Chapter 2
Is Geo-logy the New Umbrella for All the Sciences? Hints for a Neo-Humboldtian University

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Abstract In this chapter, originally presented as a lecture at Cornell University in 2016, Latour extends his inquiry into how we inhabit the territory of the earth, and how we must position ourselves to live in the strange space of an earth made perilously new by our actions. The first part of this chapter is an extended rumination on our earthliness and how this is to be understood and lived—and indeed expressed in language. In searching for an adequate descriptor of life in the world made strange through human action which is also a world in ruins, and how this is to be negotiated, Latour mobilizes the idea of critical zone—as in the Critical Zone Observatories (CZOS)—as a metaphor for how we might learn to see the world in the new way required to survive. Latour then turns to some considerations of what this means for universities. The post-Humboldtian hints reference the role of the Humboldtian model of the university in driving industrialization, whereas a decidedly post-Humboldtian vision is required to ensure our survival in the world in ruins. Three major hints are provided: the need for universities to organize themselves around the principle of outreach: the needs for new literacies in politics, performance, design, and communication, especially the communication and visualization of big data; and the urgent need for new disciplinary formations and co-locations to enable the kind of science required for planetary survival. Latour concludes with an invitation to university educators to take up this challenge.

The supposition is not as strange as it sounds: we seem to lack a shared definition of the territory inside which we are supposed to exert our political rights. By territory I don't mean only the legal framework within which state and private owners exert their sovereignty, but the very shape, composition, nature and even, to put it simply,

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the very *place* where it is supposed to lay. Where are we supposed to live is no longer clear cut. To say that we live on Earth, or in nature, does not seem to clarify the situation that much.

My hunch is that the disorientation everybody feels about the dislocation of politics—even more evident at this time of the presidential election—is the direct consequence of this other disorientation regarding the territory. If politics appears so vacuous, it might be because it has not a solid and shared ground on which to raise issues of substance. How can you expect to have substantial policy debates if there is no territory to map, no cosmos to share, no soil to inhabit? How could we maintain a minimum of decent common institutions if we have no land in common, literally no *common ground*?

In this lecture I want to diagnose the origin of such disorientation and to imagine how this very special institution that we call the University could in some ways help us to land somewhere, to reach a place drawn realistically enough so that politics could start afresh. Let me look at some of the reasons why we feel so disoriented.

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I will begin with space. I find especially telling that it is a journalist (or rather an activist *qua* journalist) Bill McKibben (2010) who suggested that the planet on which we are supposed to reside is so new (M*aking a life on a tough new planet* is the subtitle of his book) that it has to have another name altogether. The one he proposed, Eaarth, is so horrible that it deserves to be quickly forgotten, but we should not forget McKibben's counter-intuitive injunction to rediscover a planet that we thought we knew. This time it is not a novel continent in addition to the land we used to inhabit—as was the case at the time of the European land grab—but the *same land* whose behavior has become unrecognizable. As Michel Serres proposed to say, what we hear today is no longer Galileo's protestation that "*eppur se muove*" "yet it moves", but something much more scandalous for all the ears of Earth's inhabitants: "yet it is moved"—that is, it has a behavior, it is a source of movement, emotions, effects, and affects. It's no longer indifferent to our own movements (Serres 1995). Going from a stable Earth that is décor of human history, to an Earth active on the stage of a common drama, is transforming our world view much more deeply than the rather innocent move from geo- to helio-centrism that no one has actually experienced much (Fig. 2.1).

I am well aware that any talk of "discovering" a new land has become suspicious after so much postcolonial critique, but that's precisely one origin of our disorientation: those who believed they were "on Earth" are feeling that the ground on which they were supposed to stand is being taken away from them. To live on a land whose status is being disputed is no longer the tragic privilege of older nations and cultures that were brutally "discovered" by others in the past, but the common situation of every collective, including those of the former "discoverers". This is the other unexpected sense of the expression "*post*-colonial": the progressive realization that the tragedy of losing one's land is now the only situation that can be shared by all

