

The Anthro-scene: a guide for the perplexed

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Abstract

The scientific proposal that the Earth has entered a new epoch as a result of human activities – the Anthropocene – has catalysed a flurry of intellectual activity. This paper introduces and reviews the rich, inchoate and multi-disciplinary diversity of this Anthro-scene. It identifies five ways in which the concept of the Anthropocene has been mobilised, as: scientific question, intellectual zeitgeist, ideological provocation, new ontologies and science fiction. This typology offers an analytical framework for parsing this diversity, for understanding the interactions between different ways of thinking in the Anthro-scene, and thus for comprehending elements of its particular and peculiar sociabilities. The paper deploys this framework to situate Earth Systems Science within the Anthro-scene, exploring both the status afforded Science in discussions of this new epoch, and the various ways in which the other means of engaging with the concept come to shape the conduct, content and politics of this scientific enquiry. In conclusion the paper reflects on the potential of the Anthropocene for new modes of academic praxis.

Keywords Anthropocene, science studies, Earth System Science, ontology, science fiction

Welcome to the Anthro-scene

The scientific proposal that the Earth has entered a new epoch as a result of human activity – the Anthropocene – has emerged as a hot topic of discussion across the full gamut of academic disciplines, proliferating promiscuously beyond the confines of Earth System Science to which we owe its genesis (see Crutzen and Stoermer, 2000). The Anthropocene proposal has catalysed a wider intellectual event: a flurry of activity with far-reaching ontological, epistemic, political and aesthetic consequences. Various commentators have termed this event-space the *Anthro-scene*.¹

In this commentary I offer a guide to this intellectual domain. I identify five ways in which the concept of the Anthropocene has been mobilised in the Anthro-scene, as: *scientific question, intellectual zeitgeist, ideological provocation, new ontologies and science fiction*. This typology emerges from a modest involvement with this scene (see Lorimer, 2015), and an extensive reading of the burgeoning Anthro-scene literature that encompasses a range of academic, artistic and popular media. My parsing of this profusion is not exhaustive. Nor are the five ways I identify discrete. As I shall show, individuals move between them and the demands of each can be understood to shape the composition of others. It is useful to understand the concept of Anthropocene as a ‘boundary object’ (Star, 2010), or ‘charismatic mega-category’ (Reddy, 2014), that enables new conversations and collaborations across significant forms of epistemic difference (cf Lorimer (2007) on flagship species). In Katie King’s (2014) terms, the plasticity of the Anthropocene enables generative discourse across the ‘transcontextual tangles’ of contemporary political ecologies.²

There are three aims that motivate this guide. The first is to introduce and review the rich and multidisciplinary diversity of academic work emerging in the Anthro-scene. The second is to offer an analytical framework for parsing this diversity, for understanding the interactions between different ways of thinking in the Anthro-scene, and thus for comprehending elements of its particular and peculiar sociabilities. The third aim is to situate Earth System Science within the Anthro-scene, exploring both the status afforded Science in discussions of this new epoch, and the various ways in which the other means of engaging with the concept come to shape the conduct, content and politics of this scientific enquiry.

In delivering on this final aim, and in conclusion, I engage with current discussions of the Anthropocene as an opportunity for new interdisciplinary research agendas and forms of academic praxis. This debate concerns the epistemic, political and ontological problems associated with prevalent Northern, natural science-led, and ‘solutions focused’, approaches to understanding and living within the Anthropocene (for exemplary critical statements see Palsson et al., 2013; Castree, 2014b; Lovbrand et al., 2015; Todd, 2016). This article seeks to demonstrate the potential of science studies for mapping, critiquing and engaging the diverse intellectual energies that animate the Anthro-scene.

The subtitle to this review – *A guide for the perplexed* – will be familiar to historians of 1970s environmentalism. In his book with this title (and in other works), the heterodox economist Ernst Schumacher (1973; 1977) reflected on what he considered to be the deficient nature and organisation of Western knowledge and its relationship with an earlier juncture in the modern environmental crisis. Schumacher (1977) challenged the ‘materialistic scientism’ and ecological irrationalities he associated with the ‘modern experiment’ and the proposed ‘technological fixes’ of his day. While his alternatives were individualistic, spiritual and seemed to disregard politics, he makes a compelling case for epistemic pluralism, interdisciplinarity, aesthetics and forms of environmental thought all the more timely at the contemporary juncture. Engaging with the spirit, if not the letter, of Schumacher’s guide, this article aims to specify and clarify some of the ‘perplexing’ characteristics of the Anthro-scene.

Scientific question

The first and original mobilisation of the concept of the Anthropocene is (in some ways) quite specific. It describes the **scientific question** currently being considered by the Anthropocene Working Group (AWG) (Steffen et al., 2011a). This group has been tasked with formalising Crutzen and Stoermer’s concept, by developing a proposal for the formal ratification of the Anthropocene as an official subunit within the International Chronostratigraphic Chart (i.e. the official geologic time scale) according to globally standardised principles of stratigraphy. This proposal is due to be presented for consideration by the relevant sub-commissions of the International Commission on Stratigraphy (ICS) later in 2016.³ The AWG is convened by the geologist Jan Zalasiewicz. Its 38 members are primarily natural scientists, but also

include journalists and social scientists (Subcommission on Quaternary Stratigraphy, 2015). The AWG is drawn largely from the multidisciplinary field of Earth System Science (ESS).

The scientific question of the Anthropocene emerged within, and has become inseparable from, the intellectual community of ESS. The history and epistemic practices of ESS are of growing interest in the STS literatures (e.g. Hamilton and Grinevald, 2015; Castree, 2014a; Uhrqvist and Lövbrand, 2013; Uhrqvist, 2015; Lovbrand et al., 2009; Uhrqvist and Linnér, 2015). Clive Hamilton and Jacques Grinevald (2015) explain that ESS grew out of, but ultimately departs radically from, diverse and long-standing scientific concerns with human impacts on the environment. The foundations for ESS were laid in the 1950s and 1960s with the rise of systems ecology, state support for ‘big science’, and the impact of technological innovations including remote sensing and computerised models of human-environmental interactions. ESS came to the fore in the 1980s through the work of James Lovelock and Lynn Margulis (1974) on the ‘Gaia hypothesis’, and was institutionalised through the activities of the International Geosphere-Biosphere Programme (1987-2015). This was initiated by the US geophysical and space research establishment and was designed ‘to coordinate international research on global-scale and regional-scale interactions between Earth’s biological, chemical and physical processes and their interactions with human systems’ (IGBP, 2015).

In ESS, the Earth is understood as single system, comprising a series of ‘coupled’ ‘spheres’ characterised by boundaries, tipping points, feedback loops and other forms of nonlinear dynamics. ESS offers technologically and epistemologically innovative ‘macro-scopes’ for visualising, explaining and managing this Earth system (e.g. (Imura, 2013)). Several commentators (most prominently Clive Hamilton (e.g. 2016)) have argued that properly addressing the planetary ‘rupture’ of the Anthropocene through the optic of ESS requires a genuine ‘paradigm shift’ in environmental science. They argue that the scientific question of a new epoch can not be answered through a ‘uniformitarian’ approach to appraising the magnitude of human impacts upon landscapes or ecosystems. Instead, as I explore in the new ontologies section below, Hamilton (2016) argues for a ‘gestalt shift’ towards planetary scale enquiry,

necessitating a 'second Copernican revolution' in how the world is understood (Schellnhuber, 1999).

Since its foundation in 2008, the AWG has been considering a range of evidence from across the different spheres of ESS, to identify potential signatures that might qualify as the official start date for the Anthropocene (Waters et al., 2014a; Zalasiewicz et al., 2011). On its website the AWG explain that:

The beginning of the 'Anthropocene' is most generally considered to be at *c.* 1800 CE, around the beginning of the Industrial Revolution in Europe (Crutzen's original suggestion); other potential candidates for time boundaries have been suggested, at both earlier dates (within or even before the Holocene) or later (e.g. at the start of the nuclear age). A formal 'Anthropocene' might be defined either with reference to a particular point within a stratal section, that is, a Global Stratigraphic Section and Point (GSSP), colloquially known as a 'golden spike; or, by a designated time boundary (a Global Standard Stratigraphic Age (GSSA) (Subcommission on Quaternary Stratigraphy, 2015 no page).

In mid-2016 the AWG appear to be erring towards a positive recommendation for a start date reflecting the post-WW2 'Great Acceleration' (Steffen et al., 2015) in human resource use and concomitant impacts. In a recent paper, 26 of the AWG members expressed a preference for a GSSA at '05:29:21 Mountain War Time (± 2 s) July 16th 1945' – the date of the world's first nuclear bomb explosion at Alamogordo, New Mexico (Zalasiewicz et al., 2015).

However, there has been heated scientific debate about whether sufficient evidence exists to mark an epoch (or even the lesser geological unit of an 'age') and whether it is wise to decide so quickly, given the great changes that are predicted to lie ahead (e.g. Wolff, 2014; Gibbard and Walker, 2014). Those who support the possibility of revising the geological record disagree as to when the epochal moment might have occurred. Upwards of twenty possible start dates have been proposed (Waters et al., 2014a), with some members of the AWG (and the wider scientific community) advocating prehistorical beginnings. Such proposals include Ruddiman's (2003)

‘early Anthropocene hypothesis’, that dates the advent of the Anthropocene to the rise of agriculture and associated increases in greenhouse gas emissions in 8000 BP. An even earlier proposal takes the Anthropocene back to pre-Holocene impacts of human hunting (Barnosky et al., 2014; Doughty et al., 2010).

These debates presage the differences of opinion that may greet the AWG presentation to the ICS. In anticipation of this event, there is a growing concern that the knowledge practices (and valued objectivity) for periodization in geology are being stretched – perhaps beyond their utility – to answer what is a fundamentally novel, political and speculative question (Finney, 2014; Lewis and Maslin, 2015b; Gale and Hoare, 2012). Some geoscientists worry about the possibility and desirability of strictly deploying stratigraphic criteria in this case (Autin and Holbrook, 2012). Anticipatory proposals (including some by members of the AWG) are already being made to find ways of modifying prevalent epistemic and naming practices. For example, in a recent intervention, Ruddiman et al suggest that:

One way forward would be to use the term (Anthropocene) informally (with a small “a”). This approach would allow for modifiers appropriate to the specific interval under discussion, such as early agricultural or industrial. In this way, we could avoid the confinement imposed by a single formal designation, yet acknowledge the long and rich history of humanity's environmental transformations of this planet, both for better and for worse (Ruddiman et al., 2015: 39)

Lewis and Maslin contest this proposal and accuse the authors of ‘obscurantism’ (2015b: 130): the deliberate generation of confusion.

