The Many Faces of Gaia’s Response-ability
A Field Trip to the Critical Zones Digital Platform

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The Critical Zones project is a multipronged intervention toward what it calls earthly politics—transforming human engagement with Earth’s processes. The project centers on an exhibition at the ZKM Center for Art and Media Karlsruhe, Germany—an institution known for its experiments in culture-making at the intersection of art, science, and politics. French academic Bruno Latour has long collaborated with the ZKM and its director, Peter Weibel. Critical Zones is their most recent collaboration, co-curated with Bettina Korintenberg and Martin Guinard.

The exhibition project puts forward that Earth should be represented not as a spherical globe but as a patchy network of Critical Zones. These are site-specific characterizations of the Critical Zone—the layer, a few kilometers either side of Earth's crust, where habitability conditions are created and maintained by the combined action of life-forms, rocks, atmosphere, and water.

Figure 1. Critical Zones exhibition banner. Photo courtesy of the ZKM Center for Art and Media Karlsruhe.
Representation of the multi-scalar, nonlinear processes whereby the assemblage of earthly organisms create and maintain the conditions for their own survival is a project of knowledge (de)construction—and a process of identity (de)construction. The project’s beating heart lies at this (nonlinear) cross-roads of fact-making, representational craft, and metamorphosis of the human’s sense of itself as agent in world. The aim is to push the human across a threshold, from self-made Homo sapiens to terrestrial agent—acting from within a transformed sense of “emplacement” within.

The opening of the Critical Zones exhibition was impacted by the COVID-19 pandemic. Two years in the making, the exhibition opened in early 2020 only to promptly have to close again as Germany went into lockdown. Faced with the situation of having the public impeded from visiting, the curators decided to develop a digital platform—not an online presence for the exhibition but a project in itself, with its own identity, accessible to all locked-down humans. It is this platform that will be reviewed here, framed within the exhibition catalog. Like the platform, the catalog is a standalone project, but it is in clear dialogue with the exhibition, and features contributions by many who were involved in the exhibition's birthing process. Together, these projects form ecosystems of intervention. At the core of them is an intense dialogue between science, art, and politics; between fact-making, representation, and formation of collectives, toward multi-sensorial, resituated imaginaries of Earth, and of the human as actor within it. In a recent review, Sheila Hoffman (2020) argues that Museum Worlds seeks to capture and highlight moments when a museum-based project transcends habitual practice. Conceptually, methodologically, and in the boldness of its ambition, this is one such exhibition.

This review will progress in three parts. First is a conceptual journey: through engagement with the catalog, the core conceptual themes of the exhibition are introduced. Next, this particular visitor plunges into the digital realm of Critical Zones and reflects on the experience. Finally, the Critical Zones project is put forth as a multidisciplinary intervention for polyphonic attunement to the earth’s processes and framed within a broader body of scholarship creating dialogues between ecology and worldview.

“Who are we? What are we? Who and what are ‘we’ that is not only human?”

(Donna Haraway)

Welcome to the Critical Zone.

Figure 2. Navigating the Critical Zones platform. Photo courtesy of the ZKM Center for Art and Media Karlsruhe.
Part 1: A Conceptual Journey

The exhibition catalog is a heavyweight of a book, beautifully printed on matte textured paper, incorporating contributions by natural scientists, philosophers, visual artists, historians, teachers, literary writers, and others. It is edited by Bruno Latour and Peter Weibel (2020) and published by the MIT Press (Critical Zones: The Science and Politics of Landing on Earth). All contributions converge on a core problematic: figuring out how to land on a newly moving Earth, as a society. To understand the Critical Zones project, it is necessary to unpack three aspects of this statement: What is meant here by Earth? Why newly moving? And what is this collective act of landing? In other words, who must land where, and what tools must they bring along?