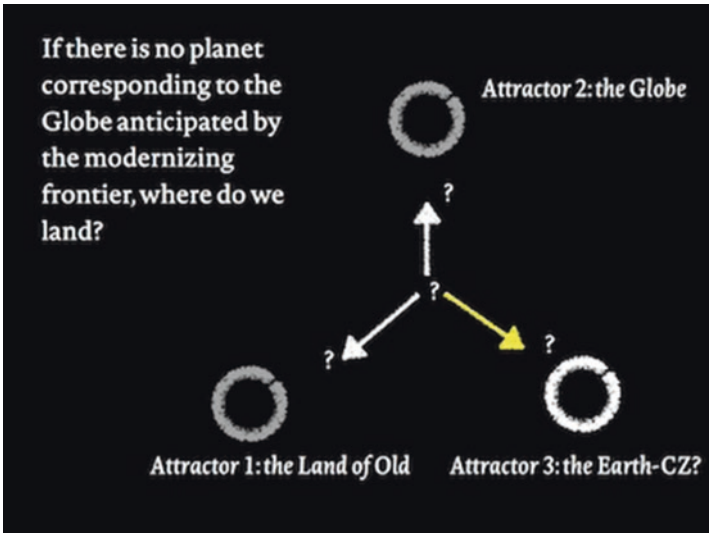

Fig. 2.1 Transforming world view

humans and non-humans alike, a new type of tragic universality. What Anna Tsing (2015) calls "living among the ruins" is what is going to unite us all in the same way.

However, this refreshing of the old trope of discovering a new land, a new planet, also has the advantage of mobilizing an immense reserve of hope and energy that is entirely missing from so much ecological doomsday literature (and that certainly includes McKibben's "Eaarth" book). If where we have to land is so new and unknown, so surprising and refreshing, then the trope might be the way to reload politics with issues of substance and to discover margins of maneuver and new settlements that would take politics out of its present depression. Instead of still dreaming of uploading ourselves into some sort of post-human future—either by uploading our mental selves into digital robots, or by transporting the human race to the Moon or to Mars—it would be much more realistic to rediscover the present planet—the only one we have—that for several centuries has apparently been not only misinterpreted, but literally *misplaced*. Such a transportation, such a migration to another planet, one that we could call rightly "ours", requires much more ingenuity, infinitely more technical and scientific innovations, and a level of mobilization and institutional invention several orders of magnitude greater than sending a few cosmonauts to Mars. "Discovery" of *new* land, I agree, is a suspicious expression, but "*re*discovery" of an old land might deserve our attention and mobilize our forces in a different way.

After space, what about time? Disorientation in space is compounded by the disorientation in history. I am alluding of course to what can be called the "quarrel of the Anthropocene". The quarrel is fascinating in itself and I have commented on it extensively, but I prefer tonight to stay away from its stratigraphic and geological

dimensions—What is the best date? Where to put the golden spike? What is the clearest evidence? Does it make even any sense to name a period that is not terminated? I prefer to concentrate on what I have called the New Climatic Regime and that Dipesh Chakrabarty (2018) has called "geohistory" or better "geostory". What the Anthropocene quarrel manifests is a much more empirically based version of what many years ago I diagnosed by using the odd expression "we have never been modern". What was already obvious in 1991—that we will not, that we cannot, modernize the whole planet—has now become common sense: there is no planet corresponding to the modernizing frontier planned by the 199 nations assembled in Paris for the COP 21st in November 2015. In other words, what could be called the horizon of the global, the infinitely receding frontier of the Globe, appears now as a sort of overshoot, a land of nowhere, an *Erewhon* where, just as in Samuel Butler's essay novel, everything has been inverted (1872/2013). What was infinite in the pull toward the Globe, has become finite; everything we thought was showing the way to the future is now taken to be leading to disaster. The arrow of time is all twisted.

If we want to understand the rage of so many voters today, I think it is not far-fetched to ask what all of you would do if you learned that all the sacrifices you had to suffer in order to modernize yourself are of no avail since there is simply no land, no common ground available so that all of us might inhabit the same planet in the same way. The shared global horizon has vanished. In my view, the deeply entrenched climatic skepticism comes from the feeling of having been so totally betrayed: "We were promised universal modernity, and it will never come. Why did you not tell us? Why did you let us abandon all our old ways? Why did you ask us to break away from the land of old, if the result was to leave us suspended in mid-air, with no way and nowhere to go?" What is called ecological mutation and global climate change is registered by most people as a raging protestation: "You betrayed us! We don't believe you anymore". Before lamenting "post-truth politics", we might wish to weigh the claims of the modernist project against realism and solid common sense: When did the project ever lead to a truth-based politics if there was no realistic planet to ground it?

