

The Anthropocene: epoch, event, historical phase or nothing at all?

What is the status of the Anthropocene after its rejection as an epoch of the Geological Time Scale?

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After 14 years of discussion, the Anthropocene Working Group (AWG) of the Subcommittee on Quaternary Stratigraphy (SQS) submitted a proposal in October 2023 for the Anthropocene to be recognized as a new epoch in the Geological Time Scale (GTS), following the Holocene (Rull, 2024). The proposal was rejected a few months later by the SQS, and this decision was subsequently ratified by the International Commission on Stratigraphy (ICS) and the International Union of Geological Sciences (IUGS). Therefore, we still live in the Holocene, which began 11,700 years ago (11.7 ka), after the end of the last glaciation.

Does this mean that the long struggle for the formalization of the Anthropocene has come to an end? Should we remove this term from scientific and non-scientific literature and common language? Is the rejection final, or is there still a possibility of submitting a new proposal? Should we have a unified concept of what the Anthropocene is—if any—or can individuals adopt their own interpretations? A couple of years after the AWG proposal and its subsequent rejection, new perspectives have emerged, inviting a reassessment of the issue.

The AWG proposal

Before delving deeper into the discussion, we need to understand some key aspects of the proposal that the AWG submitted to the SQS. As usual in the definition of new units of the Geological Time Scale (GTS), any proposal should include:

- (i) the stratotype, or the reference rock strata that define the new unit
- (ii) the stratigraphic markers, or the features that make these strata distinct from the underlying one—in this case, the Holocene
- (iii) the basal age of the new unit, or the time when this unit began to form

This body of evidence is known as the Global Stratotype Section and Point (GSSP), or the “golden spike.” The GSSP should be traceable worldwide using similar or different strata and stratigraphic markers, but the basal age must remain the same.

These requirements emphasize the evidence-based nature of stratigraphic science. The GSSP provides the empirical evidence needed to define a chronostratigraphic unit; without it, geological time cannot be measured. The GSSP can be compared to the sand in an hourglass: without this sand, time passes, but it cannot be measured by the clock (Rull, 2024).

In the case of the Anthropocene, the AWG proposed that the stratotype be located in the annually laminated (varved) sediments of Crawford Lake, Canada, and that the main stratigraphic markers be radionuclides—especially ²³⁹⁺²⁴⁰Pu—released into the atmosphere by the first atomic bomb tests that began in the early 1950s. In these sediments, the radionuclides occur within the uppermost 17 cm, first appearing in 1952 CE and peaking between 1962 and 1964 CE, as determined by varve counting. Therefore, the beginning of the Anthropocene was placed at 1952 CE. This boundary is recognizable worldwide in various sediments and stratigraphic markers, as demonstrated by auxiliary sections from the Baltic Sea, the United States, Japan, China, Australia, Antarctica, Italy, Poland, and Austria. This proposal

remains a preprint (Waters et al., 2024) and, to my knowledge, has not been published in a scientific journal.

Interestingly, the beginning of the Anthropocene, as proposed by the AWG, coincides with the Great Acceleration in population growth, industrialization, and globalization, along with their associated planetary consequences (Steffen et al., 2015). This coincidence has caused the Anthropocene—as thus defined—to transcend stratigraphic science and become an icon of human influence on the Earth system, with significant environmental, ecological, political, philosophical and ethical implications (Autin, 2016). These conceptual implications have developed independently of purely stratigraphic interests and have become firmly rooted in much of modern society, which recognizes the Anthropocene, as a concept, to be real and independent of its geological formalization.

The decoupling between the stratigraphic and environmental concepts of the Anthropocene, together with the socio-cultural implications of the latter, parallels the classical debate between science and the humanities. In this case, the main manifestation of this debate is the lack of interest shown by many environmentalists and scholars in the human sciences toward the official formalization of the Anthropocene as a geological epoch. For them, the Anthropocene, as an environmental concept, is sufficient to declare the Holocene dead since the Great Acceleration. This transforms the term into a historical epoch of humanity rather than a geological one (Edwards, 2015).

Some critics argue that the coincidence between the beginning of the Anthropocene, as proposed by the AWG, and the Great Acceleration is not accidental, as this working group first decided on the starting date and then sought the stratigraphic evidence to fit it—an approach that reverses the procedure required for defining a new chronostratigraphic unit. It has also been pointed out that this chronological choice was based largely on environmental rather than geological criteria. Most of these critiques came from prominent members of the ICS and the IUGS, which suggested that the AWG proposal was unlikely to be approved.

Rejection and reactions

The rejection by the SQS took place on March 4, 2024, roughly four months after the AWG's submission. Four members voted in favor of the proposal, twelve against and three abstained. The AWG protested the SQS decision, citing irregularities in the voting process—specifically, concerns about the validity of several members who had already completed their terms as SQS voting members (Bourzac, 2025). However, the ICS validated the SQS decision with fifteen votes in favor, one abstention, and one conflict of interest, and the IUGS ratified this outcome only a couple of weeks later, in March (IUGS, 2024). This marked the end of the process and the official dissolution of the AWG as an SQS working group.

