

THE ANTHROPOCENE

Representations of change on ‘the human planet’

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Abstract

This chapter elucidates how change is framed by one of the grandest analytical concepts created in the last century. ‘The Anthropocene’ is a geoscience category that seeks to capture the unprecedented scale, scope, and magnitude of the human impact on the Earth’s outer layer of land, ice, sea, and sky (the so-called ‘critical zone’). Fleshed-out by Earth System scientists and stratigraphers since around 2000, the term challenges inherited understandings of the speed, size, drivers, and outcomes of change – indeed, it redefines the very nature and parameters of change by collapsing hitherto separate causes and effects. However, geoscience cannot tell us all we need to know about the cognitive (descriptive and explanatory) or normative dimensions of change on ‘a human planet’. The ‘people disciplines’, like philosophy and business studies, are needed in order to comprehend how the Anthropocene should be understood and responded to. This chapter shows how the Anthropocene concept opens-up a new field for thought and action that will test people’s capacities for tolerance, cooperation, mutual understanding, generosity of spirit, creativity, and cleverness as never before. The field inspires reflection on existential questions as much as on practical solutions to very material problems like food provision, energy supply, and urban design.

It is understandable why ‘the Anthropocene’ has been so successful as a signifier: [it is] popular and scientific, horrifying and promising, potentially radical yet utterly reactionary.

(Swyngedouw and Ernstson 2018, p. 15)

At the turn of the millennium, ‘the Anthropocene’ was a neologism coined by a Nobel Prize winning atmospheric chemist, Paul Crutzen, and a freshwater biologist, Eugene Stoermer. In 2000 the duo hypothesised that the human impact on the Earth’s surface was already so great that it was tipping the planet towards a new geological epoch – something only normally possible because of very large-scale *natural* forces, such as the meteorite whose atmospheric effects eliminated the dinosaurs over 60 million years ago. Two decades on, the Anthropocene is a buzzword that might soon become a keyword – and not only in various geoscience disciplines. Keywords, as cultural critic Raymond Williams (1976) argued, are ones with the power to alter societal discourse and practice. Starting at the margins (or in a metaphorical enclave), they in time assume centrality, though their meanings are contested along the way as various people seek to solidify them in order to suit their economic, political, or other interests. Unlike buzzwords, keywords ‘stick’. No longer a term used only in the geosciences, the Anthropocene is today being widely discussed in the social sciences, humanities, and the arts. It also enjoys a degree of prominence in the news media, giving it exposure to sections of the global public, to business leaders, and to many politicians.

The Anthropocene is one of the most profound ideas about change ever to have been invented. It poses large and deep questions about the causes, rates, and effects of change, as well as normative ones about the ‘who, what and when?’ of appropriate responses to change. It directly links social change with biophysical change, from the micro- to the macro-scale and back again. It thereby brings the geosciences into a direct relationship with the various ‘people disciplines’, such as economics, history, and anthropology. It is a ‘totalising’ concept, such that those who may eventually ‘fix’ its meanings will probably exert considerable influence on the pace, direction, and goals of future social change, as well as on its biophysical conditions of possibility. In the meantime, it is assuredly a contested concept: emerging disagreements over its proper meaning and significance tell a story of rival perspectives on the drivers, impacts, and outcomes of change. At present, and as we shall see,

these disagreements are largely confined to the research community across the disciplines – though their wider dynamics can, to some degree, be foreseen with reference to the career of the ‘sustainable development’ concept over the last 30 years. Since the Brundtland Report popularised that concept in 1987, its radical message about the need for coincident changes to production, consumption, transportation, and waste disposal seem barely to have reduced the human impact on Earth ([World Commission on Environment and Development 1987](#)). It is a keyword whose potential vision of future change has been narrowed over time. Will the same fate befall ‘the Anthropocene’?

The end of the Holocene?

The Holocene is the geological epoch during which humans have multiplied and, in general terms, flourished. It’s an inter-glacial period sandwiched between the millennia of global cooling and extensive ice cover that have punctuated the Earth’s recent history. It’s during this 11,700 year period that extensive social change has occurred, sometimes slowly, sometimes quickly, sometimes through force of circumstance but often by design. In different parts of the world, humans not only adapted to their physical environment but learnt to alter it. For instance, agriculture laid the basis for the first urban settlements in the Middle East, by allowing food surpluses to be distributed geographically and stored ([Wheatley 1971](#)). Over time, this helped more and more people to be less directly dependent on, or influenced by, the biophysical world. Indeed, in the West this process allowed very idea of ‘the social’ as a domain of relationships among people to emerge from the late eighteenth century – along with a set of distinctions designed to impose semantic order on a changing world, such as nature-culture, mind-body, urban-rural, civilised-wild, and primitive-modern.