And that is the third element in the present disorientation: Who is the "we" that is supposed to suddenly enter on the stage of the new geohistory, that is asked to migrate to a planet that is so different it deserves a new name? If there is something totally disorienting, it is to be said that the "human" has become also a geological force of such a magnitude as to rival the "forces of nature". Oliver Morton (2016) in *The Planet Remade* (by the way another of those titles referring to *re*discovered planets) summarized the contradiction best: "The paradox in a nutshell is this: humans are grown so powerful that they have become a force of nature - and forces of nature are those things which, by definition, are beyond the powers of humans to control"! (p. 220) The agency with which humans are suddenly saddled has no recognizable shape, nor is it possible to design the political body that could compose this new agent of history. If "post-human" has any meaning, it is probably this situation that the concept tries to describe. I cannot resist quoting from a recent paper in the *New York Times* by Roy Scranton (2016), an author who wrote a book with the

fairly dystopic title *Learning to die in the anthropocene: reflections on the end of a civilization* (Scranton 2015) (another lugubrious sign of the times!):

> Thinking seriously about climate change forces us to face the fact that nobody's driving the car, nobody's in charge, nobody knows how to "fix it." And even if we had a driver, there's a bigger problem: no car. There's no mechanism for uniting the entire human species to move together in one direction. There are more than seven billion humans, and we divide into almost 200 countries, thousands of smaller sub-national states, territories, counties and municipalities, and an unimaginable multitude of corporations, community organizations, neighbourhoods, religious sects, ethnic identities, clans, tribes, gangs, clubs and families, each of which faces its own disunion and strife, all the way down to the individual human soul in conflict with itself, torn between fear and desire, hard sacrifice and easy cruelty, all of us improvising day by day, moment to moment, making decisions based on best guesses, hunches, comforting illusions and too little data.

Okay, I have said enough about the reasons for our disorientation lost in space, lost in time, and unable to stabilize the agency that is supposed to put all of us into action. No wonder that politics seems so empty: politics, what I define as the *progressive composition of the common world*, needs a world upon which to operate, a solid ground, since it has always been issue- and object-oriented. How can you say anything of substance if you have lost your bearings to the point of not knowing where you stand, what period you are in, and with what sort of entities you are supposed to be dealing.

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When faced with vast philosophical concepts like mutations in space, time, and agency, my research strategy has always been the same: let's try to find a neat empirical site where it is possible through fieldwork to obtain precise answers to speculative questions. For many years I have been interested in soil sciences or pedology, and I have always wondered why such a crucial discipline, the interface between agriculture, life forms, property laws and ecology, remained such a modest, mundane and, frankly, disregarded discipline. My friends the soil scientists, with their boots in the ground, their soil samples, their focus on third world countries, really looked like the poor cousins of much more prestigious disciplines like geoscience and of course chemistry or physics. There was no way that soil science could become the queen of the sciences. It had too much mud on its shoes.

This is why I became immediately attentive when I met scientists who, to define themselves, were using a label designed to prick up the ear of a philosopher: *critical zones*. The network of critical zone observatories or CZOs in the USA and now many other countries is, in effect, a reinvention of the soil sciences, except that it is greatly extended, first in space—from the top of tree canopies to the deep undisturbed rock beneath—but also in time—from the nanoseconds of biochemical reactions to the millions of years of geomorphology—and finally, in the number of disciplines being mobilized—from hydrology to geobiochemistry. Having always been interested in the questions of instruments and standardization of data, I was fascinated by the way this CZO network equips watersheds and how it begins to fathom the complexity of sites that I thought geography had already thoroughly

studied. What is surprising to me is that, in the study I begin to make of this critical zones network, the scientists I follow seem literally to discover a new planet, each locality having its own idiosyncrasy. Of great importance to me, the CZO offers a handle on the key question of how to interpret Lynn Margulis' and James Lovelock's Gaia theory (Lovelock 1987; Lovelock and Margulis 1974). Because it is not directly concerned with life forms per se—by contrast with the other networks such as the Long-Term Ecological Research (LTER), but foregrounds first rock weathering, plate tectonics, volcanic and seismic activity, as well as hydrology, and grasps the forces of life essentially sideways through the course of biochemical cycles, it offers many local points of entry into the vast question of Gaia's behavior. While Earth system science is difficult to embrace because of its vast proportion and its reliance on models, each critical zone offers a smaller but just as complicated a scale model of the question as to how living organisms elaborate their own environment and hold it together.