Edgeworth et al (2015) challenge the stratigraphic orthodoxy of the ‘golden spike’ summarised by the AWG statement above. Somewhat confusingly, the authors of this paper include three AWG members, who are also authors of the nuclear golden spike paper discussed above (Zalasiewicz et al., 2015)⁴. With feet in two camps, they suggest that it is futile to seek to ‘impose a precise and globally synchronous date onto processes that stratigraphic evidence indicates were – and still are – manifestly diachronous in onset and development’ (19). They draw attention to the time it will

take for contemporary ‘technofossils’ to materialize as coherent strata, and the ambiguous status of the far-future (>1 million years) retrospective scientist required to read them. Instead they propose a means of defining the APC that would ‘include cumulative events and processes on local and regional scales as well as the measurable global effects of human impact’ (21). The result would be a typology of what they term ‘anthrozones’ and a diachronous means of marking the advent of the APC that departs from current global standards (see also Rull, 2013).

These are heady, disorientating times for geoscientists, their disciplines and their institutions. An eclectic working group (AWG) has found itself thrust into the scientific, political and popular limelight. In responding to the AWG proposal, the ISC will be asked to pronounce with unaccustomed speed⁵ and with unfamiliar public attention on a new epoch whose evidentiary base is alien to the epistemic conventions of stratigraphy. This is not ‘normal’ (Kuhn, 1962) science. To make sense of the scientific question of the Anthropocene, we therefore need to place it within the wider context of the Anthro-scene.

Intellectual zeitgeist

The popular attention afforded the scientific question of the Anthropocene results from the spectacular reception of the term outside of the discussions of the AWG. Here the Anthropocene seems to have captured an **intellectual zeitgeist**, providing a plastic and catchy label for a common curiosity and anxiety about the state and future of Earth after the ‘end of Nature’ – i.e. the end of the idea of Nature as pure place untouched by human hands that has been so central to modern environmentalism (Lorimer, 2015). Such an end has been foretold for at least two decades in range of popular academic work (McKibben, 1990; Latour, 1993; Haraway, 1991; Merchant, 1989). The meteoric rise of the Anthropocene represents this critique going mainstream – perhaps best evidenced in the prestigious prizes awarded recent works of popular science on this theme (Kolbert, 2014; Ackerman, 2014; Vince, 2014)⁶.

Here the Anthropocene has become an umbrella term for environmental issues. It would seem to have more traction than other buzzwords – like biodiversity, climate change or sustainability – and builds upon and subsumes their more specific concerns. The planetary scale and elasticity of geologic time implied by the term seemingly

permits a more heterogeneous and speculative popular engagement. As we shall see, the Anthropocene conjoins deep time with dramatic futures. It perhaps rekindles childhood enthusiasms for fossils, dinosaurs and science fiction that are not evoked by the rather dry logics of sustainability or biodiversity. As a descriptor of an intellectual zeitgeist, the Anthropocene has catalysed the Anthro-scene. It is proving extremely generative of conversation and creativity.

The rise to prominence of the Anthropocene in the natural sciences is associated with the growing centrality of Earth System Science to existing and emerging platforms and programmes for global environmental research and governance (Uhrqvist and Lövbrand, 2013), including the *Future Earth* initiative which has merged as the successor to the IBGP (more below). The Anthropocene has featured on the front covers of top science journals (e.g. *Nature*, *Global Change*) and popular periodicals (e.g. *Scientific American*, *The Economist*). It is the subject of several new journals (e.g. *The Anthropocene Review*) and has begun to populate the titles of major disciplinary conferences (Swanson et al., 2015). The term is commonplace amongst the editorials and blogs of respected newspapers. Andrew Revkin, an important populariser of the concept at *The New York Times*⁷, sits on the AWG.

Outside of ESS and its popular outlets, the Anthropocene has emerged as a leitmotif in the new, interdisciplinary field of the environmental humanities (Castree, 2014b). The publishing world is awash with books with the title 'X in the APC'. In the last few years, works have been published with titles spanning Love, Art, Architecture, Animals, Wildlife, Freedom, Learning to Die (and myriad other activities) ... in the Anthropocene. Perhaps the largest and most prominent manifestation of this intellectual zeitgeist in the environmental humanities was *The Anthropocene Project* at the *Haus to Kulturen der Welt* (HKW) in Berlin (for commentaries see Robin et al., 2014; Swanson et al., 2015). This involved a series of events in 2013-14, which gathered and forged an Anthropocene-literati of scientists, philosophers and artists, alongside a diverse set of publics and students. The stated aim was to 'facilitate an exploration of this hypothesis' manifold implications for research, science, and art' (HKW, 2013 no page) through a series of high-profile public events, online activities and subsequent publications (Klingan et al., 2015). Follow up initiatives have been pedagogic and centre on the development of an 'Anthropocene Curriculum and

Campus' (HKW, 2014). The HKW even hosted the first meeting of the AWG, and the institution has become a key site through which the group and its chair promote their work.

The Anthropocene is also emerging as a particularly fecund thematic in the arts (especially in the fields of BioArt, SciArt and EcoArt). The Anthropocene has catalysed and helped narrate a range of recent exhibitions and interventions. In addition to the HKW project (and a follow up event at the Deutsche Museum in Munich⁸), examples include: *Yes, Naturally: How Art Saves the World* at *The Gemeentemuseum* in The Hague in 2013; *Expo 1: New York* at *MoMA PS1* in New York in 2013; and *The Anthropocene Monument*, a 2015 exhibition curated by Bruno Latour and Bronislaw Szerszynski at *Les Abattoirs* in Toulouse (for commentaries on these broader developments and specific exhibitions see Davis and Turpin, 2015; Ellsworth et al., 2012; Heartney, 2014). Angela Last notes the emergence of a 'geological aesthetic' or 'geopoetics' manifest, she argues, in 'the archiving of modern and imagined future fossils, ... urban excavations and other 'forensics', ... a resurgence of interest in 'pet rocks', ... and bird's-eye photographs of landscapes altered by human activity' (2015, 2).⁹ These experiments span diverse media, including sculpture, performance art, video games and online platforms – including those enabling participatory forms of art-science (e.g. Balkin, 2015). Ranging even further from establishment venues, this Anthro-scene artistic turn finds expression in the creative practices, and academic valuation, of indigenous art past and present (see for example Todd, 2015; Yusoff et al., 2012; Yusoff, 2015b; Povinelli, 2015).

If the APC is understood as an intellectual zeitgeist emergent from a widespread recognition of the 'end of Nature', then select, but important, parts of the world are firmly within this new epoch. Regardless of what the International Commission on Stratigraphy decides, the genie is out of the bottle. There is little chance that the term will be reclaimed or dismissed. It might be a fad, but it will leave its semantic and sensory traces in popular practices and lexicons. In a somewhat grandiose claim, (Palsson et al., 2013) herald this burgeoning post-natural zeitgeist as evidence of a 'new human condition' (after Arendt). They suggest that:

Surely the most striking feature of the Anthropocene is that it is the first

geological epoch in which a defining geological force is actively conscious of its geological role. The Anthropocene therefore really commences when humans become aware of their global role in shaping the earth and, consequently, when this awareness shapes their relationship with the natural environment. This is thus not just a new geological epoch; it also potentially changes the very nature of the geological by clearly marking it as a domain that includes intentionality and meaning. Conversely, it also marks a transformative moment in the history of humanity as an agent, comparable perhaps to the development of technology and agriculture (2013:8)

Ideological provocation

There has been rich and critical discussion about the causes and consequences of the Anthropocene. Here the Anthropocene has served as an **ideological provocation**, energising a wide range of (largely pre-existing) conceptual frameworks in the interests of variously explaining, attributing and ameliorating the Anthropocene condition. Ideological engagements with the Anthropocene can be found across the political spectrum. They have reinvigorated established debates about the social, ecological and now planetary implications of key concepts like development, capitalism, modernity and humanism. These debates intersect with and modify grand narratives about human-environment relations (Bonnueill, 2015).

One high profile and mainstream ideological engagement with the Anthropocene comes from a self-described group of ‘ecomodernists’ associated with the Breakthrough Institute (BTI) – a centre-right US think-tank. In a recent manifesto (Asafu-Adjaye et al., 2015) they imagine a ‘good Anthropocene’ in which humans achieve their Enlightenment destiny as the ‘God Species’ (Lynas, 2011) through better technology, urbanisation and the ‘decoupling’ of people from nature (Blomqvist et al., 2015). Advocates of this approach, including AWG member Erle Ellis (2015a; 2015b), tend to favour an early Anthropocene start date. They argue that ‘humans became world makers through a long process of sociocultural evolution. We have remade the world many times in the past and will likely do so many times in the future’ (Nordhaus et al., 2015: no page, see also Minter and Pyne, 2015; Marris, 2011). The technical, managerial tenor of this approach is symptomatic of the broader discourse amongst members of the AWG, who suggest that the diagnosis of the new

epoch could (and should) offer opportunities for enlightened and modern forms of planetary stewardship (Steffen et al., 2011b).

Clive Hamilton (amongst other critics¹⁰) describes this ecomodernist vision as a ‘Promethean’ ‘technofix’ (2015a), which fails to acknowledge the links between environmental destruction and the basic practices of (capitalist) modernity and development. He suggests that adopting an early Anthropocene start date works to ‘exonerate modern humans from blame for environmental decline’ (2013: 204). These criticisms speak to a broader concern that has come to dominate critical discussion of the (good) Anthropocene in the social sciences, which as Rory Rowan explains, has ‘focused on highlighting the ways in which appeals to the agency of a supposedly universal “Anthropos” conceal the historically specific forms of social power that have resulted in Earth systems change’ (2015: no page, see also Malm and Hornborg, 2014; Löwbrand et al., 2015; Haraway et al., 2015). In decentring the Anthropos, many critical interventions arrive at an alternative appellation for the epoch.

