










COMMENTARY

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The Anthropocene Is More Than a Time Interval

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Key Points:

- The Anthropocene is best studied as an ongoing event of human-influenced planetary transformation rather than a time interval
- The Great Acceleration is an intensification of a larger unfolding Anthropocene Event that is spatially and temporally heterogeneous
- Interdisciplinary research on the Anthropocene is now more important than ever

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Abstract Following the recent rejection of a formal Anthropocene series/epoch by the Subcommission on Quaternary Stratigraphy (SQS) of the International Commission on Stratigraphy (ICS), and its subsequent confirmation by the International Union of Geological Sciences (IUGS), the opportunity arises to reset the definition of the Anthropocene. The case for informally recognizing the Anthropocene to be a major planetary event of Earth system transformation offers a promising way forward, but this has been criticized by proponents of an Anthropocene series/epoch. In order to move on from the assumption that it must be a time interval, and to foster a more transdisciplinary and inclusive approach, the main points of the critique must be directly addressed.

Plain Language Summary The Anthropocene is best understood as an unfolding and intensifying event of human-influenced Earth system change. Here we respond to criticisms of the case for the Anthropocene Event and explain why attention should be shifted away from the narrow question of date of start which has dominated debate up to now. The Anthropocene, we argue, is more than just a time interval. It is first and foremost a material happening or physical transformation which unfolds through time. Interdisciplinary research on the Anthropocene is more important than ever and must continue apace.

1. Introduction

This short paper responds to criticisms leveled against informal designation of the Anthropocene as an unfolding event (Bauer et al., 2021; Edgeworth et al., 2023; Edwards et al., 2022; Gibbard, Bauer, et al., 2022; Gibbard, Walker, et al., 2022; Merritts et al., 2023; Walker et al., 2024). The Anthropocene Event has been challenged for “encompassing tens of thousands of years of progressive human cultural and societal development and impact” (Waters et al., 2022). The implication drawn is that an Anthropocene Event so defined diminishes the significance of recent rapid increases in human-induced Earth system transformations. Indeed, it has even been claimed that to oppose the epoch proposal put forward by the former Anthropocene Working Group or AWG (Head et al., 2023; Zalasiewicz et al., 2019) and its associates (McCarthy et al., 2023) is equivalent to denial of global anthropogenic climate change (Waters, quoted in Ly, 2023; see Ellis & Gibbard, 2024 for a rebuttal).

Underlying these challenges to the Anthropocene Event is the premise that it must be defined in terms of a specified span of time. Thus, following Waters et al. (2022), the Event is described as “extending over tens of millennia” and “encompassing a diachronous, diffuse welter of human activities beginning some 50,000 years ago” (Thomas, 2024). In a similar vein, members of the former AWG state that the Anthropocene Event “encompasses all significant human impacts extending back ~50 millennia” (Zalasiewicz et al., 2024). Most recently, it is asserted that it “encapsulates all human influence on the planet (and so is about a thousand times longer than the epoch...)” (Turner et al., 2024).

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2. The Anthropocene as a Material Event

These characterizations of the Anthropocene Event arise from misunderstanding of the true nature of an event. *An event is not a time interval* (Salvador, 1994, p. 73). Rather it is a material happening which takes place through time, and which takes time to emerge and unfold. It typically involves a disruption of an existing state of affairs, bringing about a change in reality, or in the framing of it (Mathé, 2018; Žižek, 2014). An emergent transformative event may be the result of convergences and interactions and thus can have multiple origins in different times and places. It is spatially and temporally variable. Moreover, it may have roots which can be traced back to incipient beginnings that are patchy and spread out over time, but which nevertheless set trajectories that influence the future course of the unfolding event. In so far as it is possible to plot on a time chart (see Gibbard, Bauer, et al., 2022, Gibbard, Walker, et al., 2022), it is important not to confuse an event with the designated time intervals of the chart itself.

This distinction brings to light a fundamental difference between the AWG case for a proposed new unit (series/epoch) in the Geological Time Scale, as recently rejected by the Subcommission on Quaternary Stratigraphy (SQS) (Witze, 2024), and the case for the Anthropocene Event. The former deals with the Anthropocene in terms of marking out divisions of time. The latter deals with the material event or transformation itself. As with other major transformative events in Earth history, such as the Great Oxidation Event (2.4–2.1 Ga), the Anthropocene Event can be conceived of separately from the Geological Time Scale. The event happens whether or not it is represented on the timescale as a geological epoch. It does not depend upon the timescale for its existence.

