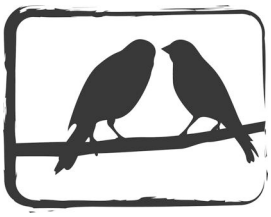
Environmental Humanities, vol. 5, 2014, pp. 155-170
www.environmentalhumanities.org
ISSN: 2201-1919



Beyond Whole Earth: Planetary Mediation and the Anthropocene

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ABSTRACT This article examines the hermeneutic and poetic operations by which we as human beings turn our very planet into a signifier for our collective existence as a species, a process which I refer to as "planetary mediation." I identify the so-called Whole Earth images first generated by the Apollo Space missions as the characteristic form of planetary mediation during the late twentieth century, and argue that our current emergence into a new geological epoch, the Anthropocene, calls for radically different representational strategies. Whole Earth images draw their strength from their iconographic and indexical qualities—in other words, their seeming ability to ground symbolic discourse in something that is undeniably and materially real. In the Anthropocene, however, physical nature itself has become a medium for the inscription of human messages, and effective planetary mediation can now take place only in virtual environments such as those of Google Earth and advanced climate modeling systems. I analyze the work of Soviet biologist Evgeni Shepelev as a starting point for this form of planetary mediation and discuss the multimedia installation *The Place Where You Go to Listen* by American composer John Luther Adams in order to show the challenges that contemporary environmental art will still have to overcome if it wants to illuminate our current planetary condition.

In 1961, two members of the Soviet space program locked themselves into airtight metal capsules and embarked on very different journeys that nevertheless both opened up new chapters in the history of what I will henceforth call *planetary mediation*. With this term, I want to designate the hermeneutic and semiotic operations that we as human beings use to turn our very planet into a signifier for our collective existence as a species. One of these pioneers was the cosmonaut Yuri Gagarin, the first person to ascend into space. The other was the biologist Evgeni Shepelev, who spent twenty-four hours in the world's first artificial ecosystem, a claustrophobic tank in which 12 gallons of green algae recycled into breathable oxygen the carbon dioxide that he exhaled.

Unlike Yuri Gagarin, who immediately became one of the most famous human beings who ever lived, Shepelev remains little known to this day.[1] Undoubtedly this was because the

[1] There is even some disagreement over the question of when his path-breaking experiment took place. The German science journalist Christian Schwägerl, through whom I first learned about Shepelev, claims that it was in 1960; all other sources that I have been able to find speak of 1961. See Christian

biologist's day in the tank yielded nothing that could have captured the imagination of a broad audience—only a cloud of noxious gasses that nearly incapacitated his assistants, and of course his own body, still breathing (though barely) long after the original oxygen allotment had been depleted. And yet, as we embark upon a new epoch defined by the cognizance of our own geophysical agency, Shepelev's experience may well hold the key to a novel understanding of our planet, one that is radically different from, and even antithetical to, the one that prevailed in environmentalist circles for the last fifty years, largely as a result of Gagarin's space flight.

Watchers in the Skies

If asked to summarize the cultural effects of Gagarin's journey, one could do a lot worse than to speak of the "abolition of human horizons." Just a year prior to Gagarin's liftoff, the German philosopher Hans-Georg Gadamer had influentially described the process by which we make sense of historically distant or culturally alien experiences as a "fusion of the horizons of understanding."[2] But as the cosmonaut ascended into orbit in a tiny capsule that with its darkened interior and miniscule portholes resembled nothing so much as a *camera obscura*, something entirely different happened. Gagarin could literally watch as his horizon of understanding expanded ever outward, eventually becoming identical with the circumference of the earth. On this early flight, only Gagarin's retinas were exposed to this new experience, but over the course of the next decade, the American Apollo missions began broadcasting what came to be known as the Whole Earth images to a spellbound planetary audience. The most famous of these was the so-called Blue Marble picture of 1972.

Figure 1 *"The Blue Marble" (NASA, photo in the public domain).*

Schwägerl, *Menschenzeit: Zerstören oder gestalten? Die entscheidende Epoche unseres Planeten* (Munich: Riemann, 2010), 7-13.

[2] Hans-Georg Gadamer, *Truth and Method* (London: Continuum, 1975), 273.

What all Whole Earth images have in common by definition is the complete absence of any horizon, of any limitation to the human field of vision. Or rather, as another exemplary image, the Earthrise photograph captured by William Anders as he circled the moon aboard Apollo 8, makes especially clear, the entire planet seems suspended within the same horizon, suggesting an experiential fusion of all members of the human race, regardless of ethnicity, creed, nationality, or socio-economic status. In almost no time at all, Whole Earth images became the most potent icon of the nascent environmental movement, providing seemingly incontrovertible proof that whatever else might separate us, we are all part of *one species*, forced to live together on the same fragile planet and sharing the same limited resources. They adorned the covers of Steward Brand's *Whole Earth Catalog* (published from 1968 to 1972), featured prominently in the Earth Day celebrations that were first held in 1970, were printed on beach balls tossed around at hippie gatherings, and inspired widely-read manifestos by Buckminster Fuller, Marshall McLuhan, James Lovelock and others.[3] Forty years later, the appeal of these images has not waned one bit, and they can be found on the covers of both popular calls for ecological action (e.g. Al Gore's *An Inconvenient Truth*, 2006) and academic publications within the burgeoning field of the environmental humanities (e.g. Karen Thomber's *Ecoambiguity*, 2012).

