

Observatories over the Critical Zone

Monitoring and “thought exhibiting” art-lab ecological practices

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Abstract

The ZKM Center for Art and Media in Karlsruhe, Germany, was the site of a two-decade-long collaboration between the curator and media theorist Peter Weibel and the sociologist Bruno Latour. This partnership resulted in four “thought exhibitions” that aimed to update a curatorial approach to research. Critical Zones: Observatories for Earthly Politics, the last of these exhibitions, not only aligned with Latour’s well-known interest in climate issues, but also signaled a reconfiguration of a particular art-science subfield. The term “Critical Zone” refers to the thin outer layer of the Earth’s surface, from the treetops to the groundwater, where fundamental life-supporting biogeochemical processes take place. This fact constitutes the premise of the exhibition, which is conceived as a platform for the convergence of Latourian “interconnections of actants”, forcing the coordination of human and non-human relational agencies. Artistic practices reflect the specific operativity of new media art, reinventing performative practices that closely resemble those of scientific observatories or laboratory outposts. Monitoring data, mobile and field research replicate the role of the Critical Zone Observatories (CZO) – the international network of labs studying soil processes – and reconfigure a possible ‘laboratory life’ in emergency response.

Keywords

Thought exhibitions; artscience; lab studies; critical zone; ecology

1. Introduction: Thought exhibitions as display testbeds

Critical Zones: Observatories for Earthly Politics (2020) is the latest in a series of four exhibitions marking the collaboration between Peter Weibel, artist and director of the ZKM Center for Art and Media in Karlsruhe, Germany – which hosted them all – and sociologist Bruno Latour. As with the previous *Iconoclash* (2002), *Making Things Public* (2005) and *Reset Modernity!* (2016), they settled on a precise term to define them: *Gedankenausstellungen* (or “thought exhibitions”, from German), suggesting an interdisciplinary art-science approach to curating. In fact, this compound word originated as a variation of Gedankenexperiment (or “thought experiment”), a concept common to the hard sciences that describes the practice of imagining a hypothetical situation and analyzing it logically without the need for physical intervention. The underlying idea of this methodological approach is quite clear: to apply to artistic representation the impossibility of testing certain ideas except on a different scale, much as theoretical physicists use models for hypotheses that cannot be contained in a laboratory:

An exhibition offers a perfect scale model to test ideas which, as you said, are much too vast to be treated head on. It’s a good habit to consider that

exhibitions of- fer an equivalent of what scientists call a “thought experiment”: when you cannot test a theory because it is too farfetched, you test it in your head and intuition – or sometimes discover! – what the result could be. [1]

It thus acts as a shift into an additional “mode” that can only be studied experimentally, as a test [2]. This practice allows for theoretical solutions, such as a flexible relationship between the containment of ideas within a laboratory and the recognition that the laboratory itself is an unsuitable setting for capturing planetary art trends. Unlike traditional exhibitions, *Gedankenausstellungen* would be formed in their hypothesis, leaving the display stage with only the function of testing: reasoning, therefore takes place mostly in advance and is resolved in phases of “planning and “debriefing” [3].

Such phases involve the idea of broad collaboration across disciplines, as numerous as the fields participating in the current art system, whose boundaries are constantly challenged and shifted. In this way, curatorial experimentation takes on the guise of a productive clash between disciplines. A methodology that integrates various Latourian threads: an exploration of “laboratory life” as a social construct [4], the “heterogeneous engineering” of Actor-Network Theory (ANT), engaging both human and non-human agencies [5], and finally, the evolution across many ‘truths’ moderns have discovered over time [6], including the management of the ecological crisis. Throughout the four exhibitions, we will witness the transformation of the ANT’s ‘anatomical theatre’ – with its «significant suspension of time, space and realism» [3] – into an increasingly porous (but no less rigorous) structure of inquiry, open to actual emergence.