For example, some critical theorists link the deleterious planetary changes associated with the APC to the ‘metabolic rifts’ and social iniquities caused by neoliberal capitalism (Malm and Hornborg, 2014). They claim the advent of the ‘Capitalocene’ (Moore, 2014) or ‘Anthroscene’ (Parikka, 2014)¹¹: terms they argue better specify causal responsibility. Sympathetic critics question the reductionism in this framing, noting that anthropogenic carbon emissions pre-exist and are not the unique preserve of capitalist economies (Chakrabarty, 2009; Haraway, 2015). Feminist critics have taken issue with the gendered figure of the responsible ‘Anthropos’, linking the crisis of the Anthropocene to the masculinist logics of resource extraction (Gibson-Graham, 2011) and drawing attention to the largely male composition of the expert panels (like the AWG) charged with deciding on (and explaining) the existence of the APC. Kate Raworth has suggested that the epoch might better be described as the ‘Manthropocene’ (2014).

This spirit of alternative nomenclature informs postcolonial interventions in which the Anthropocene becomes the Anglocene: a problem caused, named and only discussed by Northern, Anglophone ‘anthropoceneologists’ (Bonneuil and Fressoz, 2016). At a recent conference¹², postcolonial anthropologists picked up on an alternative

scientific proposal that links the start date of the Anthropocene to the global transformation associated with the arrival of Europeans in the Americas (Lewis and Maslin, 2015a). Their discussions highlighted the social and ecological depredations of colonial capitalism associated with slavery and the plantation economy. They suggest that the Anthropocene might better be known as the ‘Plantationocene’ (Haraway et al., 2015). A parallel strand of indigenous scholarship has sought to draw attention to the ‘Anthropo-not-seen’ (de la Cadena, 2015b). Diverse Australasian, Amazonian, Central American and Inuit interventions (to give but a few examples) seek to both ‘decolonise’ the discourse of the anthropocenologists, and to flag the colonial histories and presents of environmental degradation (see Todd, 2016; Instone and Taylor, 2015; Collard et al., 2014; Sundberg, 2014).

In a connected exploration of the biopolitics of the Anthropocene, Sue Ruddick (2015) situates the Anthropocene in the geographies of ‘planetary urbanism’, which she describes as a ‘worlding of the anthropological machine’ (after Agamben). She defines the anthropological machine as ‘the discursive framework that grounds ‘western man’ in a sense of civility, through the violence of a division *within* the human and *between* the human and other animals, a division that is not the after-effect of the civilizing act but rather its very foundation’ (1119). She argues that this machine, so central to the colonial project, continues to inform the acts of ‘triage’ and abandonment associated with modern Northern urban plans to adapt to the Anthropocene.

The anthropocentrism inherent within the promotion of a good Anthropocene is a central concern of both the ‘traditional’ environmentalists (against whom the ecomodernists seeks to differentiate themselves, e.g. Crist, 2013; Wuerthner et al., 2014) and from a diverse set of authors in animal studies (van Dooren, 2014; NARNEC, 2015). The problems of anthropocentrism are treated somewhat differently by Paul Robbins and Sarah Moore (2013). In a novel application of Lacanian psychoanalysis, they diagnose an ‘ecological anxiety disorder’ amongst scientists coming to terms with the novel ecologies and responsibilities associated with Palsson et al’s (2013) post-natural Anthropocene condition. They suggest that:

Anthropocene scientific culture thus simultaneously displays a panicked

political imperative to intervene more vocally and aggressively in an earth transformation run amok *and* an increasing fear that past scientific claims about the character of ecosystems and their transformation were overly normative, prescriptive, or political in nature (9).

Radical ecologists, less troubled by this condition, take issue with the forms of civilisation implied by the Anthropos in the Anthropocene (e.g. Smaje, 2015 and others associated with the *Dark Mountain* Project). In extreme forms the new epoch is heralded in apocalyptic terms: a signal of the coming ‘eco-rapture’ that will deliver a *World without Us* (Weisman, 2007) (or at least without modern forms of us).

In short, the ideological provocation of the Anthropocene proposal and the broader environmental zeitgeist it names, seem to have energised discussions of environmental politics within and around the academy. This energy is perhaps best expressed in a wave of Anthropocene manifestoes (Asafu-Adjaye et al., 2015; Latour, 2010; Collard et al., 2014; Gibson et al., 2015; Saldanha, 2013). Here the ‘rupture’ of a new epoch is summoned forth as a catalyst for an invigorated politics towards new planetary futures. Other (more sceptical) authors have expressed concerns about the ways in which the Anthropocene as ‘crisis’ might be mobilised to enable the suspension of democratic politics, ushering in authoritarian, or at least post-political, interventions associated with existing powerful environmentalisms (Dalby, 2013; Swyngedouw, 2010; Dalby, 2015a). Attention has been given to proposals for new frameworks for ‘Earth System governance’ associated with ‘Future Earth’: the successor initiative to the IGBP (for an overview see Biermann et al., 2012; Biermann, 2014). Sympathetic critical theorists welcome the call for social science participation in this initiative, but caution against an instrumental or technocratic focus on policy ready solutions that would foreclose on the generative political potential of the Anthro-scene (Lovbrand et al., 2009).

New ontologies

These variegated political imperatives have shaped a fourth mode of engaging with the Anthropocene. Here the diagnosis of a new epoch emerged from and has subsequently catalysed the generation of **new ontologies** for environmentalism. These cut across the natural and social sciences, departing from prevalent ways of

conceiving human-environmental relations in order to figure life and non-life on a ‘human-dominated’ and nonlinear planet.

An ontology of human-domination has been most clearly developed in efforts to rethink the biosphere (and its conservation) for the Anthropocene. Leading figures like Erle Ellis (on the AWG and an author of the ecomodernist manifesto) suggest reconceiving the world as a set of ‘anthromes’ (Ellis and Ramankutty, 2007; Ellis, 2015b) – non-analogue, non-linear socio-ecological systems that can be arranged along an axis from ‘wild’ to ‘used’ according to their human population density, land use, land cover and the provenance of their biotic communities. Anthromes are characterised not by a singular stable state, but by tipping points and multiple, possible future natures. This thinking reframes ecologies in terms of processes and functions, operating in systems in which the human impacts associated with the Anthropocene great acceleration have scrambled established biogeographies of what might belong where (for a summary authored by several members of the AWG see (Williams et al., 2015). Humans are clearly in the picture here, first by virtue of our long, prehistorical record of ecosystem change. Second, looking ahead Ellis and others suggest that we can ‘decouple’ (Asafu-Adjaye et al., 2015) (or perhaps more accurately better couple) human and environmental systems to deliver a ‘good Anthropocene’ by becoming beneficent managers and enlightened engineers facilitating adaptation, rewilding, translocation, and de-extinction (Keulartz, 2012).

A comparable ontology of human control can be found in the work of the geologist (and AWG member) Peter Haff. Haff has developed the concept of the ‘technosphere’, which he defines expansively as:

The set of large-scale networked technologies that underlie and make possible rapid extraction from the Earth of large quantities of free energy and subsequent power generation, long-distance, nearly instantaneous communication, rapid long-distance energy and mass transport, the existence and operation of modern governmental and other bureaucracies, high-intensity industrial and manufacturing operations including regional, continental and global distribution of food and other goods, and a myriad additional ‘artificial’ or ‘non-natural’ processes (Haff, 2014b: 301).

Haff encourages us to view technology ‘from the outside’, as a coherent, ‘autonomous’ system whose emergence ‘represents a new stage in the geologic evolution of the Earth’ (Haff, 2014a: 3). He proposes the technosphere as a new ‘geological paradigm’ (or sphere) ‘with similarities to the lithosphere, atmosphere, hydrosphere and biosphere’. He explains that humans ‘are essential but, nonetheless, subordinate parts’ (2014: 2) of the technosphere, ‘without which modern civilization and its present 7×10^9 human constituents could not exist’ (2014b: 301). Haff argues that this ontology ‘relocates the basis for thinking about problems such as environmental degradation from a human-centric to a system-centric perspective’ (2014a: 3). The concept of the technosphere seems to have caught the imaginations of some key players in the Anthro-scene. It is the title of the successor to the *Anthropocene Project* at the HKW, where it will be the focus of a four year ‘research project’ (HKW, 2015).

In a series of papers, Hamilton suggests that Ellis, Ruddiman and others focused on ecological and technological change and future control fail to appreciate the ‘rupture’ of the Anthropocene (2016). By this he means two things. First, the ‘paradigm shifting’ epistemological implications of ESS, which takes the planet as its object of enquiry, and demands an attention to planetary dynamics – not solely a focus on domain specific changes in technology or ecosystems. Second, he argues that these authors ‘get the Anthropocene so wrong’ (Hamilton 2015b) because they fail to acknowledge the likely unstable and unruly trajectory of the Earth as it departs from the Anthropocene. For Hamilton (2016), human impacts associated with the great acceleration mark a phase change, a rupture from the Holocene that undermines the optimistic and hubristic dreams of those calling for new rounds of enlightened anthropocentrism. Here the future planetary conditions of the Anthropocene will be radically different from the past emerging on planet marked by tipping points, positive feedback loops and spiralling and uncontrollable trajectories of nonlinear change.¹³

These debates within and around the natural sciences are echoed in ‘post-Natural’ and ‘more-than-human’ social theory. Much of this work precedes and presages the discussions above, but has been powered up by the emergence of Anthro-scene. In short, this literature challenges anthropocentric accounts of agency inherent within

modern, Cartesian ontologies of the environment to rethink models of kinship and politics along ecological and multispecies lines. For example, Bruno Latour draws on the anthropologist Eduardo Viveiros de Castro, to develop a ‘multinatural’ ontology for the Anthropocene characterised by hybrid (i.e. socio-natural) entities, emergent from relations in nonlinear assemblages (Latour, 2011a. See also Law, 2015). Latour, Law (and a host of others thinkers working with Actor-Network Theory and now Object-Orientated Ontology) – have been attending for some time to the material agencies of technologies. They explore human embeddedness within socio-technical ‘networks’ or ‘assemblages’, though they would not theorise these in Haff’s terms as autonomous systems. Latour is especially critical of the persistence of the modern ontological fantasy of ‘decoupling’ people from nature that he identifies in the ecomodernist manifesto. Drawing on the parable of Frankenstein, he encourages environmentalists to learn to ‘love their monsters’, recognising our inevitable entanglements with the world (2011b; 2015).