Earth as Gaia is a core proposition of the project (see, e.g., Lenton and Dutreuil 2020a, 2020b). Unlike the classic idea of Earth as blue planet—a spherical surface that organisms move on—Gaia is a multispecies process that organisms are inside of. This process is shaped and maintained within habitable conditions by humans alongside all other life-forms—all of them kept alive in myriad mutually constitutive relationships, which together create joint conditions for life. A blind experiment 3.5 million years in the making. Put forth by James Lovelock and Lynn Margulis in the 1970s, Gaia is a hypothesis that becomes cosmology, a mode of understanding how the human fits with everything else. Within this framework, Earth has been made habitable through the combined agency/action of all life-forms that have ever existed (bacterium to human to fern and pterodactyl), together with the atmosphere and rocks and water, in mutually constitutive chemical exchanges. It continues to be kept habitable today through these intersecting actions.

This habitability—the environmental conditions that sustain life—is in fact a web of complex intersecting biochemical exchanges generated by myriad actor-agents, such as humans and bacteria and fungi and trees, and regulated through feedback loops. “The distinction between life forms and environment breaks down,” write Latour and Weibel. “You cannot distinguish what an organism is from the habitability conditions that allow it to survive” (2020: 167). A good way of exploring what is meant by Gaia may be to try out different definitions for size (there are plenty of alternatives in the catalog). I like Timothy Lenton and Sébastien Dutreuil’s (2020a: 175) formulation of a “cascade of entangled metabolisms.” A planetary-scale recycling system without a leader, historically contingent, where the waste of one metabolism becomes the food and body of another.

Why, then, is Gaia described as “newly moving”? In one of the strongest contributions to the catalog, Isabelle Stengers argues that the tools humans have developed as a means of taming the natural world are the very tools that are revealing that world to be, ultimately, untamable. She writes of the role of metagenomics—“a kind of third millennium microscope”—in revealing “a world overflowing from all sides the tranquil categories that ordered it intelligibly” (2020: 228). Through metagenomics, it is possible to identify whole microbial communities without seeing them: identification happens through genetic signatures. Metagenomics is a direct informational window into the world of invisible microscopic life—and it is revealing a world packed with unimaginably diverse and dynamic microbial life, whose processes of life are coupled with ours. The better we become at peering into its processes, Stengers argues, the more wildly Earth moves.

There is another key sense in which Earth moves anew: the intersecting problems of climate change, land displacements, forced migration, and species extinctions on a mass scale. Refreshingly though, the Critical Zones project does not offer a discourse of blame for what humans are doing, or fail to be doing, to address the climate problem. Instead, it offers tools and pathways to collective “responsability” (Korintenberg et al. 2020: 323). Here, the notion of responsibility is deflected away from the weight of moral imperative and toward the creative enabling of
possibilities for response—a proposal born within feminist science studies, where it is termed response-ability (see Haraway 2016, Kenney 2019). A key component of this “responsability,” the curators propose, is attention to the Critical Zones that give the project its name.

The Critical Zone is the thin layer of Earth within which the vast majority of interacting self-regulating processes take place (see Brantley 2020; Gaillardet 2020). It extends a few kilometers either side of Earth’s surface, encompassing rock beds, water formations, the soil layer, all living forms and the air they breathe; according to Latour and colleagues, it is the core zone of attention toward understanding the processes of co-constructed habitability. Multidisciplinary observatories across the world study this Critical Zone in its local manifestations, describing its complex composition, and tracing constitutive processes across scales and temporalities—microbe to human to rock to cloud to food system. Together, these recordings highlight the complex interdependencies that make this living layer, and its fragility in the face of anthropogenic processes.

Pressing a finger to the societal pulse, Latour recently argued that the Critical Zone is the lockdown we cannot escape: a “pellicle, only a few miles thick, that has been transformed into a habitable milieu by the eons long labor of life forms” (2021: 2). A key argument of the project is that humans are “locked down” inside a pellicle of their own co-making, which is ultimately untamable yet fragile to human action. Tipped out of balance, it is increasingly vocal in its fragility. Hence the need to “figure out how to land.” The difficult and multifaceted landing process is what Latour and Weibel (2020: 227) call the terrestrial, or “Gaia plus the political”—a figure that stands for a transformed sense of agency, from which transformed action arises. As a starting point, exhibition curators Latour, Weibel and Korintenberg propose a series of field trips.