This feeling is reinforced by the presence, in each of the field sites, of the massive disruptive or let's say the transformative presence of human intervention, even in sites that were chosen to serve as a baseline because they had not been disturbed by humans. While the quarrels of the Anthropocene require settlement through a complex decision inside the equally complex bureaucracy of the International Geological Society, there is no doubt that each critical zone offers an image of humans as a powerful geomorphological force, presenting us with a new image of *geomorphing,* of *geomorphed* humans. Here Tsing's (2015) expression "living in the ruins" takes on a very literal sense.

That's where the shift I alluded to earlier from Earth-as-a-décor to Earth-as-an actor modifies also the politics of those geomorphing humans. Each critical zone multiplies the instruments so that the composition and processes of, for instance, a watershed, may begin to be felt first by scientists, then by the myriad of other actors directly interested in gaining the sensitivity necessary to inhabit and survive on this piece of land. Everything happens as if each watershed entered in intensive care where the associated humans begin to gain or to recover some feeling for what they are doing, thanks to the feedback loops built by the instruments and interpreted by the models. Human agents are rendering themselves sensitive to their own actions through the multiplication of instruments.

The Southern Sierra CZ is a good example since for most practitioners there seems to be no directly visible connection that is experienced between the green coniferous forest up in the mountains and the flat, desiccated, overexploited, highly polluted Central Valley half an hour below. Farmers in the Valley continue to be blissfully unaware of the connection between the upstream and downstream water levels. They are, to say the least, careless. Establishing a connection between the two requires placing the watershed into intensive care and rendering the instruments, the water meters, and the models so precisely and in such sophisticated fashion that the action of agribusiness and the evolution of the local climate become describable for all to see, to feel, and to react. This requires not only more hydrology, more biology, more geochemistry, but also more regulation since a totally different legal framework is the only way to balance the output of water with the

input—especially at a time of intense and some say durable drought. It also requires, I will come back to this in a minute, that scientists become able to sustain the violent controversies that their science will necessary trigger.

Peter Sloterdijk has said that the movement of history is not toward revolution—the modernist project—but toward *explicitation*; that is, the rendering explicit of hitherto taken-for-granted conditions of existence. Not a movement forward, but a continuously *retrograding* movement of explicitation when human actors belatedly realize what they should have done earlier (see Latour 2012). Organisms have no eyes to see things ahead; they have eyes only in the back, after the fact. Blindness to the future is a life condition. But organisms can be slow or fast in registering the consequences of what they have done. John Dewey would say that speed at detecting consequences and reacting to them by changing course, is what allows the differentiation of a higher civilization from a lower one (Dewey 2005). It is not clear how Dewey would grade our present late industrial societies.

What I think I am witnessing in the CZO is the slow and belated equipping of the planet with some sort of *haptic* technology—defined by the dictionary as "technics that allow you to regain the sense of touch through kinaesthetic communications, by applying forces, vibrations, or motions to the user". Such a haptic technology is of great use in robotics, but it is vastly more important for landscape, watersheds, and ecosystems. If we are out of touch, if we feel "off shore," if politics is vacuous, it is largely because of the yawning gap between what we do and how we come to register the consequences of our action. Whatever the definition of New Climatic Regime, it is clear that it is taking us into dizzying loops of explicitation, revision, and reflexivity.

So, when I began to study the CZO it became quickly apparent to me that if the older pedology had no chance to become the queen of science, something was happening in those new networks of disciplines and instrumented sites and watersheds that put the Critical Zonists, as I affectionately dubbed them, at the center of a crucial shift in natural history. I am not quite sure yet how to define simultaneously: a return to the older *natural history*, that of Humboldt—Alexander not Willem—and a formidable amplification, through the powerful instruments and models they are developing, of what could be called, so as to accentuate the contrast with what is more traditionally called *earth* science, *earthly* or *terrestrial* sciences. Earth and Earthly captures the same contrast as geo- and gaia- in the many expressions like geo- or gaia-logy, geo- or gaia-politics, geo- or gaia-graphy. The last expression being probably the best: the inscription, the writing, the marking of Gaia through the reflexivity of its inhabitants finally learning where they inhabit.

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Let me take one step further. If you agree to extend the concept of critical zone from the name of a network of field stations—an institutional financing scheme inside the National Science Foundation—to that of the thin layer a few kilometers up and a few kilometers down within which everything alive we have ever encountered is being processed, then we might begin to draw a first sketch of this strange planet I mentioned earlier which has the puzzling character of being totally familiar and totally new.