As Bruno Latour has argued in his classic book *We Have Never Been Modern* (1993), it was during the period of the European Enlightenment that it became possible to believe that ‘society’ was something one could study, manage, and even revolutionise. Society’s biophysical basis was progressively bracketed-off, allowing an intellectual, administrative, and political division of labour to take hold whose persistence is evidenced, for example, in the enduring ‘divide’ in my own discipline, Geography (between its human and physical components). This ‘purification’ of the social became possible, in large part, because many Western countries were very successful at utilising natural resources (e.g., for food and shelter) and mitigating the impacts of natural hazards – effectively insulating themselves from the vagaries of crop failure, epidemics, extreme weather events, and so on.

The concept of the Anthropocene challenges all this. It unsettles our ‘taken-for-granted’ categories and throws grit into our established views of reality. It’s among the grandest notions of change ever proposed. It both denotes changes of unprecedented scale, scope, and magnitude and connotes the need for (some) humans to alter their *modus operandi* in more or less radical ways. We might say that ‘the Anthropocene’ is intended by its scientific creators and subsequent advocates to be a proverbial ‘game changer’: it signifies accelerating and expanding *changes to everything* in order that, in conscious and reasoned ways, humans will act so as to avoid the worst *consequences* of this ‘everything change’. The term’s all-encompassing quality, bridging between the social and the natural, the ‘is’ and the ‘ought’, was clearly evident in one of the first publications to propose the term. The late Paul Crutzen’s now much-cited two page commentary published in *Nature*, entitled ‘Geology of mankind’ (2002), was provocative because it compared humanity to the ‘great forces of nature’ normally thought to be much too powerful to be affected even by a species as clever (or reckless) as *homo sapiens*. Implicitly, it posed the question of which people possessed such power, how they had amassed it and why they had unleashed it. Listing the many impacts of human activity on the Earth’s various spheres (the atmosphere, biosphere, cryosphere, hydrosphere, pedosphere, and lithosphere), Crutzen asserted that anthropogenic climate change – arguably the defining

environmental issue of the last 25 years – was but the tip of the proverbial iceberg. As he put it, in a much-cited (and complex) statement,

Unless there is a global catastrophe – a meteorite impact, a world war or a pandemic – mankind (sic.) will remain a major environmental force for many millennia. A daunting task lies ahead for scientists and engineers to guide society towards environmentally sustainable management during the ... Anthropocene. This will require appropriate human behaviour at all scales, and may well involve internationally accepted, large-scale geo-engineering projects, for instance to ‘optimize’ climate. At this stage, however, we are still largely treading on *terra incognita*.

(2002, p. 24)

In the years since Crutzen and Stoermer first hypothesised that the Holocene was ending because of unintended and unprecedented human impacts, a growing number of geoscientists have sought to add empirical substance and conceptual content to the Anthropocene concept. They comprise two main groups, the second the less interdisciplinary than the first. One group are so-called Earth System scientists, especially those – like Crutzen – who were part of the International Geosphere-Biosphere Program (the IGBP). The Project brought together a wide range of geoscientists who together sought to understand the connections between the various parts of the ‘Earth System’ (e.g., the links between changes to average atmospheric temperature and ocean biogeography, ice cover, and terrestrial biomes). The IGBP has helped create a cadre of scientific synthesists and integrators who take a holistic approach to the Earth. During and since the Project (it ended in 2015), Earth System scientists have amassed considerable evidence of human actions (some more consequential than others) taking the planet away from the Holocene ‘base line’. Much of this evidence has come from improved remote sensing technologies that allow continuous monitoring of the Earth’s surface. They describe everything from altered carbon and nitrogen cycles to changes in land cover to new ocean acidity levels, and can be correlated to social data sets about escalating human numbers and activity. The authors of an early IGBP synthesis of evidence entitled *Global Change and the Earth System* phrased it as follows:

... human-driven changes are pushing the Earth System well outside of its normal operating range ... There is no evidence that the Earth System has previously experienced these types, scales, and rates of change; the Earth System is now in a no analogue situation, best referred to as a new era in the geological history of Earth, the Anthropocene.