**Part 2: The Digital Field Trip**

I arrive at the Critical Zones platform (Latour et al. 2022) filled with curiosity. Can an online platform help me experience the complexity of these ideas spanning microbes to atmospheres, science to agency, planets to pellicles, logos to mythos, fact to imagination? I click onboard—then scroll downward to start exploring. “You are entering a Critical Zone! The Critical Zone is just a few kilometers thick. It is the only region of the Earth that has been transformed by life over many eons. The digital exhibition Critical Zones is dedicated to the critical situation of this fragile membrane of life.” I am told I am about to start a field trip—and I have a choice of locations—exhibits, let us say—to go to. Many exhibits take the visitor to Critical Zones observatories: working sites that have been setup across countries to measure, record, and investigate in detail the biogeochemical and social processes in their interactions at that site.

The first field site I choose is **Perimeter Pfynwald, a Soundscape Observatory** by Marcus Meader (2019–2020), an acoustic representation of the Pfynwald forest in Switzerland. Unfortunately, the virtual hike proves too much for my computer to handle. I am met with a minute of ever-expanding rings that are a nice variation from the usual spinning wheel—but I am going nowhere fast enough. Field trip aborted. I return to the “lobby” and choose a different adventure. The **Critical Zone Observatory Space** by Soheil Hajmirbaba and Alexandra Arènes (2018–2020). Here, I am met with a startling image: the habitual spherical Earth is turned inside out, entrails-outward so to speak. The Critical Zone is represented on the surface of the sphere, and the atmosphere is flipped into the center—enclosed within the Critical Zone. The accompanying text reads, “The Earth is closed—we are earthbound creatures.” An accompanying animation draws attention to the biogeochemical cycles between life, rocks, topsoil, canopy, and atmosphere.
This is a magnetic and perceptually challenging piece that I engage with at some length, in an attempt to wrap my head around it. In the animation, we observe the perceptual flip happening, which is helpful—Earth’s mantle displaced from the inside and flipped to the outside, and the Critical Zone (rocks, topsoil, canopy, atmosphere) promoted to the category of inside: the core of perceptual attention.

After this perceptual flip, I am wishing for something a little less cognitively demanding. I scroll downward and—when prompted—choose a thematic path: metamorphosis. I click on an exhibit called *Tusalava* by Len Lye. This is a remarkable animation from 1929, and no less demanding than the previous exhibit, though its dreamy quality and aesthetics make it easier to dwell in. With a black-and-white aesthetic that evokes Aboriginal stories of dreamtime, it presents the viewer with microbial-like creatures that bump into each other, merge, and transform. A human-like figure emerges from within a microbial-looking cell and transforms inside it, pierced into being by microbial tongues. In time, the human disappears into a cosmic egg that pulsates with energy. The piece evokes the process by which life-forms intersect, merge, and separate over time, and are transformed yet connected in the process of intersecting. It is uncanny and aesthetically alluring. I dwell here awhile, letting the imagery draw me in.

Click, click, and I stumble across *Flash Point (Timekeeper)* by Sarah Sze (2018). I jump on the opportunity to visit this artwork, which I have read about before in the catalog. From that reading, I expect a piece that immerses me in my own experience of seeing. In video installation form, this does not quite work. The video tantalizes me, gives me a sense of what I might experience in physical space—mirrors, reflections, and crackles; fragments reflecting other fragments; a continuously shifting symphony of world composing in interaction with the visitor’s movement.

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**Figure 3.** *The Critical Zone Observatory Space* by Soheil Hajmirbaba and Alexandra Arènes (2018–2020). Photo courtesy of the ZKM Center for Art and Media Karlsruhe.
But the vivid sense of something that is designed for multi-sensorial immersion creates a sense of distance from my experience in the moment, and I am left wishing I could step into the exhibit eyes, nose, ears, and limbs. Alas, I am left yearning to be immersed.

