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Reply to Response by Summerhayes *et al*. to Dąbski (2025): *Global climate change, CO_2 and climatic catastrophes*

Maciej Dąbski[1]

A b s t r a c t. The global warming issue is unfortunately subject to numerous academic malpractices and data selection biases. Summerhayes et al. (2025a, b) advocate for "scientific consensus" in terms of the leading role of anthropogenic emissions of greenhouse gases (GHGs), unprecedented global warming and accelerating climate-related disruptive events. However, the global carbon budget is still not well known and was not in balance in pre-industrial times. Anthropogenic radiation forcing is in operation, but it is not overwhelming. Natural processes, especially total solar irradiance and oceanic oscillations, play a very important role, which is usually downplayed by mainstream scientists such as Summerhayes et al. (2025a, b). Feedbacks, e.g. changes in cloudiness, are important, but still poorly known. Therefore, model-based climate sensitivity varies considerably and is far from being established. Our knowledge of the geological past teaches that CO_2 has never been the triggering factor of raises of global temperature. Contrary to the claims of Summerhayes et al. (2025a, b), there is no clear evidence that the current warming is unprecedented in its magnitude (as evidenced by ocean heat gains) or by a spatially synchronous pattern. Contrary to Intergovernmental Panel on Climate Change models, Arctic amplification currently undergoes weakening, the mass balance of Greenland and Antarctic ice sheets is not catastrophic, and climate-related disruptive events do not show an accelerating trend. The rise in global aridity has been registered only in a few recent years, and it is not a widespread phenomenon.

Keywords: *global climate change, carbon dioxide, solar activity, proxy-based reconstructions, climate-related disruptive events*

Przegląd Geologiczny recently (Vol. 73, No. 2) published two contradictory papers: one by Wierzbowski (2025) who advocates the common notion of the leading role of CO_2 in controlling the Earth climate, and another one by Marks (2025a) who opposes this paradigm and argues that the current climate change is mostly natural. In the journal issue No. 5 of the same volume, Marks was criticized by Summerhayes *et al*. (2025a), but replied to this critique and provided further evidence against the mainstream narrative resulting from Intergovernmental Panel on Climate Change (IPCC) reports (Marks, 2025b). The same group led by Summerhayes *et al*. (2025b) have criticized my paper (Dąbski, 2025) in which I downplayed the role of CO_2, but from a slightly different perspective. I am grateful to *Przegląd Geologiczny* for allowing me to reply. The readers are encouraged to read the whole discussion and to judge on their own.

Let me start with reminding the readers of what I wrote (Dąbski, 2025): "I emphasize that the development of human civilization undoubtedly influenced global climate, and that some anthropogenic influences are still to be studied. Many feedbacks between atmosphere, ocean, land and human activities remain poorly known and there are reasons to decouple economic development from the burning of fossil fuels". Decreasing dependence on fossil fuel and development of nuclear and renewable energy sources are a proper way forward, but it must be done gradually. My main message can be summarized: 1) there is quite a lot of academic malpractice in this discourse and there is no consensus about the strength of anthropogenic greenhouse gases (GHGs), mainly CO_2; 2) there is no evidence that the current climate change is driven mainly by GHGs; 3) current warming is not unprecedented, and 4) trends in climate-related disruptive events do not indicate imminent catastrophe. Summing up, the "climatic crisis" on the global scale is greatly exaggerated.

ACADEMIC MALPRACTICE AND THE "SCIENTIFIC CONSENSUS"

