As you read this article every breath you take in contains about 400 parts per million (ppm) of carbon dioxide, around a third more than your great grandparents breathed 100 years ago. As well as leading to potentially catastrophic global warming, carbon dioxide in the atmosphere has changed the way plants photosynthesise and has also made seas and lakes more acidic, more so than they have been for the last 800,000 years. The effect human activity is having in the world is on such a huge scale that, for a growing number of thinkers, Earth has entered a new geological epoch defined by human activity. Using the Greek word Anthropos (human) they propose to name this epoch the Anthropocene.

This is not just about carbon dioxide emissions. Plastic, invented not much more than 100 years ago, now forms huge swirling islands in the oceans and plastic and aluminium waste, which one study refers to as “technofossils”, can be found in sediments. One study sampled marine fish and found that more than a quarter had plastic in their bodies. The invention of synthetic fertilisers has

1 Go to www.co2.earth. This article benefitted from feedback from Alex Callinicos, Joseph Choonara, Martin Empson and Ian Rappel.
2 Lewis, 2009.
3 Zalasiewicz and others, 2015.
4 Gruber, 2015.
meant that more nitrogen is now being added to the environment by humans than by all other processes; this has allowed levels of nitrogen and phosphorous in soils to double in the past century. Radionucleotides produced by nuclear energy and nuclear weapons testing can also be detected in the soil. And species extinction is at least 100 times higher than it would be without human intervention. These changes can be detected across vast areas of the earth, the seas, the atmosphere and in the bodies of living things. And all of them would not have taken place without humans. The Anthropocene means an uncertain future, where human activity is in danger of pushing planetary conditions away from a “safe operating space” for humanity towards a completely different type of world to which human societies may not even have time to adapt.

The term “Anthropocene” was first coined by two earth system scientists, Paul Crutzen and Eugene Stoermer, in a short article in 2000 for the newsletter of the International Geosphere-Biosphere Programme. Geologists conventionally divide up historical time into eons, eras, periods, epochs and ages. Currently we are in the Phanerozoic eon, the Cenozoic era and the quaternary period. The quaternary is conventionally divided further into two epochs: Pleistocene and Holocene. The Pleistocene was marked by huge climatic fluctuations and repeated ice ages in the Northern hemisphere. The last time the glaciers retreated was the start of the Holocene. Now Crutzen and Stoermer are arguing that the current geological epoch can no longer be described as the Holocene. For them, humans have recently become a much more significant force than in the Holocene and are likely to “remain a major geological force for many millennia, maybe millions of years, to come”.

“What matters when dividing geological-scale time is global-scale changes to Earth’s status, driven by causes as varied as meteor strikes, the movement of continents and sustained volcanic eruptions.” For some, humanity’s effect on the planet is so profound that we can be likened to such events. We are like the asteroid strike and related events that killed off the non-avian dinosaurs and started the Cenozoic era (sometimes referred to as the age of mammals) 65 million years ago. For others, humanity is so deeply implicated in planetary processes

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5 Vaughan, 2016.
6 Monastersky, 2015.
7 Angus, 2016a.
8 Crutzen and Stoermer, 2000. The IGBP was itself set up in 1987 as a result of an increasing realisation of the need to study the interactions between human societies and Earth’s physical, chemical and biological processes, often described as a singular “Earth system”—www.igbp.net/
9 Angus, 2015a.
10 Lewis and Maslin, 2015.
that we are a constant presence; we are like the weather. As Simon Lewis points out, the diagnosis of the Anthropocene represents a shift in the way humanity sees itself. Scientists in the past have shown humanity how insignificant we are; Copernicus discovered that we are not the centre of the universe and Charles Darwin showed that we are not at the top of an evolutionary hierarchy. But now “the future direction of the only place in the universe where we know life exists is in our hands. Suddenly, after almost 500 years, humanity is centre stage again”.

Since 2000 the usage of the term Anthropocene has spread far beyond the small group of scientists who came up with the idea. There are now dozens of books with the word in the title covering subjects from the effects of climate change on polar ice caps and the ecology of coastal ecosystems to philosophy, art and architecture in the Anthropocene. Numerous blogs discussing the Anthropocene have been set up, articles written and events held to discuss the issue. The idea has also captured the imagination of artists like Jason deCaires Taylor, whose 2011 piece “Anthropocene” is an underwater sculpture of a Volkswagen Beetle with a girl curled up on the windscreen. The sculpture demonstrates the connection between human-made items and the lives of other species by acting as an artificial reef that is designed to attract lobsters to come and live inside it.

The Anthropocene can prompt us to rethink our ideas about the relationship between humans and (the rest of) nature, the role scientists might play in progressive politics and the centrality of environmental ideas to Marxist theory. However, the idea has not been universally accepted by Marxists. Some, such as John Bellamy Foster and Ian Angus, endorse the concept of the Anthropocene wholeheartedly while others, including Naomi Klein, argue that the idea is unhelpful or even damaging for the goal of bringing about a more environmentally just society. This article summarises some of the debates among scientists, explains the criticisms of some on the left and concludes by arguing that, nevertheless, the idea remains useful and that Marxists should seek to use our existing tools to understand the phenomenon.