(Steffen *et al.* 2004, p. 81)

Subsequently, these and other geoscientists have gone on to publish numerous peer review papers and book chapters that offer a running report on what, for the first time in its 4.5 billion year history, is ‘a human planet’. Several of these researchers have also sought to broadcast their message beyond the academic domain. For instance, in 2012 they organised a ‘Planet Under Pressure’ science conference in the lead-up to the United Nations second Earth Summit (sometimes called Rio+20). More recently, some have attended the annual Davos meeting of world political, economic and thought leaders in order to sound the alarm about our escalating effects on the Earth.

Inspired by the efforts of Earth System scientists, a second group of researchers have also been making concerted efforts to adduce evidence of an unprecedented human impact. They are stratigraphers. Their job is to analyse the deep past by examining the content of rock layers created by surface and sub-surface processes operative over the planet’s very long history. Though not stratigraphers themselves, Crutzen and Stoermer’s choice of the suffix ‘cene’ – one widely used in geological nomenclature (e.g., the Pliocene, the Miocene, etc.) – attracted the interest of several

practitioners from the mid-2000s. Subsequently, and led by Leicester University's Jan Zalasiewicz, an Anthropocene Working Group (AWG) was created to formally assess the evidence for an identifiable 'boundary' between the Holocene and the putative new epoch. With other 30 members, the AWG is a component of the Subcommittee on Quaternary Stratigraphy (SQS), which is a constituent body of the International Commission on Stratigraphy (ICS). The latter utilises exacting evidential standards to identify globally prevalent markers of previous significant changes to the Earth System. It is the guardian of the Geological Time Scale.

The Anthropocene poses an obvious challenge to stratigraphers: there is as yet no 'human rock layer'. This means that the search has been on for *other* indicators that are likely, in time, to leave an indelible imprint on the face of the Earth. Various AWG members have published dozens of papers and chapters since 2007. Recently, the Group has recommended that the Anthropocene be formally recognised as a new epoch, with a 'base' in the mid-twentieth century when radionuclides were spread worldwide because of multiple nuclear detonations. The recommendation is controversial because many stratigraphers maintain that the human imprint on Earth, while undoubtedly significant, simply cannot (yet) be treated as a geological question. For critics, the Anthropocene is at best an *informal* term useful for designating our era, but cannot possibly be an official descriptor recognised by the ICS.

Even so, the AWG's ongoing work (e.g., [Zalasiewicz et al. 2019](#)) has conferred considerable scientific legitimacy on the Anthropocene concept. It has, along with the efforts of Earth System scientists, also led to heightened news media interest in the idea. Additionally, it's inspired some journalists and public intellectuals to author books targeted at the general reader. Examples are Elizabeth Kolbert's *The Sixth Extinction* (2015), Clive Hamilton's *Defiant Earth* (2017), Diana Ackerman's *The Human Age* (2015), and Nathaniel Rich's (2021) *Second Nature*. These authors take the geoscientific claims about the Anthropocene seriously. They seek to identify their practical and existential consequences for present and future generations of people, as well as non-human life.

Though there is considerable evidence to make the Anthropocene hypothesis plausible, its semantic power also derives from the family of concepts used to make sense of the data. In other words, the Anthropocene concept has been 'hitched' to other big ideas that carry a certain authority. As noted earlier, a key concept is the 'Earth System'. Until the early 1970s, few geoscientists studied the interconnections between the hydro-, cryo-, bio-, pedo-, litho-, and atmospheres. But then pioneers like former NASA scientist James Lovelock and biologist Lynn Margulis (1974) suggested that these interconnections functioned to stabilise the Earth's environment unless and until forced towards a new homeostatic state. In so doing, they drew on established ideas in systems analysis drawn from engineering, computation and other fields – ideas such as positive feedback, negative feedback, response time, recovery time, and resilience. However, through the 1970s systems thinking evolved. In particular, notions of complexity, instability, indeterminacy, chaos, and thresholds assumed far greater prominence based on discoveries in pure mathematics, ecology, and other disciplines. While stratigraphers have made little of these ideas – their job is typically to detail the *outcome* of Earth System change rather than the processes producing the outcome – Earth System scientists have used them routinely to frame their projections about an unfolding Anthropocene. They invite non-scientists to see the entire world through particular conceptual lenses – particular because, as cultural anthropologists remind us, they are neither universal to all societies nor neutral in their literal and connotative meanings.