There are many cases that prove there is a problem with the politicization of science. Those who disagree with the mainstream opinion are sometimes banned, insulted, labelled as heretics, or even lose their academic positions. A good example is the case of Peter Vincent Ridd who lost his job at James Cook University, partly because he objected to the notion of coral reef catastrophe. Ironically, the Australian Institute of Marine Science have recently published a report that shows a remarkable natural recovery of the Great Barrier Reef (AIMS, 2022). Another example is what happened to the paper of Alimonti *et al*. (2022), which proved that there is no evidence of increasing threats from climate-related events. The paper underwent standard reviews and was published. However, later it was retracted, because "concerns were raised regarding the selection of the data, the analysis and the resulting conclusions of the article". The addendum submitted by the authors underwent a post-publication review, but the editors decided it was not suitable for publication. Obviously, the authors disagree with this retraction. It is a fact that the narration in some papers disagrees with the data displayed, as was demonstrated in my paper (Dąbski, 2025). A much more worrying situation is when data undergo mysterious and unjustified transformation to suit the case, as shown by Karlen (2025) who analysed the mysterious correction to the temperature record made by NASA. I also spotted obvious manipulation by NASA regarding the recent sea level rise (see section "Unprecedented warming"). Many unethical practices due to politicization of science are shown by Cabbolet (2025).

It is not the main aim of this paper to develop this issue, but examples are numerous. The media chases sensation and makes things worse by highlighting "apocalyptic"

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climate-related events, showing no interest in the proper long-term context of environmental changes.

Apart from these examples of academic malpractice is the fact that there is no scientific consensus about the strength of CO_2 in driving the global climate changes in the past and now. I have provided examples in my previous paper (Dąbski, 2025), maybe most important being the scientific criticism toward Mann *et al*. (1998) but here is another one. Veizer *et al*. (2000) published a paper in Nature titled *Evidence for decoupling of atmospheric CO_2 and global climate during the Phanerozoic eon*. The title says for itself. Of course this paper was later criticized but isn't it a proof that there is no consensus in this issue? Time passes, and scientific publications continue to be released. Some openly disagree with the mainstream opinion ("the science says"), while others silently convey uncomfortable data (sometimes hidden in the appendix), while maintaining a politically correct narrative. Examples can be found in Dąbski (2025) and in this paper (a good example is the case with aridity, see section "Climate-related disruptive events").

Therefore, the high proportion of publications supporting the "consensus" and provided by Summerhayes *et al*. (2025b) is highly misleading. A deeper explanation of this issue can be found in Shellenberger (2020), Koonin (2024) and Kowalczak (2024). I also refer to a 51-page paper of Connolly *et al*. (2020), in which they provide a thorough analysis of the differences in scientific publications concerning several climate-change paradigms. Finally, one must acknowledge the recent Report to U.S. Energy Secretary written by recognized scientists (Climate Working Group, 2025), which goes against IPCC and what "the science says". Of course, one could see it as being steered by the Trump administration, but the authors have a long history of being contrarians. I would recommend reading it and verifying the scientific sources on which it is based. On the other hand, IPCC can be also accused of non-transparent selection of contributing experts, and its final reports undergo political adjustments.

CARBON BUDGET AND ANTHROPOGENIC FORCING

Summerhayes *et al*. (2025a, b) do not seem to acknowledge the fact that the Earth's radiation budget has never been stable and that the climatic drivers are far more complex than anthropogenic influence (Ghil, Lucarini, 2020). I have never disputed the fact that adding CO_2 and other greenhouse gases to the atmosphere increases the greenhouse effect; however, the strength of this effect is highly debatable. The global carbon budget can only be assessed roughly yet cannot be precisely calculated because the sources and sinks of atmospheric CO_2 have been permanently changing. According to Rackley (2023), the ocean absorbs 92 GtC and emits 90.3 GtC, terrestrial vegetation absorbs 120.4 GtC and emits 118 GtC (by respiration, decay and wild fires), fossil fuel combustion emits 6.3 GtC, and land use changes are responsible for the emission of 1.6 GtC. Vegetation and the ocean absorb 4.7 GtC from anthropogenic emissions, meaning that 3.2 GtC are added to the total atmospheric C content of about 750 GtC each year. It is clear that the most important regulators of atmospheric CO_2 are the ocean and vegetation, and these have never been stable. Moreover, there are other changing sources of CO_2, e.g. volcanic activity, especially underwater eruptions, which is very poorly known. Each additional portion of atmospheric CO_2 results in a smaller radiation forcing in a logarithmic fashion (Etminan *et al*., 2016; Romps *et al*., 2022). In other words, the same extra 100 ppm results in much greater warming at lower concentrations (e.g., 200–300 ppm) than at higher concentrations.