**When did the Anthropocene begin?**
Neither of the two authors to first use the term Anthropocene is a geologist (Crutzen is a Nobel Prize winning atmospheric chemist famous for his work on the depletion of the ozone layer, Stoermer is a freshwater biologist). But it

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11 The term “human weather” is associated with Erle Ellis (Ellis, 2016).
12 Lewis, 2009.
13 Angus, 2015a.
14 Go to www.underwatersculpture.com/sculptures/anthropocene/
15 See Foster, 2016, and Angus, 2016b.
is normally the task of geologists to decide when one epoch ends and another begins. Boundaries between geological time units represent major changes in the Earth system which have often involved rapid changes in the type of species on Earth as well as signatures in the rock strata. The start of the Cenozoic era was marked by a dramatic loss of species including extinction for all the non-avian dinosaurs (the K-T extinction). It was the start of the era of birds and mammals. As well as changes in the fossil record, geologists prefer to find a marker of a specific event—known as a “golden spike”—in rock, sediment or glacier ice. So a peak in the levels of the element iridium found in the rocks at El Kef, Tunisia, is consistent with the idea that a meteor hit Earth at this time and provides an official geological marker for the Cenozoic. 16 The golden spike need not represent the most important thing that happened at the boundary between time periods, it simply serves as a marker that geologists can agree on. 17 Indeed, recent research suggests that the dinosaurs were already dying out, clearing the way for the evolution of mammals, and that the meteor strike itself was merely the final nail in the coffin. 18

At the time of writing the Anthropocene Working Group within the International Commission on Stratigraphy are still debating various options for a start date. They plan to make a formal proposal to the commission, which has the ultimate authority in describing geological time periods, later in 2016. However, at present they say they are far from reaching a decision. 20 But despite the glacial pace of geological decision-making, there is already debate about the proposed start date of the new epoch. One proposal is that the Anthropocene actually began 11,700 years ago, which by convention we currently think of as the start of the Holocene (so Holocene could be renamed “Anthropocene” or geologists could keep the existing terminology and simply accept that the Holocene has been the real age of humans all along). The Holocene is when the last ice age ended; the relatively warm temperatures in the Northern hemisphere allowed human civilisations to spread throughout the globe and agriculture to develop. 21 Other proposals for an “early Anthropocene” push the start date back even further in time, to when humans caused the extinction of many large mammals or even to the first surviving evidence of any human activity.

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16 A golden spike can also be referred to as a GSSP (Global Stratotype Section and Point).
17 The actual impact took place not in Tunisia but in Mexico’s Yucatán Peninsula.
18 Lewis and Maslin, 2015.
19 Eleftheriou-Smith, 2016.
20 Monastersky, 2015; see also http://quaternary.stratigraphy.org/workinggroups/anthropocene/
21 The GSSP for this is a shift in the levels of deuterium in the Greenland ice core 11,700 years ago. This is evidence of global warming at the time.
There is some justification for dating the start of the Anthropocene back this far. The Holocene epoch was even described in other early geology manuals as the “anthropozoic” and the “age of mind and era of man”. In the Soviet Union Aleksei Pavlov and Vladimir Vernadsky both developed an understanding of the role of human agency in environmental transformation similar to theories of the Anthropocene today. The latter, writing in 1945, was already describing humans as a geological force.22

An early Anthropocene start date would reflect the fact that the human species has always lived in a complex and developing relationship with our external environment, adapting our local environmental conditions to suit our needs throughout much of human history. We have been domesticating animals and crop plants for thousands of years.23 The development of agriculture in the Holocene influenced the way human societies have developed, allowing for the establishment of settlements and class and gender divisions within these societies. Judith Orr provides an overview of how human societies have developed in relationship with the environment throughout history with a particular emphasis on gender relations. She points out that, rather than being “a static backdrop to our lives”, the environment “undergoes perpetual change and is also itself in part human-made”.24

Another proposal for the start of the Anthropocene suggested by Mark Maslin and Simon Lewis at UCL is the time of the first contact between the new and old worlds after 1492. Humans introduced new world crops such as maize and potatoes to Europe, Asia and Africa and transported wheat and sugarcane to the Americas causing significant changes to ecosystems that were irreversible, occurred all over the world and can be detected by identifying the appearance of new types of fossilised pollen. This period of history is referred to as “the Great Transformation” in Chris Harman’s A People’s History of the World as it was also the time of the renaissance and the associated “flowering of art and literature and scientific ideas”.25 But, as Harman also describes, the “discovery” and conquest of the New World brought slavery, famine and disease to many of the people living there. One Spanish observer described the effects on the Inca Empire: “infinite deserted villages on all the roads in the kingdom”.26 The human population of

22 Lewis and Maslin, 2015. See also Foster, 2015, for an overview of the contribution to environmental thinking made by scientists in the Soviet Union, which he argues owed a lot to Marx’s dialectical and materialist understanding.
23 Agriculture, and emissions from livestock and forest clearing, have had an effect on the planet’s temperature from early in the Holocene and may have prevented global cooling that might otherwise have occurred—Zalasiewicz, Williams, Steffen and Crutzen, 2010.
24 Orr, 2015, pp34-51.
26 Quoted in Harman, 1999, p171.
the Americas declined from an estimated 54 million to 6 million by 1650 and, with fewer people to farm the land, forests started to return and levels of carbon dioxide in the atmosphere dipped. The drop in carbon dioxide level (it reached its lowest in 1610) could serve as a geological marker for this event as it can be detected in Antarctic ice. The macabre hypothesis is that it may have been the deaths of millions of humans that marked the point when humanity became a significant global force.

