Perspective

The proposal of the 'Anthropocene' as a new geological epoch has been submitted for formalization

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Abstract: A proposal for the formalization of the 'Anthropocene' as a new geological epoch following the Holocene has just been submitted (31 October 2023) to the International Commission on Stratigraphy (ICS). This proposal, prepared by the Anthropocene Working Group (AWG) after 13 years of discussions, places the beginning of the 'Anthropocene' in the mid-20th century, and considers that the better-suited Global Stratotype Section and Point (GSSP) would be placed on the varved sediments of the Canadian Crawford Lake. The primary stratigraphic marker is considered to be the radioactive fallout resulting from the first nuclear weapon tests carried out in the 1940s and 1950s. These dates coincide with the Great Acceleration, characterized by an abrupt increase in the indicators of planetary anthropization. The AWG proposal is now being considered by the ICS Subcommission on Quaternary Stratigraphy (SQS), which can endorse or reject it, or ask for modifications. If endorsed, the proposal will be submitted to the ICS Executive for approval and, if approved, it will be sent to the International Union of Geological Sciences (IUGS) for ratification. The formalization of the AWG proposal is not guaranteed due to potential inconsistencies with the requirements of the International Stratigraphic Guide (ISG). Possible alternatives to an eventual rejection are briefly discussed.

Keywords; Anthropocene, Holocene, series/epoch, stratigraphy, formalization, International Chronostratigraphic Chart, Earth system, human impact

1. Introduction

Almost two and a half decades after its introduction, the 'Anthropocene' is still an informal term (this is why the quotation marks) whose precise definition and temporal extent remain undefined. However, this does not seem an obstacle for many scholars who inaccurately use this term as if it was already a well-defined formal epoch of the Geological Time Scale (GTS). Scientific rigor is as important in geology as in any other discipline, and the terms and concepts used are submitted to a process of standardization and formalization.

The units of the GTS are represented in the International Chronostratigraphic Chart (ICC) (Figure 1). For a new unit (e.g. an erathem/era, a system/period, or a series/epoch) to be incorporated, it should meet the requirements of the International Stratigraphic Guide (ISG) [1] and must be approved by the International Commission on Stratigraphy (ICS) and ratified by the International Union of Geological Sciences (IUGS). This process is similar to adding a new element to the Periodic Table of Elements (PTE), overseen by the International Union of Pure and Applied Chemistry (IUPAC). If the PTE is fundamental for understanding the intimate nature of matter, the ICC has the same importance for Earth science and evolutionary knowledge, and has been considered one

of the great achievements of humanity [2]. Indeed, without the ICC, it would not be possible to understand the geological history of our planet and the origin and evolution of life on it. Such a fundamental framework requires high scientific accuracy.

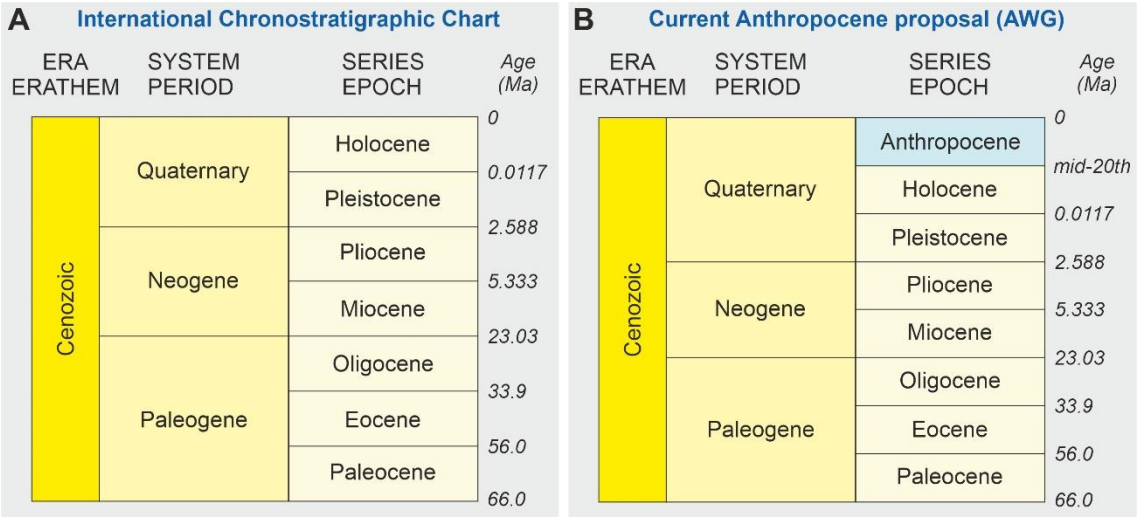

Figure 1. Part of the International Chronostratigraphic Chart (ICC) corresponding to the Cenozoic era/erathem. A) Current status (simplified from Ref. [3]). B) Proposal of the Anthropocene Working Group (AWG) for the 'Anthropocene' epoch (simplified from Ref. [4]).