I have time to underline just one feature of that old-new planet. I am obsessed, I have to confess, by the visual contrast between two ways of considering the Earth. The first is as a Globe—the famous Blue Planet viewed from out in space. In the second view the Earth is totally different; it is tiny, fragile, and far from equilibrium (another meaning of the word "critical" in the expression critical zone). It resembles a pellicle, a varnish, a skin that is always considered not from the outside as a globe, but from the inside as a highly controversial, multilayered, and disputed set of intermingling entities. One way to express this contrast is to say that humans are not *on* Earth—as on a décor from which they are detachable—but *in* Earth—among overlapping entities from which they cannot detach themselves.

The difference is so great between the image of the Globe and the image of Gaia as a critical zone, that I am tempted to say that it would make a lot of sense to distinguish that zone *from nature* as it is generally construed. This could seem shocking at first, but nature is too vast a concept to pay justice to the complete originality of this tiny, fragile, slim, contested critical zone. And for one good reason that will be easily understood by historians of science and STS scholars: while what is above and beyond the critical zones is known to us indirectly only through instrumentations—which means that those who do not have access or are not qualified to interpret the data are not able to mount a durable controversy and fight the scientific world view with any efficacy, it is not the case for the critical zones where every discipline, every instrument enters into durable and fierce conflicts with other versions of the same territories.

The pseudo-controversy over the anthropic origin of climate change is a case in point. But the example of the South Sierra is even more obvious: why would one expect the data produced by that Observatory about the diminishing water supplies in the reservoirs of the Sierra to be easily accepted by the Central Valley farmers down below who pump each other's fields out of existence? While the natural sciences properly construed can expect a relative epistemological peace about their claims, it is totally impossible for the critical zones and for the disciplines of natural *history* (if you accept to slightly modify the meaning of this venerable term by stressing the word "history") (see Fig. 2.2).

Those disciplines are necessary in conflicts—sometimes at war—with other definitions of the land. To situate the contrast between the sciences of nature and those of natural history (geohistory if you wish), it might be convenient to reintroduce the older meaning of nature that is still present in the Latin etymology of the word but even more in the older Greek meaning of "*phusis*". While everybody knows that the Galilean gesture has been to extract from the range of motions, emotions, affects, and effects included in the older *phusis*, only one movement—that of falling bodies—it is also clear that natural historians engaged in fierce disputes about the proper use of territory have in effect reintroduced all the other types of processes that Galileo had pushed aside: birth, generation and death, growth and decay, life and pollution. To the point that Gaia—again not the Global Earth but the skin-thin Critical Zone—requires a different treatment, a different style of study, a different politics than the vast expanses of nature. This different approach does not mean that the models of natural historians don't use the same laws of nature that are active at

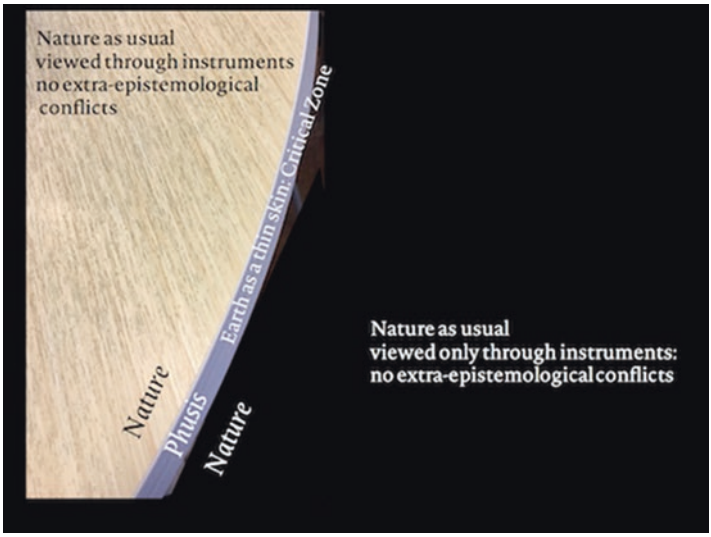

Fig. 2.2 The critical zone

the center of the Earth or in Mars and Jupiter, but that there is something so specific to the earthly sciences that it should be protected, so to speak, against a confusion with the strange and utterly modernist attempt to treat the Earth as if it was another planet, viewed from out in space. No wonder no one is moved when it is proposed to "go back to nature" or "to care for nature"; this nature is the projection onto our planet of a conception coming from out in space. And of course, things are even worse, especially in this country, when nature is confused with wilderness.