Figure 2 *"Earthrise" (NASA, photo in the public domain).*

[3] The literature on Whole Earth images is vast. For good starting points that also focus on the impact these pictures had on thinkers such as Fuller and Lovelock, see Dennis Cosgrove, "Contested Global Visions: One-World, Whole Earth, and the Apollo Space Photographs," *Annals of American Geographers* 84, no. 2 (1994): 270-94, as well as Benjamin Lazier, "Earthrise; or, The Globalization of the World Picture," *The American Historical Review* 116, no. 3 (2011): 602-30. For the adoption of these images by environmentalist and counter-cultural circles, see Volker M. Welter, "From Disc to Sphere," *Cabinet* 40 (2011): 19-25.

At the same time, however, the Whole Earth images have come in for considerable amounts of criticism. As early as the 1980s, some environmentalists were condemning them for their erasure of local and regional differences.[4] Moreover, these images do not merely reduce complexity, they also introduce semiotic tensions of their own. They are, after all, unmistakable products of the space race, and thus on at least some level propaganda tools of the Cold War. To the environmental movements in the United States and Western Europe, Earthrise may well have signaled global solidarity; in many other parts of the world, it would have served as a reminder that American military pilots were the first to get to the moon. Indeed, the very barrenness of the lunar surface in the foreground of this image raises chilling question about the exact vantage point from which it might become possible to regard humanity as a species rather than as a collection of different people. Could it be that the only logic that really unites us is the logic of mutually assured destruction? There are other tensions as well: the idea that Earth is a shared "spaceship" (B. Fuller) that we will need to learn to take care of sits uneasily with the fact that at least some people are evidently able to escape from this vessel in actual rockets, and the anti-technological rhetoric typical of early environmentalism is difficult to reconcile with the technologically highly mediated character of the images that sustained this position.

Given these inherent tensions, it makes a certain amount of sense to subsume the tradition of Whole Earth photography within the larger history of what Mary Louise Pratt has called "imperial vision."[5] Like the eighteenth- and nineteenth-century explorers whom Pratt writes about, the Soviet and American astronauts brought home news of ostensibly sublime natural vistas that they had gathered on journeys meant to prove the superiority of a given national culture; like them, they were at once scientists and conquistadors. The proximity is illustrated in a very immediate fashion by the famous pair of similes that concludes John Keats's poem "On first Looking into Chapman's Homer":

> Then felt I like some watcher in the skies
> When a new planet swims into his ken;
> Or like stout Cortez when with eagle eyes
> He star'd at the Pacific—and all his men
> Look'd at each other with a wild surmise—
> Silent, upon a peak in Darien.[6]

But there are important differences between Pratt's project and Whole Earth photography as well, differences that most clearly reveal themselves in the deictic *then* that opens these similes. For Keats, the "new planet" that swims into the "watcher's ken" provides an aesthetic experience that is subordinate to, and ultimately merely illustrative of, a quite different one, namely the discovery of what he earlier in the same poem calls the "wide expanse (…) / That deep-browed Homer ruled as his demesne." Keats here illustrates what Pratt calls the

[4] See Yaakov Jerome Garb, "The Use and Misuse of the Whole Earth Image," *Whole Earth Review* March (1985): 18-25.

[5] Mary Louise Pratt *Imperial Eyes: Travel Writing and Transculturation* (London: Routledge, 1992).

[6] John Keats, "On First Looking into Chapman's Homer," in *Complete Poems*, ed. Jack Stillinger (Cambridge, MA: Harvard University Press, 1978), 34.

"planetary consciousness" of which imperial vision is ultimately merely a product.[7] That is, he references a symbolic and totalizing account of the world that frames the sublime vista and ultimately provides a context for what initially seems non-containable. Such totalizing descriptions might be offered by epics, romances, Biblical prophecies, or (as in many of the cases explicitly discussed by Pratt) by natural history.