The 'Anthropocene', as a prospect for a new geological epoch, was evaluated by the Anthropocene Working Group (AWG), which prepared a proposal that has recently been submitted to the ICS Subcommission of Quaternary Stratigraphy (SQS) for approval, as a first step for formalization. Until recently, the proposal was in a relatively embryonic state, but in the last years, a significant boost has occurred leading to its completion. This paper summarizes the main developments that have precipitated such recent acceleration, and presents the main traits of the proposal, which remains unpublished. Some alternatives to an eventual rejection of the current AWG proposal by the ICS/IUG are also briefly discussed. Other non-stratigraphic considerations around the term 'Anthropocene' are beyond the scope of this paper.

2. The AWG proposal: progress and critiques

The story began in the dawn of the 21st century when the Danish environmental chemist and Nobel recipient Paul Crutzen and the American ecologist Eugene Stoermer coined the term 'Anthropocene' to emphasize that the global consequences of human activities on the Earth system have already surpassed the range of variability of the Holocene [5,6]. According to these authors, unless a major catastrophe of the magnitude of a global nuclear war, an asteroid impact, or a new ice age drastically reduces humankind on the planet, this situation will persist for millennia, possibly millions of years. Therefore, the definition of a new geological epoch, the 'Anthropocene', would be needed following the Holocene.

According to Crutzen & Stoermer [5,6], the preferred starting date for the 'Anthropocene' epoch would be the beginning of the Industrial Revolution, in the late 18th century, and the main geological footprints would be the growth in the atmospheric concentrations of greenhouse gases (CO_2, CH_4) recorded in polar ice cores, along with dramatic shifts in biotic assemblages, as recorded in lake sediment cores (Figure 2). These manifestations would be the consequence of the ongoing anthropogenic global change, notably the global warming, and coincided chronologically with the invention of the

steam engine by James Watts. Therefore, these authors proposed using an environmental concept to define a new unit of the GTS. It is worth noting that the term used to name this new unit implicitly suggested the rank of a series/epoch, as the suffix '-cene' is reserved for the series/epochs of the Cenozoic erathem/era (i.e. Paleocene, Eocene, Oligocene, Miocene, Pliocene, Pleistocene and Holocene).

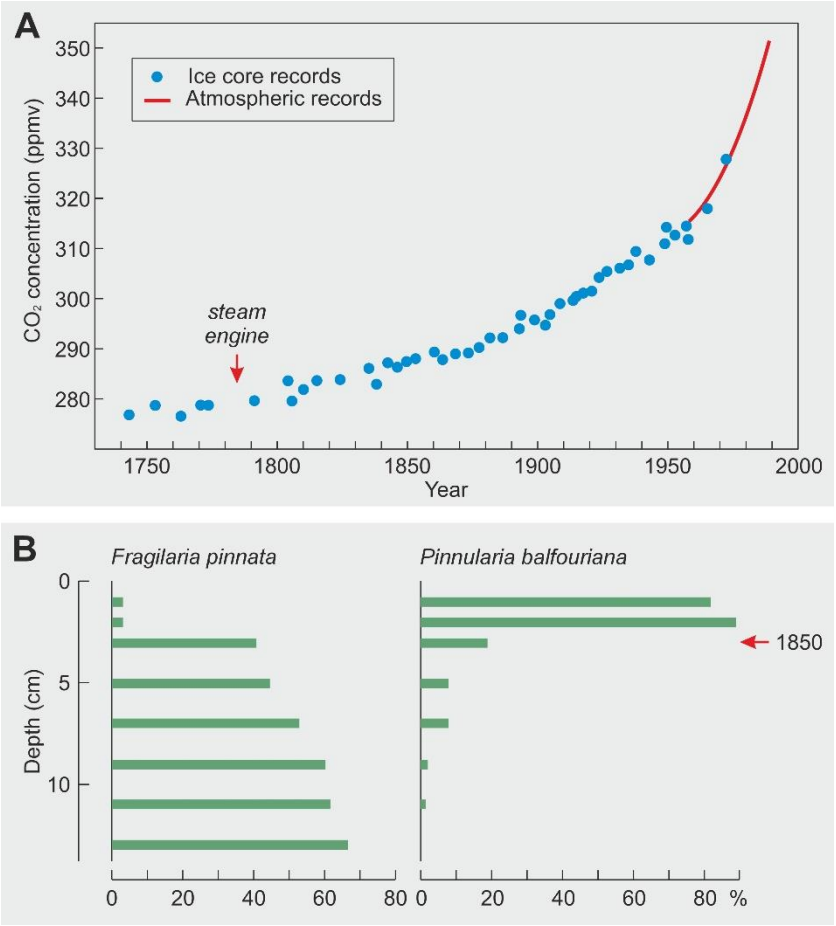

Figure 2. Examples of geological imprints cited by Crutzen & Stoermer [5,6] to situate the beginning of the 'Anthropocene' in the Industrial Revolution. A) Increase in atmospheric CO_2 concentration during the last two centuries, as measured in ice-core records from Siple Station (Antarctica). The red line represents instrumental measures from Mauna Loa (Hawaii). Modified from Ref. [7]. B) Changes in the dominance of diatom assemblages in the transition from 18th to 19th centuries, as recorded in the sediments of Ellison Lake (Ellesmere Island, Canada), and attributed to global warming. Simplified from Ref. [8].