Some human actions exert a negative radiation effect (e.g., emission of aerosols), but the outcome is dominated by CO_2 emissions and is positive. The total average anthropogenic effective radiative forcing (ERF) during the industrial era (1750–2019) is 2.72 W m^{-2} acc. to the Sixth Assessment Report (AR6) (IPCC, 2023). However, one should notice a significant uncertainty which places the ERF between 1.96 and 3.48 W m^{-2}. The Earth absorbs ~239 W m^{-2} of energy from the Sun, so the energy input has been increased by ~1%.

SUN, CLOUDS AND OCEANIC OSCILLATIONS

However, the total solar irradiance is not constant. According to Steinhilber *et al*. (2009) it has increased by ~1 W m^{-2} since the Maunder Minimum (pre-industrial times). This is also well visible on NOAA websites: Lindsey (2025) and in Total Solar Irradiance (2025). It is clearly seen (see Fig. 3 in Dąbski, 2025) that the current cycle (No. 25) is the strongest since the beginning of instrumentalization. It is a pity that Summerhayes *et al*. (2025b) do not acknowledge this data. They disregard the solar contribution to the most recent temperature surge by writing: "We are not, therefore, currently receiving exceptionally high levels of solar irradiance, and so this cannot be an explanation for the exceptional warmth of 2023 to the present". This statement contains two mistakes: 1) the exceptionally high solar peak occurred in 2023 and 2024, and we are already past it, and therefore 2) the current average global temperature has been gradually declining since March 2024 (Global Temperature Report, 2025)

Global cloudiness declined in the 1990's (Devasthale, Karlsson, 2023) and after 2015 (Goessling *et al*., 2024). The causes of this phenomenon are uncertain, but it must have increased the radiation budget due to decreased albedo. The recent surge in global temperature is the result of exceptionally high solar irradiance coupled with exceptionally low cloudiness, but the reason for the decline in cloudiness is unknown (Goessling *et al*., 2024). The eruption of the underwater Hunga Tonga–Hunga Ha'apai volcano in 2022, which released huge amounts of water vapor – the strongest greenhouse gas, probably also played a role in the temperature surge (Jenkins *et al*., 2023).

In my former paper (Dąbski, 2025), I emphasized the role of the Atlantic Multidecadal Oscillation (AMO). Moore *et al*. (2017) found that the temperature of the Northern Atlantic significantly rose in the mid-18th century, before the anthropogenic boom in GHGs emissions (Fig. 1A), and AMO is in its third major positive phase (Fig. 1B). Moreover, it is well known that the North Atlantic Oscillation (NAO) has a significant impact on climatic conditions in Europe. As this continent experienced a very rapid warming, the situation in Europe plays a very important role in shaping the global temperature, and NAO is on the rise (NAO,

