The Anthropocene: Not Only About Climate Change

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Fifty years ago hippies dreamt about a new time, that 'the times they are a-changin'' (Dylan 1964), that a new world of peace and love should emerge; the coming of the Age of Aquarius. However, things did not go so well. According to influential earth scientists now, even the hippies of 1968 were living in the epoch of the Anthropocene.

Background: A short review

In 2000 the Nobel laureate chemist Paul J. Crutzen and his collaborator, marine science specialist Eugene F. Stoermer, suggested in a short statement that planet earth has entered a new geological 'era' namely the *Anthropocene* (Crutzen & Stoermer 2000). In 2002 Crutzen developed his argument further under the headline 'Geology of mankind' in the journal *Nature*. He stated that:

> The Anthropocene could be said to have started in the late eighteenth century when analyses of air trapped in the polar ice showed the beginning of growing global concentration of carbon dioxide and methane. […] It seems appropriate to assign the term 'Anthropocene' to the present, in many ways human-dominated, geological epoch, supplementing the Holocene – the warm period of the past 10–12 millennia. (Crutzen 2002:23)

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In February 2008 a group of 21 researchers, members of the Stratigraphy Commission of the Geological Society of London, concluded that we are now living in the Anthropocene epoch (i.e. the Holocene has been replaced) and they even claimed that this was a 'conservative' conclusion (Zalasiewicz et al. 2008). At first Crutzen & Stoermer (2000) and Zalasiewicz et al. (2008) estimated the beginning of this new epoch, the Anthropocene, to *c.*AD 1800, and associated it with the industrial revolution.

These discussions have continued since 2008, with the members of the Anthropocene Working Group (AWG), which is a subgroup of the International Subcommission on Quaternary Stratigraphy (ISQS, a constituent body of the International Commission on Stratigraphy (ICS), and part of the International Union of Geological Sciences), looking for a 'Golden Global Geological Spike'.

The term 'Golden Spike' is used when a 'global boundary stratotype section and point" (GSSP) has been officially agreed by the ICS (cf. above) e.g. the chronostratigraphic boundary between the Pleistocene and Holocene. Since 2010 discussions have revolved around the *Great Acceleration*: '[t]he post-1950 acceleration in the Earth System indicators remains clear' (Steffen et al. 2015: 81), with the Golden Spike associated with the development of nuclear power and atomic bomb testing from 1946, or so-called 'artificial radionuclides' resulting from atomic detonations (Zalasieswicz et al. 2010:2230).

In a recently published article Waters et al. (2018) maintain: '[a]lthough atmospheric tests and military use began in 1945 CE, it was only with the testing of the large thermonuclear (hydrogen) devices from 1952 CE that fallout was dispersed globally and became recorded in most environments' (Waters et al. 2018:383). Furthermore, '[t]he rate of increase between 1950 and 2015 CE is 100 times greater than the Late Pleistocene to Early Holocene rise, itself considered rapid in geological terms (Wolff 2014)' (Waters et al. 2018:382).

Felix Riede stresses in his thought-provoking article how archaeologists should involve themselves in the discussions presented above: we should take part in cross- disciplinary climate related research and environmental humanities projects. I concur entirely with Riede on this point.

Earth scientists and geologists keep on discussing …

The term Anthropocene has only been introduced informally; it has not yet been officially ratified by the world's major scientific organizations. Geologists and earth scientists discuss whether there is a *need* for a new concept covering the last 250 or 65–70 years of immense human impact on

the Earth (cf. Crossland et al. 2005; Ehlers & Kraftt 2006). Critics of formalizing the Anthropocene have maintained that it 'is a misleading term of non-stratigraphic origin and usage'; it focuses 'on observation of human history or speculation about the future'; it is 'driven more by politics than science' (Zalasiewicz et al. 2017:206).

In an article published in 2017 Jan Zalasiewicz and 26 scientists respond to these criticisms. They concede that the 'Anthropocene differs from previously defined epochs in reflecting contemporary geological change, which in turn also leads to the term's use over a wide range of social and political discourse' (Zalasiewicz et al. 2017:206). However, for the geologists it is the geological evidence that is decisive for the end of the Holocene and the beginning of the Anthropocene (Zalasiewicz et al. 2017:206).