Two examples will suffice to illustrate this 'conceptual mesh' in operation. First, in a 2009 *Nature* paper a science team led by Swedish water resource specialist Johan Rockstrom proposed that there are nine 'planetary boundaries' that define a 'safe operating space' for humanity. The paper identified risk levels for each quantifiable boundary being transgressed, taking humanity into what the team considered an 'unsafe space'. This recalls the 'limits to growth' idea promoted by

some experts in the 1970s which led, among other things, to government policies to control birth rates in some parts of the world. In this case, claims about the Anthropocene are linked to notions of a changing Earth System and framed by the established notion of ‘natural limits’ (figured as ‘planetary boundaries’). Second, a closely related team recently published a paper entitled ‘Trajectories of the Earth System in the Anthropocene’ in the prestigious peer review journal *PNAS* (*Proceedings of the National Academy of Science*; [Steffen et al. 2018](#)). The paper warns of tipping points and irreversible thresholds and argues that ‘a stabilized Earth trajectory requires deliberate management of ... the Earth System’ (p. 8258). Again, claims about the Anthropocene are here framed, and made intelligible to readers, with reference to established concepts of stability and rapid change.

A game-changing concept to describe socio-environmental change?

Joel Oskeen, an American evangelical preacher, once said that ‘You can change your world by changing your words’. There is a more than a grain of truth in this statement, though how applicable it is to ‘the Anthropocene’ only time will tell. As is no doubt already clear, the concept foregrounds the need to wrestle with change in ways few others ever have or can. It is both *about change* and intended, itself, to be *an instrument of change* in ways that are almost mind-bogglingly ambitious. Bearing the imprimatur of science, the concept begs serious consideration among politicians, business leaders and citizens. Let me spell out how and why in eight points. These points encompass not only the drivers, nature and impacts of change but the very idea of what ‘change’ comprises.

- 1 *Promiscuous human impact*: The Anthropocene indicates that the sum total of human activities, be they over the last one to two centuries or (as some geoscientists would have it) since the sixteenth century (or even, according to Bill Ruddiman, the dawn of agriculture), are unintentionally altering the *entire* Earth System.
- 2 *Large scale social-natural coupling*: The Anthropocene concept thereby indicates that present day social change – that is, changes to economic, cultural, or political practices – must necessarily be conceived in relation to the biophysical changes they may set in motion. Thus *social change is biophysical change, and vice versa*; in most parts of the world, biophysical change can no longer be treated as the **fixed** stage upon which social change is played out.
- 3 *Geographically multi-scalar, bi-directional socio-environmental change*: It thus further indicates that this ‘coupling’ of social and biophysical change can have *global* impacts, even when it is occurring at local or regional scales. This is because ‘scalar effects’ cannot be readily contained any more, as the emission of greenhouse gases from point sources like power stations has long demonstrated. The spatial boundaries to large scale change are today seemingly unlimited. The metaphorical stage is bigger than ever, and is itself an actor in the drama.
- 4 *Temporally extended human impacts*: Aside from highlighting the spatially extended effects of local or regional scale changes, the Anthropocene concept also foregrounds temporal teleconnections. Human activities in the recent past and the present are shown to now have very long term biophysical impacts, ones that will unfold even if humans were to cease all activity tomorrow. This means that *more aspects of the future are significantly affected by the contemporary actions (and inactions) of people*. The distinctions between the present, the short term, the medium term, and the far future are dissolving.

These four major characteristics of the world, as depicted through the Anthropocene concept, have several major implications for thought and action in response to them as follows:

- 5 *The differential between human power and Earthly power:* The Anthropocene concept describes a disjuncture between humanity's power to *alter* the Earth system and power *over* that system. 'Power to' means the ability, intended or otherwise, to influence something. 'Power over' goes further, and means the ability to *control* the thing being influenced. Earth System scientists have made much of the disjuncture in a number of publications. For example, the metaphor of 'sleeping giants' has been used frequently to characterise large scale future changes to the planet that humans may inadvertently cause and will not be able to reverse. An example is the huge amount of methane currently locked-up in permafrost. If most of the permafrost thaws due to anthropogenic climate change, it will add significant warming potential to the atmosphere because methane absorbs considerable amounts of solar radiation. Likewise, more acidic ocean water cannot be 'reverse engineered' by humans reducing greenhouse gas emissions on a time scale of less than *thousands* of years.
- 6 *Acting in conditions of deep uncertainty, indeterminacy and unknowability:* Next, the Anthropocene concept – particularly in the hands of Earth System scientists – emphasises the potential *unknowability of serious risks to the well-being of many people and other living species*. This potential ignorance about the future is a function of two things. One is the current limits to data, computational models and conceptual vocabulary: they are not adequate in an epistemic sense to the hyper-complex realities of the future. Another is the possible *indeterminacy* of the future. That is, the dynamics of a system as intricate as the Earth System could involve unpredictable behaviour – for instance, incremental forcings of the system, coming after decades of prior forcings, may produce a cascade of biophysical effects over a few decades that involve so many 'tipping points' and feedbacks they cannot be anticipated with any precision. Together, these two things mean that even the most gifted experts cannot foresee the likelihood of extremely high magnitude, large scale biophysical alterations to the Earth System, nor the precise pattern of extreme localised events caused by them, such as more intense hurricanes.
- 7 *The need to address the most profound normative questions:* Though it is a cognitive concept – it seeks to describe and explain key aspects of the past, present and future – the Anthropocene clearly has major normative implications. It's a truism among philosophers that a statement of fact (the 'is') does not logically mandate one or other response (the 'ought'). Even so, the claim that the Holocene has ended raises far-reaching normative questions (larger even than those pertaining to existing normatively-charged issues like human rights). For instance, should humans take immediate, large-scale preventative action to avoid imposing on future generations a significantly less hospitable biophysical environment? If so, which humans should be empowered or held responsible – those in the 'developed' world or also those in the emerging economies like China? Can and should future generations now be represented, by proxy, in our present day politics? Who gets to determine which ensemble of means (such as stratospheric aerosol injection) are to be used to avoid an 'environmental catastrophe'? What (and whose) definitions of powerful normative concepts will guide efforts to affect the rate, scale and impacts of Earth System change – concepts like liability, justice, care, and equality? Are humanity's current institutions and norms – such as national governments, the World Trade Organisation and private property – adequate to the challenges of the future? The list of questions goes on.
- 8 *Connecting and balancing emotional response with reasoned action:* Finally, though a scientific concept, not only does the Anthropocene have normative (value-based) implications but it also carries a strong *emotional* charge. Interpreted in one way, the biophysical changes it describes generate feelings of fear, ones that could lead either to urgent preventative actions or else terror and inaction in the face of overwhelming forces.

Interpreted another way, the changes it describes can incite feelings of optimism and excitement about how humans will overcome the challenges rapidly coming at them. But another possibility is denial: the changes captured by the Anthropocene concept are so far beyond the range of normality that some people may hunker down and pretend nothing much is really wrong with the way many humans presently utilise the planet.

Taking stock, these eight aspects of the Anthropocene idea capture its multidimensional qualities as, perhaps, the ultimate concept of change. Clearly, it's intended to motivate deep reflection on the very *parameters* of change rather than simply important details about its pace, un/evenness or impacts. It 'speaks about' change as well as 'speaking for' change and while, largely cognitive in character, it has important normative and affective implications as we have seen.

Though it represents the 'real world' out there, in an important sense the world cannot be registered without the concept. As Mike Hulme observes of climate change, in his book *Why we disagree about climate change*, 'Climate cannot be experienced through our senses ...' (2009, p. 3), which means that 'The *idea* of climate change exists as much in the human mind ... as it exists as an independent ... physical category' (*ibid.* p. 28, emphasis added). The same can be said of the Anthropocene concept. It's a linguistic device designed to make visible phenomena that cannot otherwise be perceived by any one person or community 'on the ground'. The reason is obvious: not only is the present day Earth System too large for people to apprehend, the global future by definition eludes the understanding of ordinary people, business leaders or politicians. Scientific experts thus enjoy (or alternatively are burdened with) a major responsibility. In filling the Anthropocene concept with empirical and semantic content they get to do what few if any other people alive get to do. The planet and its future cannot speak for themselves: they must be spoken for, and the likes of Crutzen, Zalasiewicz, and Rockstrom are doing the talking ([Castree 2014](#)).

Whose time to change, how, and to what ends?

