environing and media

Starting with environing, the term connotes *the environment* to be less of a fixed space and more of a process where humans play the role of intervenor. We could add here that non-humans too intervene in and shape their environments – think of beavers building dams, for instance – as captured by niche construction theory, which recently has been put to use to explain similar processes in human culture.[8] What we want to articulate with environing media is the scale and intensity of human interventions over roughly the past five centuries that have produced new kinds of environments. Importantly, it is through environing media that we have pushed the planet into a new geological epoch.

Over time, a range of everyday practices – such as forest clearing, grazing, farming or iron production – established historical relationships between land and people that were at once social and environmental. These uses of the environment also shaped historical knowledge of, and ideas about, environments, resulting in demarcations of and norms about who had access to a place or how a resource should be used.[9] Practices of environing also produced environmental knowledge. For example, natural resource inventories or cadastral mapping often corresponded with shifts in which groups of people could translate knowledge about the environment and over time transform it further, to environ it differently.[10] By analyzing the middle ground of environing as media – for instance how data are collected, acted upon and give rise to new epistemologies – we can gain a better understanding of the past, present and future of the human-Earth relation.

The meaning of "environment" changed during mid-20th century from a local to a global phenomenon. This shift corresponded with new practices of computerizing measurements and monitoring systems, such as orbiting satellites, which made it possible to systemize and combine many different forms of environmental data.[11] The postwar era saw the rapid rise of such technologies that were put to use for both military and environmental purposes, giving rise to what has been called "cultures of prediction."[12] Illustrating how these monitoring systems emerged historically is also part of explaining why they became important for environmental management and thus central to the formulation of present-day's human-Earth relationship.[13] In his contribution, Sverker Sörlin details a genealogy of how the humanities – and the field of history in particular – began working with the concept of environment. He sees the conceptual shift toward environing as indicative of a larger processual understanding for the importance played by media in making and making known the Earth. In analyzing the new conditions of the human-Earth relation in the Anthropocene, Sörlin also emphasizes the necessary co-existing of multiple timescales in what he terms the Great Synchronization, as a deliberate parallel to the Great Acceleration. In this new episteme, Earth system scientists, historians and environmental humanists are co-exploring new ways of understanding planetary times, a matter that becomes all the more urgent as the eco-crisis proceeds.

Turning to the concept of media, we draw on the tradition of German media theory that during the last decade has gained analytical traction well beyond media studies as part of explaining how media operations generate new world views. In this context, "media" have been conceived of as a transdisciplinary endeavor to overcome certain humanist technophobia and to emphasize the techno-epistemic effects in the production and processing of power and knowledge. Instead of the more common conceptualization of media as being synonymous with the content they transmit, as in "news media" or "mass media," we rely on a more material understanding of media as cultural techniques.[14] The concept of environing media draws on this turn in German media theory toward cultural techniques, which attempts to subvert the dualism between media and culture by

focusing on the "operative sequences that historically and logically precede the media concepts generated by them."[15] In brief, the theoretical thrust of environing media is to reorient focus from ontological concepts – that are often taken for granted – to the ontic operations that exist before they are conceptualized. Writing, reading, painting or counting are practices – or cultural techniques – that predate the concepts generated from them.[16] Drawing on this philosophical insight to bear on the ontology of the environment, environing media designate the manifold technical processes that are involved in the recursion between environmental epistemology and environmental change.

It is worth emphasizing that both environing and cultural techniques are theoretical concepts that draw on agricultural history in their reinvention of an older material practice. Bernard Dionysius Geoghegan points out that in the pre-humanistic conception of the Latin word *colere*, on which Agri cultura is based, "culture" was already associated with nature and understood as a way of technically bringing forth the potential of the natural.[17] In the 19th and 20th centuries, however, "culture" attained a metaphorical meaning as the culturing of the human spirit, which is the basis of the commonplace understanding of the word today. Thus, the German word *Kulturtechnik* came to be redefined as a media theoretical concept to draw culture back to its material and technical operations in analyzing a broad range of practices in a new way. Instead of starting with the ontological level as a given, the study of cultural techniques insisted on the historical priority of techniques and practices – ontic operations – that would subsequently be understood as given concepts. During the same period, environmental historians proposed environing to zero in on the continuous production of the environmental through historical techniques and practices. Environing here similarly became a way of upending a dualistic understanding of the environment as something historically stable to gain a process-oriented understanding of the rise of the environmental in our age. Geoghegan contributes to this volume with an afterword which spells out the affordances of the concept of environing media today, by casting it through the vapor and steam of the 19th century nonmodernism of Wagnerian opera and Marx's proposition that "all that is solid melts into air." As Geoghegan puts it, "to consider how media environ is, also, to acknowledge their unsettled grounds today."