A cross-disciplinary group of 24 scientists recently presented geological evidence for the 'Anthropocene as a potential new unit of the international Chronostratigraphic Chart (which serves as the basis of the Geological Time Scale)' (Waters et al. 2018). They also maintain that anthropogenic deposits and the 'archaeosphere' may play a vital role in defining the Anthropocene (Waters et al. 2018:385–395).

Memento: The Anthropocene is not only about climate change

Hence, it is important to underline that the Anthropocene is *not* only about climate change and global warming (cf. Pétursdóttir 2017). It concerns 'anthropogenic deposits', which include sedimentary 'successions that have accumulated through direct human deposition (artificial ground) or by human influence on natural systems' (Waters et al. 2018:385). The lower boundary of anthropogenic modified deposits have been termed 'archaeosphere' by among others Matt Edgeworth (2017), a member of the AWG.

Matt Edgeworth et al. (2019) stress the role of the archaeosphere even further, arguing that finding the start of the Anthropocene through geological chronostratigraphic methods (finding the Golden Spike) is unsuitable 'for determining the start of the proposed new time unit'. The Anthropocene is defined by human activity, and thereby on archaeological and historical timescales, not on the geological timescales of millions of years. Edgeworth et al. maintain that we should study the definition of the Anthropocene from the 'ground-up', with special attention to anthropogenic strata formations and humanly modified ground: the archaeosphere. Edgeworth et al. criticize the above proposed start of the Anthropocene 'because of its extreme proximity in time' and on the grounds that it is 'essentially non-stratigraphic'.

It has been estimated that the spatial extent of human landscape is 'about 16% of the total Earth's surface or 55% of the terrestrial land surface' (Waters et al 2018:385): We are talking about terraforming, including landfills, mega-cities, dam-building and river-diversions, all kinds of earth engineering, marine deposits in oceans, lakes and rivers, de-forestation and erosion: how humans alter the surface of the oceans, seas and lakes, the earth, and atmosphere.

Furthermore, the extinction of animals must also be taken into account – the so-called sixth extinction – along with the consequences of global population increase (from *c.*750 million in 1750 people to 7.6 billion today, and a possible 9.7 billion in 2050 (United Nations 2015). In many ways this dramatic population increase, especially in Africa south of the Sahara, may be considered as an 'elephant in the room' concerning the ongoing discussions about the Anthropocene.

In the Anthropocene the oceans are full of plastic; small fibres of plastic/micro plastic have been discovered even in remote areas of the Arctic and Antarctica. Styrofoam and plastic are everywhere; they are so-called 'hyper-objects' (Morton 2013), and can be taken into account through a thin but 'recognizable and unique set of stratigraphic signals' (Zalasiewicz et al. 2017:213).

I am in complete agreement with Riede stating that 'climate change on human societies and vice versa, is not an issue of natural science alone' (Riede this volume:20). However, we must not forget that the Anthropocene is about more than climate change.

Has the Anthropocene become an empty buzzword?

In 2011 I wrote an article in the *Norwegian Archaeological Review* called 'Some reflections on heritage and archaeology in the Anthropocene' (Solli 2011:40–54). The paper was followed by critique and discussion. Some of the discussants maintained that the viewpoints I presented were a bit gloomy – well better to be a realist, than a naïve optimist.

In 2011 the Anthropocene was known in many academic circles but was not a concept widely spread in popular media. A quick google search finds that quite early academic and semi-academic examples are (from *c.*2010): the poetry of the Anthropocene; the music of the Anthropocene; museum exhibitions of the Anthropocene – for example in 2015 Deutsches Museum headlined an exhibition with the title *Welcome to the Anthropocene*. In September 2011 the Museum of Cultural History in Oslo (my own museum) presented an exhibition entitled *The Archaeology of Ice – Finds From*

the Frozen Past in which the Anthropocene was mentioned in association with prehistoric artefacts coming out of melting ice and snow patches in the Norwegian high mountains (see web version of the exhibition: Museum of Cultural History). Other topics discussing the Anthropocene have included: Feminism of the Anthropocene; Legal Theory and the Anthropocene Challenge; I could go on.