*Atmospheric Forest* by Raitis Smits and Rasa Smita (2019–present) does provide me with a sense of immersion—in place-in-process; pine forest seen anew through interpretation of data. This is another exhibit based on the Pfynwald alpine forest critical observatory. It is described as visualizing the complex relations between a forest, climate change, and the atmosphere. Clicking into the exhibit, I am immersed in sounds—a busy, crackling soundscape that is strangely soothing. I close my eyes to concentrate on the soundscape, and after a while, open them to peer into the visuals. The experience is akin to being taken into a forest at night, blindfolded—and having the blindfold removed to find that my perception has been altered. What I now see (and see through sound) are no longer the outlines of things, but the processes that connect them in time and space, crackly, and fluid, dramatic and dense with information.

So what impressions am I left with, fresh out of this field trip? It will be clear by now that this is a conceptual exhibition—a “thought exhibition” or *Gedankenausstellung*, as it is described in the catalog (Latour and Weibel 2020: 8). For one interested in the conceptual project behind it, the exhibition is a gift. Intellectually hefty, historically, and societally contextualized, polyphonic but with a strong curational vision—bold and brave. One can palpably feel the dedication behind it: the commitment to humanity and the material life of concepts.

I am left wondering, however, how a visitor arriving fresh at the site would experience it. I cannot know, of course—short of asking others to “go” see it and survey their opinions—but I suspect the site might have a hard time engaging those who come at it afresh. In that case, I recommend joining one of the guided tours, available in German and English and bookable in

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**Figure 4. Tusalava by Len Lye (1929). Stills Collection, Ngā Taonga Sound and Vision. Courtesy of Len Lye Foundation.**
advance through the website. After my site visit, I joined one of these, guided by artist Myra Hirtz (also a contributor to the catalog and the platform). Hirtz laid out the intellectual project behind the platform and guided a small group of visitors from across Europe in the basics of the navigation, while introducing us to artworks of choice.

Navigational aid is undoubtedly helpful: the site is designed so that the visitor cannot get a sense of overview. Upon entering, the visitor is prompted to scroll down and given a choice of artworks to engage with. Once the choice is made—click and go—it is difficult to go back to where one was before. One of the joys of a physical exhibition for me is what happens in revisiting the artworks through juxtaposition. Be that a juxtaposition of artists curated to speak to a theme, or of temporalities within the same artist’s body of work, the physical to-ing and fro-ing between artworks in the exhibition space is important. I tend to walk through the space once, then walk back and forth between exhibits that speak together, and lastly, before leaving, revisit individually the sites of most impact. Of course, this physicality is not available in the digital platform. But the layout also makes it difficult to develop an idea of the exhibition as a whole, or to revisit pathways. A section at the top of the page tracks the history of the visitor’s movement through the site, so that one can go back to an artwork, but this is not obvious without guidance. Unaided, the visitor will find it difficult to go back to a moment of choice and revisit what spoke to them.

This aesthetic/ethics of immersion is clearly intentful. The Critical Zones project is proposing that humans are literally locked down within that mesh-worked web of processes that sustains them alive. An overview is not possible, as there is no outside to look down from—no possibility of escaping into a bird’s-eye view, momentary as that may be. Thus, it is time for humans to get lost in the detail, this project seems to propose. Or rather, to get found in the detail.

Figure 5. Flash Point (Timekeeper) by Sarah Sze (2018). © Sarah Sze and the ZKM Center for Art and Media Karlsruhe. Photo courtesy of Elias Siebert.
In a recent lecture on the craft of poetry, Alice Oswald (2020) compares the poetry of Homer with that of John Donne. Whereas Donne’s poetry operates by metaphor, which Oswald likens to a process of incorporation—offering one image to digest—Homer’s poetry operates through an extended simile. The eye moves swiftly, never settling on one way of seeing but rather offering a proliferation of ways of seeing, which reverberate off one another. “Like this,” and “like this,” and “like this,” and “like this.” We are not offered a settled image to hold on to; rather, the expansion of seeing happens in the reverberations.