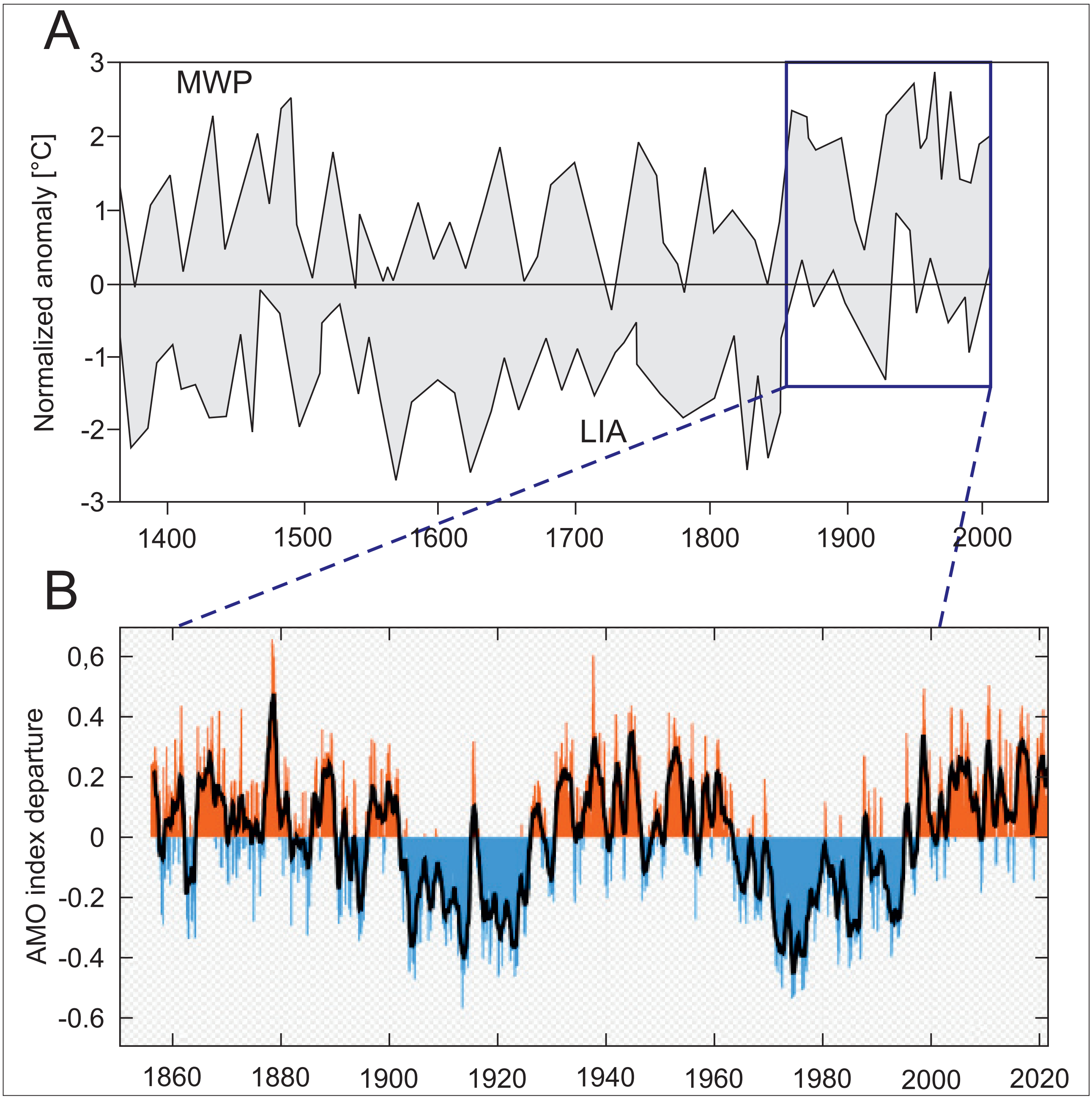

Fig. 1. A – changes in Atlantic Multidecadal Oscillation (AMO) since Middle Ages (Moore *et al*., 2017, simplified); **B** – more recent fluctuation of AMO index (AMO, 2025). MWP – Mediewal Warm Period, LIA – Little Ice Age

2025). El Niño events also push the global temperature up. It was found that variability in sea surface temperature increased after 1960–1970, influenced by more frequent and strong El Niño and La Niña events (Wang *et al*., 2019; Cai *et al*., 2023). Despite the fact that these are natural oceanic fluctuations, Cai *et al*. make a clear statement in the title of their publication: *Anthropogenic impacts on twentieth-century ENSO variability changes*. Isn't it writing for a predetermined thesis? In the second sentence of the abstract, the authors honestly admit: "Whether such changes are linked to anthropogenic warming, however, is largely unknown". Where is the academic honesty? Current warming can be at least partly explained by overlapping natural cycles that mutually reinforce climatic changes (Yang *et al*., 2016; Wang *et al*., 2017).