Is the term Anthropocene in 2019 becoming so widely used that it is in the process of losing its meaning? In the 1990s everything was supposed to be considered 'sustainable' in line with the UN commission's central concept of 'sustainable development' in the report *Our Common future* (Brundtland 1987) and the Rio summit in 1992. Is the Anthropocene, like 'sustainability', becoming an all-purpose concept, introduced everywhere without any real consideration of what it means that 'we are living in the Anthropocene'?

The term Anthropocene is increasingly becoming a concept that the geologists and earth scientists have lost control over; it is now a popular term closely connected to climate change and global warming, and for many people a feeling of crisis and of something inevitable. The Anthropocene has become, not only a scientific concept, but also an emotional and cultural concept.

In many ways the Anthropocene is used as a buzzword, but it is worth attention for all scientific disciplines. It may be used as a linguistic concept, but describes a situation that is too much of a reality 'out there' in the real world (Solli 2011:52). We are not dealing with, in the terms of the German writer Herman Hesse, a glass-bead game.

Why should the humanities, archaeologists and historians bother about the Anthropocene?

In a seminal article the Indian historian Dipesh Chakrabarty (previously mostly known for his post-colonial studies) stated that all historical disciplines exist 'on the assumption that our past, present, and future are connected by a certain continuity of human experience' and that because of the rapidly changing climate 'the exercise of historical understanding [is] thrown into a deep contradiction and confusion' (Chakrabarty 2008:197–198).

According to Chakrabarty it is the *idea of the human* that sustains disciplines like history and archaeology. Chakrabarty presented four theses in his article, the second of which states that the: 'idea of the Anthropocene, the new geological epoch when humans exist as a geological force, severely qualifies humanist history of modernity/globalization'. Furthermore, 'in no

discussion of freedom in the period since the Enlightenment was there ever any awareness of the geological agency that human beings were acquiring at the same time as and through processes closely linked to their acquisition of freedom […] Most of our freedoms so far have been energy – intensive' (Chakrabarty 2008:208).

Think about that! Most of our freedoms, in the richer countries of the world, are based on a high degree of energy consumption. As a woman growing up in the latter half of the twentieth century in Scandinavia, I have had an immense freedom to create my personal life, free education, good job opportunities, and freedom to travel. Major parts of the Scandinavian population have experienced economic growth during the last decades. Our freedoms have been based mostly on fossil energy sources. Although, especially in Sweden and Norway, a lot of the energy we use is based on waterfalls and the relatively 'clean' hydro-power (albeit the building of these dam-constructions transforms and terra-forms large areas of natural landscapes), Norway is an oil producing nation, and important parts of the economy depend on fossil energy. Income from oil has been a significant factor for economic growth from the 1970s, and especially since the mid-1990s, therefore indirectly influencing my own freedom of choice.

Chakrabarty maintains that 'the whole crisis cannot be reduced to a story of capitalism […] Climate change is an unintended consequence of human actions and shows, only through scientific analysis, the effects of our actions as a species' (Chakrabarty 2008:221).

Chakrabarty's four theses have been met with interest, debates and criticism:

> The idea of the Anthropocene severely qualifies humanist histories of modernity and globalization, whether of the neoliberal, progressive, or Marxist variety. Its geological hypothesis requires us to put global histories of capital in conversation with the species history of humans, as colonial expansion and capitalist accumulation produced both historical inequalities and locked in future climate instability tied to humanity at the level of a *global* population. (Emmett & Lekan 2016:8)

Critics have accused Chakrabarty of letting the western capitalist industrialized world too easily off the 'hook' of the crisis (González-Ruibal 2018:5–6). Some parts of the world are much more to blame for the Anthropocene than other parts. The western world, both as previous colonizers, and as overly rich consumer societies, must take more responsibility for the crisis of the Anthropocene, than poorer nations. This sounds like a reasonable criticism, but maybe we do not have the time for quarrels over allocating blame. Chakrabarty argues that:

> […] climate change would only accentuate the inequities of the global capitalist order as the impact of climate change – *for now and in the immediate future* – falls more heavily on poorer nations and on the poor of the rich nations. (Chakrabarty 2016:107, italics original)

