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DISORIENTATION

Fear might be the best way to begin this section. This is at least the suggestion of Dipesh Chakrabarty in his interview: "I grew up in a place where fear was very much still a part of my life. Something about that reverence has to be brought back to supplement our very Aristotelian sense of wonderment ..."

Chakrabarty has been one of the first to convince historians — meaning historians of *human* adventures — to pay attention to the disorientation induced by the introduction of coal and gas into the rhythm of social and world history. Everything happens as if the Global — what modernity was supposed to deliver on the surface of the planet — is entering into conflict with what Chakrabarty calls the “Planetary” — that is, the same planet once dreamed of, except now it appears concrete, material, reacting to human actions, and above all, *limiting* global development.

Everybody nowadays is aware of the name geologists have given to this disorientation: the *Anthropocene*. Nobody has done more to make the discipline of stratigraphy known to the general public than Jan Zalasiewicz. The study group that he has assembled and guided has provided a scale for measuring the magnitude of human intervention into geological history that had not been realized before. And, indeed, “in the Anthropocene, almost everything becomes geology.” (Jan Zalasiewicz) Hence the sad beauty of Zalasiewicz’s summary of this human intervention, a picture achieved by reducing some of the geological data to a one-meter measure. How odd to realize that the biomass, according to this metric, is just five kilos per square meter, whereas the stuff humans have been able to produce — rubble, ruins, soil and all — weighs as much as fifty kilos! We knew “man was the measure of all things,” but we did not know the surprising length of that measuring stick. And to learn that the collective pressure of human activity is comparable only to asteroids at the end of Cretaceous or giant volcanoes at the end of the Permian, does not make the measure any less distressing.

After all, volcanoes too have been dragged into our culture, as Karen Holmberg argues, but it’s not reassuring that humans have become volcanoes themselves, especially as their kind of industrial eruption works 24 hours a day, 365 days a year.

No wonder that the word Anthropocene has metasized to the point that Clémence Hallé and Anne Sophie Milon can refer to “the Vertigo of the Anthropocene.” The news is so disorienting that every discipline, every interest group offers an alternative term, insisting on this or that other variable, in order to cope with the maelstrom. That’s actually the good thing about this new geological label: It has spread everywhere and yet it is impossible to settle quietly “in” the historical period it designates.

It is actually one of the characteristics of the present that this disorientation can be observed in many different sites and at very different scales — which is what the layout for this volume allows. Witness the care with which

an artist like Sonia Levy follows the work of oceanographers and biologists as they accompany and maybe preserve (or at least learn as many lessons as possible from) the threatened corals gathered in the basement of a Museum in London. It is every component of the former nature that has to be taken care of.

The same puzzlement has moved Robert Boschman to explore the archeology of our only real predecessors, those hunter-gatherers living 12,000 years ago, who within only a few generations had to adjust to massive climate change. The Young Dryas episodes narrated by Boschman offer a meditation on how to cope with a massive disorientation in the order of the universe. Except our European ancestors might have been nimbler in shifting their ways of life than we modern humans are; prisoners of our mammoth technosphere.

To order the universe is precisely what becomes difficult in a time such as ours. According to John Tresch, “cosmograms” are objects, stories, images, and narratives that capture the spirit of a time or a new situation for which there is no received name. Just what we need when the whole machinery of time is getting out of joint. Cosmograms order the world just at the moment when there is no order. “What do they *do* — how do they propose, institute, challenge, satirize, critique, prop up, or quietly reinforce an order of the universe?” (John Tresch) When Tresch quotes Elisée Reclus’s “Humanity is nature becoming aware of itself,” we take stock of the distance between the optimism of geography in the nineteenth century and this more recent slogan of the activists in France today: “We’re not defending nature, we *are* nature defending itself.” Human consciousness is what seems to be in short supply today.

In times of uncertainty the crucial question is to decide whether we are able to tell the right story, and this time not to build a world of fiction but to have an imagination realistic enough to follow what the real world is made of and how; that is, what’s the story the world itself tells. A problem that Richard Powers, the great American novelist, has done more than anyone else to solve practically, by writing stories *as they are*. “And like it or not, the man and his measurements and the mountain and the neighbors and the forest and all that story’s readers are all a part of it.” (Richard Powers)



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DISCONNECTED

Our troubling disorientation and confusion would not last very long if we could reorient ourselves by surveying the shape of the land on which we finally have to settle. The problem is that we're not able to land at all because modern humans, at the time of the Anthropocene, appear to be *suspended* over at least two different and incompatible definitions of the land.

This is what is demonstrated in this section by two decisive chapters: one on the disconnection in space, the other on the disconnection in time.

With Pierre Charbonnier, a French political philosopher, Dipesh Chakrabarty's contrasts between the Global and the Planetary take on a new and tragic dimension: "The totalization of the globe, which once seemed to be opening new fields of exploration, is now closing in on us. The larger the world is, the more we suffocate in it." Charbonnier asks an apparently odd question: Where is freedom actually *enacted*? Politics is not only about humans in a vacuum: Freedom must have a place, a climate, a soil. Hence his question: Where do you actually exert your rights?