CLIMATE SENSITIVITY BASED ON MODELS AND GEOLOGICAL PAST

Summerhayes *et al*. (2025b) quote that the AR6 equilibrium climatic sensitivity (ECS) is 3°C on average. However, they later provide examples of studies which suggest a higher ECS, disregarding both the fact that 40 CMIP (Coupled Model Intercomparison Project) models produce an ECS ranging from 1.8 to 5.6°C (indicating huge uncertainty) and the studies which found the ECS much lower than the value provided by AR6, e.g. 1.15–2.7°C (Lewis, Curry, 2018) or 1.75–2.7°C (Lewis, 2023). Much depends on feedbacks, but they are highly unknown. For example, the stagnation of September Arctic sea ice since 2008 is inconsistent with the models shown by AR6, meaning the albedo feedback loop is uncertain. The AR6 states: "there is currently insufficient evidence to quantify a likely range of the magnitude of future changes to current climate feedbacks”.

I firmly maintain my previous statement (Dąbski, 2025) that, according to the geological record, the increase in atmospheric CO_2 has never been the triggering factor of numerous warmings in Earth’s history and that there were many periods when the CO_2 concentration had no correlation or even a negative correlation with temperature. This conundrum is clearly evident throughout the Phanerozoic, despite the politically correct narrative by Judd *et al*. (2024), especially in the Cretaceous (Barral *et al*., 2017) and in the Holocene (Mayewski *et al*., 2004; Liu *et al*., 2014). A very good correlation in the Pleistocene is true, but CO_2 followed temperature rises, and did not trigger them. I agree with the idea that an increase in CO_2 amplified the warming effect after the initial temperature rise, but it must be kept in mind that, at the end of glaciations, rising CO_2 played a much greater role in radiation forcing at lower concentrations than it does now.

Phanerozoic temperature fluctuations much better correlate with atmosphere ionisation (governed by solar irradiance) than with CO_2 (Shaviv *et al*., 2023). However, Summerhayes *et al*. (2025b) evidently discredit Shaviv and co-authors by calling their theory extraordinary and unjustified. Palaeoclimatic reconstructions show the sensitivity of Earth’s climate to changes in solar input over both long and short time scales (Boryczka, Stopa-Boryczka, 2004; Engels, van Geel, 2012).

In conclusion, contrary to Summerhayes *et al*. (2025b), much is still unknown and there is yet no scientific consensus on the strength of anthropogenic CO_2 and other GHGs.

“UNPRECEDENTED WARMING”

Marks (2025a, b) and Dąbski (2025) provide arguments and cite numerous studies that underline significant global climatic fluctuations during the Medieval Warm Period (MWP) and Little Ice Age (LIA). Unfortunately, this is downplayed by Summerhayes *et al*. (2025a, b). I am not going to reiterate the scientific evidence that Summerhayes and co-authors seem to be repelled by. Instead, I would like to concentrate on the following: pattern of contemporary warming, fluctuations of the global ocean heat content and sea level, and changes in cryosphere.

PATTERN OF CONTEMPORARY WARMING AND ARCTIC AMPLIFICATION

It is frequently advocated that warming occurs nowadays synchronously in all parts of the world. However, careful analysis of temperature change for the last 30 years show that there are large areas, especially in the Southern Hemisphere, where the temperature trend is close to zero or even negative. The area which experienced most rapid warming is the Arctic and, due to polar amplification based on albedo feedback, it seems that this is one of the most important drivers of the global climate change. However, since 2008 September sea ice is relatively stable with no negative trend (Wang *et al*., 2025b) and Greenland Ice Sheet (GIS) experiences gradually less negative balance (Geological Survey of Denmark, 2025). According to Luo *et al*. (2025), Arctic winter amplification has gradually declined since 2012 and it is probably related to a change in the Arctic