While its scientific origins may confer it with a certain authority, they are a necessary but insufficient condition for 'the Anthropocene' to graduate from a buzzword to a keyword of our times. This insufficiency arises for two reasons. First, the precise drivers of global environmental change not only remain debated but do not fall into the topical domain of the geosciences. For instance, while land use changes like deforestation are clearly a proximate cause of climate change, the mix of fundamental economic, political, social, and cultural causes are the focus of social science and humanities disciplines. As the scientific analysis of the Anthropocene has gained momentum since 2000, more and more analysts from the 'people disciplines' have debated the nature and relative contribution of these root causes. They have also sought to better understand the 'levers of change' required to achieve either strong reform of human affairs, or else revolutionary transformation. These researchers do not agree about the levers or about the means and ends of either reform or transformation. Nor are they ever likely to. This is because the social sciences and humanities do not adhere to a dominant analytical approach; instead, heterodoxy prevails, though less so in some disciplines (e.g., economics) than others. Heterodoxy reflects the success of academic freedom in universities, especially in Western countries: researchers have been creative and critical when engaging each other's work, producing different paradigms and angles of vision on reality.

This brings us to the second reason the Anthropocene science is by itself insufficient to produce a thought- and action-shift in the wider world. Somebody needs to speak credibly about the *implications* of the science for ethics and human action. Again, this is the domain of social science and the humanities, and even the arts. Analysts in human geography, philosophy, sociology, and elsewhere have begun to attend to the normative questions itemised above. The geoscientists who have so far invested the Anthropocene concept with meaning cannot address these questions. This is because the is-ought dualism is vital to sustaining the public image and legitimacy of all branches of

science. This dualism, famously identified by philosopher David Hulme (1711–1776), captures the idea that statements of fact do not mandate specific actions in response to them. Science is supposed to pose questions answerable using logic and evidence, rather than value questions whose answers admit of no definitive response because they are ‘perspectival’ and ‘political’ (thus generating debate and even conflict among interlocutors). These value questions are not *separate* from science – for instance, geoengineering the Earth System has serious moral dimensions that may prevent it happening, but achieving moral clarity about them counts for little without the technical know-how to act within whatever moral parameters are established to govern action. But, equally, the know-how alone is insufficient to address technology’s unavoidable moral precepts and implications.

The turn towards exploring what geoscientists call the ‘human dimensions’ of the Anthropocene is vital to determining the eventual impact of the Anthropocene as the grandest of change concepts. But that exploration, in the first instance at least, will not converge on a ‘best account’ of these dimensions that will command widespread assent. The Anthropocene has rapidly become a descriptive, explanatory, normative, and affective flashpoint. Assuming the geoscientists are broadly correct, a range of (mostly university-based) analysts have presented very different versions of its human dimensions. This is not because they are confused. Instead, it reflects legitimate disagreement over how to characterise the realities of the world. There is not the space **here** to detail the various approaches to ‘human dimensions’ here – see [Bonneuil and Fressoz \(2016\)](#), among others, for an in-depth treatment. Let me simply illustrate the range of ways that the human causes, consequences, and implications for thought and action have been framed cognitively, normatively, and affectively (see also [Dalby 2016](#)).

First, in keeping with the geoscience focus on analysing and managing the Earth System, some social scientists advocate treating ‘society’ as itself a system that, today, is endogenous to global nature (what Peter [Haff \[2014\]](#) called the ‘anthroposphere’). A recent article by Belinda [Reyers et al. \(2018\)](#) is an example: it treats the world as a synthetic, dynamic, super complex whole amenable to understanding, albeit caveated by point 6 above about indeterminacy. It presumes a single reality ‘out there’ many of whose truths can be accessed by joined-up research across the disciplines.

Second, other commentators also presume a single reality exists, but argue that many people are unable to perceive its true nature and need educating. Chief among them is Australian philosopher Clive [Hamilton \(2017\)](#). In his book *Defiant Earth* and many other publications, he decries the ‘banality of our ethics’. That is, in his view Earth System change will be so profound it requires ways of thinking and feeling that challenge almost all of our accepted definitions of justice, responsibility, care, harm, and so on. For Hamilton when some people talk about a possible ‘good Anthropocene’ – as geographer Erle [Ellis \(2011\)](#) has optimistically done – they are engaging in dangerously wishful thinking. This is echoed by ecocentric philosopher Eileen [Crist \(2013\)](#), who worries that too much Anthropocene discourse is anthropocentric – it is unable to apprehend the Earth as a living entity urgently in need of love, care, and concern; it is too fixated on achieving **and** impossible ‘power over’ (see point 5 above).