This idea of a new 'Anthropocene' series/epoch began to be analyzed in 2009 by the AWG, which was created specifically for this purpose and was led by the British geologists Jan Zalasiewicz until 2019 and Colin Waters from that date onward. Presently, the AWG has 34 members, and the decisions are taken by voting, with a supermajority of 60% required. Usually, the ICS grants four years to the working groups to complete a proposal, but in the case of the 'Anthropocene', the process has taken approximately 13 years [4,9-11]. Among the potential causes for this delay, there has been an intense debate between the AWG and influential members of the ICS and the IUGS on several aspects, such as the nature of the stratigraphic unit to be defined and its starting point, that is, the time when the Earth system, as a whole, became primarily anthropogenic.

The 'Anthropocene' critics – which include the ICS Secretary General, the British geologist Philip Gibbard, and the IUGS Secretary General, the American geologist

Stanley Finney, who are directly involved in the approval/ratification of the AWG proposal – emphasize that this new epoch is currently defined as a historical phase based on environmental criteria, but a valid chronostratigraphic unit must be defined on the basis of distinct and characteristic rock bodies following the criteria of the ISG [12-15]. According to these criteria, the first step is to locate the rock strata that characterize the new unit and the particular features that differentiate it from the underlying unit, or stratigraphic markers. Then, the base of the new unit is dated using geological methods to provide the chronological framework.

Altogether, this body of evidence is known as the Global Stratotype Section and Point (GSSP) and should be recognizable globally. Usually, the GSSP is marked in the field, at the base of the chronostratigraphic unit that defines, by a 'golden spike' (Figure 3). Although the type of rock and the stratigraphic markers could be different depending on the site and its specific environmental features, the new unit must represent the same global phenomenon. For example, the GSSP of the Holocene series/epoch is in a Greenland ice core and the stratigraphic markers are changes in the deuterium and oxygen isotopes that mark a clear shift from glacial to interglacial conditions. Other equivalent locations around the world, the auxiliary stratotypes, have been found that are based on different rocks (lacustrine and marine sediments) and stratigraphic markers (physicochemical and biological proxies) but all of them record the same phenomenon, i. e. the end of the last glaciation, and are globally isochronous, which means that they occur at the same time across the globe [16].

Figure 3. Golden spike for the Campanian GSSP (Upper/Late Cretaceous; 83.6±0.2 Ma) in Gubbio (Italy). Composed from Ref. [17].

Without a GSSP, it is not possible to measure geological time; therefore, the definition of a new chronostratigraphic unit makes no sense. It is important to bear in mind that the only available evidence for measuring geological time is rock strata. Without rocks, time passes but it cannot be measured by geological methods. This situation is similar to that of a sandglass without sand, for which time cannot be measured.

In the case of the 'Anthropocene', the GSSP and its global expression remain undefined. In August 2016, at the 35th International Geological Congress held at Cape Town, South Africa, the AWG members voted that the starting point of the 'Anthropocene' should be placed in the mid-20th century, coinciding with the so-called

Great Acceleration when many indicators of Earth's anthropization experienced an abrupt increase [18] (Figure 3). The most suitable stratigraphic marker was proposed to be radionuclide fallout, mainly plutonium (^{239}Pu) and radiocarbon (^{14}C), generated by the atomic weapon tests carried out in the 1940s and 1950s [4]. Therefore, a specific date and a set of stratigraphic markers based on environmental considerations were given before identifying the GSSP, which is contrary to the ISG rules and the empirical nature of stratigraphic science, as emphasized by the opponents.

