

The Philosophy of Geoengineering

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“The time is coming when the struggle for dominion over the earth will be carried on. It will be carried on in the name of fundamental philosophical doctrines.”

Friedrich Nietzsche 1882

Instead of the usual distinction between geoengineering technologies—carbon dioxide removal *versus* solar radiation management—perhaps a more revealing division is between large-scale interventions in the processes that govern the Earth system, where the stakes are high, and localized interventions, where the costs of failure are low. In my comments today I have in mind the former, in particular the ambitious system-altering interventions of sulphate aerosol injections, marine cloud brightening and ocean iron fertilization.

Geoengineering is inseparable from the arrival of the Anthropocene, because a changed climate is the dominant feature of the new epoch. It is an attempt to prevent or slow the transition from the Holocene—that geologically brief 10,000 years of remarkable climatic stability and mildness, which made possible the emergence of human civilization. The question now being posed to us is whether civilisation has advanced so far that it can detach itself from the conditions that made it possible, whether we have outgrown the womb of the Holocene.

I think it will take many years for us to grasp the full meaning of the announcement, made by Paul Crutzen and Eugene Stoermer, that human activity has become a force of nature powerful enough to shift the Earth’s geological arc, and in a direction much less sympathetic to most forms of life. Perhaps the significance of the Anthropocene’s advent is best illustrated by the following emerging story.

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As you know, over the last three million years the Earth's climate has fluctuated around a pattern of long glaciations punctuated by warm periods.² The great glacial succession responds to three principal cycles or orbital forcings—the precession cycle (describing the Earth's wobble around its axis of rotation), the obliquity cycle (describing the Earth's tilt on its axis) and the eccentricity cycle (describing the Earth's annual orbit around the Sun, which varies regularly from more circular to more elliptical).

Using knowledge of these cycles, climatologists can predict that Earth is due for its next ice age in about 50,000 years' time. However, in response to the persistence of carbon dioxide in the atmosphere, human-induced warming of the globe will last so long that climatologists now expect that a century or so of burning fossilized carbon will suppress the next ice age.³ If emissions rise to the higher levels anticipated then the subsequent glaciation, expected in about 130,000 years, will also be suppressed, as may all glaciations for the next half a million years.

Nothing humans have ever done approaches the momentousness of this fact. Our activities have so changed the climatic future that we have over-ruled one and perhaps several ice ages. The Earth will take tens of thousands of years to reach a new equilibrium following the pulse of carbon emissions sent into the atmosphere by humans in the twentieth and twenty-first centuries. Only then might the era of human-induced global warming approach an end.

It is for this reason that the Anthropocene represents not only a new epoch in geological history but a new epoch in human history, comparable only to the arrival of settled agriculture and the industrial revolution. It should be no surprise then that we are hearing the first faint rumblings of a dispute over how to interpret politically and philosophically the meaning of the Anthropocene. These rumblings have emerged in a disagreement in the scientific literature over when the Anthropocene can be said to have begun.

Contrary to the claim that the shift occurred with the industrial revolution, palaeo-climatologist William Ruddiman defends an 'early Anthropocene' hypothesis, according to which the Anthropocene began some 8,000 years ago with the onset of forest clearing and

² Prior to that warm periods dominated and ice ages were relatively short.

³ See David Archer in *The Long Thaw* (Princeton University Press, Princeton, 2009) especially Chapter 12, and Curt Stager, *Deep Future: The Next 10,000 Years of Life on Earth* (Thomas Dunne Books, New York, 2011), especially Chapters 1 & 2.

farming, which led to enhanced levels of methane and carbon dioxide in the atmosphere.⁴ Paul Crutzen and Will Steffen defend the claim that it properly began in the late eighteenth century with evidence showing that human impact on the world as a whole was not discernible 7,000 or 8,000 years ago, and certainly was not large enough to challenge the stability of the Holocene.⁵ Even so, it is indisputable that a step change occurred in the late eighteenth century, the beginning of the industrial revolution, described by economic historian David Landes in his classic book *The Unbound Prometheus* as the event that sparked the modern urge to mastery over nature. Beyond that step, the charts depicting human impacts used by Crutzen and Steffen show a startling leap after World War II. They conclude:

The mid-20th century was a pivotal point of change in the relationship between humans and their life support systems. The period of the Anthropocene since 1950 stands out as the one in which human activities rapidly changed from merely *influencing* the global environment in *some* ways to *dominating* it in *many* ways.⁶

Without the post-war ‘Great Acceleration’, indicators of environmental impact would today be around one third of the levels they have actually reached.