Over the last two decades, another related area of study under the label of "ecomedia" has rapidly grown into its own field, particularly in the US. Meanwhile, the European tradition of media theory has been more hesitant and cautious toward embracing the environmental challenge of our time. While ecomedia studies have overlaps with the concept of environing media that this collection is focused on, there are important differences. Ecomedia studies is defined as a field concerned with cultural *representations* of the environment in media as well as the environmental *impact* of media forms. Environing media is less interested in representations as it builds on the German media theoretical tradition discussed above and ties it closer to emergent theories of the

environmental humanities that focus on environmental epistemology and its conditions of possibility. Instead of representations, it is oriented toward the ontic operations of environmental sciences as these produce new ontologies and epistemologies.

The theoretical combination of environing and media turns the concept toward environmental sciences, like Earth system science and climatology, and makes it well suited to take on macro-analysis of epistemic objects, like the global environment. A theoretical point of departure is that the data-driven natural sciences will benefit from an integrative humanities approach, and that the environmental and planetary epistemologies they produce should be understood genealogically as part of a longer history of human attempts at knowing and shaping the Earth on a global scale.[18]

Research within the rapidly growing field of media and environment has different theoretical conceptualizations, usually depending on what aspect of human-Earth relations is to be analyzed. Environing media builds on the German media tradition mentioned above but ties it closer it to emergent theories of the environmental humanities that focus on environmental epistemology and its conditions of possibility. Where the theory of environing contends that environment is the product of human technological intervention, German media theory has long maintained on a parallel theoretical point that human culture is materially constructed and technically mediated to a much larger degree than has generally been understood. Thus, a key phrase in that tradition from its founder Friedrich Kittler is that media are devices that process, store and transmit data.[19]

John Durham Peters' *The Marvelous Clouds* (2015) builds on German media theory and its roots in Martin Heidegger's philosophy to demonstrate how we may think of environments in terms of "elemental media."[20] In this volume, Peters and Adam Wickberg contribute with an exploration of environing media in Mexico's complex history over the past five centuries. To do this, they draw on a theoretical development consisting in a shift in understanding from media as content-delivery systems to data processors. Message dissemination is a critically important role for media, but it is only one part of what they do. Media are as much in the business of organizing people and data as in transmitting messages via sound, image or word. As processors of data, media are also instrumental in our understanding and management of the environment. Calendars, clocks, towers, names, addresses, maps, registers and money are examples of media that help handling matters related to space and time, which has been of central concern for civilizations in general and for empire building in particular. An aspect of media highlighted by Peters and Wickberg is the understudied scholarly area of indigenous media. The Aztec empire was as dependent on media forms as the Spanish colonizers that replaced it, and there are numerous cases of knowledges and practices surviving in hybrid forms, for example as part of maps.

Returning to Peters' work on elemental media, these are more often than not in the business of *environing*, but environing media are not necessarily *elemental*. For example, we can think of air and water as elemental media in the case of Earth system science, but the epistemic effect of environing comes from understanding their function as "atmosphere" and "hydrosphere," and subsequently to process them as data to know their function in the global environment. One anecdote about how our understanding of air on planet Earth changed radically is from the 1960s when NASA (US) recruited James Lovelock to the Jet Propulsion Laboratories. Lovelock was to help build instruments that investigated the probability of life on Mars, whereupon he proposed that one need only look at the composition of the planet's atmosphere, which could be seen from Earth. In order to stay alive, any organism must consume materials, transform them chemically and release waste products into their surroundings.[21] If the atmosphere of Mars contained only carbon dioxide, it was a clear sign that the planet lacked life.