It’s no coincidence that *Iconoclash: Beyond the Image Wars in Science, Religion, and Art*, the first of its kind, is the most abstract and closest to art aesthetics. The exhibition is particularly concerned with the material status of the image, featuring Duchamp’s ready-mades, Malevich’s Suprematist paintings, scientific documents, screens, and religious objects. It’s also where the initial hypothetical model was first articulated: «Is there a way to suspend the iconoclastic gesture in order to interrogate instead of extending it further?» [3], accompanied by a statement from Latour himself, which establishes a foundational laboratory identity:

Nowhere else but in contemporary art has a better laboratory been set up for trying out and testing the resistance of every item comprising the cult of image, of picture, of beauty, of media, of genius. [7]

What we want to emphasize is the constant shift between different settings or, in ANT terms, ‘translations’. This process continues until the final exhibition, where the feasibility of the concept will challenge the limits of the gallery – spatially, socially, and structurally – as a site for a planetary survival experiment. The ‘public’ dimension will become increasingly pronounced, starting with *Making Things Public: Atmospheres of Democracy*, where the ‘outside’ begins to prevail. This is followed by *Reset Modernity!*, which embarks on a thought

experiment aimed at exploring once again a radically theoretical suggestion: the “resetting of modernity”, like a recalibration of a compass. This should allow the so-called ‘moderns’ to re-establish a positive political dialectic through various operations, of which climate is an essential aspect.¹ A clear statement of this transition towards an ecological subfield is the inclusion of Pierre Huyghe’s installation *Nymphéas Transplant*: a piece of topsoil (with plants, fish, amphibians, insects...) from under Claude Monet’s famous water-lily pond at Giverny, the site of his Impressionist paintings, is displayed under an ‘intelligent glass case’ that accurately reproduces the historical local weather conditions at Giverny between 1914 and 1918 – the date of the paintings.

2. Artistic coring in the Critical Zone

Nymphéas Transplant introduces the subject of the last exhibition (opened in May 2020, initially as a virtual event due to the restrictions imposed by the global COVID-19 pandemic), offering a glimpse into the fragile part of the Earth’s membrane where organic life has evolved, which scientists refer to as the Critical Zone [9]. The Critical Zone, as first defined by the U.S. National Research Council [10], encompasses the area from the lower atmosphere to the bedrock. It is characterized by its fertile geochemical permeability and by layers inhabited by organisms (lower atmosphere, canopy, soil, weathered rock) that make our planet the only one known to be capable of sustaining life. Weibel and Latour’s choice is reinforced by the fact that the Critical Zone is not only the thin layer where humanity found its place in the universe, but also the site of intense interconnection between the scientific disciplines that led to its conception in the nineteenth century: geology, chemistry, hydrology, and ecology. In the context, this network is joined by other fields such as art and medicine, the latter acting as a catalyst to launch exhibition ideas through a bodily analogy:

When a sick person enters an intensive care unit, the first thing caregivers do is to apply multiple instruments to get a good reading of the main variables that will help physicians to monitor the patient’s condition. In the same way, it is necessary to devise Critical Zone Observatories (CZO) for the Earth, to monitor all of the different parts that compose the fragile and complex domain of the Critical Zone, and to come to understand how it has worked in the past and how it is going to cope in the future with human activity. [11]

A fascinating collection of lab-like artworks is presented in a geo-traumatic environment. These artworks are engaged in meticulous monitoring, constantly screening the conditions of the Zone through technologies, media, and politics. They blend seamlessly into and contribute to this layering process, leading to further networks of individual and collective agencies. ZKM’s latest thought exhibition seems to signal a shift in a media art trend that has been quietly developing for years. This trend has gradually transcended the walls of traditional and media labs, venturing into outdoor experimentation and direct interaction with environmental data. Mobile facilities, digital tools, team organization, and interdisciplinary collaborations have all played a role in expanding what was once a more isolated and conceptual art domain. Each of these unique facets

of the lab results from horizontal and experimental collaborations between different disciplines, all converging toward common goals, whether defining terrestrial terminology, monitoring it, or conducting a curatorial project.