What I propose to do, then, is to introduce a division between nature and the natural sciences, on the one hand, and phusis and the earthly sciences on the other. A fully geo-centric move, if you wish, provided that you take geo not as a globe but as a critical zone. It is not as speculative as one might think, since there are lots of good technical reasons to utilize such a partition. Witness Timothy Lenton's version of the same divide in his book: "For many Earth system scientists, the planet Earth is really comprised of two systems -the surface Earth system that supports life, and the great bulk of the inner Earth underneath. It is the thin layer of a system at the surface of the Earth -and its remarkable properties- that is the subject of my work" (Lenton 2016).

This is something that Humboldt would have understood easily. We, the Earthlings, the Earthbound, the parents, and children of the Anthropocene, are not born in nature first and then later graduate into the worlds of symbols and society, but spend all our life from cradle to the grave inside the *phusis* out of which we will never extract ourselves, even in dreams. This what it means to be *in* Earth and not *on* Earth. Nature is too vast and too homogeneous a concept to serve as a basis for the composition of the common world.

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If we were told that the planet as we know it was going to be devastated soon and that we have to quickly vacate the premises so as to be transported to another one, there is no doubt that the whole institutional apparatus—civil, military, religious, intellectual, scientific, technical—would be on something of a war footing. A frenzied activity, as is known only in periods of war, will mobilize everybody, triggering passions as well as innovations and panic. If you have followed me until now, this is indeed a realistic description of where we stand today: collectively, at the time of the New Climatic Regime, we are contemplating a hard landing on a planet—the critical zone—that in recent times we thought we could escape from or at least ignore altogether.

To reorient ourselves we need to realize that in addition to the Globe—the infinitely receding horizon of the frontier, and in addition to the Land of Old—this mythical land that many long to go back to (for instance, the Great Britain that Brexiters dream of reaching after having abandoned the other dream of the global market, or the America Great Again that white men dream to regain after having lost the optimistic movement to the fully modernized Globe)—that in addition to those two poles, Globe and Land of Old, there is *a third pole*, a third attractor if you wish that is differently polarizing our political life, forcing us to define what is a movement forward and backward along totally different paths of evaluation. Even though the general mood seems to be a wait-and-see attitude when faced with the perspective of such a hard landing, this planet-shifting process is a realistic description of what is happening under our eyes. If most people don't seem to react, I think it's because they are anesthetized by the size of the necessary change and the novelty of the definition of a land so different from nature. From the beginning of this talk, I have taken the apparent vacuity and raucousness of present politics as the best proof of this hesitant, suspended but radical reorientation. It is thus very important that intellectuals, artists, statesmen, activists, begin to sketch the landscape that we will have to inhabit.

Since we are here at Cornell, almost exactly 40 years after the first meeting of my professional association, the Society for the Social Studies of Science, I thought it would be fitting to propose one view of how a university can adjust to this situation. In addition, it would offer a good baseline to register the immense changes that have taken place in the conceptions of scientific disciplines since we started this field of science studies.

That what follows remains totally speculative should not be surprising at a land grant university such as this one, founded, as you all know, to propose innovative research and teaching at a time in the past when a new land was to be occupied, tilled, renewed, and reinvented. Paradoxically, the rediscovery of an old land—and the necessary painful landing that goes with it— requires just as much innovation in research and teaching.

The first visible reorientation is to decide toward which goals the whole energy of the University is being directed. When the modernist project was still extant, the university took itself to be at the vanguard of a teaching and research process; its results—progressively through education and training, then through outreach and what in some place they nicely enough call "extension"—would trickle down,

eventually reaching the general public marching courageously at the rear-guard that had been mobilized for the great movement forward. So ideally, after multiplying university laboratories, accumulating starts up, grads, undergrads, and PhDs, plus a few educational museums, a shared world view would finally be constructed where everybody would have become, if not scientifically enlightened, at least able to follow, maybe to obey, the expert vanguard in important matters.