Crutzen and Stoermer themselves initially suggested that the Anthropocene may have begun towards the end of the 18th century. James Watt developed the steam engine in the late 18th century, patenting the condensing chamber that allowed large engines to be built by 1769. The first use of a coal fired steam engine to power a cotton mill was in Nottinghamshire in 1786. This is also the time when, according to Crutzen and his colleagues, atmospheric greenhouse gas concentrations started to rise. So, whereas for most of the Holocene levels of carbon dioxide in the atmosphere fluctuated—going up or down by up to 5 parts per million (ppm), since the industrial revolution carbon dioxide levels have been rising by 2ppm per year. Crutzen and Stoermer also propose a “great acceleration” around the middle of the 20th century—a “remarkable explosion” in which the levels of carbon dioxide in the atmosphere have begun to shoot up even more rapidly.

Finally, some have proposed that the Anthropocene actually started in 1945. The first nuclear weapons test (and of course the first usage of nuclear weapons in war) took place in this year and testing continued throughout the 1950s and 1960s, declining sharply after the Partial Test Ban Treaty in 1963. The effects of nuclear testing can be detected globally by measuring levels of radioactive isotopes in polar ice, lake sediments and tree rings. There is a clear peak in the levels of carbon isotopes from nuclear weapons in tree rings around this time that could act as a golden spike and it is absolutely unambiguous that this was caused by human activity. This is, of course, extremely recent for geologists used to dealing with time periods of hundreds of thousands of years.

27 Lewis and Maslin, 2015.
28 Malm, 2016, p54.
30 Malm, 2016.
32 Zalasiewicz and others, 2015. The authors of this paper also seem to like the idea that the Anthropocene started with a bomb hitting Earth due the similarity of the event to the meteor strike that heralded the start of the Cenozoic.
33 Lewis and Maslin, 2015.
34 In fact it is standard practice in geology to refer to 1 January 1950 as “the present”.

27 Lewis and Maslin, 2015.
28 Malm, 2016, p54.
30 Malm, 2016.
32 Zalasiewicz and others, 2015. The authors of this paper also seem to like the idea that the Anthropocene started with a bomb hitting Earth due the similarity of the event to the meteor strike that heralded the start of the Cenozoic.
33 Lewis and Maslin, 2015.
34 In fact it is standard practice in geology to refer to 1 January 1950 as “the present”.
Figure 1: Global real GDP, primary energy use and atmospheric carbon dioxide

Source: Steffen and others, 2015
Like the iridium deposits that mark the start of the Cenozoic, this does not mean that nuclear weapons testing was the most significant thing that happened at the time. To be considered the start date of the Anthropocene it would merely have to stand in to represent a time in which a profound shift in human societies and a related impact on planetary processes occurred. This is precisely what Earth system scientists are saying has happened at around this time:

The second half of the twentieth century is unique in the entire history of human existence on Earth. Many human activities reached take-off points sometime in the twentieth century and have accelerated sharply towards the end of the century. The last 50 years have without doubt seen the most rapid transformation of the human relationship with the natural world in the history of the species.\(^{35}\)

A recent paper by the Anthropocene working group stated that a mid-20th century start date was geologically plausible and that the middle of the 20th century represented “a pronounced, relatively sharp threshold in human modification of the global environment”.\(^{36}\) The period since the Second World War has involved rapid population growth, urbanisation,\(^ {37}\) the intensification of agriculture and the widespread adoption of consumer goods such as televisions, cars and fridges. A marked increase in the adoption of disposable packaging at this time causing a huge waste problem is just one example of the environmental consequences of the shift.\(^ {38}\) Graphs of primary energy use and carbon dioxide emissions are also both “hockey stick shaped”, showing a notable upturn around mid-century (figure 1).

Debates among geologists about when the Anthropocene began may seem far removed from, or even a distraction from, the more urgent task of dealing with issues like climate change. However, differing views on when the Anthropocene began are often associated with very different interpretations of both its causes and potential solutions. Advocates of the various early Anthropocene hypotheses have been criticised for “normalising” global environmental change.\(^ {39}\) By arguing that the environmental problems of today have their roots in the emergence of human civilisation, early Anthropocene theorists play down the dangerous effects of climate change and the speed with which these

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\(^{35}\) Steffen and others, 2004, p258. The time period of roughly 50 years ago is also consistent with the notion of a great acceleration although this is increasingly coming to be seen as the start of the Anthropocene epoch rather than a turning point within it.

\(^{36}\) Zalasiewicz and others, 2015.

\(^{37}\) The majority of people worldwide now live in cities.