The atmosphere of Earth, by contrast, contained a mix of highly reactive gases such as ozone, methane, carbon monoxide, nitrogen and sulfur actively maintained and regulated by life on the surface (the biosphere) and held in a state of constant chemical disequilibrium through biogeochemical cycling and feedback loops – creating a habitable planet for humans and other lifeforms – which subsequently also formed the basis for Lovelock's Gaia hypothesis.[22]

By looking at the atmosphere of another planet, scientists began to think differently of Earth's atmosphere in turn. From this combination of ideas (the atmosphere as an extension of the biosphere) and media technologies (infrared telescopes and satellites) came atmospheric analysis and biogeochemistry, which are absolutely crucial for environmental epistemology about the Anthropocene. The link between ideas and media is further underlined by new phenomena being explored through, and depending on, a growing computerization of science from 1960s onward. The dialectics of feedback – between knowing and doing the environment through media – continues to present time, where we may speak about a fully mediated planet of data. Data are now gathered on a global scale using media technologies like the Argo floats program consisting in 4,000 buoys in the world oceans that continuously senses the water in real time, or NASA's various satellite missions that envelop the planet to remotely sense it, producing vast amounts of environmental data. This data is then processed using supercomputers that model and analyze oceans, climate or biodiversity, to take only a few examples, that in turn are transmitted via environmental sciences into the public perception of global environmental change.

In their chapter, Susanna Lidström, Adam Wickberg and Johan Gärdebo explore the emergence of the Argo program against the background of ocean media history, beginning in the 1500s and then tracing the environing of the oceans until present time. They analyze the technological mediation of the marine realm and how specific media technologies condition our understanding of what the ocean is, how it changes and what is considered essential and "actionable" ocean knowledge. Different historical phases of knowing the ocean

can be characterized with reference to developments in and application of sensing technologies. Drawing on a longer history of increasing exploration and innovation, the arguably most influential contemporary infrastructure for how the ocean is known and mediated is the Argo program, which has been in operation since the early 2000s. Argo consists of a fleet of around 4,000 autonomous instruments, floating with ocean currents in the upper 2,000 meters of the water column, recording key variables such as temperature and salinity, and providing fundamental input for oceanographic research as well as for broader Earth system sciences, including, importantly, climate change models.[23] As such, the Argo floats act as datagatherers and are the first-level interface in the mediation process of knowledge about the Earth system from the oceanic part of the hydrosphere.

Another essential history of how the deep ocean came to be known is offered by Erik Isberg in his chapter on Swedish Deep-Sea Expedition, 1947–1948. Isberg demonstrates how the new technology of piston cores enabled new data extraction from ocean sediments. The extraction of these *deep-sea cores* effectively paved the way for the subsequent establishment of paleoceanography as a scientific discipline that today allow us to asses current climate and ocean states against the deep history of the Earth. Time, and not only space, appears in Isberg's account as a crucial category for producing planetary-scale environmental knowledge in the early postwar era. By approaching deep-sea cores as environing media, he argues that they have been realizing different temporal and geographical conceptualizations of the ocean floor at different points in time. Contrary to the popular description of deep-sea cores as "natural archives," Isberg argues, they can instead be understood as historical in themselves, deeply interwoven with data gathering practices, scientific infrastructures and computational capabilities.

The notion of a mediated planet is also relevant for a neighboring concept to environing media – the *technosphere* – popularized by geologist Peter Haff to describe an emerging planetary layer spread throughout and above the biosphere, lithosphere, hydrosphere, cryosphere and atmosphere. Similar to the biosphere that makes up the Earth's total biomass, the interconnection of 30 trillion tons of human-manufactured objects can be observed as a technosphere – an interconnected parasitical system that draws resources and fuel from all other spheres in order to grow but in the process tampers with the Earth system as a whole. Paradoxically, the observation of the technosphere, for example through sensors spread over land, throughout the seas, and up into or beyond the atmosphere, is crucial for knowing about this planetary phenomenon while also playing a part in its material perpetuation and expansion.[24] Where environing media points out the epistemological in-between of the human-Earth relation, the technosphere offers a planetary macro-perspective of the changes brought about in this process.