It is somewhat cruel to be reminded of this ideal at the time of the US election since the trickle down project has been such a radical failure that a large segment of the population of this country believes neither in Darwinist evolution nor in the anthropic origin of climate change, and, worst of all, believes that those are questions of belief and value, not of science! The true meaning of universities as ivory tower was revealed to me when I was in Cambridge, England a few weeks back and learned that the college city had voted 75% for Remain in the Europe referendum while the rest of the shire voted from 54% to 75% for Brexit. We can of course lament the backwardness of the people, but it is also a dismal proof of the isolation of the experts. Trickle down epistemology does not work better than trickle-down economics. Universities no longer offer a preview of what will become future common sense, but rather isolated archipelagos in a sea of discontents.

If you have followed the planet shifting movement I described earlier, the new university, what we might call the neo-Humboldtian university (again taking more from Alexander than from his brother Willem), goes exactly in the opposite direction from that of the nineteenth and twentieth centuries: soon, eight-billion people will need help in landing on a territory, on a land, which has none of the characteristics modernists had prepared them for and which is totally new to everybody (Guarin 2004). It will require of each member of the public an amazing effort to adjust, to inquire about the right way to survive there, to propose changes in lifestyles, to resist conflicts over land appropriations and to entirely retrofit goals, morality, and values. There would be some trickling down, to be sure, but it might run in the opposite direction, moving from the surprised public to the experts suddenly forced to discover the extent of their ignorance.

So here is the first radical reorientation: what used to be called extension, outreach or pedagogy is no longer the last but the *first front line* and alongside which all actions of the future university will be evaluated. All departments are mobilized to service the public engaged in this migration of biblical proportion. This does not mean that basic research is jeopardized, quite the contrary, but that the order, priority and goals have been reversed. To survive in the critical zones without killing each other and rediscovering the multiple layers of Gaia so as to obtain margins of maneuver in technology, energy, and resource requires immense advances in scientific inquiry. This is what I meant when I said that rediscovering the old new planet should create as much creative energy as during the period that had been called the "age of discovery". Especially that now the project of reinventing how to live on the planet might be a project shared with the formerly dispossessed.

The meaning of "public engagement" is now considerably changed. It is no longer an afterthought, added once basic research has been completed; it is that toward which basic research is directed. But how to establish the links between those two

lines of activities? Two words have cropped up everywhere when institutions of higher education have realized that to cope with the planet shift required a major change or orientation: *performances and design*. The fortune of design as a metaterm replacing dozens of activities that before would have been understood as engineering, management, activism, or policy is extraordinary. The word design now means a general method to cope with the traumatic experience of having to readjust the totality of our conditions of existence. This is what Peter Sloterdijk meant with his argument that explicitation was the only way to deal with the new existential situation (see Latour 2012). When you talk about designing or redesigning it means you have abandoned revolution and tabula rasa, and that the best you can expect is to make life more livable. It is slightly more ambitious than remediation, but it is much less heroic than revolution. Adapting? Adjusting? Coping? All sorts of words that mean how to live in the ruins.

The fortune of performances and performance studies is also rather extraordinary. This other metaconcept does not simply mean the older arts of dance, music, or theater but a much larger set of transdisciplinary skills that provide players and audience with a sensitivity for situations where there was none before. What I have called the "political arts" is a way to explore the three aesthetics of arts, science and politics, where aesthetics is understood as gaining a sensitivity for the new planet on which we are supposed to land—sensitivity which is gained by scientific instruments, by political representation but also by what the arts have to offer. Performances have the crucial advantage of allowing the *dramatization* what is at issue, but also the *dedramatization* of issues since they are artificially staged. No politics of the Anthropocene is possible as long as its players are paralyzed and inarticulate. Without the arts, people will remain stuck in the old planet without moving an inch, terrified by guilt and willful ignorance. In that sense, performances, much like design, offer key metamethods to prepare for the planet shift.

A third metaterm is easier to detect since it has become common sense; rare are universities not investing massively in big data: namely visualization and what some of us call "digital methods." A key side effect of the digital is that people of completely different disciplines are pushed to compare their data sets no matter where they come from. Today an art historian, a spy, a geographer, an activist, an administrator, or a physicist can begin to have, on their respective screens, documents, tables, traces, inscriptions which share many characteristics that were not visible before. The down side is that wherever you go, from biology to cosmology, from social networks to archaeology, the same problem arises: too much data, not enough visualization. And yet building recognizable and shareable landscape through multiple and often controversial data sets is essential for the landing operations we are readying ourselves for. Look at what is necessary for landing one robot on a Mars mission: imagine what it will require to land eight billion people on Earth!