Figure 1: Starting to Observe, Atrium 2. *Critical Zones. Observatories for Earthly Politics*, ZKM, Karlsruhe 2020. Photo: courtesy of Tobias Wootton

The Critical Zones catalogue bears a telling subtitle: *The Science and Politics of Landing on Earth* [12], highlighting the act of landing “on Earth” as the primary and ultimate place we are given to inhabit. In the coexistence network of a collective terrestrial pathway, laboratories play a crucial role, identified by the curatorial team as actual structures: the Critical Zone Observatories (CZO), whose activities are mainly presented in Atrium 2 (Figure 1). The observatory chosen for the exhibition is the Strengbach Observatory, located in the small village of Aubure on the French border, about 150 kilometers from Karlsruhe. However, CZOs remain entities spread across the globe. In 2007, following an initial spark in 2003, the U.S. National Science Foundation launched a pilot action to establish a systematic network of observatories capable of monitoring processes on the Earth’s outermost surface. The first round of funding supported three field labs at the University of California Merced, the University of Colorado, and Penn State University. Shortly after, three more were added in the U.S., followed by an additional four. This model inspired similar initiatives in many other countries around the world, leading to a more structured organization of research clusters.

A single site is not sufficient to develop and test ideas about how interactions between tectonics, fluid transport, weathering and biological processes shape the Earth’s surface. Instead, we must network data, ideas, models and tools [13] to build the integrated understanding we hope to achieve. [14]

A networked realm. What makes it even more fascinating from the perspective of a thought exhibition is the fact that these multidisciplinary approaches do not prescribe a single directive for how a CZO should be designed and operated. With a distinct ANT flair, they are described as “a network of networks” [15]. At the ZKM, these methods are highlighted by displaying tools

¹ As Latour already expressed it in a seminar at the Collège de France on 26 November 2003: «The [...] moderns presented themselves to history as those who would in the end be torn away from all archaic and natural determinations; so what did they do then? They multiplied their attachments, at an ever increasing scale, to an ever more intimate degree of involvement, with those (ever more numerous and

heterogeneous) who allowed them to exist. They speak of emancipation at the very same time that they have to take charge, via legal, technical, mechanical and human means, of beings as vast as the climate, oceans, forests, genes... a strange liberation which has done the opposite: created attachments!» [8].

used in weather stations, gravity measurements, water and earth studies, tree, and river basin research. This part of the exhibition follows the idea of showing science ‘in action’, a concept related to Latour’s ideas [16], realized with the help of the architecture studio Société d’Objets Cartographiques (SOC).

Specifically, Alexandra Arènes attempts to provide a visual representation of the CZO, noting the limitations of traditional Cartesian mapping and even more advanced diagrams. Although diagrams are often regarded as excellent visual companions for media theory, they lack the capacity to delve into the multifaceted ‘deep time of the soil’. The monitored terrain of Aubure shows complexity both spatially (with different layers of the Zone interlocking in a non-linear) and temporally (considering sedimentation, growth, seasonal cycles, plant life stages, and atmospheric events – essentially requiring the consideration of multiple time scales):

Borders, frontiers and lines are not enough to describe landscapes at a time when we need to visualize environmental changes: the melting of ice, the flooding water or the atmospheric pollutants scattering everywhere [17].

The alternative map-making process she presents in this section, referred to as an abacus or model, begins with an in-situ ethnographic study and then illustrates what Arènes calls “the glove operation”. This approach shifts the focus from the Earth’s core to its surface skin, emphasizing the representation of the soil. Although the chart is two-dimensional, it aims to reflect not only the surface but also the depths by drilling down into the layers. Each moves at a different pace: circles indicate layers, monitoring stations intersect with the natural cycles of atmospheric particles. As Jussi Parikka notes in his catalogue review:

The collection argues that the critical zone is a perspectival space – even a material texture – that is epistemologically significant. It is pitched as a way to break down “the cartographical view of planet Earth” while it is also meant to interrupt “the legal and political unity of any global view.” [18].

Atrium 2 becomes the driving force behind the entire exhibition, bringing together several key elements: the potential of outdoor labs operating directly in the wild (and how these are also open to creative realms), the adoption of an ethnographic approach typical of laboratory studies [4], and finally the presence of Gaia in the curatorial narrative, as proposed in the hypothesis of the same name introduced by James Lovelock [19].