Plunging into the Critical Zones platform and catalog, I was reminded of Oswald’s performance lecture. The visitor is invited to move from one exhibit to another, and another, and another, and not given a chance to backtrack. Each exhibit is a voice, strong spoken, offering a tool for seeing, but it is in the reverberations between essays and exhibits that the vitality of the project lies. A transformed gaze happens in the juxtaposition of gazes, in the cross-wired conversations, which become simultaneously collective and individual. This exhibition asks us to work in the spaces between exhibits. A kind of work that does not offer solutions, but instead confronts the viewer with problematics and invites a depth of multiskilled attention that matches the depth of the problem—what Donna Haraway (2016) has called “staying with the trouble.”

In drawing attention to the complex interplay of scales and temporalities that make up the living world, the online medium has distinct advantages. It lends itself to the juxtaposition of scales, temporalities, and sensorial modes—of field sites and localized stories that together form a composite, nonadditive whole—and to juxtaposition of attentional crafts. Critical Zones is not alone in taking advantage of this. The Feral Atlas platform (curated by Tsing et al. 2021) similarly draws together cross-scalar, cross-temporal case studies to highlight the interconnectivity of the living world and human action and suggests tracing this interconnectivity through attention to specific ecological patches. In Feral Atlas, seemingly unconnected entities such as “underwater noise,” “phosphorus,” “Styrofoam,” and “cattle” coexist as entities floating across a screen and
come into interaction in localized maps once the viewer clicks on them. Like Feral Atlas, the Critical Zones project can be read as methodology for knowledge and action.

**Part 3: The Harvest—A Toolkit for Response-ability**

In a *Science* journal article called “Gaia 2.0,” Lenton and Latour (2018) argue that “collective awareness” of the agency of living forms in maintaining a habitable Earth could be the feature that enables humans to correct behavior, so as to steer a course toward sustainability. Collective, conscious awareness—and its ability to mobilize. The “blind agency” of before becomes coupled with awareness of this blind agency, and of the need to measure the consequences of human actions, to keep track of them, to sense, behave, adjust, respond. Humans become double agents of sorts, spying on the consequences of their own actions, putting in place feedback loops modelled on biological processes. If humans are unwittingly, though increasingly not unconsciously, creating the conditions for diminished collective survival, could their relentless curiosity, remarkable thirst for knowledge, and capacity to form and commit to heterogenous, cross-cultural, multivoiced collectives, turn them around to the project of knowledge-for-survival? Beyond survival, conscious participation in the biological processes that keep living forms alive: history, present, and future?

The challenge here is no less ambitious than that of societal metamorphosis. Toward this end, Latour and Weibel (2020) reach for the concept of *terrestrial*.¹ I read terrestrialization as a twin challenge of sense of agency and mode of attention and action. First, terrestrials understand themselves-in-world differently from the entities that Latour (1993) has called the *moderns*, whose sense of self is premised on the separation of nature and culture, human and nonhuman. Their cosmologies are different, as are their origin and maintenance stories. Terrestrials perceive themselves to be coagents of change whose very being is created through interactions with earthly others. Continuously in intersecting cascades of action-response, terrestrials co-maintain the webbed pellicle of biological processes which make them. They operate by a “new metric” beyond parts and wholes (2020: 12). That is to say, terrestrials are not constituent parts adding up to an Earth ecosystem—but rather the ecosystem resides within their actions. Taking this perceptual reversal into the level of the body, one could say that terrestrials do not *host* microbes as symbionts inside their guts and on their skin. Rather, they *reside* in the embodied dialogue with these microbes—they are holobionts.²

It is worth pointing out here that the concept of terrestrial is protean and defined in multiple ways at different sites in the project. In the catalog’s glossary, Latour describes terrestrials as a term coined to denote the surprise and anxiety that industrial societies are feeling at the newly discovered fragility of Earth’s habitability (Latour and Weibel 2020: 324). Elsewhere in the catalog, the concept is described as “codeword” for a shift into a “new metric” beyond parts and wholes (18); elsewhere still, it is described as “Gaia plus the political” (227).