As shown by Gerard de Vries, this was also a question raised by Montesquieu in the eighteenth century. Although his political theory of the climate might have been mocked by political scientists obsessed by the centrality of human agency, nobody today would find Montesquieu's question moot: "Many things govern men: climate, religion, laws, the maxims of the government, examples of past things, mores and manners; a general spirit is formed as a result." (Montesquieu) What de Vries argues is that his definition of politics brings back the key question of the relations between land and people. Politics is always geopolitical. "Surely, it will require us to go beyond Montesquieu ... but we owe it to the one planet we live on, Earth, where climate has to do with law and liberty."

What Charbonnier argues, however, is that what might have been thinkable in the eighteenth century is no longer possible because the world we live *in* and the world we live *from* have become utterly disconnected. This is what he calls the "ubiquity of the moderns." "We modern people, heirs of the industrial and imperial impetus, therefore live not on one but on two territories: the legal and political territory of the national state, and the ecological and economic territory of the space required to mobilize the goods that we consume." And he adds, "The disconnect between the official political space defined by borders and flags — the sphere where sovereignty asserts itself — and the ecological space that is required by our consumption patterns is even more spectacular when one thinks of the colossal fossil resources burned daily in terms of spatial equivalents, as the clever term *ghost acres* invites us to do." Is it at all possible to literally *resettle* politics away from its ghostly existence? Do we have any chance of reconciling the sources of our prosperity with those of our freedom?

The amazing thing is that we aren't only living in

between two territories, but also in between two different times. Timothy Mitchell is famous for having defined "the Economy" not as the real infrastructure of exchanges, but as the artificial invention, in the mid twentieth century, of a spurious infinity based on the availability of limitless oil and gas. In his beautiful chapter, Mitchell gives a new twist to his argument: "The economy is also a kind of time machine, a way of organizing our relationship to the future." By way of the "alibi of growth" economists have managed to render acceptable the total disconnection between the present we live in and the future in which we will be forever obliged to repay our debts. "Uber eats the future" for good since the present value of its stock market share is based on the bet that all efforts of cities, taxi drivers, and citizens to live freely in the future will be thwarted. "The windfall represents the value of an encumbrance imposed on the firm's future customers and workers. The company's profits, and thus its shareholders' dividends, depend on maintaining this burden."

The Anthropocene traps humans in between a real and a ghostly territory, a real and a ghostly future. Such a disconnection justifies paying new attention to the material components of the soil. This is why Steve Banwart, one of the Critical Zone scientists we are going to meet later, reminds us: Politics assumes sovereignty over a territory, but remains fairly silent about the exact nature and especially the durability of the soil. Hence the necessity of becoming materialist again by being a bit more down to earth.

We can no longer take for granted what a ground is, especially if you look to how people in practice are deprived of their land (as Paul Jobin shows in the case of Taroko in Taiwan) or when suddenly a corporation abandons an uranium mine in Canada (as in the photo essay of Robert Boschman). As Montesquieu had anticipated, politics is really about making life last a little bit longer. He would surely have been very taken by the attention Matthieu Duperrex invests in the *sedimentology* of a place in the South of France: sedimentology being almost a synonym for the way laws of the land bind people and dirt. Something poets have always known, as Stefanie Rau reminds us by speaking, literally, in tongues, and that Romanticism, in the rendering of Joseph Koerner, had explored through its peculiar sort of "geognosy."



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CRITICAL ZONES

If the disconnection between the world we live *in* and the world we live *from* is really the cause of the disorientation mentioned above, then the remedy is clear: We should find ways to *decrease* the distance between the two worlds, so as to begin our landing on Earth — without crashing.

In this section, we begin the first of three steps leading down to Earth by having its main protagonists present the scientific domain called the Critical Zone. The paradox is that what should be utterly familiar to us is also the least understood, what Jérôme Gaillardet calls for this reason a *terra incognita*: “This pulverulent layer, colonized by living organisms, is the thin coat of varnish on which humanity has established itself, the precious layer which we cultivate and build upon, and it is the sponge from which we draw our water and in which we store our waste products ... It does not include the rocks or the air; it is the permeable zone on the Earth’s surface with many different shapes and features: soil, groundwater, river, trees, swamps, glaciers.” There is a clear tension between viewing the Earth as a planetary body floating in space and considering such a tiny biofilm from the inside. If this new science is so important, it is because it tries to bridge the gap in between those two scientific world views: that of the planet and that of the Critical Zone. No wonder that we might feel lost in it, even though this is the only world we have ever experienced.

The reason for our ignorance is visible when you consider the paradigm at the heart of this new interdisciplinary field: There exists a wide gap between what can be observed in the laboratory and what happens *in situ* and *in vivo*. As Susan Brantley puts it: “When we estimated rates of reactions in nature, we discovered they were always slower, sometimes almost a million times slower, than our measured lab rates. Many people puzzled over this.” It really meant, as Brantley argues, devising a new role for “Earth physicians”: “In Earth surface science before 2004, we didn’t have many GPs [general practitioners]. That’s why many of us pushed to create a new type of scientific GP. We created Critical Zone Science to focus on studying the Earth’s surface — from air to trees to water to rocks to humans.” It’s about time that land benefits from what patients have in medicine, namely a well instrumented emergency room! “Earthcastings” are as crucial to cope with life-threatening diseases as are prognoses for cancers or strokes.