The Whole Earth photographs have certainly been subordinated to any number of such framing attempts as well; Ursula K. Heise speaks in this context of "allegories of connectedness."[8] But these framing attempts are ultimately parasitic on a quite different form of signification that astronomer Carl Sagan memorably analyzed in a famous passage he wrote about the "Pale Blue Dot" photo taken by the Voyager 1 space probe in 1990:

> Consider again that dot. That's here. That's home. That's us. On it everyone you love, everyone you know, everyone you ever heard of, every human being who ever was lived out their lives. The aggregate of our joy and suffering, thousands of confident religions, ideologies, and economic doctrines, every hunter and forager, every hero and coward …, every king and peasant, every young couple in love, every mother and father, hopeful child, inventor and explorer, every teacher of morals, every corrupt politician, every "superstar," every "supreme leader," every saint and sinner in the history of our species lived there—on a mote of dust suspended in a sunbeam.[9]

This is certainly a tropologically rich passage, but allegory is not one of its distinguishing features. In allegory, the signifier is not itself important, because its ultimate role is to dissolve into the signified; Sagan's prose, on the other hand, is defined by its militant indexicality, its insistence that the connection between signifier and signified is material and indissoluble rather than merely arbitrary: the pale blue dot *is* here, it *is* home, it *is* us. Even what seems on first sight like a metaphorical flourish at the end of the passage is actually an index, for when viewed across a cosmic scale the earth *is* indeed nothing more than a mote of dust with some organic life clinging tenuously to its surface.

Sagan emphasizes the importance of this indexicality by explicitly contrasting it with the various kinds of allegorical narratives we ordinarily use to assure us of our common humanity. The kings and peasants, couples in love and corrupt politicians, sinners and saints—all the stories, in other words, that comprise the epics, romances or histories on which other forms of planetary consciousness are based—literally *pale* in significance to the signifying power of the tiny blue pixel. And therein, of course, lies the universal appeal of the Whole Earth photographs. They do not depend on previously existing narratives, which are always tainted by cultural specificity, no matter how seemingly universal. They appeal to us instead by what the Medieval Scholastics would have called their *quiddity*, their undeniable *thusness*. Planetary mediation of the kind that was set in motion by Yuri Gagarin's spaceflight thus enabled a completely new kind of global consciousness, one that was grounded not in the logic of the arbitrary signifier, but rather in an unalterable presence. For this reason, the Whole

[7] Pratt, *Imperial Eyes*, 11.

[8] Ursula K. Heise, *Sense of Place and Sense of Planet: The Environmental Imagination of the Global* (New York: Oxford University Press, 2008), 22.

[9] Carl Sagan, *Pale Blue Dot: A Vision of the Human Future in Space* (New York: Ballantine, 1994), xv.

Earth images are perhaps the closest equivalent to a religious icon that our secular age has ever produced.

From Whole Earth to Google Earth

Over the course of the last ten years, however, our relationship to the Whole Earth tradition has changed dramatically. The most likely place in which we now stumble across images of our planet is no longer the bookstore, or an Earth Day celebration, but rather the home screen of the Google Earth interface, which is ubiquitous not only in personal life, but also in the business world and in the news media. Google Earth differs from the earlier static tradition of Whole Earth photography (and, for that matter, from the more recent tradition of Whole Earth videography) in at least two important ways.[10] First, it allows users to zoom, pan, tilt, and otherwise alter their perspective, as well as to share markup data, screenshots or even short video tours with other people around the world. The older association of the Whole Earth with a homogenized and universal model of global solidarity is thus replaced with what Ursula Heise calls a "deterritorialized eco-cosmopolitanism," i.e., with novel and ever-changing efforts to bring the local into dialogue with the global.[11] Second, and even more importantly, the earth that is depicted in the Google interface is a *virtual* object that, despite all its pretensions towards iconography and indexicality, is actually generated on a computer. The novelty of Google Earth, in other words, lies not merely in the fact that it allows us to annotate and manipulate the globe with database operations of our own, but also in the fact that the image of the planet that it puts before us is actually a construct, an only seemingly seamless whole that has in reality been stitched together out of thousands of individual components, each of which have been subjected to complex mathematical manipulations.[12] And as the anthropologist Stefan Helmreich has shown, the resulting "data infrastructure," despite its own pretensions towards iconographic authenticity, actually bears a highly mediated relationship to physical reality, flattening some dimensions and distorting others even in those cases where it is based on flawless high-resolution imagery.[13]

The development of Google Earth in the early years of the twenty-first century coincides exactly with the claim, first made by Paul Crutzen and Eugene Stoermer and since widely repeated, that we have entered a new geological epoch known as the Anthropocene.[14] In the Anthropocene, our very planet becomes a medium for human inscription carried out through processes such as carbon exhausts, strip mining, species extinction and the like. Far

[10] For a recent example of Whole Earth videography, see Giacomo Sardelli, "Further Up Yonder: A Message from ISS to all Humankind," 26 November 2012, accessed 18 December 2013, http://vimeo.com/54269169.

[11] Heise, *Sense of Place and Sense of Planet*, 63-67.

[12] Lev Manovich speaks in this context of "software performances." See Lev Manovich, "The Algorithms of Our Lives," *The Chronicle of Higher Education*, 16 December 2013, accessed 18 December 2013, http://chronicle.com/article/The-Algorithms-of-Our-Lives/143557.