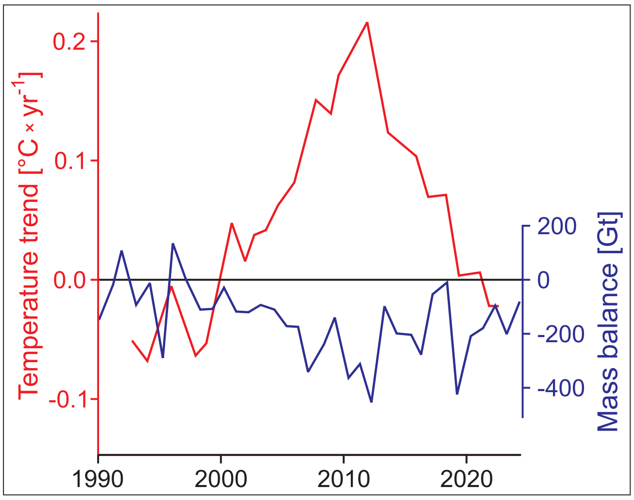

Fig. 2. Changes in Arctic winter amplification (temperature of 65–90° N minus temperature of 0–90° N) and Greenland Ice Sheet mass balance (Geological Survey of Denmark, 2025; Luo *et al*., 2025, simplified)

Oscillation, which is also reflected in GIS mass balance (Fig. 2). They write: “These findings indicate a fundamental shift in uneven warming patterns in the Northern Hemisphere mid-to-high-latitude regions”. Therefore, the notion of synchronous warming is poorly justified. The direction and rate of future temperature changes, especially in the North Atlantic, are uncertain if we acknowledge that AMO could soon cool the Northern Hemisphere.

GLOBAL OCEAN HEAT CONTENT

Summerhayes *et al*. (2025b) call MWP and LIA “low amplitude events”, despite the numerous geological and glaciological records which were cited by Marks (2025a, b) and Dąbski (2025). Almost 70% of the Earth’s surface is covered by oceans, so the thermal reaction of the water bodies can be representative of the global scale climatic fluctuations. The data provided by Gebbie and Huybers (2019) shows that the ocean started to gain heat in 1750, long before a significant increase in anthropogenic GHGs emissions. The ocean heat content (OHC) of the uppermost 700 m of the ocean rose by ~600 ZJ from the mid-18th century to the 21st century, but it was preceded by the same heat (~600 ZJ) losses since 600 CE. The deeper layers of the ocean (below 2000 m) were gaining 800 ZJ in the first millennium AD and afterwards were losing this heat until 1950 CE (Fig. 3). This shows the ocean’s long thermal memory and demonstrates that the increase in OHC since pre-industrial times is not necessarily unprecedented in terms of magnitude, although it is quite rapid.

SEA LEVEL

In general, the global temperature trend is closely linked to the rate of global sea level rise. Summerhayes *et al.* (2025b) argue that the global sea level rise (GSLR) is accelerating. However, Frederikse *et al*. (2020) show that, in the first half of the 20th century when GHGs emissions were still not “in full swing”, the rate of GSLR increased at a similar rate to that observed after 1980 (Fig. 4). Summerhayes *et al*. (2025b) write, after the NASA news release (NASA, 2025), that GSLR jumped from 4.5 mm yr^{-1}

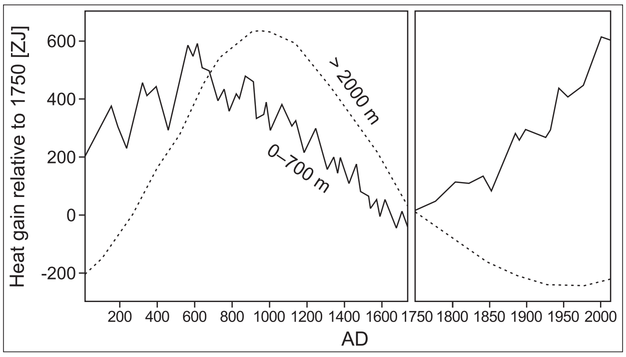

Fig. 3. Global ocean heat fluctuations of the ocean upper layer (0–700 m) and lower layer (>2000 m; Gebbie, Huybers, 2019, simplified)