The reason for this distance between what happens in the laboratory and what happens in the field is, of course, the emergence of life forms which have endlessly complicated the running of chemical processes. As William E. Dietrich puts it: “Suddenly, I saw that the slow workings of geologic processes, which shape hills, weather to a porous stone the underlying bedrock, and produce a mobile soil, were driven by biotic processes that enhanced the storage of water (and nutrients) to life itself: a coevolving system connected from canopy top down to fresh

bedrock.” And Dietrich expresses again the same surprise as Brantley: “The Critical Zone is where we live and, surprisingly, it is also a frontier area of research.”

Why? Because this Earth physiology completely transforms the description of what a landscape is. As Daniel D. Richter, another Critical Zonist, and Sharon A. Billings explain: “The Critical Zone is defined by the slogan ‘from tree top to bedrock,’ by its fluids ‘from the atmosphere to the deepest of circulating groundwaters,’ and by its temporality ‘across human, biologic, and geologic time.’” This zonal reach is enough to expand collaboration among many established disciplines.

Essential to the collaborative work of the Critical Zonists are long-term and well instrumented research sites. The solution was to choose specific watersheds and to equip them with enough instruments to decrease the distance between lab results and field data. Hence the creation of an international network of Critical Zone Observatories (CZOs). As shown by Alexandra Arènes and then by Marie-Claire Pierret in one specific case, the Sternbach site in Alsace, it is through the careful instrumentation of these sites that people are learning to inhabit them in a new way. And the same is true of the unfortunate trees in Paris as illustrated by Aleksandar Rankovic.

Which gives still another meaning to the adjective “critical”: “Thus to study the Critical Zone, scientists study critical places, as Alexander von Humboldt had already understood when he wrote in his famous book *Cosmos* that ‘everywhere, in every separate portion of the Earth, nature is indeed only a reflex of the whole.’” (Jérôme Gaillardet) As Simon Schaffer shows, this link between a network of instruments, the conception of an animated Earth, and worries about the development of the human race, industry, and resources is not new. Critical Zone Science is but one episode in the attempt to build one of those cosmograms that John Tresch proposes in the first section.

It is because these zones are so odd that art is indispensable for giving them a provisional shape as is done magnificently in the sculptures of Sarah Sze discussed by Bruno Latour. Hence the right use of the word “zones” in the plural to describe such *terra incognita*. Jeanne Etelain, in her brief history of the term, from Greek belts to erogenous zones, offers a perfect transition for what comes next, the second step in landing on Earth, namely Gaia.



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GAIA

“We have become accustomed to the following story about life on Earth. We are supposed to live on a planet where providential conditions have endured ever since the origin of life ... In this familiar story, geology has provided a stage, independent of life’s activities, to which life’s only duty is to adapt.” This story “transforms the continuity and development of Life on Earth into the result of a miraculous harmony.

By chance, or should we say, by providential foresight, geology has made itself 'just perfect' as a paradise of organisms. But who created this paradise? Is there a mysterious power above Earth and Life?" (Timothy M. Lenton and Sébastien Dutreuil, "What Exactly Is the Role of Gaia?")

Shifting attention from Critical Zones to Gaia — the second step in our landing on Earth — means a deep change in the agents at work in what we used to call "nature" and an attempt to avoid any providential or miraculous narrative. The shift is demonstrated in this section thanks to three decisive chapters by Timothy M. Lenton, a student of James E. Lovelock, and Sébastien Dutreuil, a historian of the science of Gaia. "The myth that Life is just a passive actor adapting to a stage set by physical, chemical and geological processes has exploded in the face of the knowledge summarized here. With just a tiny fraction of incoming solar energy, Life has largely freed itself from the constraints imposed by physical, chemical and geological processes, principally by cycling the chemical elements it needs within the Critical Zone." (Timothy M. Lenton and Sébastien Dutreuil, "What Exactly Is the Role of Gaia?")

This means that on Earth at least, the distinction between life forms and environment breaks down; which also means that the scientific disciplines which try to understand the world we live in have great difficulty in focusing on Gaia. As Lenton and Dutreuil show, neither geologists, nor Earth system science, nor biologists have realized how original, how idiosyncratic, Gaia is. Hence the great paradox of a major discovery that everyone in practice takes for granted — the self-regulation by life of the Earth's thin surface — even though the terms of the discovery remain immensely far from common sense.