The dispute is not merely academic. One implication of Ruddiman’s ‘early Anthropocene’ hypothesis is that if humans have been a planetary force since civilization emerged then there is nothing fundamentally new about the last couple of centuries of industrialism. In this view, it is in the nature of civilized humans to transform the Earth, and what is in the nature of the species cannot be resisted. By focusing attention on ‘humankind’ in general rather than the forms of social organization that emerged more recently, the Anthropocene becomes in some sense natural. In this view, global warming is not the product of industrial rapaciousness, an unregulated market, human alienation from nature or excessive faith in technology; it is merely the result of humans doing what humans are meant to do, that is, using the powers Prometheus gave us to better our lot. This gives rise to a relaxed view about human impacts

⁴ W. Ruddiman, ‘The anthropogenic greenhouse era began thousands of years ago’, *Climatic Change*, 61, pp. 261–293, 2003; W. Ruddiman, ‘How did humans first alter global climate?’, *Scientific American*, 292, pp. 46–53, 2005

⁵ Paul Crutzen and Will Steffen, ‘How long have we been in the Anthropocene era? An editorial comment’, *Climatic Change*, 61, pp. 251–57, 2003, p. 253

⁶ Crutzen and Steffen, ‘How long have we been in the Anthropocene era?’, p. 253

on the natural world; Ruddiman himself seems quite comfortable with the idea that over the next 200 years all economically accessible fossil fuels may be mined and burned.⁷

If humankind is in this sense inseparable from Nature then there is nothing inherently preferable about the natural state or the Holocene climate. Thus in one reading of the ethics of geoengineering, ‘there is no prima facie justification for attempting to preserve the current climate, if some other climate might be better for humans and animals’.⁸ Depending on the assessment of human wellbeing (and perhaps that of other sentient beings), there may be a ‘better’ temperature or climate as a whole. It is therefore justified for humans to ‘set the global thermostat’ wherever we please.

American ecologist Erle Ellis, an ally of Ruddiman in the debate, defends what he calls the ‘good Anthropocene’. He is confident ‘human systems’ can adapt and indeed prosper in a hotter world because history proves our flexibility. There are no planetary boundaries that limit continued growth in human populations and economic advance. The Anthropocene is barely distinguishable from the Holocene; for him, the only barrier to a golden future is human self-doubt. Ellis writes:

A good ... Anthropocene is within our grasp. Creating the future will mean going beyond fears of transgressing natural limits and nostalgic hopes of returning to some pastoral or pristine era. Most of all, we must not see the Anthropocene as a crisis, but as the beginning of a new geological epoch ripe with human-directed opportunity.⁹

Ellis’s expertise is in early agricultural systems, and he does not recognise any historical break with industrialism’s arrival. He understands change in ‘human social organisation’ only in terms of technological development, new forms of ‘ecosystem engineering’ rather than new forms of property ownership, new modes of organizing production or new relationships to consumption. Even so it is not his expertise that comes into play, but his worldview.

⁷ ‘The rapid warming of the past century is probably destined to persist for at least 200 years, until the economically accessible fossil fuels become scarce. Once that happens, the earth’s climate should begin to cool gradually as the deep ocean slowly absorbs the pulse of excess CO₂ from human activities. Whether global climate will cool enough to produce the long-overdue glaciation or remain warm enough to avoid that fate is impossible to predict.’ Ruddiman, ‘How did humans first alter global climate?’

⁸ Russell Powell, Steve Clarke, Mark Sheehan, Tom Douglas, Bennett Foddy, Julian Savulescu, ‘The Ethics of Geoengineering’ (working draft), Oxford Uehiro Centre for Practical Ethics, 2010, p. 6. See http://www.practicaethics.ox.ac.uk/data/assets/pdf_file/0013/21325/ (accessed 12 May 2011).

⁹ Erle Ellis, ‘The planet of no return’, *Breakthrough Journal*, No. 2, Fall 2011.

