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AN ANTHROPOCENE WITHOUT ARCHAEOLOGY—SHOULD WE CARE?

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For more than a decade, a movement has been gathering steam among geoscientists to designate an Anthropocene Epoch and formally recognize that we have entered a new geological age in which Earth's systems are dominated by humans. Chemists, climatologists, and other scientists have entered the discussion, and there is a growing consensus that we are living in the Anthropocene. Nobel Prize-winning atmospheric chemist Paul Crutzen (2002a, 2002b; Crutzen and Stoermer 2000) coined the term, but the idea that humans are a driver of our planet's climate and ecosystems has much deeper roots. Italian geologist Antonio Stoppani wrote of the "anthropozoic era" in 1873 (Crutzen 2002a), and many others have proposed similar ideas, including journalist Andrew Revkin's (1992) reference to the "Anthrocene" and Vitousek and colleagues (1997) article about human domination of earth's ecosystems. It was not until Crutzen (2002a, 2002b) proposed that the Anthropocene began with increased atmospheric carbon levels caused by the Industrial Revolution in the late eighteenth century (including the invention of the steam engine in A.D. 1784), however, that the concept began to gain serious traction among scientists and inspire debate.

Despite growing recognition that we are living in a human-dominated climatic and geological epoch, considerable debate surrounds the Anthropocene concept. This includes questions about the utility of the new designation, debate about when the Anthropocene began, and concern about how the Anthropocene differs from the Holocene that began about 10,000 years ago. These debates have garnered attention in the popular media (e.g., *National Geographic*; the cover story on the May 26, 2011,

edition of *The Economist*) and top-tier academic journals such as *Science*, *Nature*, and the *Proceedings of the National Academy of Sciences*.

A large volume of data have been gathered in support of the Anthropocene, including rapid accumulations of CO₂, CH₄, and N₂O in atmospheric records; exponential growth of human populations; anthropogenic land surface clearance and human manipulation of floral and fauna communities; the collapse of aquatic ecosystems from overfishing, ocean acidification, and pollution; the appearance of radionuclides from atomic detonations; and much more. These data have focused most on the current debate on when the Anthropocene began. In 2008, a proposal for the formal designation of the Anthropocene was presented to the Stratigraphy Commission of the Geological Society of London (SCGSL) (see Zalasiewicz et al. 2008). A 22-person Anthropocene Working Group was formed to evaluate the proposal's merits and determine whether the Anthropocene be formally added to the Geological Time Scale and to decide when it began (Zalasiewicz et al. 2010).

The working group is dominated by geoscientists and paleoclimatologists, but also includes an environmental historian and a journalist. After our 2013 Society for American Archaeology symposium in Hawai'i, archaeologist Bruce Smith accepted an invitation to join the group. Prior to Smith's 2013 appointment, despite a specific objective to address the environmental impact of pre-industrial societies, archaeologists trained to investigate the complex dynamics of human–environmental interactions and evaluate when humans first measurably shaped local,

regional, and global natural systems were absent from the formal evaluation of the proposed Anthropocene Epoch. Although humans are central to the processes leading to the Anthropocene, there also has been relatively little discussion on the topic in the archaeological literature.

The formal SCGSL proposal suggests that the Anthropocene be defined as starting with the dawn of the Industrial Revolution (~A.D. 1850) or the nuclear era of the 1960s. Most Anthropocene supporters have proposed to further segment the Holocene (Figure 1), already the shortest geologic epoch beginning 11,700 years ago, or to do away with the Holocene all together (Ruddiman 2013). The compression of the Holocene makes sense to some scientists, given that recent climatic data and stratigraphic records are of higher resolution; but for others, such condensed geologic epochs are out of synch with normal geologic timelines (Jones 2011).

Designations of geologic timescales and a potential Anthropocene boundary are determined by either a numerical age (Global Standard Stratigraphic Age) or a physical stratigraphic section or ice core (Global Stratigraphic Section and Point, often called a “golden spike”), and are generally the domain of geoscientists. In this sense, the composition of the working group is not surprising. Because the Anthropocene would be defined on the basis of human domination of Earth’s systems, however, the debate must include perspectives from archaeologists, historians, and other social scientists.

Archaeology Considered?