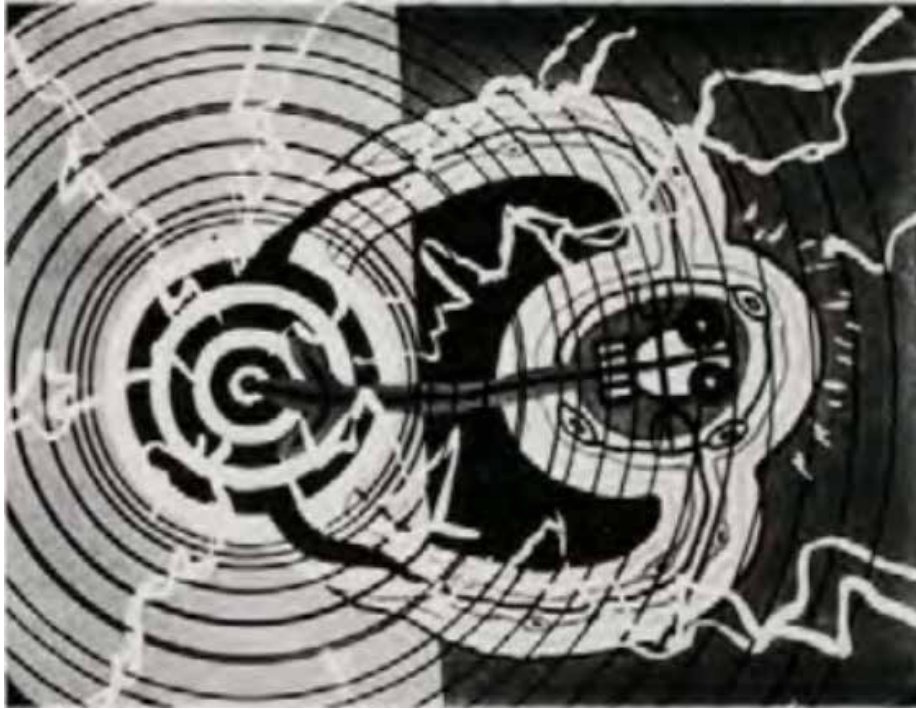
Dutreuil shows us the problem: "It is because the activities of the beings we classically recognize as living overflow and exceed what we classically recognize as the inanimate world that we must, precisely, revise the idea that this world is inanimate." But this does not mean that the Earth is an organism, a big animal; it simply means that on Earth you cannot distinguish what an organism is from the *habitability conditions* that allow this animal to survive. "Gaia is not in contradiction with evolutionary biology; it is simply the study of a *new being*." (Sébastien Dutreuil) And it's inside this new being that every life form has ever resided. Hence the crucial importance of learning what is it composed of and how it reacts to human actions. "When Lovelock uses 'life,' however, he does not use it as a term for a class, but as a *proper name* designating a singular entity: all the living organisms that have

succeeded each other since the origin of Life." (Sébastien Dutreuil)

Learning about Gaia really looks like an episode of *Star Trek* about the exploration of a foreign planet — Ali Gharib implements this idea. A new feeling for cybernetic feedback mechanisms has to be invented as Alexander W. Schindler and Anne Schreiber propose. Perhaps the exploration requires, as Bettina Korintenberg shows, the powers of fiction to recreate what it is to live in an artificial Earth, as in the exciting experiment of Biosphere 2. Meaning a return to the strange year 1610 as Pauline Goul argues?

What opens up when looking differently at the components of Gaia is a sense that you can free yourself from the narrow limits imposed by physical geography. Take, for instance, the case of rivers so beautifully recast by Anuradha Mathur and Dilip da Cunha: A river is not necessarily a flow inside well-defined banks drawn on a map as one single network. If you take the case of the Ganges, it is an entirely different phenomenon that should rather be called "wetness." "The Sanskrit word for this all-encompassing ocean is *Sindhu*." "It then does not flow as water does, but rather soaks, blows, seeps, osmotes, and transpires its way to ever-extending holdings of wetness, holdings that eventually become the ocean that re-connects with the wind."

Once again, the strange thing is not that we have to learn how to animate the Earth anew, but why it has been considered as inanimate for so long. According to Laura Dassow Walls, this was already Alexander von Humboldt's definition of *Erdkunde*, those "tidings of the Earth" so important in the Romantic period, and even earlier with Athanasius Kircher, as related by Siegfried Zielinski. As Dassow Walls says about Humboldt: "The novelty lies in his direction of travel: After millennia of longing to *ascend from* Earth, to escape it to reach for the stars, he invites us instead to 'descend to our own planet' to see it anew, to see a new world — even more, to inhabit a new cosmology — that does not divide us from the heavens but connects us with them, linking 'the realms of infinity' with the swarms of 'minute microscopic animal and vegetable organisms which exist in standing waters and on the weather-beaten surface of our rocks.'" Humboldt showed us Earth as "the star to which one returns." (Alexander von Humboldt) His unfinished book, *Cosmos*, seems to be the volume we still have to write.



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TERRESTRIAL

If we want to land on Earth for good, neither Critical Zones nor Gaia offer a good enough feel for the place in which we have to settle. Made by scientists and for scientists, these framings have opened up many possibilities for the Earthbound to seize upon, but they do not yet have enough political resonance. This is why a third step is needed, one that starts from deep in the soil and tries to offer a different way to reconnoiter the place.