3. Beyond the Question of Date of Start

Once the Anthropocene is conceptually detached from the constraints and regulations involved in defining a chronostratigraphic unit and constructing a timescale, the question of “when does it start?”—which has dominated discussion up to now - becomes largely irrelevant. The fixation of much western scholarship on origins or starting points (Bloch, 1953) is unhelpful, and can lead to conceptual dead-ends of binary thinking. Not every emerging event or process has a start that can be pinned down to a single stratigraphic level in a stratotype section, to satisfy requirements of the chronostratigraphic method for an isochronous timeline, and especially when working on timescales of human history as opposed to deep geological time. To ask when the Anthropocene starts is like asking when the English language begins. Numerous beginnings can be identified, and a good case perhaps made for many of them, but ultimately it has to be acknowledged that there is no exact moment of onset any more than there is a single place of origin.

An event-oriented approach to the Anthropocene gives time-depth to analysis but does not specify the form such an analysis should take or how far back it should go in time. That would constrain the scope and range of enquiry to the detriment of understanding. Nor is there any specification of scale or boundaries in time in an event framework. That is partly because the Anthropocene Event has multiple sources, and partly because it is still unfolding, so that it is impossible to tell whether it will turn out to be a transformation of the Earth system on the scale of a series/epoch, a system/period, or something else entirely (Swindles et al., 2023). The key point is that in order to understand what is happening to the Earth system today and to envisage what might happen in the future it is necessary to look back at what has led to the present situation, making full use of the rich resource provided by physical stratigraphical archives (Edgeworth et al., 2023) and paleoecological data (Levy, 2017) alongside historical records and other available evidence (Boivin et al., 2024), as well as information contained in traditional knowledge systems of indigenous peoples. Time depth is precisely what the AWG's formulation of the Anthropocene series/epoch, starting abruptly in 1950 or 1952 CE, does not provide.

4. The Great Acceleration as Intensification

Does an event-oriented approach dilute the significance of recent rapid increases in human-induced Earth system change, as AWG critiques suggest? Contrary to the impression given by those critiques, the Great Acceleration (Steffen et al., 2015) is fully accepted as the most recent part of the intensifying Anthropocene Event. As one of the event papers puts it:

“The unfolding nature of the Anthropocene Event is crucial. Recent transformations such as those encapsulated by the term Great Acceleration are fully recognized as intensifications of the larger evolving event, with effects of

human activities on global Earth systems increasing dramatically in modern times yet still with deep roots in the past” (Walker et al., 2024).

That the Earth system is undergoing rapidly increasing transformation, and that this is in large part due to effects of human activities, is not in dispute. What is contested is pinpointing the start of an Anthropocene epoch to a precise moment to correspond with the Great Acceleration, itself not instantaneous globally. To suppose that the Earth system transitioned from a stable Holocene state to an unstable Anthropocene state almost instantly is unrealistic, and not representative of how change unfolds through time in the real world. It is to make a “category mistake” (Ryle, 1949), ascribing properties of an isochronous timeline in a conceptual system of time division to a material event or transformation.

The Great Acceleration is more appropriately regarded as an intensification of the emergent Anthropocene Event. In critiques that frame events as time intervals, the crucial aspect of intensification is invariably overlooked, along with developing processes, changing interactions, and variable speeds of transformation. Even small local effects can accumulate and compound to add up to global scale impacts, which in turn can accumulate and further compound (Walker et al., 2024). Such emergent cumulative processes unfold through time. In the Anthropocene Event, scale and intensity of human impact has increased gradually through accumulation of effects over thousands of years, with rates of change speeding up significantly from the industrial age on (Crutzen, 2002; Crutzen & Stoermer, 2000), and dramatically so from the mid-twentieth century on in the Great Acceleration. There may have been other intensifications of smaller scale at times in the more distant past, such as the spread of agriculture and deforestation in Neolithic and colonial expansions, and perhaps even further back with extinction of Pleistocene megafauna and its cascading impacts (Gill et al., 2009). The evidence of multiple indicators of recent Earth system change, as set out by Steffen et al. (2015), is indisputable, but the Great Acceleration did not have a precise moment of onset any more than the larger Anthropocene Event of which it is part. It is more distributed in time and space than the graphs suggest, has its roots in the past, and proceeds along trajectories at least partly set in previous centuries.