The journey to becoming terrestrial is well accompanied in multidisciplinary halls of Anthropocene scholarship. It sits within what geographer Jamie Lorimer (2020: 7) has called the “Gaian ontostory of nested systems shaped by symbiotic relations,” a framework adopted by Latour, Donna Haraway, Isabelle Stengers, and Anna Tsing, among others, in translating between science and social theory. In Harawayan language, one might argue terrestrials to be *sympoetic* critters (Haraway 2016), made and sustained through symbiotic relations. Adopting a concept from Karen Barad (2007), one might call terrestrials “intra-active” agents: their identity as species not preceding the relations that make them. Adding Stengers to the conversation, intra-active agents are further conceptualized as being held in multiple “reciprocal captures”: dual and
ongoing processes of identity construction that “coinvent one another and each integrate a reference to the other” (2010: 36). Len Lye’s Tusalava (reviewed in part 2), captures for me the dynamism and strangeness of these intra-active reciprocal captures—hence the simultaneous sense of fascination and discomfort that it evokes.

This attentional shift away from things-in-themselves and toward relations-that-make is at the heart of the Critical Zones proposition, and is a core aspect of terrestrialization. Concepts like Gaia, sympoesis, and the holobiont are key propositions, and portals through which to reconstrue the gaze on the world and the human. But a remarkable strength of this project is the generosity of the attentional toolkit it offers— a tool kit that includes but does not stop at the conceptual. The platform offers site visits to Critical Zones observatories. Here (provided their internet connection is fast enough) visitors can be immersed in the multidisciplinary work of measuring and recording biogeochemical processes as undertaken at key observatories across the world. Alongside this, the project offers a plethora of tools for knowledge contextualization, and for translation between the empirical, conceptual, and societal. For example, science historian Simon Schaffer (2020) warns of the importance of attending to conceptual lineages and the onto-epistemological assumptions they come with, so as to steer away from machinelike and teleological accounts of Earth. Art historian John Tresch (2020: 60) tours the reader through of a series of object-worldviews (cosmograms) produced by humans across historical periods at different geographies—as a speculative answer to the question of how a shift away from a “mechanical, material and objective” cosmology might be possible at this historical juncture. Novelist Richard Powers (2020) ponders what kind of story can contain within it multiplying protagonists in continuous implicated action over long timescapes—on a ticking clock toward extinction. Philosopher Vinciane Despret (2020) asks how a focus on sound might act as a model in shifting the grain of perception towards intersection points—markedly distinct from the categorical lines of visual attention.

What is on offer through the Critical Zones project writ whole is an extravagant tool kit for polyphonic attunement to the Earth’s processes as accessed from within. All these tools revolve around the challenges of perceiving, measuring, and representing complex multi-scalar, multi-temporal, entity-forming processes. That is to say, they are tools for rendering processes noticeable in their ongoingness—physical tools and perceptual tools. A remarkable strength of the project is the spotlight on fact-making and representation. Latour and Weibel argue that “changes in cosmology cannot be registered without changes in representation” (2020: 19). Permeating through this whole project is the assumption that knowledge is a question of aesthetics as much as it is a question of facts.

The tile of this article—the many faces of Gaia’s response-ability—highlights the depth of the perceptual shift on offer. When compared to the self-made human standing on a spherical blue planet, the terrestrial is a much stranger creature. It is itself a more-than-human agent, held alive within a multiplicity of intercrossing lifeways which sustain it, and which it simultaneously sustains and destroys. If Gaia resides partly within the human, then our processes of developing the capacity to respond to the challenges faced by a “newly moving Earth” are, in fact, part and parcel of Gaia’s response. The interiority is complete. This shift is critical to understanding what is on offer. Critical Zones is not a green project of lament for human action gone wrong; it is instead a remarkably tenacious and multifaceted attempt at human capacitation for response. Rising from its nodes of intersection, the meeting of one exhibit and the next text, I hear a symphony of hope—critical and collaborative hope, all kinds of sleeves rolled up.
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NOTES

1. Latour (2018) also has conceptualized the terrestrial.
2. For considerations on holobiont visual representation within the catalogue, see Lukyanova (2020); for considerations on the role of the concept within Lynn Margulis’s work, see Reitschuster (2020).

REFERENCES