This is what we call the “Terrestrial,” what might aptly be defined as “Gaia plus the political.” As shown in this section, the Terrestrial requires another placement for science, another definition of law and sovereignty, another understanding of how entities overlap with one another and also, as always, another way of exploring what it means to call Earth a “mother.”

In her moving chapter, “The Earth Won’t Let Itself Be Watched,” Isabelle Stengers offers a way for scientists to migrate from definitions of their trade that have been adapted to the Globe, to new ways of letting their research be affected and “infected” by other epistemologies. What happens when you can no longer separate entities from one another? Stengers’ proposition is radical: “If the general laws of physics and chemistry and their scientific derivatives are called ‘laws of nature,’ one has to conclude that, in this respect, nothing is natural where terrestrial beings are concerned.” A paradox? No, the shift in attention is itself enough to bring science and scientists closer to the specific materiality of the Earth. “All knowledge, human and nonhuman, is now stammering, and the question asked in each zone is how to share a concerned perplexity, how not to dream of a solution, but to learn, as Donna Haraway put it, to ‘stay with the trouble.’”

Which is what Vinciane Despret offers by exploring the relations of living beings and territories. Despret is well known for the way she reads the scientific literature and how she twists it ever so slightly to explore new ontological lessons. In her chapter, she proposes to follow birds or, more exactly, how birds sing and how they knit, from one song to the next, another landscape she calls the “Phonocene.” “Inhabiting the Phonocene certainly means trusting in the musicality of the world (and its rumblings) and attempting to learn from them; it means leaving the sphere in which the *logos* of the *anthropos* is exclusively privileged, in order to speak once again with those that are other than human.” In contrast to the many clichés about how humans “defend” their territories — which are projected unduly onto animals — Despret offers to reverse the attitude and to learn how overlapping, shifting, complex territories are “animated” in thousands of ways by life forms that could be used as models for opening up what it means for humans to “own” a place.

The same understanding of other ways to connect with “other than humans” is developed by Verónica Calvo by letting Bolivian farmers picture their own ways of relating to their plants, and in Estelle Zhong Mengual’s reading of an amazing picture by Albert Bierstadt: “Why is it not sublime enough to scare us? It may be because

Bierstadt represented it *from the point of view of the mountain* and not that of humans.” A point Johanna Ziebritzki elegantly repeats about Pierre Huyghes’s aquarium: “Critical zones do not offer an outside, a safe distance from which we can look at the messy matter. We’re part of the zone we observe, and even our observing partakes in the composition of the zone, just as the zone partakes in the composition of my perception and me.” Exhibiting nature also requires hiding it, explains Hanna Jurisch using the example of the Karlsruhe Natural History Museum in Karlsruhe.

This is where the scientific question merges with the legal one. You don’t define property rights in the same way when you survey the land from above rather than if you explore it from the inside. Sarah Vanuxem, a French legist, shows that even in modern legal philosophy, obsessed by the distinction between human subjects and nonhuman objects, there exist many alternative resources to let things connect with one another and establish “their” rights. Properties have “servitudes” and those servitudes are a powerful way to let humans have partial rights *granted to them*. A complete inversion of what it is to “own” a property.

As Dorothea and Pierre-Yves Condé argue in their fictional dialog on sovereignty, it is possible that the modern ideas of state territories may turn out to be so obsolete that they will simply be ignored and pushed aside. Already in 1758 Emer de Vattel wrote: “When navigators have met with desert countries in which those of other nations had, in their transient visits, erected some monument to show their having taken possession of them, they have paid as little regard to that empty ceremony as to the regulation of the popes, who divided a great part of the world between the crowns of Castile and Portugal.”

Which leaves to Emilie Hache the magnificent task of connecting the Terrestrial with the massive return, in all topics and in all walks of life, of the feminine. Not because of the limited association of Earth with procreation, but rather, because of the necessity of engendering all life forms anew. “To our stories we should therefore add one narrative that goes thus: the deadly devaluing link between women and nature, which structured all of modernity, masks a powerful, transformative analogy with the Earth, which itself carries within it a bond of generation with the land from which we have been expropriated.” (Emilie Hache) At which point, the Terrestrial could again become a world worth living in. Except that most people it seems, don’t live on this planet!



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DIVIDED

Even if they required the three painful steps we have just reviewed, the science and politics of landing on Earth would be relatively manageable if only people could agree on which planet to reach! Alas, the common expression of dissent “We don’t live on the same planet,” figurative until recently, has now taken on a literal meaning.

There are lands on which the climate mutation occurs at a vertiginous speed and, at the same time, entire countries which strive to sever all political links with the others. Nature has now become the strongest divisive force in contemporary politics. The Blue Marble has become a divided war zone.