So, the first front line is public engagement; the second line is design, performance and data visualization. What is the third line? Time is running out, but it would be refreshing to imagine what will happen to the earthly sciences once they are mobilized in the direction I indicated. Remember that we leave aside, for now, the natural sciences, those dealing with what is either above or below the Critical

Zone. All the remaining disciplines have become branches of Geo-logy or rather Gaialogy since they all have to handle the planet shift and prevent a hard landing. Contrary to the natural sciences, the earthly sciences cannot ignore that they are engaged in controversies for the production, interpretation, and application of data. Natural history is, by definition, full of history. So, the training of geo-historians implies a lot of science studies and politics. This new insistence on history will actually be nothing but a return to the origin of the discipline of geology and stratigraphy proper since their birthplace, as Martin Rudwick (2014) has so beautifully shown, is the same as archaeology. Historical disciplines they were, historical disciplines they will be. With the added twist that the Anthropocene has sped up the rhythm of this story quite a bit (see Fig. 2.3).

If I were a science fiction writer I would have great fun sketching the destiny of disciplines mobilized in the shift to earthly science. Having been the dean of my school I know that disciplines are simultaneously indispensable for training and job markers and useless for defining issues and new fields. Still, it would be more than simply entertaining to watch sociology turned earthly—at least people will stop asking me if social is limited to humans and how things could have agency too; it would be greatly inspiring to see economics turned earthly science, reinternalizing everything that it has externalized beyond the limits of its calculations and beginning to multiply the currencies instead of limiting their numbers; how fascinating to see the law school fully engaged in the redefinition of property rights and inventing many new ways for the various agents to have standing in courts; we should not be surprised to see that political scientists are helping the public redefine the limit of sovereignty and elaborating with the performance departments new ways of assembling political bodies finally able to be representative of life on earth; those who

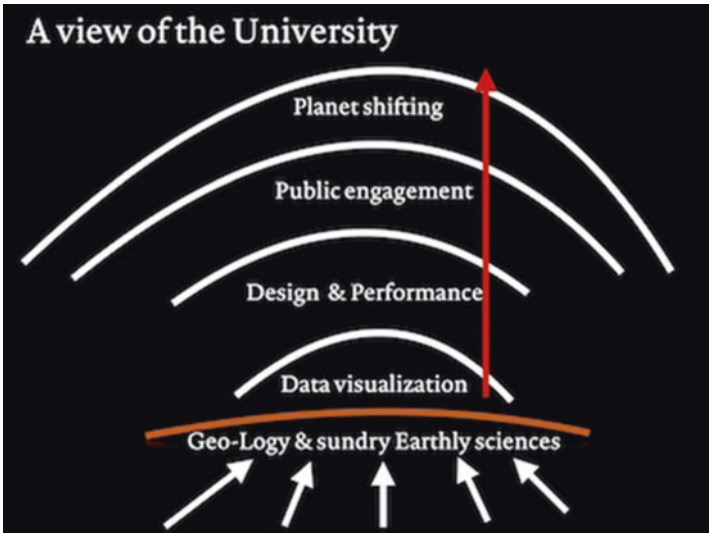

Fig. 2.3 A view of the university

certainly feel most at ease in this new situation are the anthropologists, precursors of all the other earthly sciences, since they are the ones who keep alive the experience of those who have been dispossessed most vividly for all the other disciplines to learn from; even the divinity school is changing its relation with the sciences it had loved to hate for so long, rediscovering in the dogma of incarnation an access to the earthly and mundane existence well-adjusted to the planet shift; humanities are not behind either since in them reside the immense reservoir of alternative definitions of what it is to be a human and to be surrounded by different kinds of agencies, and just at the time when the humanities looked obsolete in the horizon of globalization, they become indispensable to compose the common world idiosyncrasy by idiosyncrasy; philosophy? Ah, that's true I have not enough imagination to invent ways in which departments of philosophy could become earthly. I am sure others can do so better than me.

Anyway, this lecture is coming to a close and it is your job to follow those few hints for a neo-Humboldtian university. I propose that we ask knowledge designers and performance studies experts to help us through the brainstorming sessions necessary to adjust to the new situation. What is sure is that we have not that much time and that we cannot remain an island in a sea of disgruntled voters who have come to believe that questions of life on earth are questions of belief.

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