The IUGS (2024) identified three main reasons for rejecting the proposal:

- (i) human-induced impacts on Earth's environment and climate began long before the 20th century—such as early agriculture, the colonization of the Americas and the Pacific, and the Industrial Revolution in Western Europe—implying that the Anthropocene has far deeper roots in geological time
- (ii) establishing a new unit in the GTS that truncates the Holocene but spans less than a single human lifetime is inconsistent with the GTS framework, in which units typically extend over thousands to millions of years
- (iii) human influences on global systems are time-transgressive, varying across both space and time, and therefore cannot be accurately represented by an isochronous boundary marking a single moment in time

The rejection letter also suggested that the Anthropocene might be better regarded as an event rather than an epoch, a topic that will be discussed later.

Just after rejection, I contacted several members of the AWG, who stated that they would continue working on the topic outside the SQS and wait for changes within the ICS and IUGS composition that might create a more favorable environment for their proposal. Such a change occurred during the International Geological Congress held in Busan (Korea) in August 2024. The AWG members consulted

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expressed hope that, with this renewal, the ICS and IUGS would invite them to submit a new proposal. Although this has not yet occurred, the assessment confirmed that resubmission or the submission of a different proposal is possible.

In the meantime, proponents of the Anthropocene as a new geological epoch continue to argue that the rejection disregarded the overwhelming body of evidence supporting the AWG proposal (McCarthy et al., 2025). Others, including some of the most active ICS/IUGS opponents of the proposal, insist that the lack of synchrony in Earth's anthropization prevents the formal definition of a new epoch and have therefore put forward alternative views.

The Anthropocene as an event

The idea of the Anthropocene as an event emerged shortly before the rejection of the AWG proposal and was led by prominent ICS members (Gibbard et al., 2022). What distinguishes a geological event from a geological epoch is the time-transgressive and multitemporal nature of the former, which can range from seconds to millions of years and from local to global scales. A geological event is a transformative process that occurs gradually and unfolds at different times in different places. Consequently, it does not require a globally synchronous starting date and thus does not need a formalization protocol.

A well-known example of a geological event is the Great Oxidation Event (GOE) of the Proterozoic, which occurred between ca. 2.5 and 2.0 billion years ago (Ga) and fundamentally altered life on Earth by creating an aerobic atmosphere that enabled terrestrial life. The GOE represents a process rather than a chronostratigraphic unit of the GTS and, as such, is not represented by any specific GSSP. The Cambrian Explosion (CE; ca. 540–530 million years ago, Ma) and the Great Ordovician Biodiversification Event (GOBE; ca. 485–460 Ma) are other examples of geological events that lack global synchrony yet had a worldwide impact.

The Anthropocene Event (AE) may therefore be a more appropriate concept to describe the process of Earth's anthropization, which began at different times depending on the region considered but ultimately came to affect the entire planet (Waters et al., 2022). The AE has been defined as the progressive transformation of Earth by humans since the Late Pleistocene (ca. 50 ka). This term and concept, however, contain a terminological inconsistency—namely, the use of the suffix *-cene*, which is reserved for epochs of the Cenozoic Era (Paleocene, Eocene, Oligocene, Miocene, Pliocene, Pleistocene, Holocene). For this reason, the term Global Humanization Event (GHE) has been proposed, which aligns with previously defined geological events (GOE, CE, GOBE) and avoids terminological issues (Rull, 2025).

Another approach is the Anthropogenic Modification Episode (AME), which is also free from terminological issues and was proposed by members of the AWG in response to the AE concept (Waters et al., 2022). Geological episodes were originally defined to compare time spans represented by stratigraphic units with non-synchronous boundaries at different localities. Therefore, the GOE, the CE and the GOBE would be considered episodes rather than events. In this context, the AME is defined as an informal unit encompassing the time interval during which humans have been modifying the Earth, with a duration of at least 50 ka.

Within this framework, the Great Acceleration is regarded as a set of synchronous events—collectively referred to as the Great Acceleration Event Array (GAEA)—which marks the beginning of the Anthropocene, as defined by the AWG and later rejected by the SQS. In this way, the AWG members managed to integrate their concept of the Anthropocene epoch into the framework of event stratigraphy—a methodological approach that employs rare, abrupt geological events to date and correlate geological sequences. However, this view was not shared by the proponents of the AE, who maintained the need to disentangle the Anthropocene from the assumption that it must represent a specific time interval (Edgeworth et al., 2024).

Unexpected consequences of rejection

In its ratification of the rejection, the IUGS (2024) expresses that:

“...the Anthropocene as a concept will continue to be widely used not only by Earth and environmental scientists, but also by social scientists, politicians and economists, as well as by the public at large. As such, it will remain an invaluable descriptor in human-environment interactions. But it will not be recognised as a formal geological term but will more usefully be employed informally in future discussions of the anthropogenic impacts on Earth’s climatic and environmental systems.”

