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The Anthropocene is best understood as an ongoing, intensifying, diachronous event

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Current debate on the status and character of the Anthropocene is focussed on whether this interval of geological time should be designated as a formal unit of epoch/series rank in the International Chronostratigraphic Chart/Geological Time Scale, or whether it is more appropriate for it to be considered as an informal 'event' comparable in significance with other major transformative events in deeper geological time. The case for formalizing the Anthropocene as a chronostratigraphical unit with a base at approximately 1950 CE is being developed by the Anthropocene Working Group of the Subcommission on Quaternary Stratigraphy. Here we outline the alternative position and explain why the time-transgressive nature of human impact on global environmental systems that is reflected in the recent stratigraphical record means that the Anthropocene is better seen not as a series/epoch with a fixed lower boundary, but rather as an unfolding, transforming and intensifying geological event.

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There are two radically different views on the nature, character and status of the Anthropocene in geological thinking. The Anthropocene Working Group (AWG) of the Subcommission on Quaternary Stratigraphy (SQS) proposes that it should be a new chronostratigraphical unit of series/epoch rank in the International Chronostratigraphic Chart/Geological Time Scale (GTS). Its base (or lower boundary) is to be marked by a stratigraphical horizon comprising radiogenic fall-out in recent stratigraphical sequences, and its defining characteristic is a rapid increase in abundance of a range of anthropogenic indicators from around 1950 CE onwards (the 'Great Acceleration', GA). As a new unit of series/epoch rank, the Anthropocene will have to be ratified first by the SQS, then by the International Commission on Stratigraphy (ICS) and ultimately by the International Union of Geological Sciences (IUGS). No formal proposal has yet been submitted to these bodies and hence at present a chronostratigraphical/geochronological Anthropocene remains unratified.

However, there is now an increasing number of voices within the Quaternary community, and indeed beyond, that are not supportive of formalizing the Anthropocene within the GTS (e.g. Autin & Holbrook 2012; Gibbard & Walker 2014; Ruddiman *et al*. 2015; Walker *et al*. 2015; Finney & Edwards 2016; Ruddiman 2018; Edgeworth *et al*. 2019; Swindles *et al*. 2023) and in recent years opposition to this suggestion has crystallized in a counter-proposal that the Anthropocene should be seen not as a new series/epoch, but rather as a distinctive geological 'event'. Events in geology are happenings or occurrences (Salvador 1994) that bring about transformations or changes in states of affairs over time. Without some change or transformation, there can be no event. Events differ from episodes (see below) in that the latter constitute specific intervals of time. Defining the Anthropocene as an event means that it is comparable with some of the major events in deeper geological time, such as the Great Oxidation Event (2.4–2.1 Ga; Gumsley *et al*. 2017) or the Great Ordovician Biodiversity Event. Significantly, neither of these major transformative events in earth history are represented as chronostratigraphical units, and hence there has been no requirement for formal ratification. The same is the case with an Anthropocene Event, and accordingly 'Anthropocene' should henceforth be considered as an informal non-stratigraphical term.

The case for a formal Anthropocene series/epoch has been laid out by the AWG in a number of papers published over the past decade or so (e.g. Zalasiewicz *et al*. 2015, 2020; Waters *et al*. 2016, 2022; Syvitski *et al*. 2020; Head *et al*. 2022), as well as in numerous media

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reports, and will not be considered further here. Instead, this paper focuses on the alternative view that the Anthropocene is an event that, it is suggested, is more congruent with the evidence for human impact on the Earth's global climate and environmental systems during the Late Holocene. It must be emphasized at the outset, however, that it is fully accepted that the term 'Anthropocene' is here to stay. It is now widely used not only in scientific discourse, but also across a range of social, economic and cultural disciplines. It is also extensively reported in the media. Equally, it is important to stress that by challenging the chronostratigraphical definition of the term, this in no way diminishes the argument that human activity is impacting at an ever-increasing rate on the physical and climatic fabric of the planet.