Consider just one of the indicators of the Great Acceleration—the rapid increase in the number of giant dams. The Hoover and Grand Coulee Dams built during the Great Depression (1929–1939) in the US were the outcome of dam-building traditions which spanned multiple centuries and continents. Most of the world's waterways in populated areas had already been dammed, with hundreds of thousands of dams worldwide by the early 1900s. Although not all “giants”, these structures have irrevocably altered aquatic landscapes and ecosystems, as well as the flow of water, sediment, and nutrients from uplands to lowlands and coastal regions (Walter & Merritts, 2008). The assumption that all large dam and reservoir projects are entirely products of modernity is challenged by the evidence of extensive pre-colonial water engineering earthworks in South India (Bauer & Morrison, 2014), and in many other parts of the world. The marked increase in number of giant dams built since the 1930s is an intensification or outgrowth of processes of human-river interaction already well underway.

5. The Way Forward

An event framework facilitates and encourages the many facets of research on the Anthropocene to continue. Entangled as it is with social and historical processes (Bauer & Ellis, 2018), the Anthropocene is regarded as more than just a time interval, and more than just a matter for geology (Henderson & Vachula, 2024). It is multi-scalar and manifests on all scales from nano to global. It concerns the future as well as the past. It involves a complex mix of hybrid human-natural processes. It needs social science and the humanities as well as natural science to help understand it (Ellis et al., 2016).

Much of the former AWG's work in compiling geological evidence for the proposed new epoch is still highly relevant. Paradoxically, it fits better into narratives of an unfolding, diachronous, and rapidly intensifying Anthropocene Event than into that of a rigidly defined series/epoch. Innovative papers on the geological cycle of plastics, the technosphere and archaeosphere, technofossils and novel materials, the presence of fly ash and plastics as inclusions in strata, the stratigraphy of metros, shifting patterns of sediment transport and deposition in rivers, anthropurbation, urban strata, and much more - all these have diachronous signals that transgress any imposed timeline. It is very important to emphasize that it was not this substantial body of evidence that was rejected by the SQS. What was decisively rejected was the specific proposal of an Anthropocene series/epoch starting in 1950 or 1952, marked by a thin line in sedimentary deposits at the bottom of Crawford Lake in southern Ontario, Canada (McCarthy et al., 2023; Zalasiewicz et al., 2019). One might contrast the extensive, varied,

worldwide stratigraphic record of human impact, in some places scores of meters thick and still in the process of formation (Edgeworth et al., 2023), with that of the few centimeters of lake-bed sediments that the AWG proposed as the Anthropocene Series.

As this article shows, it is perfectly possible for the Anthropocene (including the Great Acceleration as a rapid intensification of earlier trends) to be studied as a material happening or unfolding event rather than as a series/epoch. But it must be stressed that by using the term “event” in relation to the Anthropocene, we are not referring narrowly to the geological practice of “event stratigraphy”, which is the correlation of sedimentary sequences via marker beds or event horizons and with which the single term “event” has occasionally been confused (see Waters et al., 2022). Rather, we are concerned with wider meanings and broader usage of the term.

When the Anthropocene is disentangled from the assumption that it must be a time interval, it still stands as a viable scientific concept because it relates to something more concrete than just the conceptual division of time. While the Anthropocene as a formal time unit did not find favor with geologists, the material Anthropocene, the happening or event, the partly human-induced but not human-controlled transformation of the Earth system manifesting on multiple scales all around us, continues to unfold and generate evidence. Developments observable today such as climate change, melting ice, warming oceans, rising sea levels, biodiversity loss, proliferation of plastics and other artificial materials, the vast and rapidly growing accumulations of human-modified strata, etc. are all part of the unfolding and intensifying Anthropocene Event. The global environmental challenges presented demand that we gain a better understanding of what is happening to the Earth system and the role of humans in precipitating planetary transformation (Ellis, 2024). In this respect, the study of the Anthropocene is now more relevant than ever.

Data Availability Statement

Data were not used, nor created for this research.

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