Furthermore,

> Climate change is not a standard business cycle crisis. Nor is it a standard 'environmental crisis' amenable to risk-management strategies. The danger of a climate tipping point is unpredictable but real. Left unmitigated, climate change affects us all, rich and poor. (Chakrabarty 2016:108)

In many ways I sympathize with the criticism that has been raised against the idea that all of the humanity now sails on the same ship, and there are no life-boats, we are all in this together, rich and poor. Alfredo González-Ruibal insists that 'the human at the origin of the Anthropocene is predominantly white, male and Western, but also state-organised and modern' (González-Ruibal 2018:6). In my opinion to 'the blame it on the white, western male' is too simple: the freedoms of women have never been greater than in the modern western societies; women have also benefitted enormously from the last century's high energy consumption. Furthermore, the societal model called communism was not exactly free from polluting industries. Asian 'tiger' economies, with China in the forefront, have taken giant leaps into the modernity of capitalism during the last 30 years. The large cities of China are haunted by airborne pollution and smog.

As far as I can see all these societies have responsibilities for the past, present and future of the planet. We are in this together, and living in the Anthropocene as a species.

How can archaeology contribute to studies of the Anthropocene?

Archaeology is a discipline that has the research history, theoretical perspectives, and the methodological tools to make a grounded contribution to the analysis of the Anthropocene. Archaeology has never been stuck in one of the two scientific cultures (Snow 1959 [1964]), as can be seen in the long tradition of cross disciplinary and ecological perspectives in Scandinavian, British archaeology and later New Archaeology (see Solli 2011:49–52 for references).

Riede refers to a prominent professor of climate and culture who argues that the humanities should be taken seriously in climate studies. This professor mentions the study of literature, history, and the finer arts, but not archaeology (Riede this volume:14). This omission of archaeology is a bit

depressing, and shows that even top academics at the University of Cambridge are unaware of both the research history of archaeology and ongoing environmental research on past societies. I agree with Riede when he states that 'we can only hope to truly understand climatic and ecological baselines if we look towards the past' (Riede this volume:16).

Since 2010 the term Anthropocene has been increasingly debated among archaeologists, for example in the special issue on the 'Archaeology of the Anthropocene' in the *Journal of Contemporary Archaeology*, edited by Matt Edgeworth (2014). When did the Anthropocene start? There is not space to take up this debate properly in this article, but I must admit that I find it quite meaningless when some archaeologists argues that the Anthropocene started with the introduction of agriculture, or even worse, when humans started to use fire.

Karl Butzer (1934–2016), a veteran in Environmental Archaeology, stated in a special issue of the journal *Holocene* in 2015, 'tangible human impact on global ecosystems was uncommon during the early Holocene times, while even robust mid-Holocene modifications are relatively scarce in many world environments' (Butzer 2015). Ruddiman (2003) drew attention to the accelerating build-up of atmospheric methane and carbon-dioxide from perhaps 6000 years ago. But given its scanty archaeological support, that trend also has other possible explanations and still requires rigorous study (Butzer 2015:1540).

In the case mentioned by William Ruddiman, humans have become environmental agents, not geological agents, which is what is on the agenda of geologists defining the Anthropocene. Humans in the epoch of the Anthropocene now 'wield a geological force. […] To call human beings geological agents is to scale up our imagination of the human' (Chakrabarty 2008:206).

What should we as archaeologists do?

We should enter the ongoing discussions of the Anthropocene, both since they concern archaeology as a discipline, and as researchers of the 'archaeosphere' and 'producers' of both tangible and intangible heritage. We could also, through archaeological methods used to study the archaeosphere, question the assumption that the beginning of the Anthropocene can be pinned down to a Golden Global Geological Spike (cf. Edgeworth et al. 2015; Edgeworth et al. 2019). Maybe the Anthropocene started at various points in both in time and space?

We also have a lot to do concerning the concrete challenges to archaeological sites, monuments and artefacts due to the Anthropocene. There is

no doubt that the Anthropocene must engage archaeologists all over the world. Not only melting of ice (Pilø et al. 2018; Solli 2018), but also rising sea levels, erosions, terraforming, migrations and so forth, will place heavy demands on us to step up our work in a rapidly changing world.

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