In responding to the Anthropocene proposal, Donna Haraway (2008) has developed her long-standing interests in forms of human-nonhuman companionship and symbiogenesis. She proposes an ontology that ‘entangles myriad temporalities and spatialities and myriad intra-active entities-in-assemblages—including the more-than-human, other-than-human, inhuman, and human-as-humus’ (2015: 160). Comparable work has developed this thinking to engage with the ecological, fungal and animal implications of the Anthropocene (Lorimer, 2015; Kirksey, 2015; Tsing, 2015). These literatures increasingly draw on and are emerging in (sometimes fraught) discussion with indigenous ontologies – less troubled with the ontological contortions of becoming and now unbecoming modern. Latour’s engagement with De Castro is indicative of a broader conversation underway between anthropologists and STS scholars concerned with alternative more-than-human cosmologies from de la Cadena’s *Anthropo-not-seen* (e.g. Kohn, 2013; Bubandt et al., 2016; de la Cadena, 2015a).

Haraway and Latour’s recent writing maintain the affirmative tenor (if not the anthropocentrism) of forms of ecomodernism. A comparable body of work offers more-than-human ontologies more concerned with the ‘darker’ (Morton, 2010; 2013), cataclysmic and ‘radically asymmetrical’ ‘inhuman natures’ (Clark, 2011) of the earth

system flagged by Hamilton above. Strands of this work examine the ‘geosocial formations’ (Yusoff, 2015a) through which modern societies are entangled with fossilised (and other) carbon. In a much-cited paper, Dipesh Chakrabarty (2009) reflects on the implications of considering geological agency in the ‘most humanist’ discipline of history. He is particularly concerned with how the ‘parametric’ shifts predicted by APC science trouble the distinction between natural and human history. Other work in geography and ‘geophilosophy’ blurs any binary distinction between life and nonlife by attending to the mineral, molecular circulations involved, for example, in our consumption of the ‘gift’ of fossilised carbon or our corporeal vulnerabilities to the earth-shattering events associated with Anthropocenic and other geological hazards (Yusoff, 2013; Grosz, 2008; Clark, 2012; 2014; Clark and Yusoff, 2014).

Across their rich diversity, these new ontologies offer very different conceptions of the Earth and the human subject to some of their disciplinary predecessors. They share an understanding of the world as nonlinear and of people as materially embedded within ecological and geological assemblages. New ontologies in the natural sciences seek to fold the human into a modified nature, identifying the ‘anthrosphere’ or ‘technosphere’ as coupled systems ‘analogous to’ (Williams et al., 2015: 16) more established geological paradigms like the lithosphere or atmosphere (e.g. Ellis, 2015b). New ontologies in the humanities and social sciences tend to hold on to the human as an important ontological, political, legal and ethical container, but challenge the exceptionalism associated with modern, anthropocentric models of resource management. They offer a politically differentiated model of the geological subjects of the Anthropocene, who emerge as much more vulnerable, material and asymmetrically entangled within the nonhuman and inhuman forces of an unruly planet.

What is striking about these new ontologies – a point not always clear in the somewhat hopeful discussions of ‘anthromes’, the ‘technosphere’ or even ‘human-nonhuman companionship’ – is the degree to which the story of the APC is not one of the successful domestication of the planet or the reconciliation of human-environment entanglements. Instead, the Anthropocene speaks of the return of the repressed, the power of an inhuman nature to tip the planet out of the benign climate envelope of the

Holocene, withdrawing the fundamental grounds in which modern (and other forms of) civilisation came into existence and replacing them with more energetic, unstable and hostile conditions.

Science fiction

In his book *The Earth After Us*, Jan Zalasiewicz (2008) (chair of the AWG) makes clear how the scientific question of the Anthropocene can only be answered through an act of **science fiction**. Definitive fossilised evidence of a synchronous stratigraphic layer that would legitimately indicate the advent of a new epoch will only materialise several million years from now. The proposal for accepting the Anthropocene therefore requires a future geologist, living on, returning to, or visiting the Earth, and blessed with the sensoria and apparatus capable of interrogating the planet's strata. The Anthropocene thus requires an act of speculation somewhat alien to the retrospective periodization of the geosciences.

Science fiction and speculative futures seem to be emerging as central motifs of the Anthro-scene. Scientists like Zalasiewicz offer us future histories: scenarios predicted by the natural sciences and narrated from a not too distant future. *The Earth after Us* is indicative of an expanding genre of such texts, which includes Alan Weismann's *The Earth without Us*, Mark Lynas' *Six Degrees*, Peter Ward's *The Flooded Earth*, James Hansen's *Storms of my Grandchildren* and Art Bell and Whitley Streiber's *The Coming Global Superstorm* (which inspired the Hollywood film *The Day after Tomorrow*). These books offer thought experiments, creating canvasses for imagining future planetary conditions, trajectories and events. Their primary aim is to shock their readers with calls to avert planetary change (von Mossner, 2014). As the blurb on the jacket of Zalasiewicz's book suggests: 'we would not wish to be dubbed by future explorers the amazingly clever and utterly foolish two-legged ape' (2008, book jacket). Writing for (and with) his stratigrapher colleagues, Zalasiewicz cautions that 'it is important to recognize that human decision-making has the potential to shape the future geological record. For the present, we must continue to work with a developing narrative, even as it unfolds' (Waters et al., 2014b: 17). Here he channels Palsson et al's (2013) claims of a new human condition, recognising the epistemological challenges of the performative potential of geological appeals to truncate or even forestall the epoch it is currently

ushering into existence. Such time travelling conundrums are common science fiction concerns.

While much Anthropocene science has centred on the past, this willingness amongst geoscientists to speculate, coupled with normative concerns about the trajectory of planetary events, seems to have made the future a legitimate domain for mainstream scientific research and political activity (Braun, 2015; Bai et al., 2016). The most striking example being *Future Earth*: a large, international research platform supporting future-orientated ‘transformative projects for global sustainability’. This initiative explicitly aims to be interdisciplinary, solutions-orientated and geared towards public participation. It grows out of and seeks to improve on existing global environmental change programmes (for critical discussion see Lövbrand et al., 2015). There is a prefigurative aspiration in this programme’s desires to imagine and enact alternative futures. One example would be their *Seeds of a Good Anthropocene*: a ‘suite of research activities that aim to solicit, explore, and develop a suite of alternative, plausible visions of “Good Anthropocenes” – positive visions of futures that are socially and ecologically desirable, just, and sustainable’ (PECS, 2015).

The Anthro-scene is also becoming a touchstone amongst established and emergent figures within the diverse literary movement that is science fiction. Authors have either turned their attentions to Anthropocene thematics, or their earlier writings have been revisited by virtue of the ways in which they pre-empt contemporary concerns (Swanson et al., 2015). Some notable figures here include Kim Stanley Robinson, Ursula La Guin, Octavia Butler, Margaret Atwood, JG Ballard and Cormac McCarthy. There is now an established genre of Climate Fiction (Cli-Fi), whose emergence some (like Margaret Atwood 2015b) claim is symptomatic of a wider cultural shift away from consumerist values. Robert MacFarlane (2015) makes similar claims about the recent resurgence of nature writing in the UK. This trend seems to have promoted and been energised by a renewed interest in the humanities and social sciences in the radical, prefigurative potential of science fiction (Heise, 2011; Wark, 2015; Meillassoux, 2015; Trexler, 2015) – including some tentative experiments in science fiction by established philosophers and social scientists (including one member of the AWG (Oreskes)) (Negarestani, 2008; Oreskes and Conway, 2014; Szerszynski, 2015). Authors like Donna Haraway and Anna Tsing are particularly

interested in the power of speculative, present-future narratives to imagine and begin to enact alternative futures (Swanson et al., 2015), including explorations of the potential of forms of indigenous- and afro- futurisms (Last, 2013).

One of the key themes in these discussions is the relative merit of dystopian or utopian future imaginations for engaging the present (Strauss, 2014; von Mossner, 2014). Dystopia is prevalent in the apocalyptic narratives of contemporary scientists' future histories and in popular works like *The Road* (McCarthy, 2006). Some critics take issue with this affective logic, promoting in diverse ways the performative potential of hope (Gibson-Graham, 2006; Kallis and March, 2014; Buck, 2014). Others defend the possibilities of dystopia and the related emotions of grief and mourning (van Dooren, 2014; Head, 2016). For example, in reflecting on apocalyptic film Ginn suggests that:

Anthropocene apocalypse might not be exactly hopeful, but it demands a kind of depressing redemption: realizing that the question is not how to continue present ways of life, but the deeper challenge of crafting new ways to respond with honor and dignity to unruly earth forces (2015: 357).

An important body of work cautions against the utopic, messianic dimensions of some Anthropocene visions amongst ecologists – critiquing them for impossible Edenic imaginations or hubristic hopes for future human mastery (Robbins and Moore, 2013; Kirksey, 2015). In reflecting on her science fiction Margaret Atwood explains how she seeks to depict 'ustopia' a neologism that describes spaces and relations 'which combine utopia and dystopia, the imagined perfect society and its opposite. Each contains latent versions of the other' (Atwood, 2015a). Such stories, images and analysis seem to share an aesthetic and geographical pre-occupation with post-industrial, post-apocalyptic ruins. In some cases this delivers a form of futurist Anthropocene porn: strip mine, coffee table click-bait for conspicuous redemption. More nuanced accounts offer surprising, even affirmative tales of 'life in capitalist ruins' (Tsing, 2015; Kirksey, 2015).

A second debate within this Anthro-scene turn to science fiction relates to a broader discussion of the place of scientists, science and realism within this genre. The future histories of contemporary scientists, like Zalasiewicz, hold fairly fast to the

parameters of reality and authorised subjects of the contemporary geosciences. While these are valuable, various critics have suggested that such work can constrain the imaginative and political possibilities of fiction. For example, both Donna Haraway and Quentin Meillassoux argue in different ways for the potential of what they respectively term ‘speculative fabulation’ (Haraway, 2011) and ‘extro-science fiction’ (or fiction beyond science) (Meillassoux, 2015). Meillassoux explains that this work unlinks science fiction from the confines of what contemporary science thinks is possible, imagining ‘worlds beyond science’ without introducing ‘unreasonable, unexplainable ruptures, which would seriously diminish any interest in the narration’ (2012: no pages).