\(^{39}\) Lewis and Maslin, 2015.
environmental problems need to be addressed to avoid a catastrophe. This loses the power to shock that is one of the intriguing things about the Anthropocene diagnosis in the first place. Ian Angus supposes that these views are being promoted by anti-environmental lobbyists.\textsuperscript{40}

Holocene conditions could hardly be described as benign. There have been disasters such as earthquakes, volcanoes, tsunamis and famines throughout the epoch. For much of the world’s human population life has always been precarious. Nonetheless, the Holocene is often thought of as relatively conducive to human wellbeing compared to what the Anthropocene might bring: “Holocene conditions are the only ones that we know for sure are compatible with complex human societies”\textsuperscript{41}. Therefore, Angus prefers the idea that the Anthropocene started in the mid-20th century and refers to a global catastrophe with a very rapid onset that the left should move quickly to address.

**How not to talk about the Anthropocene**

There is a particular narrative associated with the Anthropocene that is highly problematic politically. The standard narrative goes something like this: there is something inherently destructive about humans; it is therefore inevitable that we have now reached the Anthropocene; all humans are implicated in this to some extent; as there is little we can do to change human nature we may need to take drastic measures (geoengineering) to fix the problem. For some proponents of the standard Anthropocene narrative, humanity’s ability to use fire has led humans to manipulate the planet like no other species. When we figured out how to start fires in the distant past, it led in a linear progression to a situation where humans would at some point learn how to extract fossil fuels. We would inevitably end up burning those too. This kicked off a chain of events that led to a rapid expansion in fossil fuel use and the skyrocketing carbon emissions we can observe today. According to one scientific paper: “The mastery of fire by our ancestors provided humankind with a powerful monopolistic tool unavailable to other species that put us firmly on the long path towards the Anthropocene”\textsuperscript{42}.

This narrative involves a paradox. Humans seem to have more agency than we have ever had in the past. For the first time in human history we are able to push the whole planet into a new epoch; we are in the driving seat in a way we have never been before even though it seems we are intent on crashing the train. However, it is also assumed that we have very little agency actually to change the situation, faced as we are with the prospect of unleashing global forces

\textsuperscript{40} Angus, 2015b.
\textsuperscript{41} Angus, 2016a.
\textsuperscript{42} Steffen and others, 2007. See Malm, 2015a, for a critique of this thinking.
that we have little power over except perhaps by unprecedented technological intervention.

Anthropocene scientists have referred to the “great forces” of nature, arguing that: “human activities have become so pervasive and profound that they rival the great forces of Nature”.\(^43\) This evokes the narcissistic notion that humanity is separate from the rest of nature and acts in opposition to it. In contemporary environmentalism, including in some discussions of the Anthropocene, this separation of nature from society is particularly problematic. It provides a philosophical underpinning to the notion that humans are nothing but an impact on “nature” and that the best thing we could do to “save nature” would be to scale back “our” impacts and try to leave the rest of the world alone as much as possible. The standard narrative implies that “nature” was somehow pristine and unspoilt before human influence reached the levels that it presently has. Scientists have even stated that: “Earth has now left its natural geological epoch”,\(^44\) implying that there was something “natural” about the Holocene epoch. Recall that the Holocene itself only represents a very short period in geological terms, essentially a mere interval between ice ages, and that humans were already starting to influence the external environment during this time.

At the same time we are told we are overcoming the forces of nature, we are also a force of nature ourselves; human destructiveness is seen as somehow intrinsic to our own human nature. The Anthropocene is seen as simultaneously both a natural and an unnatural phenomenon.\(^45\) By contrast a Marxist approach (of which more later) would need to proceed from a much more sophisticated, dialectical understanding of the role of humans within the natural world.

The dominant Anthropocene narrative has been criticised as post-political, defined as “a socio-political arrangement that replaces ideological contestation and struggles by techno-managerial planning” and where “the space for political contestation, debate and reorientation is also restricted.”\(^46\) In other words, the narrative (as with some of the narratives around climate change) tells us that we are all in it together. We are all, whatever political views we might hold, faced with the same overwhelming threat and we can all agree on its urgency. Therefore we are told that we should put aside any differences of opinion over the nature of the problem and work together to achieve a common solution. This tends to restrict political debate to very narrow questions around the type of technology to adopt.

\(^{43}\) Steffen and others, 2007.
\(^{44}\) Steffen and others, 2007.
\(^{46}\) Lövbrand and others, 2015.
Perhaps unsurprisingly then, Crutzen himself has suggested that high-tech geoengineering solutions might be needed to solve climate change. He has been sceptical about whether humans can get out of the climate situation quickly enough by political means and he favours a strategy of trying to cool the climate by firing sulphur into the air.47 There should be a much wider debate on the left about geoengineering and it is beyond the scope of this article to discuss the issue in full. However, one criticism of this approach, as a technological solution to a problem caused by capitalist society, is that even if one of the various proposals actually works (by no means guaranteed), it would address the symptoms but not the ultimate cause of climate change. Cooling the planet down would not solve any of the other multiple environmental problems beyond global warming and would almost certainly have its own negative consequences.