[13] Stefan Helmreich, "From Spaceship Earth to Google Ocean: Planetary Icons, Indexes, and Infrastructures," *Social Research* 78, no .4 (Winter 2011): 1211-1242.

[14] The program we now know as Google Earth was originally developed as *EarthViewer 3D* by Keyhole Inc. in 2001. Paul Crutzen and Eugene Stoermer coined the term "the Anthropocene" in 2000, in an eponymous article in the *Global Change Newsletter* 41 (2000): 17-18.

from impressing us through a militant indexicality that grounds all our attempts to construct "allegories of connectedness," future representations of the Whole Earth will consequently have to be read as symbolic texts in their own right. We no longer live on a Blue Marble or Pale Blue Dot that is at once symbol of our achievements and of our fungibility, but rather (to invoke Bill McKibben's felicitous coinage) on "Eaarth," a textual environment of our own making.[15]

As an illustrative example of this, consider NASA's latest foray into planetary mediation, the "Images of Change" Ipad application released in December 2013. By presenting side-by-side images of satellite photography taken at different points in time, this app, according to NASA's John Grunsfeld, "gives users an astronaut's or Earth explorer's view of the changes occurring on our planet and demonstrates the important role NASA plays in contributing to the long-term understanding of earth."[16] "Seeing is believing," adds a different NASA administrator, "and the perspective we get from space helps us step back and see Earth as a whole."[17] The second quote especially is indicative. Apparently, space-based photography no longer suffices if we want to see "Earth as a whole," it merely "helps us step back" and gain a new perspective that is a necessary, but no longer sufficient condition for such a totalizing vision. What is missing from static photography is the element of time, the before-and-after that alone makes climate change apprehensible. The earth, in the logic of this press release, is a constantly changing construct, and NASA's mission is to study its long-term trajectory. This definition would presumably have flummoxed the early audiences of Whole Earth photography, for whom the Blue Marble was instead an icon of relative permanence, whose literally glacial pace of change provided a corrective perspective on the fleeting activities of humankind.

The semiotic ramifications of the shift from Blue Marble to the "Images of Change" gallery are profound. As we have already seen, earlier examples of the Whole Earth tradition impressed primarily through their iconographic and indexical qualities, i.e. through the implied visual and material identity between signifier and signified. The "Images of Change," however, add to these iconographic and indexical qualities the logic of referential signification that (post)structuralist theory has identified as characteristic of all symbolic communication. In order to grasp the significance of a climate change image, one has to read not only what is there, but also what *isn't* there. Just like the word *horse* becomes apprehensible as a signifier indicating a specific kind of large herbivorous mammal only by its difference from all other words in a given language, so a particular Whole Earth image signifies man-made climate change only by its fundamental difference from all other Whole Earth images both past and future.

When users of the "Images of Change" gallery gaze at side-by-side representations of satellite imagery or superimpose them upon one another using the app's slider bar, they thus engage in a dual semiotic operation, not at all unlike those also performed by users of the Google Earth interface. On the one hand, they are creating and documenting new connections among existing climate data sets, and thereby experiencing what Ursula Heise, following Lev

[15] See Bill McKibben, *Eaarth: Making a Life on a Tough New Planet* (New York: Henry Holt, 2010).

[16] Quoted in "Images of Change" press release, 3 December 2013, accessed 10 December 2013, http://climate.nasa.gov/news/1007.

[17] NASA web editor Amber Jenkins, quoted in "Images of Change" press release.

Manovich, has called the "database aesthetic" of modern global visualization systems.[18] But more importantly, they are also discovering anthropogenic climate change as a kind of textual superimposition or layering, a process by which the pristine Blue Marble is transformed into a medium for human self-inscription ultimately not all that different from the virtual globe spinning on our computer screens.

Picturing Geophysical Agency

The realization that Whole Earth photography in the Anthropocene has moved from a predominantly iconographical and indexical mode of signification towards a predominantly symbolic one can help us gain traction on what Dipesh Chakrabarty has described as the biggest hermeneutical challenge of the new epoch, namely our inability to comprehend our own geophysical agency. Chakrabarty points out that we come to understand experiences that are not like our own (because they are historically distant, geographically remote, or culturally alien) through the mediation of human beings who experience them vicariously for us and then record them in some fashion, i.e. through Gadamer's "fusion of the horizons of understanding." To *experience* ourselves as a geophysical force, on the other hand, is impossible; we can at best hope for a partial mediation by the victims of local manifestations of such a planetary force—by hurricane survivors, farmers whose livelihood has been taken away by droughts or rising temperatures, or families displaced by flooding, for instance.[19] The gap between this merely local knowledge and comprehensive understanding of the planetary conditions that cause such catastrophes is vast, however, and not just, as Rob Nixon has shown, because the traditional tools we have developed to analyze human suffering are ill-equipped to deal with the "slow violence" that accompanies global climate change.[20] The Anthropocene puts into question not only the spatio-temporal parameters in which claims for representation and justice are ordinarily expressed, but even such fundamental notions as human causality. How, for instance, are we supposed to link a particular instance of flooding to any corresponding emission of climate-altering gasses? The current back-and-forth between developed and developing nations over who bears a greater financial responsibility for climate-change mitigation programs reminds us of the very real ways in which these hermeneutical problems interfere with political action.