Both environing media and technosphere are concepts that describe how we entered into the Anthropocene. To catch a snapshot of this process, Christoph Rosol's chapter uses the year 1948 to pivot his analysis of the fundamental role played by environing media in the co-evolution of both the Earth system science and the technosphere. Introducing the reader to a series of historical-geographical

vignettes juxtaposing various events that took place from January to December of 1948, it was a year, Rosol argues, that pointedly marks a decisive moment in which the juggernaut of modernity was greatly accelerated by recombining itself into a highly dynamic, mutually reinforcing technological, scientific, political, economic and medially environed complex. Perambulating the rise of electronic computing, molecular genetics and petro power, the commodification and universalization of global relations under the West's domination, as well as new concepts that reposition humans in nature, Rosol's vignettes chart a strikingly similar origin and mutual unleashing of the digital-, the nuclear- and the environmental age. Moreover, they highlight in how much that shift can be attributed to the increasing control over elementary building blocks such as bits, molecules, atoms and genes. Rosol thereby creates a sense of how many complex and interconnected processes led to the emergence of a new environmental epistemology. New media technologies created new environmental conceptions that in turn informed alterations of the environment itself, which is the complex feedback loop at the heart of the theoretical concept of environing media.

At the same time as digital media technologies have had a tremendous stake in the unleashing of Anthropocene drivers, Rosol argues that these are the very same technologies that are key to detecting, understanding and addressing this transition. This new techno-medial regime is one in which manipulations at the micro-level have massive effects at the macro-level. The regime presents a powerful but largely overlooked signature of humanity's mid-20th century embarkment on an unintended planetary experiment – the very experiment that has now resulted in the socioeconomic and technoscientific gridlock that our societies are stuck with when facing the multiple crises of the Anthropocene.

A crucial dimension of environing media is that different media produce different epistemologies. Depending on if one chooses to look at life on Earth from below or from above, the resulting knowledge will be very different, as argued by Giulia Rispoli who continues the volume's study of a mediated environment in the form of the biosphere and the Earth system. The biosphere concept grew out of a longer history of thinking about life *on* of the Earth whereas Earth system science depicted life from the *outside*, hence ignoring the role played by humans in environing the planet. Hinting at the prehistory of the cosmological crisis that is currently unfolding in the clash of global and planetary perspectives, the two views from inside and outside carry incommensurable values about the Earth itself. It is through the intellectual and material history of epistemological objects like biosphere and Earth system, Rispoli argues, that we can hope to understand the current state of the planet and work toward resolving tensions in the now unfolding human-Earth relation.

Another central aspect of planetary mediation is climate, and our understanding of it is fully dependent on a process that goes from data gathering and processing to transmission in the form of models, which come to guide our view of the possible future. Nina Wormbs' chapter shifts environing media, from space- to timescales, by analyzing where climate modeling's projections end.

As she reminds us, the Anthropocene is not just about the past but also about the future. Studying the UN IPCC's Assessment Reports, Wormbs details the most common target year 2100 and what affordances this timescale has in terms of human timespans, Western civilizational meaning and relevance for addressing the wickedness of continued anthropogenic climate change. How we can understand time in the Anthropocene is a seemingly straightforward question. But as we learn more about the past of this epoch, the future seems to vanish. This chapter focuses on the mediation of the future in the assessment reports and specifically on the target years of the model-based scenarios. This in turn has historical reasons that relate to issues of modeling capacity and the pace of climate change. The result is a tension between scales that do not synchronize the different temporalities of climate change.

The rapid datafication of the planet means that areas like the air itself can be tracked in real time and analyzed in detail. In her chapter, Eva Horn takes the current COVID-19 pandemic as a point of departure for historicizing the air itself as an environing medium. Horn tells a story about how air, for the longest time in Occidental thought, was conceived of as an environing medium, connecting bodies with other bodies, bodies with locations, locations with spaces and all of these to the cosmos. In contrast to the modern view of air as a body of gases, as in the example of Lovelock's discovery of Earth's atmosphere via Mars, Horn analyzes older conceptions of air to grasp the changing mediality of the air. In these understandings, the relationality of air becomes apparent in that it is not only that which surrounds individual bodies, but also something that connects bodies with one another by transporting the "exhalations" of one organism to another, as we have become painfully aware of during the COVID-19 pandemic where the contagiousness of airborne virus was often underestimated. In the pre-modern understanding, then, air was not just a medium of individual bodies but also considered a medium of the social. What differentiates earlier conceptualizations of the air as an environing medium is the fact that the air and its pathologies can be sensed – smelled, felt and seen. While modern concepts of the air and its varying states have tended to emphasize the imperceptibility of the air's pathologies, the pre-modern theories help regain a sense of the air as a palpable medium of life, both biological and social.