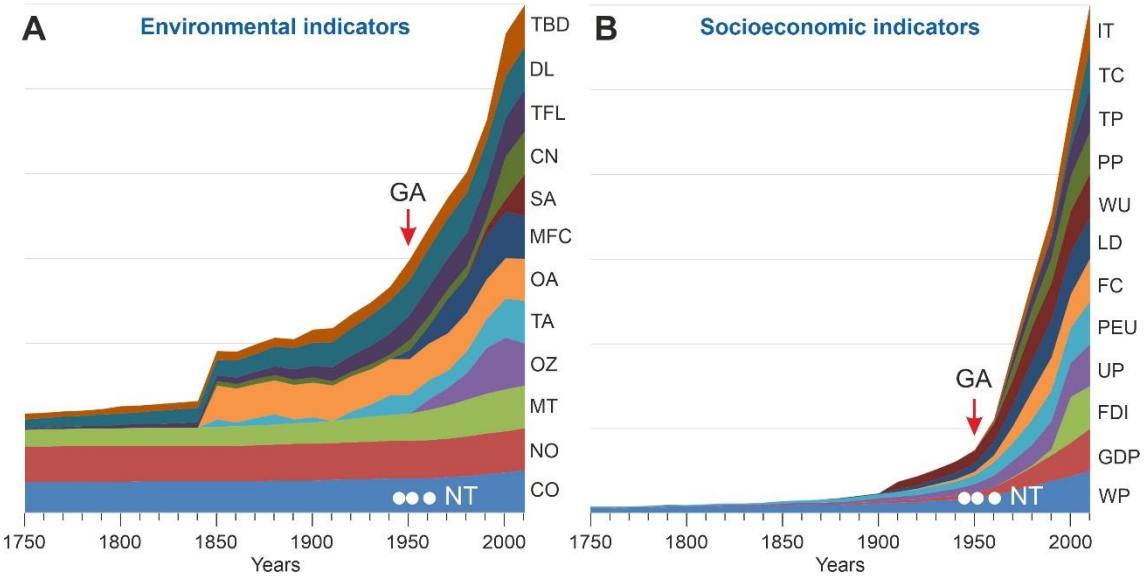

Figure 4. Relative trends of environmental and socioeconomic indicators since 1750. Data scaled to 2010 value for each category. The Great Acceleration (GA; 1950) onset is marked by a red arrow, and the first nuclear weapon tests (NT; 1945, 1952, 1961) are indicated by white dots. Environmental indicators: TBD, terrestrial biosphere degradation (3,53 to >28.57% decrease of mean species abundance); DL, domesticated land (0.08 to >0.38 of total land area); TFL, tropical forest loss (0.96 to >27.6 of total compared to 1700); CN, coastal nitrogen (0 to >79.7 Mt/y); SA, shrimp aquaculture (>3.77 Mt); MFC, marine fish capture (>64.14 Mt); OA, ocean acidification (>5.21 nmol/kg); TA, temperature anomaly (>0.47°C); OZ, Ozone depletion (>54.09%); MT, methane 705.34 to 1744.07 ppb); NO, nitrous oxide (271.39 to >322.46 ppb); CD, carbon dioxide (276.81 to >384.27 ppm). Socioeconomic indicators: IT, international tourism (0 to >939.9 10^6 arrivals); TC, telecommunications (0 to 6.48 10^9 landlines); TP, transportation (0 to 1281.35 10^6 vehicles); PP, paper production (0 to 398.77 Mt); WU, water use (0 to 3.87 10^3 km^3); LD, large dams (>15 m height; 0.06 to 31.63); FC, fertilizer consumption (171.46 Mt); PEU, primary energy use (16 to 533.37 exajoule); UP, urban population (0.05 to 3.5 10^9); FDI, foreign direct investment (0 to 1.3 10^{12} USD); GDP, real gross domestic product (0.35 to 50.15 10^{12} USD); WP, world population (0.73 to >6.9 10^9). Modified from Ref. [19].

The AWG proposal has been the object of many critiques, not only because of the procedure but also because other previously proposed starting points were dismissed. Indeed, in the original proposal, Crutzen and Stoermer [5.6] suggested that the 'Athropocene' could encompass the last centuries or the last millennia, even the whole Holocene. Since then, numerous studies have proposed a wide range of dates within this timeframe, such as the Middle Holocene increase of greenhouse gases due to the global neolithization, also known as the 'early Anthropocene hypothesis' [20,21], or the worldwide cultural and biotic exchange initiated with the Columbian arrival to America, also known as the 'Orbis hypothesis' [22], among others. These studies have also emphasized the heterogeneous and diachronic nature of human impact across the globe and the difficulty of identifying a particular starting point of global reach for the anthropization of the Earth system [22,23]. This introduced a new drawback because,

according to the ISG rules, a new chronostratigraphic unit of the ICC cannot be defined based on a diachronic boundary.

In 2019, at the request of the ICS, the AWG reaffirmed its chronological definition, which confirmed that the proposal for the 'Anthropocene' series/epoch to be submitted to the ICS/IUGS will consider the mid-20th century as the starting date (Figure 1). Although opponents argue that, so defined, the available sedimentary record accumulated in barely 70 years is insufficient to characterize a geological series/epoch, the AWG concentrated on identifying the GSSP representative of this time period, that is, a rock body that met the pre-established conditions.

3. Latest developments

In the last few years, the AWG prospect has undergone a significant boost that has been decisive for the development of the final proposal. After a thorough review of the available evidence [11,24], this working group concluded that the most suitable candidates for the 'Anthropocene' GSSP were paleoarchives able to provide high-resolution (annual or seasonal) records from the 20th century, such as (i) annually laminated (varved) sediments from lakes, coastal marine environments and anoxic marine basins; (ii) annual growth rings from trees, corals, mollusks and speleothems; and (iii) annual/seasonal accumulation layers from glacial ice caps. These archives can provide the chronological reliability and resolution needed for a precise identification of the first appearances of the appropriate markers and hence of the beginning of the 'Anthropocene'.

The most suitable (primary) markers should meet the condition of being widespread and globally correlatable. This is the case for the previously mentioned radionuclides (^{239}Pu and ^{14}C) and the ^{13}C stable isotope, which are found worldwide across most sedimentary environments. Other supporting (secondary) markers identified were fly ash, lead (Pb), biological proxies for significant turnovers and anthropogenic introductions, and stable isotopes such as δ^{15}N or δ^{18}O, among others (Table 1).