This, then, is where the second model of planetary mediation that I mentioned in the introduction to this essay, the one inaugurated by Evgeny Shepelev, proves its superiority to the tradition of Whole Earth photography. Whole Earth images fail to do justice to the force-like nature of the human species in the Anthropocene, because force, by its very definition, is a measure of change over time (in Newtonian physics, $F = m \Delta v \Delta t$). The iconographic nature of Whole Earth photography, however, places it outside the temporal flow entirely. Side-by side comparisons of images, as in the NASA app, can provide stunning illustrations of the impact that various processes of human self-inscription have had on the earth system, but they still

[18] Heise, *Sense of Place and Sense of Planet*, 67.

[19] Dipesh Chakrabarty, "Postcolonial Studies and the Challenge of Climate Change," *New Literary History* 43 no.1 (2012): 12-13.

[20] Rob Nixon, *Slow Violence and the Environmentalism of the Poor* (Cambridge, MA: Harvard University Press, 2011).

only hint at the ways in which geophysical agency on a planetary scale has become part of the human condition. Before and after images imply an intervening catastrophe that took place at a specific point in time, but force is a vector quality that can be only understood as a rate of change over time. The climate change that we are currently bringing about on planet Earth has no fixed temporal coordinates, no matter how many tipping points we may wish to cite in the form of calving glaciers or record temperatures. It is an ongoing process, a constitutive part of our species existence in the Anthropocene.

Shepelev's tank, on the other hand, lacks any iconographic pretensions. Its semiotic mode is resolutely that of allegory (these tanks of green algae represent the sum of all earthly flora, that human body represents the species entire). This allegory is rendered all the stronger by the unpretentiousness of the experimental setup. Unlike the inhabitants of the much better-known *Biosphere 2* in Arizona, Shepelev was never billed to the public as some kind of heroic pioneer embarking on an unprecedented scientific adventure. He simply served as a placeholder for the human species. The descriptions of his nearly lifeless body tumbling out of a capsule in which the oxygen cycle had become self-sustaining, but in which other gasses had built up to poisonous levels reads like a commentary by Samuel Beckett on *Geworfenheit*, the Heideggerian notion that we are all thrown into the world, suitably updated for the Anthropocene.[21]

The image of the world that emerges from Shepelev's experiment is that of an assemblage, or, to invoke a term recently coined by Bruno Latour, a "composition."[22] A composition, first, because the cloud of noxious gasses that signifies the earth atmosphere within the experiment is indeed the composite product of human and non-human processes, all tied up with one another in a comprehensive feedback loop. But it is a composition also because the auto*poi*esis that took place within Shepelev's chamber can, at the same time, be read as an auto*po*esis, a writing-into-being of a new kind of species image.[23] The concept of a divine breath, or *pneuma*, has ancient origins, but it was the Romantics who made it the centerpiece of a theory of expressivity in which to exhale becomes synonymous with the creative drive (Freud's *Eros*) and thus also with the modern condition. The Shepelev experiment takes this idea one step further, however. Within its allegorical parameters, respiration quite literally becomes what Richard Wagner called "world-breath" (*Welt-Atem*): a process by which we as a species create a new world through the alteration of atmospheric chemistry.[24]

The noxious gasses that escaped from Shepelev's chamber served as a potent reminder of the compositionist nature of the Anthropocenic earth: one could literally smell how man

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[21] Martin Heidegger, *Being and Time* (New York: Harper & Row, 1977), 173.

[22] Bruno Latour, "An Attempt at a Compositionist Manifesto," *New Literary History* 41 (2010): 471-90.

[23] *Autopoiesis* is a term drawn from biological and sociological systems theory, where it refers to the processes by which systems reproduce and maintain themselves. The neologism *autopoesis*, which has recently gained traction in several unrelated areas of literary criticism, applies this concept to the systems of culture generally speaking, and to poetics in particular. *Humanism*, for instance, is an autopoetic system because the great works of the humanist canon were written by human subjects with the express goal of cultivating more human subjects. For a book-length introduction to this idea, see Ira Livingston, *Between Science and Literature: An Introduction to Autopoetics* (Champaign, IL: University of Illinois Press, 2006).