Arguments over the genesis of the Anthropocene center on how we should identify temporal and stratigraphic markers of a human-dominated epoch. With all previous geologic epochs, scientists enjoyed considerable temporal distance, and thousands or even tens of thousands of years of gray area between geologic boundaries made little difference. With the Anthropocene, the deposits being identified, and perhaps the boundary itself, are currently being formed. The primary problem with an Anthropocene starting date of A.D. 1850 is that it lacks engagement with the deep historical processes that created our human-dominated planet, such as pre-Industrial Revolution landscape alteration and clearance; anthropogenic extinctions and translocations of plants and animals; the construction of mines, earthworks, canals, dams, irrigations systems, cities, and roadways; and much more that are instead placed into a pre-Anthropocene phase (Smith and Zeder 2014; Steffen et al. 2007). Periman (2006:558) bluntly summarized the problem from an archaeologist’s perspective: “... by defining the beginning of the Anthropocene as a geological epoch beginning only 200 years ago, Crutzen and Stoermer (2000) truncate thousands of years of human interactions with the global environment.”

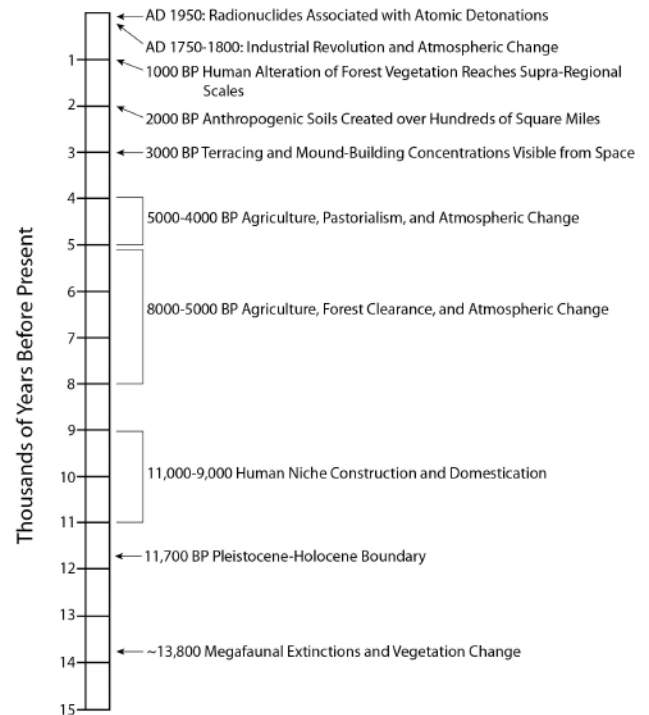


Figure 1. Timeline showing some of the proposed temporal boundaries for the Holocene-Anthropocene division; all dates are in calibrated calendar ages before present (adapted from Smith and Zeder 2014).

In an effort to draw attention to this issue and to stimulate archaeological dialogue and perspectives, archaeologists Todd Braje and Jon Erlandson organized a symposium titled “When Humans Dominated the Earth: Archaeological Perspectives on the Anthropocene” at the 2013 Society of American Archaeology annual meeting in Honolulu (Balter 2013). The session employed (and a forthcoming 2014 special issue of the journal *Anthropocene* will employ) archaeological, paleoecological, and historical records to consider the Anthropocene from a variety of topical or regional perspectives. Papers addressed human niche construction and the development of agricultural and pastoral societies as marking the onset of the Anthropocene (Smith and Zeder 2014); late Pleistocene and Holocene extinctions as a continuum mediated by climate change, human activities, and other factors (Braje and Erlandson 2013); human impact on Polynesia, the Caribbean, and California’s Channel Islands (Rick, Kirch, Erlandson, and Fitzpatrick 2013); the deep history of human impact on marine fisheries and ecosystems (Erlandson 2013); and the effects of colonialism and globalization along the Pacific Coast of North America and around the world (Lightfoot, Pannich, Schneider, and Gonzalez 2013). Several other papers explored the archaeology of human landscape transformation within specific regions of the world, including in East

Asia (Aikens 2013), Europe (McClure 2013), Amazonia (Roosevelt 2013), and Mesoamerica (Kennett and Beach 2013). While not exhaustive, we hope the SAA symposium papers, its subsequent question-and-answer session, media coverage, and the upcoming 2014 special issue of the journal *Anthropocene* will initiate a deeper exploration of archaeological issues related to defining an Anthropocene Epoch and a greater understanding of the deep historical processes that led to human domination of Earth's ecosystems.