Table 1. The localities of Figure 4, with indication of the type of archive, the date suggested for the beginning of the 'Anthropocene' in each site (A-onset), the thickness of the 'Anthropocene' sediments (A-thick) in cm, and the stratigraphic markers used. AAs, anthropogenic artifacts; BTIs, biotic turnovers/anthropogenic introductions; HD, historical documentation; LT, lithology; SCPs, spheroidal carbonaceous particles (fly ash). Raw data from Ref. [25].

Site	Map	Archive	A-onset	A-thick	Stratigraphic markers
East Gotland, Baltic Sea	EG	Anoxic marine basin	1956±4	26.5	LT, ^{239}Pu, ^{241}Am
San Francisco, USA	SF	Estuary	Mid-20th	230 (?)	Unclear
Searsville, USA	Sv	Lake	1948	366	^{239}Pu, SCPs, Pb, BTIs
Crawford, Canada	Cf	Lake	1950	15.6	^{239}Pu, SCPs, δ^{15}N, BTIs
Sihailongwang, China	Sl	Lake	1953	8.8	LT, ^{239}Pu, ^{129}I,^{14}C, SCPs, PAHs, δ^{13}C
Flinders, Australia	Fl	Coral reef	1958	36.9	^{239}Pu, ^{14}C, Sr/Ca, δ^{18}O, δ^{15}N
West Flower Garden, USA	WF	Coral reef	1957	28.4	^{14}C, ^{239}Pu
Palmer, Antarctica	Pm	Ice sheet	1952	3490	^{239}Pu, SCPs
Ernesto, Italia	Er	Cave speleothem	1960±3	0.4	^{14}C, S
Śnieżka, Poland	Sk	Peatland	1950-1955	39.5-44.5	^{239}Pu, ^{14}C, BTIs
Beppu, Japan	Bp	Bay	1953	64.6	LT, ^{239}Pu, ^{210}Pb, δ^{15}N
Vienna, Austria	Vn	Urban anthropogenic deposits	1945-1959	30	^{239}Pu , AAs, HD

Combining the better-suited archives and markers, a total of 12 localities around the world were selected for a more intensive study as GSSP candidates (Figure 4; Table 1). Using the rock archives from these localities and the abovementioned stratigraphic markers, the beginning of the 'Anthropocene' was tentatively placed between 1945 and 1968, with most dates situated in the 1950s. In agreement with former expectations, plutonium is the most common primary 'Anthropocene' marker in these sites [25]. After a detailed site-by-site analysis, the AWG voted that the best suited GSSP candidate was the Canadian Crawford Lake, whereas the other candidates could serve as supporting localities useful for global correlations. The announcement was intended for the 4th International Congress on Stratigraphy celebrated on July 2023 in Lille (France), but this was not allowed and was finally made in parallel in a press conference specially organized for this purpose by the AWG and the German Max Plank Society.

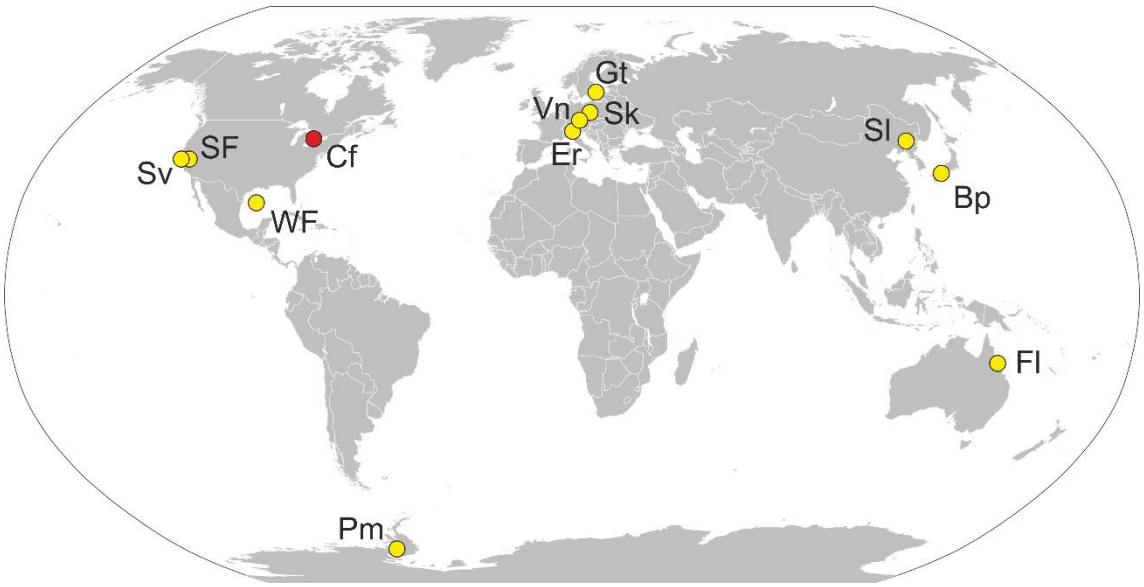

Figure 5. The 12 localities selected by the AWG to determine the most suitable GSSP for the 'Anthropocene'. The locality selected by the AWG as the best GSSP candidate (Crawford Lake; Cf) is highlighted in red. Redrawn from Ref. [25].