[24] Friedrich Kittler, "World-Breath: On Wagner's Media Technology," in *Opera through Other Eyes*, ed. David J. Levin (Palo Alto: Stanford University Press, 1994), 215-38.

and nature intermingled. This same fact, however, also points to the limitations of the Shepelev experiment for purposes of planetary mediation. None of us can now, more than fifty years later, experience what Russian scientists smelled that day, and even if we repeated the experiment, the results would be less than useful. For Shepelev's chamber owes its illustrative force precisely to its hyperbolic extremity: if our actual atmosphere were to attain such an extreme level of toxicity, we would all have already perished, along with all higher life on the planet. Unlike merely local pollution, which one can easily experience with all of one's senses, the planet-wide processes that constitute human geophysical agency in the Anthropocene aren't easily apprehended with such visceral immediacy.

These limitations are overcome only by another component of the Shepelev experiment that is, however, so banal that it is routinely written out of modern retellings such as the one offered by Schwägerl: the reams of data produced by gas probes and other measuring devices. Ultimately, we will have to accept that neither the heroic experiences of conquistadors, astronauts, and putative bionauts, nor the gleaming images produced by satellite photography enable us to experience ourselves as a geophysical force. Only the complex measurements of machines will allow us to do so.

This is certainly not the first time in human history that scientific instruments have played a central role in the process of planetary mediation. We need to think here only of Galileo's telescope, which was so crucial in dispelling the geocentric model of the universe and consequently also in ushering in a new understanding of what it means to be human.[25] But there is an important difference between this early modern case and twenty-first century climate modeling, a difference perhaps best illuminated by the old story of how the philosophers of Padua refused to look through Galileo's telescope because doing so might have undermined the authority of the ancients. This story (first related by Galileo himself in a letter to Johannes Kepler) has become justly famous because it offers a concise illustration of what is classically understood as the scientific method; while the telescope allows Galileo to observe the motions of the heavenly bodies from a kind of neutral Archimedean point, the Aristotelian philosophers search for truth in ancient texts whose authority they themselves generate by circulating, annotating and shuffling them about in ever-new fashions.

The problem here is that modern climate scientists have almost as much in common with the humanists of Padua as they do with Galileo. They collect empirical data much as Galileo did through his telescope, but because they are trying to measure changes in a planet-wide and inherently chaotic system, their efforts are always subject to a degree of skepticism one rarely encounters in other areas of the natural sciences: were enough sensors used, and of the right kind? Were they placed in the right locations? Worse yet, these measurements then need to be fed into predictive computer system whose calculations, again owing to the enormous complexity of the models involved, are at best approximate, and which need to be further supplemented with *guesses* about future human behavior. It is for this reason that the theoretical physicist Freeman Dyson, who is at once today's most plausible successor to the legacy of Galileo and perhaps the most visible climate change skeptic within the scientific community, has repeatedly tried to discredit climate modeling on account of the "enormous

[25] On Galileo's telescope as an instrument of what I am here calling *planetary mediation*, see Joseph Vogl, "Becoming-media: Galileo's Telescope," *Grey Room* 29 Fall (2007): 14-25.

gaps in our knowledge, the sparseness of our observations and the superficialities of our theories."[26]

The purpose of the foregoing reflections is not to discredit climate modeling, but rather to point out that our very understanding of what it means to do science may have to change in the Anthropocene. We can no longer imagine ourselves as being separate from the systems that we observe, as Galileo could with his telescope. Instead, we have inscribed our presence upon them, and our effort to decipher the significance of these inscriptions is as much a hermeneutic operation as it is a scientific one. The best that climate scientists can do is present us with a range of what they call *representative concentration pathways* (RCPs), i.e., with different greenhouse gas concentration scenarios; the question of how to decide between them has to be adjudicated using a number of anthropological and sociological conjectures, such as: "what fundamental assumptions are we willing to make about human nature and its capacity for change," "what predictions can we make about the political future of the various nation-states that contribute to greenhouse gas emissions," "how stable do we think the capitalist world order is," etc. Perhaps even more interestingly, the outcome of these hermeneutic operations will in turn alter the future inscriptions that we perform upon our planet, since widespread recognition of the severity of anthropogenic gashouse emissions will almost certainly lead to a lower rate of future emissions than we might expect from a populace that remains ignorant. This is yet another proof of the fact that the feedback loop linking us to our planet is as much auto*poetic* as it is *auto*poietic.