A more immediate concern is that, as climate scientist Kevin Anderson has pointed out, the promise of possible geoengineering fixes in the future can feed into political inaction today. The targets for greenhouse gas reduction set at the most recent UN talks in Paris fell short of the radical action that is needed as they were premised on the idea that humanity would, at some point, come up with a way of sucking carbon dioxide out of the air. Although it is not Crutzen’s intention, geoengineering may have gone from being a “last ditch Plan B” to part of the only plan. 48

Related to the post-political narrative is the perverse idea that the Anthropocene is “good” or “great” and is something to be embraced. Erle Ellis points out that Homo sapiens is not the first species to have altered its external environment—when green plants first evolved they changed the atmosphere dramatically by producing oxygen, for example. But humans are, unlike plants, conscious of the effect we have on the rest of the planet and able to change our actions. This is a reasonable point to make, but for Ellis it comes tied to the idea that we have finally “woken up” to the negative effects we are having and just need to put the knowledge that we are in the Anthropocene to good use:

The boom in Anthropocene discussions might itself indicate that societies are waking up to the realities of becoming a global force in the Earth system...we might guide this new “great force of nature” toward better outcomes for both humanity and nonhuman nature. It is time to embrace what makes us human, ultrasociality, and turn it towards the grand challenges of the Anthropocene—to intentionally build better societies and cultures of nature.49

49 Ellis, 2016.
Advocates of the idea of a good Anthropocene have described it as a great opportunity to offer an “optimistic vision” of a future society founded on increased use of technology. They have even criticised mainstream environmentalists as being too pessimistic in raising concerns about natural disasters or resource depletion. Again there seems to be little discussion of who will be responsible for implementing all the proposed technological innovations.50

However, not everyone who uses the term Anthropocene has adopted the dualistic thinking of the standard narrative. For some commentators, rather than demonstrating the human impact on nature, the Anthropocene idea is useful precisely because it forces us to acknowledge how closely entangled human activity is with the rest of nature. After all, every terrestrial living thing lives in an environment that has a higher concentration of greenhouse gases in it than it would without humans. Therefore, the Anthropocene idea could also make a contribution to a body of work within the social sciences that has always criticised the concept of “nature” as something separate from human society. One example of such an approach—although not written from a Marxist perspective—is Jamie Lorimer’s book *Wildlife in the Anthropocene*, which uses the idea of the Anthropocene to draw attention to the wildlife that lives in human created environments such as cities, therefore criticising the association of nature with “wilderness”.51

**An Anthropocene myth?**

One of the most persistent critics from a left wing perspective of the Anthropocene narrative is Andreas Malm. Malm is an academic at Lund University in Sweden and an activist who is rightly strongly critical of the lack of action by delegates at the Paris talks in 2015. He calls for “militant resistance on the streets” to confront climate change.52 Clearly he is far from being complacent about the scale of today’s environmental problems. So why does he refer to the “Anthropocene Myth”?52

In his critique of these ideas Malm returns to Crutzen’s suggestion that the Anthropocene began with the invention of the steam engine, the industrial revolution and the associated increase in fossil fuel use. He offers an important counter-narrative to the idea that this was a direct result of humankind’s earlier mastery of fire, pointing out that Crutzen and others do not say a lot about what actually caused the adoption of steam power in Britain around the 1830s. Basing his arguments on a detailed historical analysis, he shows how the rise of the steam engine came about in a capitalist society and served a particular purpose at the time.

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50 Angus, 2015b.
51 Lorimer, 2015.
52 Malm, 2015b.
Interestingly, Malm argues that steam engines were not technologically superior to alternative forms of technology such as the water wheel, either in the amount of energy that could be produced or how cheaply it could be produced. In fact for an individual factory owner buying coal was the more expensive option. However, coal did offer several other advantages for the capitalist: It provided a regular supply of energy; it didn’t require different capitals to band together and invest in infrastructure in the way that water did; it could be used at a convenient time of day; and perhaps most notably, steam power brought industrial production into cities like Manchester. Cities increasingly provided a plentiful supply of cheap and exploitable labour power; it was hoped that workers in urban areas would be more easily forced to accept the discipline of factory life. Note that, for Malm, steam power was “presupposed” by an early capitalist system in which a small minority owned the means of production and much of the rest of society were being drawn into wage labour:

While it is admittedly banal to point out, steam engines were not adopted by some natural-born deputies of the human species. The choice of a prime mover in commodity production could not possibly have been the prerogative of that species, since it presupposed, for a start, the institution of wage labour. It was the owners of the means of production who installed the novel prime mover.

Central to this argument is the idea that climate change is political, and the adoption of coal came about as a result of class struggle. In this particular struggle in Britain in the 19th century it was the ruling class who won and got to implement their technology at the expense of workers. The Anthropocene was brought about consciously, not in the sense that capitalists then could have understood or predicted climate change, but nevertheless they did take concerted action, in the face of fierce resistance, to shift to burning fossil fuels. It didn’t just happen as part of some natural process of human evolution.