A critical dimension of this work is to make space for alternative future subjects, experts and authorities that might narrate, claim and inhabit speculative futures. Davies and Turpin identify this ethos in the emerging field of speculative Anthropocene art, and describe it as:

A non- moral form of address that offers a range of discursive, visual, and sensual strategies that are not confined by the regimes of scientific objectivity, political moralism, or psychological depression (2015: 17).

In short the speculative epistemology of the Anthro-scene seems to engender and power up new forms of environmental aesthetics willing to imagine alternative futures and prefigurative political techniques that might bring them into being.

Anthro-scene praxis

This article offers a short guide to the Anthro-scene structured around a discussion of five ways in which the Anthropocene proposal has been engaged by different groups of academics, artists and policymakers. The first aim has been to offer a flavour and initial parsing of the great diversity of work in this area, and the ways in which its constituent parts intersect and interact. I anticipate that this five-fold typology will offer a useful heuristic for those new to or currently caught up within the Anthro-scene. A further aim of this review, on which I focus this concluding section, is to consider the place of Anthropocene science within the broader Anthro-scene. I want to examine the implications of this review for current

discussions of the Anthropocene proposal as a prompt for new modes of academic praxis (Castree et al., 2014; Palsson et al., 2013; Castree, 2014b).

It is clear that the Anthropocene has overflowed the spaces of the geosciences from which it originally emerged. The term has become ‘transcontextual’ (King, 2014). It has proliferated promiscuously in ways unforeseen by its creators. To an extent, the geosciences have lost ownership of the term as other disciplines, fields and institutions engage in deliberate or inadvertent projects of ‘anticipatory semantics’¹⁴ to frame its meaning. Nonetheless, there remains a central interest across all parts of the Anthro-scene in the AWG and whether, and in what form, the concept might gain scientific legitimacy through its acceptance into the terminology, classifications and institutional arrangements of the geosciences. While this is understandable, it does suggest a somewhat perverse dependency upon, and deference to, the esoteric naming practices of geology. Many geoscientists have already come to accept the informal utility of the term, acknowledging that we are living in the a/Anthropocene (Maslin and Lewis, 2015; Rull, 2013). There are important intellectual, epistemic, personal and institutional reasons why geoscientists are interested in whether we end up in a new epoch or age, or whether we are offered a flexible, informal diachronic label, but these ultimately matter less than the pressing problems the Anthropocene names. I will return to these below.

At the same time, an attention to the political, aesthetic, economic and other energies that animate the Anthro-scene does help makes sense of some of the contemporary practices and tensions within the AWG and Earth System Sciences more generally. A proper examination of the AWG and its pending decision would require more extensive, detailed and ethnographic research than what I have offered here. It would constitute an important, timely and no doubt fascinating research project, that ought to situate this geological controversy amidst its historical antecedents (e.g. Rudwick, 1985). Nonetheless, there are a few general observations that can be drawn from the intersections and traffic between the five themes identified above. First, it is clear that the intellectual zeitgeist that the Anthropocene describes has placed the workings of the AWG and the ISC in an unfamiliar and sometimes uncomfortable spotlight. Such attention is propelling and compelling geologists and earth system scientists to pronounce on planetary processes and relations well beyond their qualified

specialisms. Anthropocene scientists have begun to assume (sometimes readily, more often unwillingly) the status of prognostic seers for the future of environmentalism and the planet at large. Individuals, institutions and disciplines have become invested in the debate around the acceptance of APC. Concerns have been expressed about the ‘zealous’ or ‘religious’ ways in which some enthusiasts on the AWG make their case (Monastersky, 2015). There is a range of political, economic and academic benefits that will accrue as a result of the ISC decision.

Similarly, the ideological weight that ‘the Anthropos’ in the Anthropocene has come to carry makes the outcome of the naming deliberations all the more political. As a result of interventions by scientists and social scientists, the choice of start date is no longer neutral. If the early Anthropocene hypothesis is accepted, then some would argue that this helps exonerate modern humans for recent planetary impacts. Lewis and Maslin’s start date in the 17th century would help flag the colonial provenance of planetary change. Crutzen’s original 1784 start date, linked to the invention of the steam engine and the industrial revolution, ties the Anthropocene firmly to capitalism and its technologies, whose causal and salutary powers divide the Anthropocene communitariat. Finally, the post-WW2 start date favoured by the AWG, and linked to nuclear testing and the great acceleration, dovetails with narratives of the end of Nature familiar to 20th century environmentalism. As far as I am aware, there is no necessary reason why the Anthropos should persist in the chosen title. There is still the potential that the AWG could propose an alternative name for the epoch as a result of the discussions reviewed above. Though at this stage this seems unlikely. Indeed the emergence of Anthropocene science as a ‘crisis-field’ (Castree, 2014b) akin to ‘biodiversity’ and ‘climate change’, makes a castigation of certain mid-twentieth century forms of industrial life the more likely.

Third, the speculative, far-future-retrospective nature of the epistemic and evidentiary practices associated with the possible detection of an Anthropocene horizon has created a series of opportunities and challenges for the scientists on the AWG and in the wider ESS community. For Jan Zalasiewicz, engaging with science fiction offers a compelling narrative structure and a speculative canvass for his project of popularising geology. For others, it gives licence to speculate on future (largely cataclysmic) planetary trajectories. These in turn offer platforms for normative

interventions seeking to guide current policy and to shape popular sensibilities and individual behaviours. At the same time the current absence of legitimate evidence create strains on the orthodox knowledge practices of stratigraphy. This generates both anxiety and creativity amongst diverse practitioners who see both risks in joining the APC bandwagon, as well as ways of developing their own methods and concepts for a timely form of scientific enquiry.

It is in this speculative, futurist guise that I believe the Anthro-scene offers its greatest intellectual and political potential. Developing political ‘arts of living’ (Tsing, 2015) in the Anthropocene requires exploring ‘the full range of values, means and ends that might guide human responses to GEC’ (Castree et al., 2014). It means thinking beyond the type of technical, ‘solutions-orientated’ and ‘deficit-model’ forms of knowledge practice that are to be found in some high profile responses to the challenges of the Anthropocene.

The Anthro-scene presents a rich cacophony of new and original academic work, marked by a refreshing epistemic and ontological pluralism oft absent from comparable academic zeitgeists (Swanson et al., 2015). Under the banner of the Anthropocene, within the AWG, at events like The Anthropocene Project at the HKW, or in the pages of the Anthropocene Review, a great diversity of experts are beginning to find a new language to talk about planetary impacts. Geologists, artists and philosophers share platforms, terms, anxieties and audiences. While the lingua franca is of systems science, there is an epistemically polyglot tenor to these gatherings. The Anthro-scene is making possible novel forms of knowledge and arrangements for knowledge production. As various commentators have noted, there is a shared interest here in forms of collective intellectual experimentation. For Latour and others, the Anthropocene must be understood as a situation in which the laboratory has taken over the world, where people are geological actors and multiple (but uncertain) futures are possible. In this context we see an appetite for new epistemic and aesthetic practices.

Seen from one vantage point, the Anthro-scene thus offers a certain reinvigoration of the environmental politics that must accompany any transition to sustainability. This is most strikingly evidenced in the proliferation of manifestoes and the

subsequent debates to which they given rise. Although these debates currently reside primarily within the academy, the studio or the museum, they have significant potential to open up the discourse of environmental politics that has long been curtailed by anti-political appeals to the type of essential Nature that the Anthropocene has publically undone (Latour, 2004; Purdy, 2015). A world in which multiple future natures are possible, in which (certain) humans are planetary forces, and in which the Earth has great but indeterminate power offers grounds for very different political projects and practices.

Speculative, democratic practices for Anthropocene are perhaps most clearly evidenced in the enthusiastic reception and reworking of the concept in the arts. These enthusiasms and creativities are rambunctious, disjointed and often overlapping. They offer new, creative, and sometimes collective, ways of sensing environmental change (Gabrys and Yusoff, 2011; Davis and Turpin, 2015; Kirksey et al., 2013). There are powerful political aesthetics at work here, that can traverse a broader landscape of affect than the narrow instrumentality of market reason that lies at the heart of ecomodernism and other ‘scientific’ appeals for behaviour change. Current humanities engagements with the Anthropocene have not been corralled into particularly directed or ‘useful’ programmes of the type that some commentators seek. I suspect there would be some resistance to any concerted effort to do so. The democratic vitality of the Anthro-scene relies on such pluralism, even in the face of a common (yet differentiated) planetary crisis. *Let a hundred –cenes bloom!*

Yet seen from a very different vantage point, the geography and sociology of the Anthro-scene remain Northern, urban and exclusive. Many parts of the world may well be entering a new and (for them) disproportionately dangerous planetary epoch, but they are not currently in the Anthro-scene. The Anthro-not-seen describes the long, undistinguished history and colonial present of the ‘war waged against world-making practices that ignore the separation of entities into nature and culture – and the resistance to that war’ (de la Cadena, 2015b: no pages). This earthy war remains absent from the Panglossian visions of a Good Anthropocene, or the airy ‘cloud cities’ that featured in a recent high-profile Anthropocene monument (Saraceno et al., 2015).

Biography

Jamie Lorimer is an Associate Professor in the School of Geography and the Environment at the University of Oxford. His research explores the social and cultural dimensions of environmental governance across a range scales. Past work has focused on biodiversity conservation and the emergence of rewilding as a new framework for wildlife management. His current work is focused on the microbiome, examining the social implications of this new field of science and developing participatory methods for engaging publics with microbial worlds. He is the author of *Wildlife in the Anthropocene: Conservation after Nature* (University of Minnesota Press, 2015).