Together, the chapters of this book demonstrate how the recent human-Earth history can be fruitfully understood and analyzed through the concept of environing media. The integration of environing and media is a significant step forward in thinking about the environment today in that it brings the theoretical forefront of media studies and environmental humanities into an exploration of the various historical, present and future ways of environing the planet. The combination of these two fields is necessary to spell out the implications of contributions by environmental humanists in the past decades, namely, that life in the Anthropocene is as much a social dilemma as a physical one. One must grasp both positivist disciplines and interpretive ones to make sense of anthropogenic environmental change. It is the argument of this book that we do so by

reconsidering and closing the theoretical gap between media and environment as it allows us to produce historically specific understandings of how ideas, humans and machines come together in the production of both environmental knowledge and environments themselves.

Notes

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2 Sverker Sörlin & Paul Warde, "Making the Environment Historical: An Introduction," *Nature's End: History and the Environment*, eds. Sverker Sörlin & Paul Warde (Palgrave Macmillan 2009), 8.
3 Etienne S. Benson, *Surroundings: A History of Environments and Environmentalism* (Chicago: The University of Chicago Press, 2020); Vin Nardizzi, "Environ," *Veer Ecology. A Companion for Environmental Thinking*, eds. Jeffrey Jermoe Cohen & Lowell Duckert (Minnesota: University of Minnesota Press, 2017), 183–195; Paul Warde, "The Environment," *Local Places, Global Processes*, eds. Peter Coates, David Moon & Paul Warde (Oxford: Windgather Press, 2016), 32–46.
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5 Adam Wickberg, "Reconfiguring Temporality in the Anthropocene: Coloniality and the Political Eco-Crisis," *Resilience: A Journal of the Environmental Humanities* 8 (2020): 1, special issue "Roots of the Future," ed. Anthony Lioi, 37–59; Rolando Vazquez, Precedence, Earth and The Anthropocene: Decolonizing Design, *Design Philosophy Papers Design Philosophy Papers* 15, no. 1 (2017), 77–91, DOI: 10.1080/14487136.2017.1303130; Kathryn Yusoff, *A Billion Black Anthropocenes or None* (Minneapolis: University of Minnesota Press, 2019).
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8 Kevin Laland & Michael O'Brien, "Cultural Niche Construction: An Introduction," *Biological Theory* 6, no. 3 (2011): 191–202.
9 Tim Ingold, *The Perception of the Environment: Essays on Livelihood, Dwelling and Skill* (London: Routledge, 2000); cf. Karl-Johan Lindholm, "Environing: The Archaeology of 'Real Life' Remains," *The Resilience of Heritage: Cultivating a Future of the Past*, eds. Anneli Ekblom, Christian Isendahl & Karl-Johan Lindholm (Uppsala: Uppsala University, 2018), 253–256.
10 Johan Gärdebo, *Environing Technology: Swedish Satellite Remote Sensing in the Making of Environment 1969–2001* (Stockholm: KTH Royal Institute of Technology, 2019).
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14 Eva Horn, "Editor's Introduction: 'There Are No Media,'" *Grey Room* 4, no. 29 (fall 2007): 6.
15 Bernhard Siegert, "Cacography or Communication? Cultural Techniques in German Media Studies," *Grey Room* 29 (2008): 28.
16 T. Macho, "Zeit und Zahl: Kalender- und Zeitrechnung als Kulturtechniken," *Bild – Schrift – Zahl*, eds. Sybille Krämer & Horst Bredekamp (München: Fink), 179.
17 Bernard Dionysus Geoghegan, "After Kittler: On the Cultural Techniques of Recent German Media Theory," *Theory, Culture, Society* 30, no. 6 (2013): 72.
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