Another point that follows from Malm’s general line of argument is that, of course, we as the human race are not all equally responsible for the burning of fossil fuels. The shift to such a system was brought about by a particular subset of the human species in the 19th century, wealthy, white, British and male. Global warming is anthropogenic; it is caused by human activity. However, to this day the responsibility for carbon emissions cannot possibly be said to lie with humanity as a whole. A person’s individual energy consumption depends to an overwhelming extent on the type of society they live in. The energy consumption of an average Canadian (let alone a rich Canadian with three cars) is a staggering

53 Malm, 2016, and Martin Empson’s review (Empson, 2015a).
54 Malm, 2015a.
1,000 times greater than that of a typical farmer in the Sahel. Overall, the poorest 45 percent of humanity generate just 7 percent of the carbon emissions.\textsuperscript{55}

It is worth noting here that Malm’s argument is not necessarily a critique of the word Anthropocene \textit{per se}. What he objects to is a particular narrative associated with its use.\textsuperscript{56} But equally it is fair to say that he is sceptical about how useful it would be for Marxists to take up the term Anthropocene. As well as calling the Anthropocene a “myth”, he has also stated that the popularity of the idea “may be part of the problem” and is “an indefensible abstraction at the point of departure”.\textsuperscript{57}

There is much to agree with in Malm’s arguments. It makes sense to try to politicise climate change and to point the finger at the capitalists rather than the “Anthropos” or humanity in general. The environment could once again become a site of class struggle. People are starting to engage in climate activism in greater numbers and to adopt radical slogans such as “system change, not climate change”. Struggles over climate jobs, where trade unionists and others demand jobs that could cut emissions, over the local environmental consequences of resource extraction (fracking, tar sands extraction, gold mining, etc) and over the impacts of the extreme weather events that will result from climate change all start to raise the issue that when it comes to climate change we are not “all in it together”.\textsuperscript{58}

However, several commentators, including Marxists, have argued against dismissing the notion of the Anthropocene. Much of Malm’s argument hangs on a critique of Crutzen and of a few others with particularly problematic views. But the debates around the Anthropocene are becoming much wider than that. It seems premature to associate the Anthropocene so closely with the industrial revolution. This is only one of many proposals about the epoch’s start date and one that is unlikely to be accepted. Crutzen and Stoermer themselves were very clear that the industrial revolution start date was just a suggestion and that they expected there would be further debate on the issue.\textsuperscript{59} In fairness to these scientists they are aware that not all humans are equally to blame for climate change. Crutzen himself has argued from early on that only 25 percent of humans are responsible.\textsuperscript{60} After receiving some criticisms from social scientists, further work has been produced that differentiates between humans at least based on whether they live in rich or poor countries, although of course this is not the same as a historical and class analysis of the ultimate roots of the problem.\textsuperscript{61}

\begin{itemize}
\item \textsuperscript{55} Malm, 2016, p169. Malm and Hornborg, 2014.
\item \textsuperscript{56} Malm made this point at a book launch for \textit{Fossil Capital} in London on 2 March 2016.
\item \textsuperscript{57} Malm, 2016, pp32 and 391.
\item \textsuperscript{58} Jeffery, 2015.
\item \textsuperscript{59} Crutzen and Stoermer, 2000.
\item \textsuperscript{60} Crutzen, 2002.
\item \textsuperscript{61} Steffen and others, 2015.
\end{itemize}
Malm tends towards explaining historical developments in terms of class struggle between one group of humans and another where the most powerful group will win out (an approach that could be described as class struggle determinism). This examination of what happens between humans gives very little emphasis to the way human societies develop in a relationship with the rest of nature. Jason Moore has sharply criticised this type of thinking, pointing out that “human activity not only produces biospheric change, but relations between humans are themselves produced by nature”.

Moore argues that the origins of the epoch should be traced to profound shifts in socio-natural relations beginning as far back as the late 15th century with the origins of the capitalist system rather than with the 19th century expansion in fossil fuel use. He says that:

To locate the origins of the modern world with the rise of capitalist civilisation after 1450, with its audacious strategies of global conquest, endless commodification, and relentless rationalisation, is to prioritise the transcendence of the relations of power, knowledge, and capital that have made—and are now unmaking—the modern world as we have known it. Shut down a coal plant, and you can slow global warming for a day; shut down the relations that made the coal plant, and you can stop it for good.

For many, the Anthropocene gives a name to a phenomenon that is actually happening in reality and for which the scientific evidence is overwhelming. What is therefore needed is an understanding of the causes of the Anthropocene rather than a rejection of the word itself. It has also, to some extent, started a discussion among scientists, activists and members of the public about the environment and humanity’s role within it. Greater public awareness of the seriousness of climate change and other environmental issues is surely a positive development.

Towards a Marxist approach

To understand the Anthropocene requires an approach that studies the earth as a complex system in which living things, including humans organised in societies, play an active role. To quote Will Steffen and others:

Crucial to the emergence of this perspective has been the dawning awareness of two aspects of Earth System functioning. First that the earth itself is a single system within which the biosphere is an active, essential component. Secondly, that human activities are now so pervasive and profound in their consequences.

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62 Moore, 2014. See also Moore, 2015.
63 Moore, 2014.
that they affect the earth at a global scale in complex, interactive and apparently accelerating ways.\textsuperscript{64}

Making sense of this system will need ideas from both the social and the natural sciences. And it will require an interpretation of how a complex system can undergo change gradually or abruptly. It is entirely possible to argue that humans have always existed in a complex relationship with our environments but also that there have been recent and decisive shifts in the nature of this relationship and therefore to take the recent Anthropocene proposals seriously. None of this is alien to Marxist thought. In fact the approach outlined by Marx and Engels to humanity’s role within the natural world and subsequently developed by more recent generations of Marxists (from a range of disciplinary backgrounds) offers a sophisticated basis on which to assess the implications of the Anthropocene.