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Notes

¹ A number of other authors have referred to the ‘Anthropo-scene’ to describe this intellectual space. The first academic record I can find in print is Castree N (2015). Others include the Anthropo-scene art exhibition <http://Anthropo-scene.weebly.com/>, The Anthropo-scene Manifesto: An interdisciplinary arts and humanities journal <http://Anthropo-scenemanifesto.com/>, Jeremy Schmidt’s blog entitled the Anthropo.scene <http://jeremyjschmidt.com/> a ten-part series by the journalist and biologist Christian Schwägerl on the Next Nature site <https://www.nextnature.net/search/Anthropo-scene/>

² See Swanson et al. (2015) for a comparative typology of the Anthropo-scene that makes use of, and modifies, Anne-Marie Mol’s concept of the ‘multiple’.

³ See Gibbard and Walker (2014) for an account of the relevant stratigraphic principles and the process of ratifying a proposal for a new epoch.

⁴ This overlap is identified and discussed in Walker et al (2015). The lead author, Michael Walker was part of the group that defined the start of the Holocene in 2008. He resigned from the AWG in 2014.

⁵ For comparison, there was a 53 year interval between the proposal and official acceptance of the Holocene as a geological period (Chakrabarty 2009).

⁶ In 2015 Elizabeth Kolbert won the Pulitzer Prize, Gaia Vince the Royal Society Winton Book Prize and Diane Ackerman the P.E.N. Henry David Thoreau Award for Nature Writing.

⁷ Revkin’s *Dot Earth* blog at the New York Times can be found here <http://dotearth.blogs.nytimes.com/>

⁸ This exhibition is entitled 'Welcome to the Anthropocene. The Earth in Our Hands' www.deutsches-museum.de/. An Anthropocene exhibit is also being planned at the US National Museum of Natural History in Washington DC.

⁹ See for example the work of Ryan Dewey www.ryandewey.org/

¹⁰ A collection of critical responses to the Ecomodernist Manifesto are gathered in volume 7 of the journal *Environmental Humanities*. For a wider discussion see Dalby (2015b).

¹¹ Anthroscene was also the title of an urban political ecology workshop held at the KTH Environmental Humanities Laboratory in Stockholm in September, 2015. See www.anthro-obscene.situatedecologies.net/index.html

¹² *Arts of Living on a Damaged Planet*, held at the University of California, Santa Cruz, May 8-9 2014. Videos of some of the conference proceedings are available at <http://anthropocene.au.dk/>

¹³ For further discussion of the debate that Hamilton's interventions have provoked see Maslin and Lewis (2015) and Oldfield (2016).

¹⁴ Noel Castree used this phrase in a discussion of the Anthropocene at a lecture in Cardiff in 2013.

References

- Ackerman D (2014) *The Human Age: The World Shaped by Us*: Headline.
- Asafu-Adjaye J, Blomqvist L, Brand S, Brook B, Defries R, Ellis E, Foreman C, Keith D, Lewis M, Lynas M, Nordhaus T, Pielke R, Pritzker R, Roy J, Sagoff M, Shellenberger M, Stone R and Teague P (2015) *An Ecomodernist Manifesto*, Oakland: Breakthrough Institute.
- Atwood M (2015a) *Dire Cartographies: The Roads to Utopia and the Handmaid's Tale*: Knopf Doubleday Publishing Group.
- Atwood M (2015b) It's Not Climate Change — It's Everything Change. *Matter* July 27.
- Autin WJ and Holbrook JM (2012) Is the Anthropocene an Issue of Stratigraphy or Pop Culture? *GSA Today* 22(7): 60-61.
- Bai X, van der Leeuw S, O'Brien K, Berkhout F, Biermann F, Brondizio ES, Cudennec C, Dearing J, Duraiappah A, Glaser M, Revkin A, Steffen W and Syvitski J (2015) Plausible and Desirable Futures in the Anthropocene: A New Research Agenda. *Global Environmental Change*. [doi:10.1016/j.gloenvcha.2015.09.017](https://doi.org/10.1016/j.gloenvcha.2015.09.017)
- Balkin A (2015) Public Smog. In: Davis H and Etienne T (eds) *Art in the Anthropocene: Encounters among Aesthetics, Politics, Environments and Epistemologies*. London: Open Humanities Press, 341-347.

-
- Barnosky AD, Holmes M, Kirchholtes R, Lindsey E, Maguire KC, Poust AW, Stegner MA, Sunseri J, Swartz B, Swift J, Villavicencio NA and Wogan GO (2014) Prelude to the Anthropocene: Two New North American Land Mammal Ages (Nalmas). *The Anthropocene Review* 1(3): 225-242.
- Biermann F (2014) The Anthropocene: A Governance Perspective. *The Anthropocene Review* 1(1): 57-61.
- Biermann F, Abbott K, Andresen S, Bäckstrand K, Bernstein S, Betsill MM, Bulkeley H, Cashore B, Clapp J, Folke C, Gupta A, Gupta J, Haas PM, Jordan A, Kanie N, Kluvánková-Oravská T, Lebel L, Liverman D, Meadowcroft J, Mitchell RB, Newell P, Oberthür S, Olsson L, Pattberg P, Sánchez-Rodríguez R, Schroeder H, Underdal A, Vieira SC, Vogel C, Young OR, Brock A and Zondervan R (2012) Navigating the Anthropocene: Improving Earth System Governance. *Science* 335(6074): 1306-1307.
- Blomqvist L, Nordhaus T and Shellenberger M (2015) *Nature Unbound: Decoupling for Conservation*, Oakland: Breakthrough Institute.
- Bonneuil C and Fressoz JB (2016) *The Shock of the Anthropocene: The Earth, History and Us*: Verso Books.
- Bonnueill C (2015) The Geological Turn: Narrative of the Anthropocene. In: Hamilton C, Gemenne F and Bonneuil C (eds) *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch*. London: Routledge, 17-31.
- Braun B (2015) Futures: Imagining Socioecological Transformation—an Introduction. *Annals of the Association of American Geographers* 105(2): 239-243.
- Bubandt N, Gilbert S, Haraway D, Ishikawa N, Olwig K and Tsing A (2016) Anthropologists Are Talking About the Anthropocene. *Ethnos* 81(4).
- Buck HJ (2014) On the Possibilities of a Charming Anthropocene. *Annals of the Association of American Geographers* 105(2): 369-377.
- Castree N (2014a) The Anthropocene and Geography I: The Back Story. *Geography Compass* 8(7): 436-449.
- Castree N (2014b) The Anthropocene and the Environmental Humanities: Extending the Conversation. *Environmental Humanities* 5: 233-260.

-
- Castree N (2015) Changing the Anthro(po)scene: Geographers, Global Environmental Change and the Politics of Knowledge. *Dialogues in Human Geography* 5(3): 301-316.
- Castree N, Adams WM, Barry J, Brockington D, Büscher B, Corbera E, Demeritt D, Duffy R, Felt U, Neves K, Newell P, Pellizzoni L, Rigby K, Robbins P, Robin L, Rose DB, Ross A, Schlosberg D, Sörlin S, West P, Whitehead M and Wynne B (2014) Changing the Intellectual Climate. *Nature Climate Change* 4(9): 763-768.
- Chakrabarty D (2009) The Climate of History: Four Theses. *Critical Inquiry* 35(2): 197-222.
- Clark N (2011) *Inhuman Nature : Sociable Living on a Dynamic Planet*, Thousand Oaks: SAGE.
- Clark N (2012) Rock, Life, Fire: Speculative Geophysics and the Anthropocene. *Oxford Literary Review* 34(2): 259-276.
- Clark N (2014) Geo-Politics and the Disaster of the Anthropocene. *Sociological Review* 62(SUPPL1): 19-37.
- Clark N and Yusoff K (2014) Combustion and Society: A Fire-Centred History of Energy Use. *Theory, Culture and Society* 31(5): 203-226.
- Collard R-C, Dempsey J and Sundberg J (2014) A Manifesto for Abundant Futures. *Annals of the Association of American Geographers* 105(2): 322-330.
- Crist E (2013) On the Poverty of Our Nomenclature. *Environmental Humanities* 3: 129-147.
- Crutzen P and Stoermer F (2000) The Anthropocene. *Global Change Newsletter* 41: 17-18.
- Dalby S (2013) Biopolitics and Climate Security in the Anthropocene. *Geoforum* 49: 184-192.
- Dalby S (2015a) Anthropocene Formations: Environmental Security, Geopolitics and Disaster. *Theory, Culture & Society*.
- Dalby S (2015b) Framing the Anthropocene: The Good, the Bad and the Ugly. *The Anthropocene Review*.
- Davis H and Turpin E (2015) *Art in the Anthropocene: Encounters among Aesthetics, Politics, Environments and Epistemologies*. Open Humanities Press.

-
- de la Cadena M (2015a) *Earth Beings: Ecologies of Practice across Andean Worlds*: Duke University Press.
- de la Cadena M (2015b) Uncommoning Nature. *e-flux* #65: no pages.
- Doughty CE, Wolf A and Field CB (2010) Biophysical Feedbacks between the Pleistocene Megafauna Extinction and Climate: The First Human-Induced Global Warming? *Geophysical Research Letters* 37(15): L15703.
- Edgeworth M, deB Richter D, Waters C, Haff P, Neal C and Price SJ (2015) Diachronous Beginnings of the Anthropocene: The Lower Bounding Surface of Anthropogenic Deposits. *The Anthropocene Review*.
- Ellis E (2015a) Too Big for Nature. In: Minter B and Pyne S (eds) *After Preservation: Saving American Nature in the Age of Humans*. Chicago: University of Chicago Press, 24-31.
- Ellis E (2015b) Ecology in an Anthropogenic Biosphere. *Ecological Monographs* 85(3): 287-331.
- Ellis E and Ramankutty N (2007) Putting People in the Map: Anthropogenic Biomes of the World. *Frontiers in Ecology and the Environment* 6(8): 439-447.
- Ellsworth E, Kruse J and Beatty R (2012) *Making the Geologic Now: Responses to Material Conditions of Contemporary Life*: Punctum Books.
- Finney SC (2014) The 'Anthropocene' as a Ratified Unit in the Ics International Chronostratigraphic Chart: Fundamental Issues That Must Be Addressed by the Task Group. *Geological Society, London, Special Publications* 395(1): 23-28.
- Gabrys J and Yusoff K (2011) Arts, Sciences and Climate Change: Practices and Politics at the Threshold. *Science as Culture* 21(1): 1-24.
- Gale S and Hoare P (2012) The Stratigraphic Status of the Anthropocene. *The Holocene* 22(12): 1491-1494.
- Gibbard PL and Walker MJC (2014) The Term 'Anthropocene' in the Context of Formal Geological Classification. *Geological Society, London, Special Publications* 395(1): 29-37.
- Gibson K, Bird Rose D and Fincher R (2015) *Manifesto for Living in the Anthropocene*, New York: Punctum Books.
- Gibson-Graham JK (2006) *A Postcapitalist Politics*, Minneapolis: University of Minnesota Press.