The Crawford Lake sediments are formed by clearly visible annual laminations consisting of dark (organic)/light (calcite) seasonal couplets, which provide a continuous and detailed chronology for the 20th century (Figure 5). In these sediments, the bomb test signal (notably ^{239}Pu) is clearly visible at approximately 15 cm depth, which corresponds to 1950. This boundary is marked by an unusually thin calcite layer, as a result of enhanced terrigenous supply from the basin due to the rapid industrialization of the area during the Great Acceleration, along with an abrupt decline in elm pollen due to a documented widespread disease of this tree. Other stratigraphic markers of the GSSP horizon included a ^{137}Cs peak; increases in fly ash and elements such as Fe, K, Ti, Cu and Pb; and declines in $\delta^{15}N$ and Ca [26].

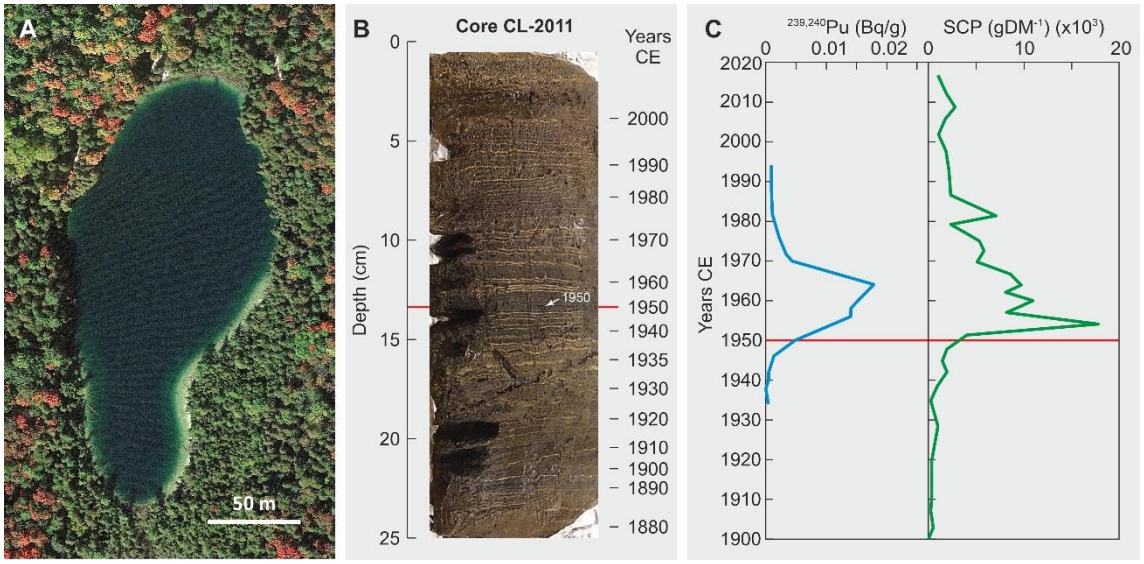

Figure 6. The sediments of Crawford Lake as the 'Anthropocene' GSSP with the lower 'Anthropocene' boundary marked by a red line. A) Google-Earth image of the lake showing its small size. B) The top-25 cm from core CL-2011 representing the last century, as dated from varve counting. C) The main stratigraphic markers, plutonium fallout (^{239,240}Pu) (blue) and spheroidal carbonaceous particles (SCP) (green), showing the significant peaks at the beginning of the 'Anthropocene'. Composed from Ref. [26].

Some critics, especially the American geologist and former ICS member Lucy Edwards, argue that barely a few centimeters of unconsolidated lake sediments can easily be mixed or removed – even the whole lake could dry out in a matter of centuries or millennia – which would irreversibly eradicate the 'Anthropocene' GSSP. The same would be true for other candidates if we also consider sea-level shifts and erosion by aerial exposure, among other disturbing factors [27]. However, the AWG decision was made and the final proposal will be issued soon in the 2023 AWG Newsletter, which is available on the website of this task group [28].

In a nutshell, the 'Anthropocene' as a new geological epoch following the Holocene commenced in 1950 and its GSSP lies in the sediments of Crawford Lake, at a depth of 15.6 cm. The primary stratigraphic marker is the radionuclide fallout (^{239}Pu), which resulted from mid-20th century bomb tests. Other localities widespread worldwide may serve as auxiliary sections (especially Beppu, Shailongwang and Śnieżka), and other proxies signaling the global influence of human activities (notably ^{14}C, fly ash, heavy metals and stable N/O isotopes) could be used as auxiliary stratigraphic markers.