Erle Ellis argues that the Anthropocene requires us to understand why humans, rather than any other species, became a global force. How and why did we go from hunting and gathering to living in agricultural societies and, later, more complex societies with cities, diverse job roles and rapidly developing technology? How did we reach the point where we are not just changing external nature but changing it so profoundly that our influence can be measured in the geological record?\textsuperscript{65} These are questions that Marxism can play a role in answering. Marx begins his own analysis of the labour process in \textit{Capital} by pointing out that humans act on external nature but at the same time also change themselves. It seems he would have agreed on the point that humans have differentiated ourselves from other animals in our ability to transform the rest of the world. He famously argued that: “A spider conducts operations which resemble those of a weaver, and a bee would put many a human architect to shame by the construction of its honeycomb cells. But what distinguishes the worst architect from the best of bees is that the architect builds the cell in his mind before he constructs it in wax.”\textsuperscript{66} So humans are able to manipulate the natural world with a qualitatively greater capacity for conscious and intentional action than other animals (although we are not all-powerful, our actions can also have unforeseen and unintended consequences).

Humans evolved from the same ancestors as other animals so our differentiated abilities cannot have been innate but must have arisen in a process of evolution; Frederick Engels offered one hypothesis as to how human capacities evolved from those of our primate ancestors in his short essay “The Part Played By Labour In The Transition From Ape To Man”.\textsuperscript{67} This transition, he supposed,

\textsuperscript{64} Steffen and others, 2004, p1.
\textsuperscript{65} Ellis, 2016.
\textsuperscript{66} Marx, 1990, p284.
\textsuperscript{67} Engels, 1934.
took place as a result of our ancestors’ manipulation of the external environment mediated by labour. As he concludes:

all the planned action of all animals has never succeeded in impressing the stamp of their will upon the earth. That was left for man. In short, the animal merely uses its environment, and brings about changes in it simply by its presence; man by his changes makes it serve his ends, masters it. This is the final, essential distinction between man and other animals, and once again it is labour that brings about this distinction.68

The transition “from ape to man” represented a qualitative shift in the ways in which humans related to external nature. So Marx and Engels already laid the basis for an understanding of the ways in which a further shift might have taken place as we pushed planetary conditions from Holocene to Anthropocene.

Marx’s point that we change our nature as we adapt external nature is also a starting point for a much more sophisticated understanding of human nature than the simplistic approach associated with some interpretations of the Anthropocene. All humans share basic needs due to our biology such as the need for food, water, sleep and shelter, etc; we can criticise capitalism on the basis that it cannot adequately provide for our needs. But there is no reason to suggest that we have always been individualistic, violent or competitive. Rather “our nature is in a constant process of evolution”69 Our behaviour and psychology have changed dramatically throughout history as we have lived in different types of society. For Marx there is no essential “human essence” that can be abstracted from social relations.70

As some are arguing that there is something innate in humans that compels us to burn fossil fuels, Marxist understandings of human nature and how it developed in line with the needs of different types of society are clearly relevant here. Indeed, the idea of a fixed and inherently destructive human nature that is responsible for environmental problems has been effectively criticised in this journal. For example, in an article on biodiversity conservation Ian Rappel locates the origins of this misanthropic thinking in biological determinism, which suggests that our apparent tendency towards destructive behaviour can be explained by our genetic make-up.71

Human action involves a complex relationship with the natural world but we do not relate to it just as individuals. We are also social beings whose relationship with nature varies with the type of society we live in. Recognising this basic point is central to the approach to environmental issues developed by writers in

68 Engels, 1934.
69 Blackledge, 2007.
70 Blackledge, 2007; Terzakis, 2006.
71 Rappel, 2015.
this journal and elsewhere. It allows us to show how environmental problems arose as societies changed throughout history and serves as a basis on which to study the specific ways in which capitalism is damaging. It also means we can envision a future socialist society where a more rational approach to the environment will correspond to more democratic and egalitarian social relations.\textsuperscript{72}

Although human societies involve a relationship with the environment, capitalism differs from previous societies in its detrimental effects. Whereas feudal lords, for example, would exploit the peasants and serfs, they only needed to do so to satisfy their own material needs and those of their entourage. In a capitalist society individual capitalists are compelled to compete against each other to accumulate more surplus value by exploiting their workforce. If a capitalist fails to extract surplus value and invest it in further production they risk going out of business.\textsuperscript{73} Naomi Klein explains how this happens in the contemporary fossil fuels industry. Companies that do not have access to oil and gas reserves to meet expected future demand lose out as their investors put their money elsewhere and are therefore forced to search the globe for more places where they can drill.\textsuperscript{74} This constant drive towards accumulation turns more and more of the natural world into commodities that can be used. As Jason Moore describes, as capitalism entrenched itself globally from the mid-15th century onwards it stalked the earth in search of more commodities, such as iron, silver, timber and sugar, cutting down forests at a rapid rate as it went.\textsuperscript{75} The development of capitalism has therefore gone hand in hand with a huge expansion in the forces of production—the technology, resources, practices and knowledge available for use in the production process.\textsuperscript{76}