Hence the necessity, as Bruno Latour argues, of drawing a planetarium of the seven planets he has reckoned — planetarium that Mira Hirtz had the clever idea of transforming into a dance. In a strange development of H. G. Wells' science fiction title, politics is no longer about different views on the same world, but, a *War of the Worlds* (1898). "It is no wonder that we feel politically disoriented: these seven planets make their influences felt simultaneously over every one of us and modify the paths of our enterprises minute by minute." (Bruno Latour, "We Don't Seem to Live on the Same Planet': A Fictional Planetarium," this volume, xxx-xxx)

One of the warring parties has decided simply to fly away, turning the emancipatory project of modernity into a different enterprise: escapism. Daniel Irgang explores the different brands of "transhumanist eschatology" for which "technology is transcendence": "Detached from the physical *wetware* of the body, and uploaded to higher performance storage devices, the human mind will be able, at the speed of light, to leave behind the boundaries of its own planet and colonize the universe." In the same vein, Nikolaj Schultz has chosen to poke some fun at the Tesla car roaming forever in space as he concludes wryly in his contribution "Life as Exodus": "This is the best proof we have of the hypothesis that the ultra-rich are abandoning us — they say so themselves."

Impossible to solve the new war of all against all without recognizing a state of war in the first place. As Benedikte Zitouni shows with Antwerp harbor or Yohji Suzuki with seventeenth century history of Japanese cosmology, we cannot count any more on the background of a common world.

It is this new state of war that opens up again the traditional question of the Body Politic. Simon Schaffer reminds us that there is a long tradition of connecting the divisions of the people, those of the organs, with those of the cosmos. "One group of presuppositions, by no means novel, held that the world was an animal. This idea was much more than mere metaphor. Rather, the world was understood as a cosmopolitical body." (Simon Schaffer, "On the Difficulty of Animating the Earth," this volume, xxx-xxx) The most tragic division was, of course, that of the Deluge created directly because of human-kind's sins: "According to this early modern notion that

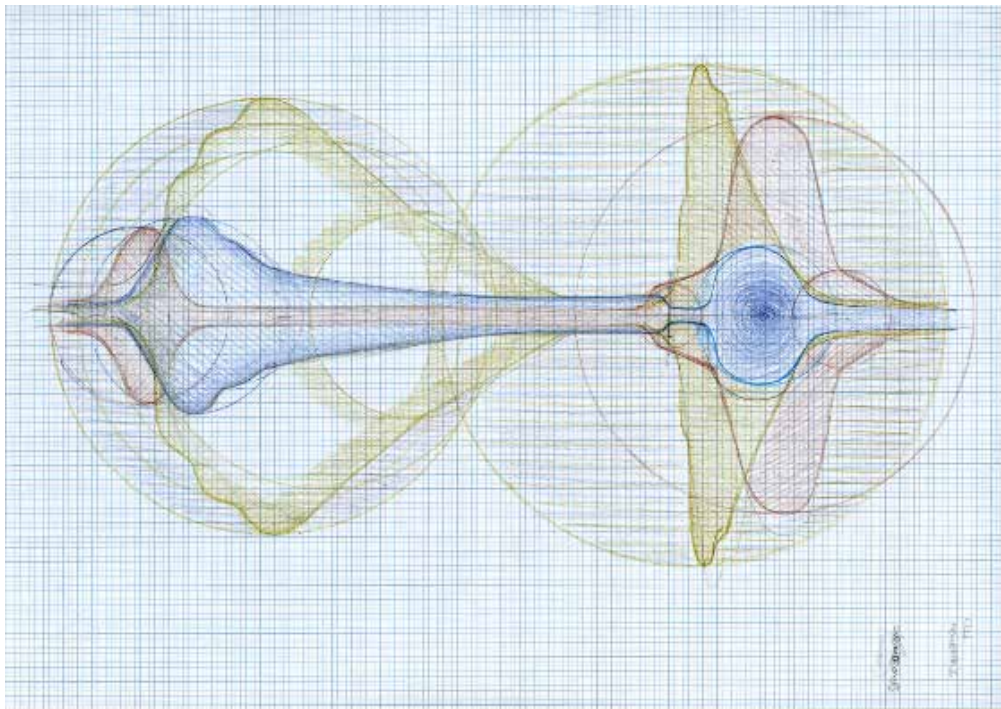
humans as sinners, subjects of the Fall, could affect and change the very condition of the Earth." What was true in the past, is even clearer today.

And yet, as Emanuele Coccia demonstrates in his provocative chapter, those connections between body and cosmos have never been able to move forward to a coherent definition of politics. Why? Because of the weight of the metaphor of the *house* that has paralyzed it. "Ecology continues to ask all nonhuman species to behave like good fathers of the family (attentive to order and utility) or citizens careful not to cross the borders of their own nation." Politics of dissent has never been able to emancipate itself from the fake harmony imposed by "the economy of nature": "That's why to think of the planet as a house, to think of it ecologically, means to make any form of Earth politics literally impossible." Ecology or politics, one has to choose.

To accept dissent, one would have to find different ways of representing class struggles. This is what is argued by Nikolaj Schultz in his contribution on "New Climate, New Class Struggles": "This is a crucial change. In the processes of engendering, exploitation is no longer based on the surplus value that ownership over the means of production allows some to profit from. Rather, exploitation is based on the surplus existence that some collectives' ways of life prosper from at the expense of other collectives' possibility of occupying a habitable territory." Now it seems that the front lines could be drawn for good. "Hence, by identifying, reclassifying, and comparing geo-social collectives, we would also be able to delineate who is occupying the territory of who, or, if you prefer, who is exploiting who."