Third, attuned – like Hamilton – to the different ways the ‘reality’ of the Anthropocene can be perceived, Marxists like Jason [Moore \(2016\)](#) argue that the capitalist economic system has been the principal driver of Earth System change, starting in Europe 300 years ago and now operating globally. We need to name and shame this system and its chief operators – to politicise it, in other words ([Swyngedouw and Ernstson 2018](#)). In Moore’s view, only through working class mass action, in tandem with coordinated civil society protest groups, can capitalism be reformed or dismantled – this in the face of the formidable power of capitalist firms and of governments committed to the survival of capitalism, **]** despite its destructive tendencies.

Fourth, without disputing the profound impact humans are having on the Earth, some have questioned the way geoscience presents the reality of the Anthropocene. One critique has been of its ‘neo-colonial’ character, however unwitting (see, for instance, [Fagan 2019](#)). That is, when geoscientists make their grand claims about the all-encompassing human impact on the Earth it risks overlooking the ongoing local and regional decimation of non-Western ways of life (e.g., in Canada, Brazil, and Australia). These ways of life risk being further subordinated to the ‘new imperative’ to act globally and with the future in mind so as to protect all of ‘humanity’ from serious harm. Yet, if we listen, these ways of life may tell us profound things about how to live better on the Earth and overturn the ‘banal ethics’ animating too much current thinking about the global environmental crisis.

The fourth response to the Anthropocene concept raises important questions about the ‘extra-scientific’ content and uses of scientific ideas. These ideas can perform political work precisely when they appear to be value free and neutral. It is thus important to acknowledge the inevitable entanglement of scientific knowledge in a range of non-scientific agendas, interests, power relationships, and cultural beliefs that relativise our assessment of whether science is a force for ‘good’ or for ‘ill’.

Swedish geographer Wim [Carton \(2019\)](#) provides an example of this linked to the Anthropocene concept. He focuses on the idea of ‘negative emissions technologies’ (NETS), which has grown in importance among experts who design and run ‘integrated assessment models’ of the planet’s future. Though most of these technologies have not been tested at scale, *the idea that they might be* affects the present by offering an authoritative vision of the global future via models. NETs propose to ‘suck’ greenhouse gases out of the atmosphere and are envisaged by some as a way of ‘recovering the GHG deficit’ later this century after a period ‘over-shoot’. Carton, in an analysis of recent strategy documents published by the leading oil company Shell, shows how the idea of NETS is used to justify a delay in moving away from fossil fuel use in the near future. It allows the scientific possibility of future NETS to justify not radically mitigating greenhouse gas emissions today. Carton’s paper reveals the power of words to shape action – and inaction – depending on who gets to use (or challenge) their scientific credibility.

Conclusion

The Anthropocene concept poses far-reaching questions about the drivers, pace, direction, and outcome of social change, hitching them to grand questions about biophysical change. Originating in science, some may be tempted to believe that in time the ‘correct’ meaning of the term, and its wider implications, can be established through further research and debate. However, as this chapter has suggested, it is arguably more fruitful to regard the Anthropocene as a concept that is ‘good to think with’. It’s a fecund focal point for discussions about what exactly needs to change in the twenty-first century, about who can or should be agents of change, and about what the goals of change ought to be. Far from being symptomatic of muddled thinking about the realities of present and future change, these discussions reflect valid disagreements about the nature of a world to come. In democracies, at least, such disagreements are supposed to be the life-blood of politics, leading to publicly legitimate actions taken by those in power. But, as Carton’s research illustrates, the economic and other stakes of avoiding a ‘bad Anthropocene’ are so high it’s almost inevitable that powerful interest groups will seek to stifle debate, especially about radical alternatives and solutions. Ironically, these groups’ commitment to business-as-usual may then all but guarantee a dystopian future that could produce just the sort of revolutionary change they very much wish to avoid (or else anarchic and violent change). But we must recognise too that even an orderly process of revolutionary change may impose enormous costs of its own: creating something genuinely new necessitates unravelling elements of the socio-ecological fabric that has helpfully blanketed many of us from serious harm so far in our lives.

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