For Ellis and those of like mind,¹⁰ humanity's transition to a higher level of planetary significance is 'an amazing opportunity' and he expects that 'we will be proud of the planet we create in the Anthropocene'.¹¹ In his embrace of the 'good Anthropocene', and in a foretaste of a conservative reframing, Ellis is joined by Ronald Bailey from the libertarian *Reason* magazine, who believes we can only become better in our role as Earth's 'guardians'.¹² The early Anthropocene hypothesis is interpreted as exonerating modern humans of blame for environmental decline. The new epoch is read as the fulfillment of humanity's potential.¹³

It is a reading that finds a more sympathetic ear in the United States than in Europe. Even so, this kind of American Promethean dreaming meets stiff resistance in its homeland. The *New York Times* opinion pieces in which Ellis and Bailey expressed their views were met with a barrage of objections—'nothing to be proud of', 'the Anthropocene era may be extremely short-lived', 'we have not much control over what mother nature has in store for us next', 'Ozymandias', and so on.

Perhaps the defenders of the 'good Anthropocene' intuitively understand that if the beginning of the new epoch is located at the end of the eighteenth century, with a step-change in the 1950s, then we must ask what was distinctive about those times. The answer of course is the inception of industrial capitalism and then the turbocharged era of industrial expansion that followed World War 2, a surge only intensified with the era of hyper-consumerism that washed over the rich world in the 1990s and 2000s. If free-market industrialism and 'affluenza' are the source of the problem then perhaps they must be constrained, a suggestion that raises conservative hackles.

“The time is coming ...”

If the defenders of the 'good Anthropocene' are Prometheans, what should we call those who view the Anthropocene with foreboding? If Prometheus is the god of technological mastery,

¹⁰ Including the free-market environmentalists associated with the Breakthrough Institute in the United States.

¹¹ Erle Ellis, 'Neither good nor bad', *New York Times*, 23 May 2011
<http://www.nytimes.com/roomfordebate/2011/05/19/the-age-of-anthropocene-should-we-worry/ neither-good-nor-bad> [accessed 14 March 2012]

¹² Bailey quotes the declaration of 'environmental visionary' Steward Brand, 'We are as gods and might as well get good at it' (an odd stylistic juxtaposition of the oratorical with the semi-literate).

¹³ The effect of the reinterpretation is to cover over the perils of what has been disclosed, not by finding in the danger some hope of a saving power, but in denying that there is a danger at all.

who is the Greek divinity of caution? Perhaps the closest is Soteria, the goddess of safety, preservation and deliverance from harm.¹⁴ I am suggesting that climate engineering is the fulfillment of Nietzsche's prophecy of a struggle for domination over the earth, the last battle in a titanic struggle between Prometheans and Soterians, with the prize nothing less than the survival of civilized society.

While Soterians are naturally cautious and have modest ambitions for human intervention, some have nevertheless concluded that we have little choice but to prepare for the possible deployment of geoengineering, a 'necessary evil' brought on by our overweening Promethean ambitions and penchant for self-delusion. It is an approach that diverges, often sharply, from Promethean advocacy of climate intervention, expressed in its crude form by advocates such as Lowell Wood, Newt Gingrich, Bjorn Lomborg and the authors of the popular book *Superfreakonomics*, whose motto might be borrowed from the shoe manufacturer, 'Just do it'.

Prometheans are inclined to see climate engineering as a way of defending the established order so that expansion can continue uninterrupted. Soterians view it as a regrettable and risky means of protecting those deeper values now threatened by the consequences of endless expansion, that is, viable societies, vulnerable communities, ecological values and life itself. For them, climate engineering is a stop gap measure to be deployed only until we come to our senses.

Beneath these differences, I'd suggest, one's orientation towards geoengineering depends on how one understands the role of humans in the scheme of things. Let me distinguish between three positions according to their understanding of the nature of the 'subject', that is, the essential construction of the human that emerged during the Enlightenment, that of an isolated ego existing inside a body that acts autonomously on an external world of objects. The three positions might be called those of the confident subject, the modest subject and beyond the subject.

The confident subject is rooted in an implicit faith in human capacity for spontaneity and 'world-creation'. Our freedom and the fulfillment of our potential as beings are realized through the continual extension of our control of the environment. So our technological power should be celebrated and those who wield it are the exemplary members of the species.

¹⁴ Although a case could be made for Metis, the goddess of prudence, wisdom and cunning, or Aidos, the goddess of shame, modesty and humility.

Geoengineering, as one element of an even grander conception of ‘Earth system engineering’, is therefore only the next human challenge, one to which we will rise. Nature, in this view, is essentially knowable and subject to control; its ‘otherness’ can be neutralized, swallowed up and rendered unthreatening. The strongest expression of this view can be found in the American idea of ‘manifest destiny’; the drive to spread ‘civilization’ westwards has now been transposed to the Earth as a whole.