4. Last-minute complications

In the last couple of years, while the AWG was finalizing the analysis and selection of GSSP candidates, a new possibility has emerged that may challenge the progress made by this working group during the last decade. Indeed, all the work developed to date by the AWG has been based on the idea of the 'Anthropocene' as a prospective geological series/epoch, as initially proposed by Crutzen & Stoermer [5,6]. But now, a group of stratigraphers consider that the 'Anthropocene' could be better defined as an event [29,30]. This could affect the 'Anthropocene' formalization process, as this group includes the most influential ICS/IUGS critics quoted above.

A geological event is a time-transgressive concept that is not included in the GTS/ICC; therefore, it does not need to be homologated using a fixed point in time, such as a GSSP, and can accommodate the spatiotemporal heterogeneity characteristic of

human impact on Earth. An event is not a minor geological feature, as it can imply fundamental worldwide transformations, such as those attributed to human activities and even greater. For example, a well-known geological event is the Great Oxidation Event (GOE), which radically changed the course of evolution, including the development of multicellular life and the colonization of land. The GOE was not a point in time but rather a gradual process lasting approximately 300 million years (2400-2100 Ma).

According to Gibbard et al. [29,30], an 'Anthropocene Event' could incorporate a far broader range of transformative anthropogenic practices, both in time and space, than an 'Anthropocene Epoch'. The AWG replied that the 'Anthropocene Event' concept includes all kinds of human activities with local to global impacts that developed over the last 50 millennia, thus obscuring the recent abrupt planetary change involving the entire Earth system, which is what the 'Anthropocene Epoch' wants to emphasize. In addition, they recall that the suffix '-cene' characterizes Cenozoic series/epochs and is therefore inappropriate for naming an event [31,32].

5. Potential outcomes

The AWG proposal was submitted to the ICS on October 31, 2023 and is now under consideration. Within the ICS, the first instance is the SQS – which is led by two relevant AWG members, Zalasiewicz (Chair) and the Canadian geologist Martin Head (Vice-Chair) – and the second instance is the ICS Executive, where the opponent Gibbard is the Secretary General. In both cases, a minimum of 60% majority is needed for approval. This will not necessarily be a quick step, as the SQS should analyze in detail the proposal, and there is no a specific schedule for this. If the proposal is approved by the ICS, then it will be submitted for ratification to the IUGS where Finney, one of the most active critics of the AWG proposal, is the Secretary General. Again, a detailed re-evaluation may be needed. If the ICS and the IUGS reach an agreement before summer this year, the final decision could be announced in the 37th International Geological Congress to be held at Busan (South Korea) in late August, 2024. According to Waters (pers. comm.), the current AWG Chair, none of these steps are guaranteed to pass and there is no any preliminary feedback from the ICS, as the Executive of this organism prevented the AWG members to discuss the issue with the SQS members.

The risk of the 'Anthropocene' proposal not being formalized, in its current status, is real, and the AWG is aware of this. The fact that a number of relevant ICS/IUGS members, who should vote for final approval/ratification, have repeatedly questioned AWG decisions strongly suggests this possibility. Noteworthy, the AWG always reaffirmed its position and answered the critiques without reconsidering the questioned points [33,34], which did not contribute to changing the opponent's perspective. This situation fostered the interest of the author in potential alternatives to the eventual rejection of the current 'Anthropocene' prospect and approached a number of AWG, ICS and IUGS members to ask for their input on this matter [35]. The IUGS members who were contacted declined to comment on the issue arguing that, as members of the organization responsible for the final decision, they preferred not to express their personal opinion on the subject.

The AWG members, including Zalasiewicz and Head, were reluctant to modify the current proposal to downgrade the 'Anthropocene' to one more Holocene stage/age, as suggested by Gibbard and other critics. These AWG members emphasized that changes associated with the 'Anthropocene' are of greater magnitude than those associated with current subdivisions of the Holocene. Curiously, the possibility of a chronostratigraphic unit of higher rank – such a system/period, the 'Anthropogene' [36], or an erathem/era, the 'Anthropozoic' [37] – has not been considered by the AWG, as emphasized by

Edwards. When asked for an eventual plan B, Zalasiewicz responded that there is no such thing and that the AWG will remain attached to the 'Anthropocene' concept, as originally defined by Crutzen (who was also a member of the AWG) and Stoermer. ICS members, such as Gibbard and Edwards, commented on the survival of 'Anthropocene' term regardless of the final outcome, in a cultural sense to emphasize the human influence on global environmental issues, a topic that is beyond the competence of stratigraphic organisms.

The whole discussion can be read at Ref. [35], but the general impression is that both proponents and opponents of the current 'Anthropocene' proposal remain attached to their own positions and are reluctant to change their mind. The AWG has already crossed its Rubicon, and now we should wait for the result of the SQS deliberations in the first instance. This Subcommission can endorse or reject the proposal but can also request modifications. It is important to note that an eventual rejection does not imply the refusal of the 'Anthropocene' as a stratigraphic term and concept but of the current AWG proposal. Therefore, a new and different proposition would still be possible. According to Waters (pers. comm.), some SQS members have published strongly in favor of the AWG proposal and others strongly against, and the result is uncertain, especially if we consider that a 60% majority is required. *Alea iacta est*.