The papers presented in the 2013 SAA symposium highlight that archaeologists have much to offer in defining the Anthropocene and in the understanding of the complex cultural and ecological processes that have contributed to it. Humans have actively shaped environments and ecosystems for thousands of years, and their effects, sometimes subtle but often dramatic, have been compounding over the millennia. Archaeologists largely work at local or regional scales, identifying living surfaces, midden soils, potholes, irrigation channels, roads, agricultural fields, and much more. Taken individually, these may not be indicative of an Anthropocene; but the activities of a global community of humans, taken together, have resulted in human action that is planetary in scope. Human-induced extinctions; transformation of forests over large areas of continents; the construction of agricultural fields, mines, canals, and earthworks; the diversion of rivers and filling of estuaries; the transportation of plants, animals, and raw materials; the depletion of near-shore marine ecosystems; and more—all began thousands of years ago (Kirch 2005). Taken together, anthropogenic changes at a global scale began well before the Industrial Revolution. The identification of an Anthropocene starting point is bound to be at least somewhat arbitrary and predicated on the type and scale of the evidence consulted. But it seems clear from archaeological research that significant anthropogenic changes began to occur at least 10,000 years ago and accelerated through time, blurring the line between the Holocene and Anthropocene.

Science and Archaeology in the Public Domain: Perception Is Reality

Archaeologists have provided nuanced analyses of long-term human–environmental interactions and the impact of humans (both positive and negative) on local, regional, and global ecosystems for more than half a century. Nonetheless, the initial response of some archaeologists to debates over the Anthropocene may be one of indifference. Whether the Anthropocene began in A.D. 1850, 10,000 years ago, or not at all, may only minimally affect archaeologists' research agendas, results, and interpretations—or perhaps not at all.

One of the more compelling aspects of the Anthropocene debate, however, might be the attention it has generated among the media and public. The Anthropocene has the potential to play a powerful role in shaping public perception and guiding policies related to anthropogenic climate change. How we describe the Anthropocene and how it is defined will influence the public's view of the state, scale, and causes of our planet's most pressing environmental issues and how best to transcend this crisis. We can ill afford to miss the opportunity to demonstrate the use of archaeology in defining the Anthropocene; in better understanding the cultural, social, and natural forces that have coalesced to shape the modern world; and in providing context and baselines for modern conservation and restoration efforts.

The designation of an Anthropocene Epoch at the dawn of the Industrial Revolution, the appearance of artificial radionuclides associated with atomic detonations, or any other recent date harkens back to the faulty premise that pre-industrial humans lived in harmony with nature and that a “natural” world existed in some idyllic pre-modern state. Archaeologists are well aware that as Europeans expanded their presence around the globe and long before the dawn of the Industrial Age, landscapes, plant and animal species, and local and regional ecosystems already had been shaped and altered by humans for millennia. A post-Industrial Anthropocene also gives short shrift to the severe impact of colonialism and the research of many archaeologists and tribal scholars trying to remedy these changes. Even if other scientists recognize this point but fail to understand the scale of these anthropogenic transformations, how can we expect the public to recognize this? Several authors of the Anthropocene proposal and members of the Anthropocene Working Group illustrate this view:

Preindustrial societies could and did modify coastal and terrestrial ecosystems but they did not have the numbers, social and economic organisation, or technologies needed to equal or dominate the great forces of Nature in magnitude or rate. Their impacts remained largely local and transitory, well within the bounds of the natural variability of the environment (Steffen et al. 2007:615).

The International Commission on Stratigraphy (ICS) will evaluate the Anthropocene proposal using the same criteria for defining all previous geological epochs since the Cambrian golden spikes or inception dates. Rigorous geologic standards will be applied and evaluated based on the established standards. The challenge is that the Anthropocene has been and continues to be referenced in the academic literature without a formal designation or definition, and a nebulous Anthropocene Epoch is being consumed by the media and interested public with little consistency in its message.

The real power of the Anthropocene concept may lie in its potential to shape public opinion and future environmental policy. As archaeologists, we should take advantage of this opportunity to demonstrate the utility of archaeological data for addressing modern issues and challenges. We should not shy away from using the Anthropocene to raise public awareness of anthropogenic climate change and environmental degradation and to act as a call for increased conservation efforts and global awareness. We should actively consider how the designation of an Anthropocene is interpreted by the public and, to some degree, by other scientists. A post-Industrial Revolution starting date may suggest that our future environmental management strategies need not consider the deeper history of human impact. Decades of work and progress by ecologists, geologists, paleobiologists, environmental historians, archaeologists, and many other scientists have demonstrated the vast array of pre-industrial human impact on local, regional, and global environments. The application of this work into public policy, however, is limited. Historical data are crucial to future management, conservation, and restoration efforts, and an Anthropocene that, at a minimum, acknowledges the transformative effects of ancient human societies and the lessons that can be learned from their successes and failures is clearly important.

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