-
- Gibson-Graham JK (2011) A Feminist Project of Belonging for the Anthropocene. *Gender, Place & Culture* 18(1): 1-21.
- Ginn F (2015) When Horses Won't Eat: Apocalypse and the Anthropocene. *Annals of the Association of American Geographers* 105(2): 351-359.
- Grosz EA (2008) *Chaos, Territory, Art : Deleuze and the Framing of the Earth*, New York: Columbia University Press.
- Haff P (2014a) Humans and Technology in the Anthropocene: Six Rules. *The Anthropocene Review*.
- Haff PK (2014b) Technology as a Geological Phenomenon: Implications for Human Well-Being. *Geological Society, London, Special Publications* 395(1): 301-309.
- Hamilton C (2013) *Earthmasters: Playing God with the Climate*: Allen & Unwin.
- Hamilton C (2015a) The Technofix Is In. *Earth Island Journal* April
- Hamilton C (2015b) Getting the Anthropocene So Wrong. *The Anthropocene Review* 2(2): 102-107.
- Hamilton C (2016) The Anthropocene as Rupture. *The Anthropocene Review*.
- Hamilton C and Grinevald J (2015) Was the Anthropocene Anticipated? *The Anthropocene Review* 2(1): 59-72.
- Haraway D (1991) *Simians, Cyborgs, and Women: The Reinvention of Nature*, New York: Routledge.
- Haraway D (2008) *When Species Meet*, Minneapolis: University of Minnesota Press.
- Haraway D (2011) Speculative Fabulations for Technoculture's Generations: Taking Care of Unexpected Country. *Australian Humanities Review* 50: 182-219.
- Haraway D (2015) Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin. *Environmental Humanities* 6: 159-165.
- Haraway D, Ishikawa N, Scott G, Olwig K, Tsing AL and Bubandt N (2015) Anthropologists Are Talking – About the Anthropocene. *Ethnos*: 1-30.
- HARNEC (Human Animal Research Network Editorial Collective) (2015) *Animals in the Anthropocene: Critical Perspectives on Non-Human Futures*. Sydney: Sydney University Press.
- Head L (2016) *Hope and Grief in the Anthropocene*, London: Routledge.

-
- Heartney E (2014) Art for the Anthropocene Era. *Art in America* Feb 2014.
www.artinamericamagazine.com/news-features/magazine/art-for-the-anthropocene-era [accessed June 2016].
- Heise UK (2011) Martian Ecologies and the Future of Nature. *Twentieth Century Literature: a scholarly and critical journal* (Hofstra Univ., Hempstead, NY) 57(3/4): 447.
- HKW (2013) *The Anthropocene Project. An Opening* Available at:
<http://www.hkw.de/en>. [accessed June 2016].
- HKW (2014) *Anthropocene Curriculum*. Available at: <http://www.hkw.de/en/>. [accessed June 2016].
- HKW (2015) *Technosphere*. Available at: <http://www.hkw.de/>. [accessed June 2016].
- IGBP (2015) *About*. Available at:
www.igbp.net/about.4.6285fa5a12be4b403968000417.html. [accessed June 2016].
- Imura H (2013) *Environmental Systems Studies: A Macroscopic for Understanding and Operating Spaceship Earth*: Springer.
- Instone L and Taylor A (2015) Thinking About Inheritance through the Figure of the Anthropocene, from the Antipodes and in the Presence of Others. *Environmental Humanities* 7(1): 133-150.
- Kallis G and March H (2014) Imaginaries of Hope: The Utopianism of Degrowth. *Annals of the Association of American Geographers* 105(2): 360-368.
- Keulartz J (2012) The Emergence of Enlightened Anthropocentrism in Ecological Restoration. *Nature and Culture* 7(1): 48-71.
- King K (2014) Media in Transcontextual Tangles: Why It Matters. *Berlin Memorial Lecture* Purdue University, West Lafayette, IN.
- Kirksey E (2015) *Emergent Ecologies*: Duke University Press.
- Kirksey SE, Shapiro N and Brodine M (2013) Hope in Blasted Landscapes. *Social Science Information* 52(2): 228-256.
- Klingan K, Sepahvand A, Rosol C and Scherer BM (2015) *Textures of the Anthropocene: Grain Vapor Ray*: Mit Press.
- Kohn E (2013) *How Forests Think: Toward an Anthropology Beyond the Human*: University of California Press.

-
- Kolbert E (2014) *The Sixth Extinction: An Unnatural History*: Bloomsbury Publishing.
- Kuhn TS (1962) *The Structure of Scientific Revolutions*, Chicago: University of Chicago Press.
- Last A (2013) *Super-Natural Futures: One Possible Dialogue between Afrofuturism and the Anthropocene* Available at: <https://mutablematter.wordpress.com/2013/08/13/super-natural-futures-one-possible-dialogue-between-afrofuturism-and-the-anthropocene/>. [accessed June 2016].
- Last A (2015) We Are the World? Anthropocene Cultural Production between Geopoetics and Geopolitics. *Theory, Culture & Society*. doi: 10.1177/0263276415598626
- Latour B (1993) *We Have Never Been Modern*, Cambridge, Mass.: Harvard University Press.
- Latour B (2004) *Politics of Nature: How to Bring the Sciences into Democracy*, Cambridge: Harvard University Press.
- Latour B (2010) An Attempt at a "Compositionist Manifesto". *New Literary History* 41(3): 471-490.
- Latour B (2011a) From Multiculturalism to Multinaturalism: What Rules of Method for the New Socio-Scientific Experiments? *Nature + Culture* 6(1): 1-17.
- Latour B (2011b) Love Your Monsters. In: Shellenberger M and Nordhaus T (eds) *Love Your Monsters: Postenvironmentalism and the Anthropocene*. Breakthrough Institute.
- Latour B (2015) Fifty Shades of Green. Presentation to the Panel on Modernism at the Breakthrough Dialog.
- Law J (2015) What's Wrong with a One-World World? *Distinktion: Scandinavian Journal of Social Theory* 16(1): 126-139.
- Leigh Star S (2010) This Is Not a Boundary Object: Reflections on the Origin of a Concept. *Science, Technology & Human Values* 35(5): 601-617.
- Lewis SL and Maslin MA (2015a) Defining the Anthropocene. *Nature* 519(7542): 171-180.
- Lewis SL and Maslin MA (2015b) A Transparent Framework for Defining the Anthropocene Epoch. *The Anthropocene Review* 2(2): 128-146.

-
- Lorimer J (2007) Nonhuman Charisma. *Environment and Planning D-Society & Space* 25(5): 911-932.
- Lorimer J (2015) *Wildlife in the Anthropocene: Conservation after Nature*, Minneapolis: University of Minnesota Press.
- Lövbrand E, Beck S, Chilvers J, Forsyth T, Hedrén J, Hulme M, Lidskog R and Vasileiadou E (2015) Who Speaks for the Future of Earth? How Critical Social Science Can Extend the Conversation on the Anthropocene. *Global Environmental Change* 32: 211-218.
- Lövbrand E, Stripple J and Wiman B (2009) Earth System Governmentality Reflections on Science in the Anthropocene. *Global Environmental Change-Human and Policy Dimensions* 19(1): 7-13.
- Lovelock JE and Margulis L (1974) Atmospheric Homeostasis by and for the Biosphere: The Gaia Hypothesis. *Tellus A* 26(1-2).
- Lynas M (2011) *The God Species : How the Planet Can Survive the Age of Humans*, London: Fourth Estate.
- MacFarlane R (2015) Why We Need Nature Writing. *New Statesman* 2 September.
- Malm A and Hornborg A (2014) The Geology of Mankind? A Critique of the Anthropocene Narrative. *The Anthropocene Review* 1(1): 62-69.
- Marris E (2011) *Rambunctious Garden: Saving Nature in a Post-Wild World*, New York, NY: Bloomsbury USA.
- Maslin MA and Lewis SL (2015) Anthropocene: Earth System, Geological, Philosophical and Political Paradigm Shifts. *The Anthropocene Review* 2(2): 108-116.
- McCarthy C (2006) *The Road*, New York: Knopf.
- McKibben B (1990) *The End of Nature*, New York: Anchor Books.
- Meillassoux Q (2012) Metaphysics and Fiction About the Worlds Beyond Science. *Purple Magazine* 18.
- Meillassoux Q (2015) *Science Fiction and Extro-Science Fiction*: Univocal Publishing LLC.
- Merchant C (1989) *The Death of Nature : Women, Ecology, and the Scientific Revolution*, New York: Harper & Row.
- Minteer BA and Pyne SJ (2015) *After Preservation: Saving American Nature in the Age of Humans*: University of Chicago Press.