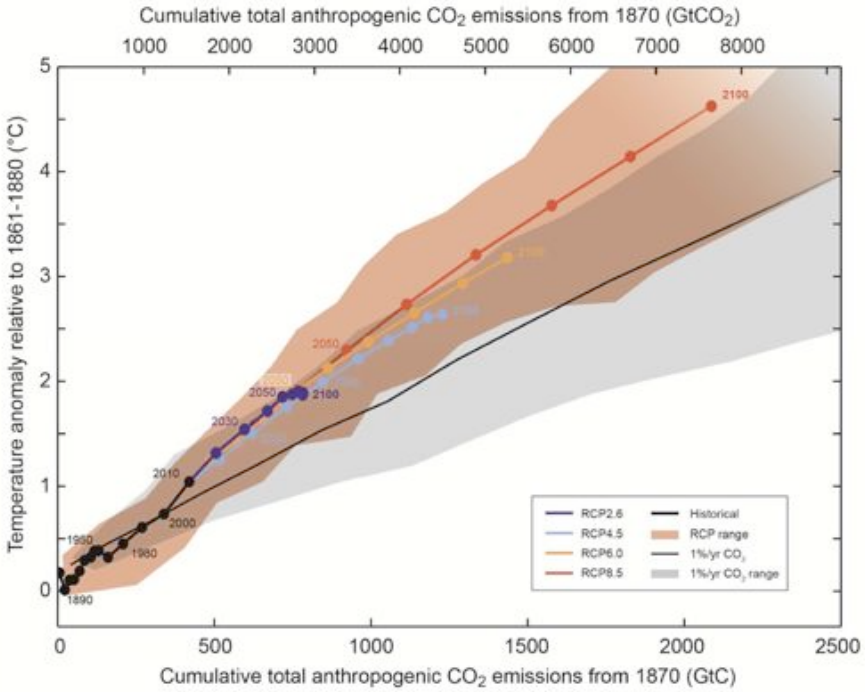

Figure 3 *Projections for Cumulative total anthropogenic CO_2 emissions and corresponding temperature anomalies according to the "Approved Summary for Policy Makers," Twelfth Session of Working Group I for the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment, September 2013. The graph lists four possible RCPs; which of these is considered most plausible is a matter of sociological conjecture, not of natural science.*

[26] Nicholas Dawidoff, "The Civil Heretic," *The New York Times Magazine*, 25 March 25 2009, accessed 18 December 2013, http://www.nytimes.com/2009/03/29/magazine/29Dyson-t.html?pagewanted=all.

Listening to the Anthropocene

As we hurl forward into the Anthropocene, our continued survival will hinge in part on our ability to conceive of new ways of imagining the Earth (and by extension also the human species) in both the statistical and the autopoetic fashion necessitated by modern climate science. Currently, we still have a long ways to go, as I want to illustrate in the final few pages of this essay with a brief discussion of the multimedia installation *The Place Where You Go to Listen* (henceforth simply *The Place*), which the American composer John Luther Adams created at the Museum of the North on the campus of the University of Alaska Fairbanks. *The Place* is an example of what media theorist Douglas Kahn has called an "aelectrosonic" artwork, i.e. one that seeks to transform inaudible and invisible geophysical energies, such as magnetic fields and faint seismic tremors, into an audible (and here also visible) form.[27] Music journalist Alex Ross describes the installation as follows:

> *The Place* occupies a small white-walled room on the museum's second floor. You sit on a bench before five glass panels, which change color according to the time of day and the season. What you notice first is a dense, organlike sonority, which Adams has named the Day Choir. Its notes follow the contour of the natural harmonic series—the rainbow of overtones that emanate from a vibrating string—and have the brightness of music in a major key. In overcast weather, the harmonies are relatively narrow in range; when the sun comes out, they stretch across four octaves. After the sun goes down, a darker, moodier set of chords, the Night Choir, moves to the forefront. The moon is audible as a narrow sliver of noise. Pulsating patterns in the bass, which Adams calls Earth Drums, are activated by small earthquakes and other seismic events around Alaska. And shimmering sounds in the extreme registers—the Aurora Bells—are tied to the fluctuations in the magnetic field that cause the northern lights.[28]

As far as aelectrosonic artworks go, *The Place* isn't particularly original; Kahn documents examples of similar pieces going all the way back to the 1960s. Adams's installation nevertheless stands out for two different reasons. The first is the fact that it is multiply mediated; it translates not just one, but rather several different earth energies (solar rays, magnetic fields, seismic tremors) into a synesthetic environment of unparalleled immersive complexity. Even more interesting, however, is the way in which this installation invokes (through its title, its accompanying texts, its choice of media, and even its institutional location) a recognizably Romantic conception of place.

As Alex Ross informs us, the title *The Place Where You Go to Listen* "refers to Naalagiagvik, a place on the coast of the Arctic Ocean where, according to legend, a spiritually attuned Iñupiaq woman went to hear the voices of birds, whales and unseen things around her."[29] In the catalog that accompanies the installation, Adams similarly reiterates that "[t]he specificity of this work comes from the specificity of the setting in which it is

[27] See Douglas Kahn, *Earth Sound Earth Signal: Energies and Earth Magnitude in the Arts* (Berkeley: University of California Press, 2013), 6.

[28] Alex Ross, "Song of the Earth," *The New Yorker,* 12 May 2008, accessed 18 December 2013, http://www.newyorker.com/reporting/2008/05/12/080512fa_fact_ross.