3. Monitoring and shaping

The exhibition is enriched by a variety of study objects, including rocks from natural history museums, travel documents, books, videos, more traditional works of art (such as Courbet’s *Deer at the Spring*, which draws attention to the depiction of rock strata), and contemporary and media art. Amidst this plethora of inputs, the narrative seems to question the expanded role that varied agencies could play in a ‘modern natural history.’ Once again, the ‘observation of the observer,’ approached ethnographically, emerges as a central theme, acting as a chosen medium for both media art and terrestrial politics to probe the state of the Critical Zone. Alexandra Arènes’ ‘abacus,’ which serves as a navigational device for the CZO section, is based on detailed field research conducted alongside scientific personnel. Similarly, some of the artworks on view seem to

speak the same language: if we are not allowed to leave this planet – as the narrative of *Critical Zones* constantly reminds us –, this only reinforces the idea of using the entire Earth’s crust as a space for exploration, display, and connection. The more contemporary pieces include different solutions and a wide range of media: mechanical works, installations with documentary narratives, immersive VR experiences, but there is also a fascinating core that perfectly encapsulates the integration of media art into an extended lab environment. This includes Yu Hsin Su’s work *Frame of Reference* (2020), a complex video installation created during a period of field research at a CZO in Taiwan’s Taroko Gorge. This site serves as an interdisciplinary workspace for scientists dedicated to monitoring the explicit and implicit activities of the Critical Zone, with a particular focus on river erosion and landslides. The work is presented with a distinct media art perspective, highlighting the supportive yet crucial role of telecommunications within these laboratories: antennas, computers, networks, and shared databases. Indeed, the relationship between the inside and the outside is constantly being forged both in the observatory’s field trials, and in the communication routes between the local NCTU Disaster Prevention, Water Environment Research Centre and the GFZ German Research Centre for Geosciences in Potsdam, a data analysis center:

With the disappearance of [the] metaphysical Globe, I am interested in the shift from [the] “view from every- where and nowhere” to [the] “view from within,” and examine the infrastructure of [the] view from within. How do those sensory instruments form images within [the Critical Zone] and facilitate relationships between different materials and events at different scales? [11]



Figure 2: Su Yu Hsin, *Frame of Reference I & II* (2020). Installation view in Taipei Biennial 2020 *You and I Don't Live on the Same Planet*, Taipei Fine Arts Museum. Courtesy the artist and Taipei Fine Arts Museum. Photo: Yuro Huang

The internal perspective is one of the “anti-planetary processes” that the exhibition seeks to trigger, playing on the corresponding anti-escapist view of the globe. While the external perspective of the Earth, exemplified by the historic space photograph known as *Blue Marble*, taken by the Apollo 17 spacecraft on its way to the Moon in December 1972, and the preceding *Earthrise* by the Apollo 8 mission in 1968, may have introduced a broader gaze, it also consolidated its exact opposite: the depiction of a confined planet, singularly alive in the galaxy, whose “warm coexistence” within is both a necessary and productive condition. As Latour states:

This is why “Critical Zone” is such a useful term: it helps us to free our imagination from the attraction

of the too-famous Blue Marble. We are not space aliens. We reside inside a thin bio- film no thicker than a few kilometers up and down, from which we cannot escape – and, “Critical Zonists” would add, whose reactions (chemical alterations and geological mechanisms, as well as social processes) are still largely unknown. [1]

Such a disruptive image can lead to reflections on shifting perceptions, both individual and collective, as highlighted in a dedicated chapter by Laura Kurgan [20], who also mentions Denis Cosgrove’s commentary. Cosgrove notes how the different generations of Blue Marbles, in addition to evoking images of global unity, have undergone transformations, moving the core of the visual culture from traditional photography to composite and virtualized satellite images, leading to an increasingly prevalent “infrastructural” sentiment [21]. Indeed, the external perspective now seems largely a collective construction of the internal infrastructures that make up the blue sphere; cables, data transmissions, sensors embedded in the ground, core samples, and from underground observation structures extending beyond the treetops to satellite transmission sites. Thus, to return to the ZKM, a combination of fixed cameras, mobile drones, data from seismometers and weather stations inform *Frame of Reference*, which in turn replaces first-degree vision with data, then passes through a second transmission system directly to the databases of a research center in Germany. The structure of the multiple video panels on display takes the shape of a nested interplay of relationships. As Jussi Parikka writes, describing the artwork:

The composition of carefully crafted scenes is cinema about instruments. The scenes could be narrated as featuring scientific practice but there’s more at play as you can imagine. It is not that frame of reference is only about scientific practice of measurement and the critical zone of life that covers the planet but that the images become instruments that start to compose the space they are in. They are involved. They are based on but also feed forward observations. These involved observations are, as Su Yu Hsin tells us, on the ground as the surface layer of life, but they are also off the ground; these spaces are seen through the capacity of the instruments which allow the space to lift from a specific place onto a (data) server across the planetary surface. [22]

As the quote suggests, the image remains the centripetal force of the piece, but at the same time the fieldwork aspect refers to a tradition that is not entirely new. As early as the 1990s, a certain trend emerged in media art based on a growing and increasingly urgent relationship between art and science. This trend was also reflected in curating, in a ‘research turn’ of artistic exhibitions that gave rise to a wide range of cultural phenomena: from media labs and festivals to exhibitions such as *Laboratorium*, curated by Hans Ulrich Obrist and Barbara Vanderlinden in Antwerp in 1999. That exhibition experimented with the theoretical overlap between the artist’s studio and the scientist’s laboratory, which at the same time opened to topographical space [23]. Latour himself took part in the event, proposing a re-enactment of Louis Pasteur’s 1864 conference experiment to refute spontaneous generation in favor of

biogenesis. In this demonstration, the scientist showed how he had contaminated the flasks of his rival, Félix-Archimède Pouchet, with micro-organisms.² Marko Peljhan was also present at Antwerp. He had worked along a similar path of hybridizing media art, outdoor field research laboratories and telecommunications, and is probably one of the most pertinent examples of a pioneering era. His *Makrolab*, which he began designing in 1994 and presented in its most historic iteration at Documenta X in 1997 (and later in Australia, Scotland, Italy, etc.), was a mobile, self-sustaining MIR-shaped laboratory for artists and scientists equipped to monitor climate research, migration, and telecommunications. It was a small, self-sufficient system that used wind and solar power, recycled waste, and provided for the survival of its operators for up to 120 days. In the mid-1990s, the main theme was an updated perception of globalization and its politics, as well as a technologically expansive and non-pauperized ecological approach. However, from our perspective the form of the laboratory is equally interesting. Peljhan wanted to reach out to the physical site of research and install an outpost where artists could directly experience the data. Although it lacked the geochemical approach of today’s CZOs, the small mobile structure was equipped with meteorological detection tools, radio communication technologies, and observation and recording equipment. As Andreas Broeckmann points out, the project combines a constructivist avant-garde approach with a systems aesthetic that favors “the effective intervention into the construction of a political and ecological reality” [24].



Figure 3: Barbara Marcel, *Ciné-Cipó – Cine-Liana: ATTO – Amazon Tall Tower Observatory* (2020). Multichannel video installation. Film still courtesy of the artist

Similarly to *Frame of Reference*, Barbara Marcel’s 2019-20 video installation *Ciné-Cipó Cine-Liana at ATTO (Amazon Tall Tower Observatory)* is also on display at the Critical Zones exhibition (Figure 2). Located in the heart of the Amazon rainforest, the Tall Tower Observatory is a scientific research project collaboratively undertaken by Brazil and Germany, involving the INPA (National Institute of Amazonian Research) and the Max Planck Institute for Biogeochemistry. ATTO, one of the tallest towers in Latin America, overlooks the rainforest far from any urbanization (the nearest city, Manaus, is 150 kilometers away) and offers a vertical perspective on the Critical Zone. Here, scientists work together in another example of a scientific monitoring community, investigating the relationships between the forest, the different soils, and the atmosphere of the region to better understand the planetary impact of the Amazon basin on the Earth system. Marcel applies an artistic-scientific

the difficulty of finding appropriate materials to represent the experiments, and the challenge of making the atmosphere of a laboratory accessible to the public [23].