-
- Monastersky R (2015) Anthropocene: The Human Age. *Nature* 519(7542): 144-147.
- Moore J (2014) The Capitalocene. Part I: On the Nature & Origins of Our Ecological Crisis. <http://www.jasonwmoore.com>. [accessed June 2016].
- Morton T (2010) *The Ecological Thought*, Cambridge, Mass.: Harvard University Press.
- Morton T (2013) *Hyperobjects: Philosophy and Ecology after the End of the World*: University of Minnesota Press.
- Negarestani R (2008) *Cyclonopedia: Complicity with Anonymous Materials*: re.Press.
- Nordhaus T, Shellenberger M and Mukuno J (2015) Ecomodernism and the Anthropocene: Humanity as a Force for Good. *Breakthrough Journal* 5.
- Oldfield F (2016) Paradigms, Projections and People. *The Anthropocene Review*.
- Oreskes N and Conway EM (2014) *The Collapse of Western Civilization: A View from the Future*: Columbia University Press.
- Palsson G, Szerszynski B, Sörlin S, Marks J, Avril B, Crumley C, Hackmann H, Holm P, Ingram J, Kirman A, Buendía MP and Weehuizen R (2013) Reconceptualizing the ‘Anthropos’ in the Anthropocene: Integrating the Social Sciences and Humanities in Global Environmental Change Research. *Environmental Science & Policy* 28: 3-13.
- Parikka J (2014) *The Anthrobscene*: University of Minnesota Press.
- PECS (2015) *Seeds of a Good Anthropocene*. Available at: <http://www.pecs-science.org/>. [accessed June 2016].
- Povinelli E (2015) Routes/Worlds. *e-flux* 27.
- Purdy J (2015) *After Nature a Politics for the Anthropocene*, Harvard: Harvard University Press.
- Raworth K (2014) Must the Anthropocene Be a Manthropocene? *The Guardian*. London. www.theguardian.com/commentisfree/2014/oct/20/anthropocene-working-group-science-gender-bias [accessed June 2016].
- Reddy E (2014) What Does It Mean to Do Anthropology in the Anthropocene? *Platypus. The CASTEC blog*. Available from: <http://blog.castac.org/2014/04/what-does-it-mean-to-do-anthropology-in-the-anthropocene/> [accessed June 2016].
- Robbins P and Moore SA (2013) Ecological Anxiety Disorder: Diagnosing the Politics of the Anthropocene. *Cultural Geographies* 20(1): 3-19.

-
- Robin L, Avango D, Keogh L, Möllers N, Scherer B and Trischler H (2014) Three Galleries of the Anthropocene. *The Anthropocene Review* 1(3): 207-224.
- Rowan R (2015) Extinction as Usual?: Geo-Social Futures and Left Optimism. *e-flux* e-flux journal at the 56th Venice Biennale.
- Ruddick S (2015) Situating the Anthropocene. Planetary Urbanization and the Anthropological Machine. *Urban Geography* 36(8): 1113-1130.
- Ruddiman W (2003) The Anthropogenic Greenhouse Era Began Thousands of Years Ago. *Climatic Change* 61(3): 261-293.
- Ruddiman WF, Ellis EC, Kaplan JO and Fuller DQ (2015) Defining the Epoch We Live In. *Science* 348(6230): 38-39.
- Rudwick MJS (1985) *The Great Devonian Controversy: The Shaping of Scientific Knowledge among Gentlemanly Specialists*: University of Chicago Press.
- Rull V (2013) A Futurist Perspective on the Anthropocene. *Holocene* 23(8): 1198-1201.
- Saldanha A (2013) Some Principle of Geocommunism. *Geocritique*.
<http://www.geocritique.org/arun-saldanha-some-principles-of-geocommunism/> [accessed June 2016].
- Saraceno T, Engelmann S and Szerszynski B (2015) Becoming Aerosolar: From Solar Sculptures to Cloud Cities. In: Davis H and Turpin E (eds) *Art in the Anthropocene: Encounters among Aesthetics, Politics, Environments and Epistemologies*. London: Open Humanities Press, 57-62.
- Schellnhuber HJ (1999) 'Earth System' Analysis and the Second Copernican Revolution. *Nature* 402: C19-C23.
- Schumacher EF (1973) *Small Is Beautiful: Economics as If People Mattered*: Blond and Briggs.
- Schumacher EF (1977) *A Guide for the Perplexed*: Harper Colophon Books.
- Smaje C (2015) Dark Thoughts on Ecomodernism. *Dark Mountain Blog*. <http://dark-mountain.net/blog/dark-thoughts-on-ecomodernism-2/> [accessed June 2016].
- Steffen W, Broadgate W, Deutsch L, Gaffney O and Ludwig C (2015) The Trajectory of the Anthropocene: The Great Acceleration. *The Anthropocene Review* 2(1): 81-98.
- Steffen W, Grinevald J, Crutzen P and McNeill J (2011a) The Anthropocene: Conceptual and Historical Perspectives. *Philosophical Transactions of the*

-
- Royal Society A: Mathematical, Physical and Engineering Sciences*
369(1938): 842-867.
- Steffen W, Persson Å, Deutsch L, Zalasiewicz J, Williams M, Richardson K, Crumley C, Crutzen P, Folke C, Gordon L, Molina M, Ramanathan V, Rockström J, Scheffer M, Schellnhuber HJ and Svedin U (2011b) The Anthropocene: From Global Change to Planetary Stewardship. *Ambio* 40(7): 739-761.
- Strauss K (2014) These Overheating Worlds. *Annals of the Association of American Geographers* 105(2): 342-350.
- Subcommission on Quaternary Stratigraphy (2015) *Working Group on the the 'Anthropocene'*. Available at:
<http://quaternary.stratigraphy.org/workinggroups/anthropocene/> [accessed June 2016].
- Sundberg J (2014) Decolonizing Posthumanist Geographies. *Cultural Geographies* 21(1): 33-47.
- Swanson H, Bubandt N and Tsing A (2015) Less Than One but More Than Many: Anthropocene as Science Fiction and Scholarship-in-the-Making *Environment and Society* 6 149–166.
- Swyngedouw E (2010) Apocalypse Forever?: Post-Political Populism and the Spectre of Climate Change. *Theory, Culture & Society* 27(2-3): 213-232.
- Szerszynski B (2015) Commission on Planetary Ages Decision Cc87966424/49: The Onomatophore of the Anthropocene. In: Hamilton C, Gemenne F and Bonneuil C (eds) *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch*. London: Routledge, 177-183.
- Todd Z (2015) Indigenizing the Anthropocene. In: Davis H and Turpin E (eds) *Art in the Anthropocene: Encounters among Aesthetics, Politics, Environments and Epistemologies*. London: Open Humanities Press, 241-254.
- Todd Z (2016) An Indigenous Feminist's Take on the Ontological Turn: 'Ontology' Is Just Another Word for Colonialism. *Journal of Historical Sociology* 29(1): 4-22.
- Trexler A (2015) *Anthropocene Fictions: The Novel in a Time of Climate Change*: University of Virginia Press.
- Tsing AL (2015) *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*: Princeton University Press.

-
- Uhrqvist O (2015) One Model to Fit All? The Pursuit of Integrated Earth System Models in Gaim and Aimes. *Historical Social Research-Historische Sozialforschung* 40(2): 271-297.
- Uhrqvist O and Linnér B-O (2015) Narratives of the Past for Future Earth: The Historiography of Global Environmental Change Research. *The Anthropocene Review* 2(2): 159-173.
- Uhrqvist O and Lövbrand E (2013) Rendering Global Change Problematic: The Constitutive Effects of Earth System Research in the Igbp and the Ihdp. *Environmental Politics* 23(2): 339-356.
- van Dooren T (2014) *Flight Ways: Life and Loss at the Edge of Extinction*: Columbia University Press.
- Vince G (2014) *Adventures in the Anthropocene: A Journey to the Heart of the Planet We Made*: Random House UK.
- von Mossner A (2014) Science Fiction and the Risks of the Anthropocene: Anticipated Transformations in Dale Pendell's the Great Bay. *Environmental Humanities* 5: 203-216.
- Walker M, Gibbard P and Lowe J (2015) Comment on "When Did the Anthropocene Begin? A Mid-Twentieth Century Boundary Is Stratigraphically Optimal" by Jan Zalasiewicz Et al. (2015), *Quaternary International*, 383, 196–203. *Quaternary International* 383: 204-207.
- Wark M (2015) *Molecular Red: Theory for the Anthropocene*: Verso Books.
- Waters C, Zalasiewicz J, Williams M, Ellis M and Snelling A (2014a) A Stratigraphical Basis for the Anthropocene. London: Geological Society.
- Waters CN, Zalasiewicz JA, Williams M, Ellis MA and Snelling AM (2014b) A Stratigraphical Basis for the Anthropocene? *Geological Society, London, Special Publications* 395(1): 1-21.
- Weisman A (2007) *The World without Us*: Virgin.
- Williams M, Zalasiewicz J, Haff P, Schwägerl C, Barnosky AD and Ellis EC (2015) The Anthropocene Biosphere. *The Anthropocene Review*. 2 (3) 196-219.
- Wolff EW (2014) Ice Sheets and the Anthropocene. *Geological Society, London, Special Publications* 395(1): 255-263.
- Wuerthner G, Crist E and Butler T (2014) *Keeping the Wild: Against the Domestication of Earth*: Island Press.

-
- Yusoff K (2013) Geologic Life: Prehistory, Climate, Futures in the Anthropocene. *Environment and Planning D: Society and Space* 31(5): 779-795.
- Yusoff K (2015a) Anthropogenesis: Origins and Endings in the Anthropocene. *Theory, Culture & Society*. 33 (2) 3-28.
- Yusoff K (2015b) Geologic Subjects: Nonhuman Origins, Geomorphic Aesthetics and the Art of Becoming Inhuman. *Cultural Geographies* 22(3): 383-407.
- Yusoff K, Grosz E, Clark N, Saldanha A, Yusoff K, Nash C and Grosz E (2012) Geopower: A Panel on Elizabeth Grosz's Chaos, Territory, Art: Deleuze and the Framing of the Earth. *Environment and Planning D: Society and Space* 30(6): 971-988.
- Zalasiewicz J (2008) *The Earth after Us: What Legacy Will Humans Leave in the Rocks?:* OUP Oxford.
- Zalasiewicz J, Waters CN, Williams M, Barnosky AD, Cearreta A, Crutzen P, Ellis E, Ellis MA, Fairchild IJ, Grinevald J, Haff PK, Hajdas I, Leinfelder R, McNeill J, Odada EO, Poirier C, Richter D, Steffen W, Summerhayes C, Syvitski JPM, Vidas D, Wagnreich M, Wing SL, Wolfe AP, An Z and Oreskes N (2015) When Did the Anthropocene Begin? A Mid-Twentieth Century Boundary Level Is Stratigraphically Optimal. *Quaternary International* 383: 196-203.
- Zalasiewicz J, Williams M, Fortey R, Smith A, Barry TL, Coe AL, Bown PR, Rawson PF, Gale A, Gibbard P, Gregory FJ, Hounslow MW, Kerr AC, Pearson P, Knox R, Powell J, Waters C, Marshall J, Oates M and Stone P (2011) Stratigraphy of the Anthropocene. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 369(1938): 1036-1055.