This represents an explicit acknowledgment of the meaning of the term beyond the stratigraphic domain. Therefore, the IUGS accepts the continued use of the term despite its rejection as a geological epoch and the stratigraphic burden implied by the suffix -cene. This may seem contradictory to the explicit rejection of the term and may encourage the decoupling of the scientific and non-scientific meanings mentioned above. In practice, this means that, as far as the IUGS is concerned, anyone may use the term at their own discretion, except to designate a geological epoch beginning in 1950. In this context, anyone can define the Anthropocene as they wish—or choose not to define it at all.

I faced this dilemma when tasked with providing a definition of the Anthropocene for the Catalan technical and scientific dictionary TERMCAT (<https://termcat.cat/en>). The initial definition, written before the rejection, was as follows:

“Informal term proposed to define a new geological epoch following the Holocene, characterized by the global human impact on the Earth system since 1950, coinciding with the Great Acceleration”

Obviously, the definition needed to be revised after the rejection, but it could not simply read: *“A term that has been rejected...”* The initial reaction was to state that the term lacked a definition, but this was not acceptable, as the concept appeared to be clear. I therefore proposed instead:

“Time without geological entity, characterized by the global anthropogenic impact on the Earth system”

However, this is essentially the same as saying nothing and, consequently, provides no useful chronostratigraphic context.

Now anyone is free to speak about the Anthropocene according to their own definition, whether explicit, implicit or inexistent. For the sake of clarity and understanding, it would be desirable to provide—or at least reference—the specific definition of the Anthropocene used in each case. The rejection of the AWG proposal prevents the use of the term as a geological epoch beginning in 1950, while the lack of general consensus hinders the adoption of the above-mentioned event or episode definitions.

It seems reasonable to assume that people using the term and concept of the Anthropocene, whether in scientific or non-scientific contexts, are referring to a time interval during which human impact on the Earth system is global, evident and clearly visible. However, this time interval remains undefined and, as such, is prone to misunderstanding.

What can we do?

The fact that a reliable and widely accepted definition of the Anthropocene has not yet been reached does not imply that it does not exist. That human activities have profoundly transformed the structure and functioning of the Earth system seems beyond all doubt. It is often said that, formalized or not, the Anthropocene is real (Zalasiewicz et al., 2024). If, as hoped by members of the AWG, the new composition of the IUGS and ICS executive committees is willing to request and evaluate a new proposal, the issue may move toward a resolution. Otherwise, the current lack of definition will persist.

For the time being, it is not known whether a possible future AWG proposal would differ from the one submitted two years ago, or how it might be received by the new IUGS and ICS authorities. However, such dependence of strictly scientific decisions on the composition of the deciding organizations may undermine confidence in science. What seems certain is that the AWG remains committed to identifying a geological epoch, as originally proposed by Crutzen and Stoermer (2000), with a well-defined GSSP.

Alternatives such as the AE or the GHE are still young and need time to become strong candidates, although they do not require formalization. Another possibility is to define the Anthropocene as a

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historical epoch of humanity based on environmental characteristics, without any stratigraphic connotations (Edwards, 2015). This could break the cycle and lead to a more natural outcome, free from unnecessary geological complications. This approach, however, would once again require terminological reconsideration to avoid the stratigraphic implications of the suffix *-cene*.

In summary, for the Anthropocene to be formally recognized as a new geological epoch, a new proposal from the AWG or another similar working group must be submitted and approved by the corresponding stratigraphic bodies. Any other approach would not meet the requirements for establishing a new chronostratigraphic unit within the GTS. Alternative options—such as defining an event or a historical phase—would require terminological adjustments to avoid the suffix *-cene*.

Of course, it is always possible to disregard the scientific conventions and define the Anthropocene from a different perspective, without making any terminological modifications. It is also possible to adopt the AWG definition despite its recent rejection. This appears to be the position of many scholars, regardless of their scientific or non-scientific orientation. However, following the rejection, the Anthropocene has lost its identity, and the only way to recover a widely accepted meaning is to submit a new proposal—or resubmit the AWG proposal—to the newly elected ICS/IUGS decision-maker members.

In summary, the term Anthropocene does not have a clear definition and, ideally, should be defined before being used. The only definition that is currently invalid is the one proposed by the AWG in 2023. Curiously, this definition is the most elaborate, precise, and well-documented; however, it has been officially rejected. Other possibilities exist (Lewis & Maslin, 2015), but they have not been proposed to the ICS for formalization. We should therefore wait for future developments.

Conclusions

The Anthropocene is a concept in search of a definition, and action in this regard is urgently needed. Following its rejection as a geological epoch, we can no longer speak of the Anthropocene in a general sense, as if everyone understood what it means. The greatest precision we can currently achieve is to state that the term refers to the time during which humans have globally transformed the Earth system. However, we still do not know its beginning, its duration, or whether it constitutes an epoch, an event a historical phase or nothing at all. Needless to say, those unconcerned with scientific rigor or terminological accuracy have nothing to worry about.

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