As most often in this volume, it is the arts that are given the crucial role of giving a shape to the historical moment. As Joseph Leo Koerner shows in his chapter "Self-Portrait in Distress," it is in one painting of Saint-Antony, transformed by Joos van Craesbeeck into a terrifying self-portrait, that we are presented with the exact mirror of our time. "Although the hermit saint remains piously apathetic, the giant countenance that beholds him does not. Wide-eyed and open-mouthed, this face of terrified realization is in fact the painter Craesbeeck's own." And our own as well.

In keeping with the Boschian mood, a collective of artists have set off another kind of pandemonium with their imaginative glossary of some of the terms in competition for describing our divided world: "Bodenlos," "Heimat," "Life-forms," "Porosity," "Solastalgia," the delicious "Self-critical zone," and the mysterious "Holobiont" to which we will now turn. Divided we were, divided we remain.



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DEPICTION

Not only, for now, is there no way to overcome division, but without the recognition of this state of war — literally H. G. Wells's *The War of the Worlds* (1898) — there is no chance of reaching a possible peace. This is why it is so important to be able to depict the new landscape we find ourselves having been thrown into.

Hence this new step in our pursuit: attempting to depict where we are and for what we stand. Once again, we have tried to do so through art and through science, since both are radically reconfigured by our landing on the Terrestrial.

Joseph Leo Koerner, once again, in a superb piece of art history, summarizes the many twists and turns of nature painting. Starting from Alexander von Humboldt — clearly the hero of this publication! — and closing with him, Koerner shows in his contribution “Nature Painting” the many ways in which the human gaze, the extraction of features in nature, and the judgment from God’s elevated point of view, have always been inextricably connected. “Humboldt’s *Naturgemälde* defines its elevation not from the ground plane up, but from below ground, from the subterranean and underwater regions where the ‘geography of plants’ begins. The vertical extent, from fungi to the dark blue sky above is neither anthropocentric nor infinite. Instead it is the Critical Zone. Created by life and life sustaining, it is Humboldt’s achievement to have pictured it: Earth, our home imperiled now not by forces of nature or acts of God but by human beings.”

What Koerner does in showing how painting has allowed us to situate ourselves in the world, Bronislaw Szerszynski seeks to do for language skills. The things in the world we are beginning to land on are not made of parts sitting side by side; they overlap, they drift, they are neither subject nor object. Hence the necessity of retrieving from language the many nuances that have been lost along the way of our modernization, as we attempted to be lifted away into outer space. Szerszynski argues: “To become terrestrial, what we need now is not *anagoge* but *catagoge* — not ascent but descent, leading and carrying us not up to abstract concepts but down into the very origins and machinery of language.”

Amazingly, those attempts in the arts and humanities are exactly the same ones that are needed to understand the puzzle of how in biology life-forms overlap with one another — those very life-forms we have followed in the sections above when they were engineering Gaia. Lena Reitschuster shows that Lynn Margulis could not introduce her holobionts without looking for visual alternatives. Although “the refutation of the tree model, and thus of a theory of evolution characterized by random mutation and differentiation, made Margulis an outsider in academia,” she has not remained an outsider. The whole of biology it seems is now converging on alternative renderings of how life-forms are embedded in one another. Having been “particularly opposed to the concept of the individual and its implications for evolutionary biology,” Margulis

is being increasingly vindicated by this convergence.

However, it is one thing to say that there is no individual and quite another to find ways to *draw* a visually appealing and visually understandable alternative. As Olga Lukyanova shows in her own attempt at picturing holobionts: “There is a lack of adequate visual language to express the dynamic heterogeneity of symbolic couplings and to trigger the imagination to picture such a radically rethought figure.” Even if you are convinced that there are many more bacteria than cells in your own body, you might be at a loss to take a selfie that would include all of them without making the picture blurry!

And yet it is exactly what, according to Michael Flower, developmental and molecular biologists are now able to literally picture with the amazing new visual technologies that he has tried to reconstruct for us. What happens when we “turn to the rapidly growing field of single-cell analysis in which the data from large numbers of cells characterized singly is conjoined and from which cells emerge as *profiles*.” What seemed impossible before — how to shed the individual atomistic view without blurring the picture — seems possible now. “Cells are referenced not as separate entities but in the same way you might define someone by reading their CV, that is, as a life trajectory.” You might have your cake and eat it, too.

But the best solution for pursuing the description of our state of affairs might be to better instrument ourselves with sensors so that, as Jennifer Gabrys puts it, we might “sense a moving planet.” Including by making nonhumans “speak” through their “datafication,” as argued by Jonathan Gray. In the end, the task of description might merge with that age-old term of “caring for the soil,” the new depiction of our roots that Anna D. Krzywoszynska has decided to pursue. The more sensors we are able to install and feed from, the more informative will be the feedback that makes possible a quicker change of course — before it is too late. Here depiction and action converge with moral aptitudes.