The confident subject conception of humankind owes much to the Kantian idea that we appropriate the world with our reason. More than that, we take to it the “legislation for nature” that gives the world its form. Utilitarianism, although rejecting Kantian idealism, made out the human project to be the happiness of the subject. In Europe, the confident subject reached its historical zenith in Victorian Britain. But its self-assurance was severely dented by the savagery of the world wars. As that savagery was committed mostly on European soil its impact there was more enduring, which is why the confident subject is today more likely to reside in the United States.

A variation on the confident subject to emerge from Europe rejects all modern notions of the independent subject but arrives at a similar conclusion. Bruno Latour has long argued that the modernist desire to separate ourselves from the world around us, the essential Cartesian project, was a misguided endeavour.¹⁵ Subjects and objects are always entangled, so humankind can never emancipate itself from Nature, neither physically or metaphysically. So we should not recoil from our entanglement with the natural or chastise ourselves for transgressing some natural boundaries; instead we should embrace our entanglements, including our technological engagements. If Dr Frankenstein used science and technology to create a monster then we should “love our monsters” rather than flee from them. Latour urges us not to turn away from our technological creations but to take full responsibility for them.

The second position, the modest subject, sees human as flawed creatures, prone to hubris and always limited by intellectual shortcomings or moral failures. It is these flaws, whether individual or embodied in our institutions and practices, that have brought us to the ‘tragic’ point of climate engineering. In contrast to the self-belief of the first position, the modest subject always keeps our faults in mind. Its doubts receive confirmation from ecology’s

¹⁵ Initially in Bruno Latour, *We Have Never Been Modern* (Harvard University Press, 1993). Most recently, in ‘Love Your Monsters’, *Breakthrough Journal*, Fall 2011. For a rejoinder see Clive Hamilton, ‘Love Your Scapegoats’, *Breakthrough Journal*, 18 April, 2012.

revelations of unfathomable complexity and the monotonous appearance of unintended consequences. The humility of the modest subject does not grow, as it once did, out of a sense of our cosmic insignificance; instead it springs from the contemporary recognition of our excessive Earthly significance.

With respect to geoengineering, this view finds expression in an ethical concern about ‘playing God’, a metaphor for mortals assuming god-like attributes or daring to occupy a domain that is not properly theirs. The anxiety is that there are certain qualities—those of omniscience, omnipotence and supreme benevolence—that humans cannot and should not aspire to, both because they are beyond us and because aspiring to them invites calamity. For all its advances, Earth system science itself teaches the limits of our understanding. Although in principle the Earth system might be knowable, in practice we suspect that its full complexity and unpredictability will always elude us. System-altering geoengineering schemes aim for a kind of omnipotence—the power to regulate the Earth as a whole—which, although perhaps unavoidable, seems fraught with danger at a time when we have just realized that our historical exertion of power over the world has brought us into a new epoch, the Anthropocene, that is *more* unstable and *less* controllable.

Moreover, given that humans have been prompted to engineer the climate because of a cascade of institutional failings and self-interested behaviours, any suggestions that deployment of a solar shield, for example, would be done in a benevolent way, fulfilling the strongest principles of justice and compassion, would lack credibility, to say the least.

What of the third position? The modest subject looks across at an unpredictable object, but still lives within the idea of the subject as an isolated ego inside a body that acts on the external world. In the third position (which might be traced to Heidegger and can only be sketched here), humans are understood not as Kantian creative agents but as receptive beings who succumb to forces beyond those of science and human will, whose autonomy is circumscribed and whose fate is not solely in their hands. Heidegger revived an ancient Greek understanding when he wrote:

‘Much of what is cannot be brought under the rule of humanity. Only a little becomes known. What is known remains approximate; what is mastered remains unstable.’¹⁶

In short, no matter how determined we are Earth will always resist our attempts to control it.

In this view, technology must be rethought. Rather than being our tool, we are chained to technology. Before it can be an instrument, modern technology presents or reveals the world in a particular way, as a repository of materials and energy for human use. Thus geoengineering can be understood as the fulfillment of the entire technological project, because in geoengineering the Earth as a whole is represented as an object available for human regulation. The thinking that gives rise to geoengineering is the same thinking that first creates the world as an object suitable for technological manipulation. As a result, the only global warming escape routes that occur to us are technological ones, whether they be new forms of low-emission energy, carbon capture and storage or engineering the climate. So this view prompts the rhetorical question: How can we think our way out of a problem when the problem is the way we think?

¹⁶ Martin Heidegger, *Poetry, Language, Thought* (New York: Harper & Row, 1971) p. 53.