² Latour developed a concept called the “Theatre of Proof”, a series of historical re-enactments that explored the nature of experimentation. While working on this project, Latour also explored the thought experiment in the field of art exhibitions. He identified two key challenges in creating these exhibitions:

approach to this community, altering the daily life of the laboratory by incorporating the voices and experiences of two local activists (Natalina do Carmo Oliveira and Milena Raquel Tupinambá), who bring a unique anthropological take on the complexity of the rainforest. Here too, the role of telecommunications remains central, through the creation of a temporary radio station capable of broadening the participation of mutual knowledge between scientists (in media forms) and the population (in political forms).

4. Conclusion: Gaia's Graft

The translation of the hypothesis posed by Critical Zones is found not only in practices and images, but also in written theory and terminological choices. Perhaps the most striking example is the exhibition of James Lovelock and Lynn Margulis' texts on the Gaia hypothesis in a dedicated section titled "We Live Inside Gaia." These texts, written at the end of the 1970s, describe the planet as a finalist entity of interaction between organisms, a homeostatic network of relationships that is self-regulating through an integrated feedback system that continuously reacts.

Despite its limited and controversial acceptance within the scientific community, Weibel and Latour [18] use it to raise productive questions: in particular, to show how human and non-human agencies are interconnected in this layer of the Earth. In this way, by refraining from interpreting Gaia as a purpose-driven super-organism, what remains is actually a category deeply rooted in Latourian thought, encompassing concepts such as interdependence and hybridization. This is evident in the numerous reflections Latour has developed in recent years on the productive use of Gaia, referring, for example, to "Gaiagraphies" in a theoretical project in collaboration with Alexandra Arènes, using the concept as the basis for presenting the CZO in *Critical Zones* as an anamorphic planetary display. Gaia is functional in context because it proposes an alternative to a model that is neither strictly geocentric nor heliocentric, but rather centered on vital intersections from which a centrifugal movement of reorganization spreads: this has its own meaning, both affirmative (the ecological order) and graphic (differentiation of the zones affected by 'life in action'). This would be a more accurate measure of the life cycle expressed in the Critical Zone, compared to the cosmological dimensions of other cycles in deep space, which would tend to hide it in the ratio of scales [25]. Latour has also experimented with this approach in other exhibition settings, such as his artistic direction of the 2020 Taipei Biennale – with *Critical Zones* already underway and Yu Hsin Su's Frame of Reference on view – entitled *You and I Don't Live on the Same Planet*. The Biennale presented an interesting display format in which an alternate solar system enclosed the exhibition spaces-planets, each exploring a different critical aspect: globalization, security, escape, terrestrial conditions, and gravity. This representation was also conceived out of a reflection on Gaia's synthesizing capacities, as already appeared in Latour's 2018 lecture at Harvard, titled *A Tale of Seven Planets: An Exercise in Gaiapolitics* [26].

In conclusion, the visual representation of the complexity of "landing on Earth" is necessarily central for several reasons. Firstly, it unveils the underlying mechanism of thought exhibitions, presenting concepts, including challenges – illustrated by the involvement of Gaia, evidently deemed necessary to explain the mechanism of social science analysis – in a laboratory workspace. Latour's language remains as visually compelling as that of art and its display [27; 28], seamlessly integrating into art history, drawing on the materialist foundations of media art, land art, Arte povera and relational art. However, it also serves to highlight the dynamic networks of scientific relations and the contradictions within

terrestrial politics. In this case, by highlighting the lack of reconciliation regarding ecology in a specific historical context, we necessarily draw parallels between Latourian thought, where disputes between disciplines serve as a historical catalyst, and various other 'clashes' – whether between images or cultural institutions – that define the *Gedankenausstellungen* framework.

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