6. Final remarks

If the current AWG proposal is approved/ratified by the ICS/IUGS, the living beings above 74 years old (i.e. those born before 1950) will automatically fall within those that originated in a past geological epoch, the Holocene. This means that more than 310 million humans, almost 4% of the total (raw data from Ref. [38]), could be considered as genuine Holocene living fossils, whereas the remaining 96% would be of Anthropocene origin. The fossils would correspond to the so-called Lost Generation (Gen) and part of the Greatest Gen, whereas most Silent Gen, and all Boomers, Gen X, Millennials, Gen Z and Gen Alpha would be Anthropocene (Figure 7). According to this, some famous Holocene living fossils would be the Dalai Lama, Pope Francis, King Charles III, Hilary Clinton, Paul McCartney, Barbra Streisand, Mick Jagger, Yoko Ono, Bob Dylan, Cher, Arnold Schwarzenegger, Jack Nicholson, Meryl Streep, Clint Eastwood, Sophia Loren, Robert de Niro, Billie Jean King, Mark Spitz, Eddy Merckx, Emerson Fittipaldi or Kareem Abdul-Jabbar, among many others.

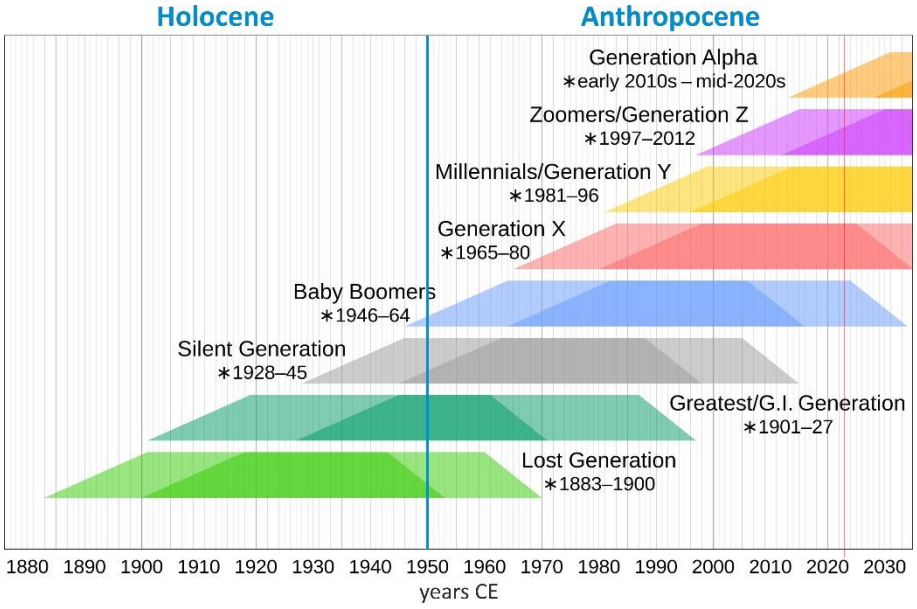

Figure 7. Timeline of generations in the Western World showing the Holocene/Anthropocene boundary (blue line) according to the current AWG proposal. Modified from Ref. [39].

This situation would be similar to the first century of the Holocene, when Pleistocene and Holocene humans coexisted. The main difference is that, in those times, the GTS had not been created yet and these humans were unaware that, according to the current standards, they were crossing a geological boundary. Today, we have the opportunity to experience how a situation like this could be but, as the Early Holocene humans, we ignore how future scholars from the next millennia will subdivide geological time (or whether they will do this at all) and whether the 'Anthropocene' geological footprint will grow and consolidate, as expected by the AWG members, will remain stationary or will be removed by natural and/or anthropogenic agents.

The 'Anthropocene' will only make sense in the first case and under the current chronostratigraphic standards. In other words, the 'Anthropocene' will consolidate as a true geological epoch only if we keep deteriorating the planet and this is manifested in sedimentary rocks. If this is the case, our species may disappear from the face of the Earth or may undergo a global collapse, as anticipated by Crutzen & Stoermer [5,6]. In both cases, the continuity of the current chronostratigraphic framework is not guaranteed and the 'Anthropocene' could be the last unit of the ICC [40]. If, on the contrary, we are capable of deeply changing our life standards and attaining a sustainable planet in time (say, in the next centuries), the geological footprint of the 'Anthropocene' will remain as a fragmentary witness of an ephemeral historical phase insufficient to define a geological epoch, or will eventually vanish, thus losing any geological entity. Therefore, defining the 'Anthropocene' as a new geological epoch implicitly accepts that we will be unable to stop our harmful impact on the planet for millennia or millions of years, provided we persist that long and keep using the ICC.

As stratigraphy is concerned with the past and not with the present or the future [14,15], this possibility cannot be evaluated using stratigraphic methods. Therefore, the formalization or not of the current AWG 'Anthropocene' proposal is a big challenge, whose final outcome is totally unpredictable and may deeply affect the future developments of the current chronostratigraphic framework [41].

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Data Availability Statement

No new data are provided.

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Conflicts of Interest

The author declares no conflict of interest.

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