Ian Angus agrees that the problem is capitalism, but says that we should seek to understand the environmental implications of a specific development within capitalism after the Second World War, the advent of monopoly capital. The increasing domination of large monopolies limits competition as small firms are denied access to the market. It leads to the creation of an excess surplus for which there are not enough productive outlets for companies to invest in.\textsuperscript{77} Angus also adds that, rather than just being a marker of the divide between the early 20th century and the later 20th century, the Second World War itself was also significant to the social changes that came after it. He argues that the war left the United States in a much more advantageous economic position compared to

\textsuperscript{72} Empson, 2014 and 2015b.
\textsuperscript{73} Empson, 2014, chapter 11.
\textsuperscript{74} Klein, 2015.
\textsuperscript{75} Moore, 2014 and 2015.
\textsuperscript{76} Empson, 2014, chapter 11.
\textsuperscript{77} Angus, 2015a.
European states, that manufacturing technology was revolutionised during the war and that state investment in armaments and manufacturing more generally continued after the war benefitting US monopolies in particular.\(^78\) Angus makes a general point: socialists should analyse the specific ways in which capitalism has changed during the 20th century as well as the workings of capitalism in the abstract. However, the monopoly capital approach has been criticised for over-emphasising economic stagnation in the US and downplaying the role competition plays in Marxist analysis.\(^79\) As outlined above, competition and the search for profits are the ultimate driving forces behind capitalism’s destructive ecological role rather than stagnation and monopoly.

Marxists have also argued that, rather than simply “acting on” nature, capitalism can be said to reorganise nature. For example, Rappel also describes the creation of a “capitalist ecology” with its own distinctive characteristics including a tendency towards growing crops in monocultures, exhausting supplies of resources and discharging waste into the environment as pollution: “The ecology that is actively engineered under capitalism is one determined by ruling class aspirations for profit.”\(^80\) If Marxists accept that capitalism constructs a particular ecology, it is not much of a leap to suggest that we are in the Anthropocene. In other words, capitalism has allowed the construction of a particular ecology on a global scale and to the extent that the effects of this can now be understood in terms of a shift from one geological epoch to another.

Some have suggested that if environmental problems can be located with capitalism not humanity, “Capitalocene” might be a better word to use.\(^81\) This terminology comes much closer to getting to the root of today’s environmental problems and may yet become more popular, especially among radical social scientists. However, one disadvantage is that it is less likely to be accepted by geologists and other physical scientists (it doesn’t fit with the conventions of geological terminology) as well as those who are concerned about the environment but who don’t (or don’t yet) blame capitalism.\(^82\) As the word “Anthropocene” has already entered common usage it may simply be too late to start proposing alternative terms.

Andreas Malm complains that discussions of the Anthropocene have been dominated by natural scientists and are therefore “the illogical and ultimately self-defeating foray of the natural science community...into the domain of

\(^78\) Angus, 2016b, pp137-145.  
\(^79\) Choonara, 2009.  
\(^80\) Rappel, 2015, p110.  
\(^81\) For example, Moore, 2014.  
\(^82\) Angus, 2016b, pp230-231.
human affairs”. He argues that such people “extend their worldviews to society” and that “geologists, meteorologists and their colleagues are not necessarily well-equipped to study the sort of things that take place between humans”.

The argument that follows is that understanding the growth of fossil fuel use for instance should be left to historians and other social scientists. But Marx and Engels themselves would not have been so dismissive of scientific insights or claimed that natural scientists are stepping out of line if they comment on issues that involve humans. Both took an interest in the scientific discoveries of their own time, particularly Darwin’s theories of evolution. This is not to say that they were uncritical of Darwin’s views, which were often rooted in liberal ideology, but they did see how the kernel of his thinking could be important to the development of their own worldview. In this spirit Ian Angus calls for a synthesis of insights from Earth System science and ecological Marxism. He complains about “carping from the sidelines about the scientists’ lack of social analysis” and argues that instead socialists should pay much more attention to what the physical scientists are saying: “ecosocialists need to approach the Anthropocene project as an opportunity to unite an ecological Marxist analysis with the latest scientific research, in a new synthesis—a socio-ecological account of the origins, nature, and direction of the current crisis in the Earth system.”

There is another danger in accepting uncritically the ideas and the narratives coming from some quarters and especially from the super-optimistic “let’s not let a good crisis go to waste” purveyors of the “good Anthropocene” argument. But there are plenty of situations, including climate change itself, where we might not agree with the dominant narrative about the ultimate cause of a problem or the solutions proposed by the ruling class, but where we would agree that the problem exists. If some scientists have ideas that we might find problematic, this isn’t helped by socialists dismissing the whole notion of the Anthropocene—effectively leaving the argument in the hands of the right.

Scientists are now telling us that “business as usual...is not a viable option.” If capitalism is allowed to continue, the extinction of humanity is an all too real possibility. In that case the Anthropocene is unlikely to last long and will register as a short geological episode. The alternative is that we can overthrow capitalism and replace it with a sustainable society, one that allows our species to continue.

83 Malm and Hornborg, 2014.
84 Angus, 2015a.
85 Angus, 2016a.
86 Will Steffen endorsement for Angus, 2016b.
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