[29] Ross, "Song of the Earth."

experienced …. [It] is a nexus between the architectural space in which we listen and the larger geographic place with which the work resonates."[30] The fact that the magnetic fields responsible for the Aurora Borealis as well as the energy of the sun—so crucial and yet so variable a mere 120 miles south of the Arctic Circle—were chosen for inclusion in the installation makes clear that the "geographic place" in question is Northern Alaska. Indeed, the University of Alaska Fairbanks commissioned Adams's work specifically to serve as an expression of regional identity.

The environment that Adams's installation tries to invoke is thus neither that of its immediate architectural surrounding, as it is, for instance, in Alvin Lucier's sound-piece *I am Sitting in a Room* (1970), nor is it that of the entire planet, as it is in Terry Riley's composition *Sun Rings* (2002), even though this latter piece also relies on measurements of the earth's magnetosphere (among other geo- and astrophysical energies). It is something in between, namely the tundra and mountains of northern Alaska. Adams himself explains that "[t]he first vision of *The Place Where You Go to Listen* came to me at thirty thousand feet, as I was flying over the peaks of the Alaska Range. From that altitude this new work appeared as vast and clear as the terrain below."[31] A distance of thirty thousand feet is a lot more than artists are usually able to take from their subjects, but it is not exactly Yuri Gagarin's vision of Whole Earth either.

In constructing and describing *The Place*, Adams thus obscures that the various sensors he employs in his artwork—magnetometers placed along the south slope of the Alaska Range, seismic stations at Coldfoot, Kantishna, Purkeypile, College and Paxson, among others—provide testimony not only of a local environment, but of a planet-wide geophysical system. He also fails to recognize that we not only *listen* to these earth energies, we actively rewrite them in an autopoetic process that renders distinctions between the human and the environment, the local and the global largely irrelevant. As our atmosphere heats up due to the continued consumption of fossil fuels extracted in, among other places, Alaska, cloud patterns will change and the harmonies of Adams's "Day Choir" will change with them. The changes in atmosphere will also lead to widespread deglaciation, which will not only uncover new sources of oil and gas but also lead to a decrease in albedo and thus to further increases in temperature and further changes to the Day Choir. At the same time, the rising temperatures will also melt the Arctic permafrost and change—even if ever so slightly—the speed at which Seismic waves propagate through the Alaskan tundra. This, in turn, will change the frequency of the Earth Drums. Other feedback loops can easily be imagined. For instance, the melting glacier will also reveal new sources of shale, an important component for hydraulic fracking, which is already used in roughly 25% of all oil and gas wells in the state. Widespread fracking will not only provide further fossil fuels, but may also cause anthropogenic earthquakes, as seems to have recently happened in Oklahoma and Texas.[32]

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[30] John Luther Adams, *The Place Where You Go to Listen: In Search of an Ecology of Music* (Middletown, CT: Wesleyan University Press, 2009), 7-8.

[31] Adams, *The Place Where You Go to Listen*, xiii.

[32] Kelly Connelly, David Barer, and Yana Skorobogatov, "How Oil and Gas Disposal Wells Can Cause Earthquakes," *StateImpact Texas*, 6 December 2013, accessed 18 December 2013, http://stateimpact.npr.org/texas/tag/earthquake/.

There is a further, and even more vindictive, irony operative in *The Place*, however. Although he could have constructed his aelectrosonic installation just as easily in New York or in Hong Kong, Adams's fealty to the notion of place and to a Romantic ecology are so strong that he insists his audience travel all the way to Fairbanks to experience it. But jet travel—especially jet travel to so remote and fragile a location as the Arctic Circle—is one of the primary sources of Anthropogenic global warming. In an irony well familiar to ecocriticism, to travel to "the Place Where You Go to Listen" thus also means to help destroy it.

This final irony reaffirms the autopoetic nature of our current tradition with exceptional strength; the very act of representing our world in the Anthropocene already means to change it, for the fundamentally modern division of *les mots et les choses*, of things and the words used to describe them, has irrevocably collapsed.[33] The Anthropocene is often characterized as a post-human condition, in which human agency intermingles with, and is more often than not drowned out by, non-human actants, such as unpredictable weather phenomena.[34] But understanding and describing are fundamentally humanist operations whose importance is enhanced, rather than diminished, by our current ecological quandaries. The Blue Marble was merely an icon in which we saw reflected our nascent utopian longings. In the Anthropocene, however, our planet has quite literally become a book in which we write our own destiny. What we desperately need, then, is a hermeneutics and a poetics (a theory of understanding and a theory of expression) that might accompany the scientific study of the changing Earth system. The challenge that our present situation poses to the humanities has never been graver.

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[33] Here I am of course referring to the original French title of Michel Foucault's influential book *The Order of Things* and to its thesis that "modernity" is the name we give to a shift in what Foucault calls the "episteme," i.e. the way semiotic systems ("discourses") are deployed to structure external reality. See Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences* (New York: Random House, 1970), 344-87.

[34] See e.g. Bruno Latour, "Facing Gaia," February 2013, accessed 17 December 2013, http://www.bruno-latour.fr/node/487.

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