Which brings us back to where Koerner had begun: to how art has always been able to “recalibrate the sensorium,” to use the beautiful expression of Daria Mille’s piece on Russia, or how Pierre Wat comments on the amazing work of Sophie Ristelhueber and her rendering of “the skin of the Earth.” Hence the beautiful German word underlined by Koerner: *Erdlebenbildkunst*. “It therefore behooves artists not to paint a landscape as it outwardly appears to them, as *nature morte*, but to study and understand nature in its inner dynamics, using methods and incorporating findings of the natural sciences.” (Koerner, “Nature Painting”)



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SUSPENDED

Are we now finally able to land on Earth? Probably not. But at least we have been pointed — not to say converted — in a different direction. And now, it's every reader for herself/himself. As we said in the introduction to this volume: “A ‘thought exhibition’ cannot do more than open a fictional space in which to explore life in the Critical Zones with the help of the various art forms and to let readers or visitors reside in a state of suspension.”

That's where we are, puzzled, suspended, divided not only among ourselves, but also inside ourselves, teetering above the abyss. A good occasion to explore new ways to cope with the new climatic regime.

In a moving biography of his own explorations in science and art, Peter Weibel retells how he invented ways to situate himself in the cosmos through constant innovations for connecting technologies and radical critique. From his early works to the development of the "Infosphere" and all the way to the reenactment of clouds and stones, he brought the outside world inside the museum. As a model for building art networks, with ZKM itself as its hub, he has been "especially impressed by a research community, which had been initiated in 1836 by Alexander von Humboldt and his Göttinger Magnetischer Verein [Göttingen Magnetic Society]." He starts his reflections with the disarming confession that as a child — before learning about Newton's law of gravity — he was afraid of falling off the Earth and drifting away. Adding what could be the motto of the *Critical Zones* exhibition: "If there is no habitable land, the traveller cannot land."

Christianity always had a problem with landing on Earth, hence the practical joke Bruno Latour played on Christian iconography: What if the urge to escape from the Earth toward heaven, visible in so many paintings, was actually reversed? It is certainly the case with a work Neo Rauch could have painted: *Der heilige Franziskus Bergoglio Märtyrer huldigt Gaia* [Saint Francis Bergoglio the Martyr Pays Homage to Gaia].

It is always fascinating for curators to compare what can be done in an edited volume to shift common ideas of space with the very *space* of the exhibition. As Bettina Korintenberg and Martin Guinard summarize in their review of the artists mobilized in the *Critical Zones* exhibition at ZKM | Karlsruhe, what we have attempted is to give a stronger meaning to the words "observatory of the Critical Zone": "The concept of the observatory points towards a different kind of sensitivity and attitude with regard to all the life-forms cohabiting the Critical Zone. As the Latin etymology of the term reminds us, *observare* not only means to observe, but also to look after, to take care of, to esteem." And they rightly insist on the principal originality of an exhibition — if you compare it with silent reading: Many people, interest groups, schools, NGOs, scientists, and citizens may "activate" the exhibition by using it as a vast open space and collaborative workshop during the time the show is open.

In many ways, an exhibition is much like the "cockpit"

of Elizabethan theaters that Frédérique Aït-Touati contrasts with the "theatrum mundi" painted by Descartes and his contemporaries. That is a place where all the passions of the people are staged in an intense and concentrated moment in which all the cosmic forces are simultaneously addressed. Hence her definition of theaters as "places for modelling the experience of inhabiting." And it's clear for her historical eye that "if nature has become a backdrop, it may be because Earth has become a theater — a specific type of theater. Inquiring into the origins of this founding trope of Western thinking means analyzing the sources of the current crisis in our ways of inhabiting the Earth." And just as in the time of Shakespeare and the Globe Theatre, scientists, poets, cartographers, kings and princes were mixed together on and off stage, the same intense mixing should be at work today to reinvent alternative ways of landing on the Terrestrial: "They make another relationship to space palpable and dissolve the ancient conception of nature as a backdrop. They no longer stage the world but rather 'fill the stage with the Earth'." (Climate Lens) A tall order, to be sure, but one we hope to have tried to fulfill by joining the beautiful layout of this volume, designed so carefully by Donato Ricci, with the design of the exhibition.

Who could close this volume better than Donna Haraway? Not with a great manifesto but with the humbler genre of a letter: "This is a personal letter to an old friend in the hope that we can share both the pleasures and work of science fiction for landing on Earth." The old friend in question is a bit slow of mind and never managed to be moved enough by science fiction. Hence the friendly admonishment and the beautiful attempt of the writer to show him that fiction is essential to "worldling." Why? Because "it is impossible to re-describe our dwelling places with conventional stories of conquest, displacement, heroic action, and limitless growth. The issue is not making other worlds up, but making worlds otherwise." And it is certainly fitting to end with the quote from Ursula K. Le Guin inserted in Haraway's chapter: "Hence it is with a certain feeling of urgency that I seek the nature, subject, words of the other story, the untold one, the life story."