The basis of an Anthropocene Event is most fully articulated in a recent series of papers (Edwards *et al.* 2022; Gibbard *et al.* 2022a, b; Edgeworth *et al.* 2023; Finney & Gibbard 2023; Merritts *et al.* 2023), and the following discussion draws on these publications to explain further why the Anthropocene should be informally designated as an event and not a formal series/epoch. Five points in particular merit elaboration:

1 A central tenet of a formal Anthropocene series/epoch is that it is characterized by an isochronous horizon with a fixed start date (1950 CE) that marks the abrupt intensification of human activity (the GA). But in many ways, this is a wholly artificial construct as it effectively ignores much of the material evidence for human influence on natural global systems that is contained within the earlier stratigraphical record (cf. 3 below). Moreover, human processes that had or have significant impacts and which are reflected in these records are not isochronous but by their very nature are time-transgressive. This is equally the case whether it be the origins of agriculture, the beginnings of urbanization, the colonization of the Americas, the Renaissance, the Industrial Revolution, or the Great Acceleration – all important events in their own right and, collectively, part of the broader Anthropocene Event. The start date of 1950 CE, that is taken to mark the onset of the GA in human-driven processes, is also misleading as many of these that are incorporated into the definition of the GA (Head *et al.* 2022) began before (in some cases well before) 1950 CE.
2 Defining the Anthropocene as a new series/epoch, with a fixed basal horizon and with a precise global start date, fails to account not only for the diachronic nature of human impacts on global environmental systems during the Late Holocene but also the spatial heterogeneity of those impacts. Moreover, the attempt to identify a precise boundary is essentially reductionist in its thinking and hence detrimental to reaching a broader understanding of human involvement in planetary change. Indeed, this could easily lead to distorted perceptions of the evidence of physical strata, artificially organized either side of a conceptual boundary that has little basis in stratigraphical reality. An Anthropocene geological event, by contrast, reflects more closely the reality of both historical and currently ongoing human–environmental interactions, many of which have deep roots in Holocene time, and which encapsulate both the spatial and temporal variability as well as the diverse social and environmental processes that characterize anthropogenic global changes. As such an Anthropocene Event incorporates a far broader range of transformative human cultural practices and is more readily applicable across a range of academic fields than a rigidly defined Anthropocene series/epoch.
3 Little attention has been directed by proponents of a formally defined Anthropocene to its physical stratigraphical basis. This is curious, given that physical stratigraphy is fundamental to any definition of a geological time unit, and the ICS defines chronostratigraphical units that serve as the material basis of the geochronological units. Indeed, in view of the rich anthropogenically influenced stratigraphical archive that is available (e.g. artificial strata with natural constituents, humanly modified ground, legacy sediments and natural geo-deposits: Edgeworth *et al.* 2023) it is apparent that a diachronic event framework is more appropriate for understanding the Anthropocene than treating it as a new series/epoch with an isochronous lower boundary at a fixed point in time (Edgeworth *et al.* 2019). Accordingly, this detailed and often highly resolved stratigraphical legacy must surely form part of any Anthropocene definition; collectively, of course, it extends well back beyond 1950 CE and hence adds further support to the case for recognizing the Anthropocene not as an epoch, but rather as an ongoing and unfolding event.
4 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. As noted above, the Anthropocene Event is understood as a transformation of growing scale and importance that is taking place over time, rather than a time interval as such, and is therefore not to be confused or equated with the Anthropogenic Modification Episode (Waters *et al.* (2022) or any other unit of time duration.
5 Finally, the proposal to define the Anthropocene chronostratigraphically as a series/epoch is represented at the proposed stratotype sequence (Crawford Lake in Canada) by only ~15 cm of lacustrine sediment. The odd situation arises whereby the stratigraphical evidence that is being presented by epoch proponents is hardly sufficient to justify series/epoch status for the Anthropocene, whereas the vastly

greater corpus of relevant diachronous stratigraphical evidence that is being overlooked reflects transformations of the Earth system on a scale that may well turn out to exceed that of a series/epoch.

To conclude, the idea that human impact on the Earth system can be understood in terms of an effectively instantaneous transition from the Holocene Series/Epoch to an Anthropocene series/epoch specifiable to a moment in time in the mid-20th century ignores the time-transgressive transformative complexity and progressively amplified development that is evident in the material records. When this stratigraphical and other evidence are analysed objectively and without imposing a rigid chronostratigraphical framework, the picture emerges of a much more diachronous set of transformations, speeding up significantly in the 20th and 21st centuries, and that are most appropriately characterized as an unfolding and intensifying Anthropocene Event.

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