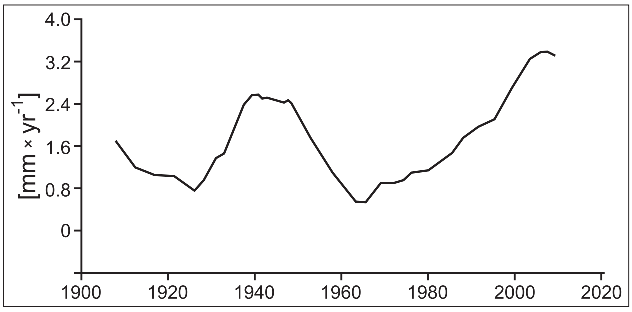

Fig. 4. Global sea level fluctuations (Frederikse *et al*., 2020, simplified)

(average for the last decade) to 5.9 mm yr^{-1} in 2024. It is a double manipulation: 1) in order to determine the trend, a long-term trend, not just one year, must be analysed, and 2) careful analysis of the graph provided by NASA shows that the rise was close to zero in 2016–2019. So how could sea level rise jump to 5.9 mm yr^{-1}. The sea level exhibits an annual oscillation (like CO_2 atmospheric concentration) of ~1 cm. The NASA's graph informs that the value of 5.9 mm yr^{-1} is the annual rise in 2024, not a trend value, and that it is actually much smaller than in previous years! Nevertheless, the title of the news (published on NASA website) is: "NASA Analysis Shows Unexpected Amount of Sea Level Rise in 2024" and this misleading information (at the boundary of pure lie) is repeated by Summerhayes *et al*. (2025b). More accurately, they could write about an unexpected slowdown in GSLR in 2024.

I am glad that Summerhayes *et al*. (2025b) admit that there is scientific evidence of a higher-than-now sea level 3.2 kyr BP (by 24 cm), but they call it "modestly higher-than-now". If this is modest, then the sea level rise since the pre-industrial era is also modest (although relatively quick).

CHANGES IN CRYOSPHERE

The Greenland Ice Sheet (GIS) melting is a major contributor to the global sea level rise, but there does not seem to be any correlation between the rate of its melting (Mankoff *et al*., 2021; Geological Survey of Denmark, 2025) and the CO_2 atmospheric concentration (Fig. 5). If we examine the environmental conditions of the previous interglacial period (Eemian), we find that the GIS was much smaller than it is today, and the sea level was much higher, despite the fact that CO_2 concentration was just 280 ppm (Shackelton *et al*., 2020; Sommers *et al*., 2021). Summerhayes *et al*. (2025b) selectively pick the periods to support their claim, ignoring all available data series, which is a typical example of data selection bias.

Summerhayes *et al*. (2025b) quote Otosaka *et al*. (2023) to support the statement that the Antarctic Ice Sheet (AIS) continues to lose ice. However, the above-mentioned study pertains to the period 1992–2020. Following that period, the mass balance of AIS turned positive, resulting in a decline in its contribution to GSLR (Wang *et al*., 2023, 2025a). Moreover, the message conveyed by Summerhayes *et al*. (2025b) disagree with the study of Zwally *et al*. (2015) who found that, in the period 1992–2001, AIS gained mass at a rate of ~112 ±61 Gt yr^{-1}, and in the years 2003–2008, it gained mass from snowfall that exceeded discharge losses by 82 ±25 Gt yr^{-1}. What is certain is that the precise calculation of the mass balance of such a huge ice sheet is very difficult, and different methods bring different results. Overall, however, the situation with AIS is not catastrophic.

Temperature trends in polar regions are indicated also by the active layer thickness (ALT) developed on permafrost. Li *et al*. (2022) analysed changes in ALT in the Northern Hemisphere in the period 2000–2018 and found that there has been no rising trend in this important indicator since 2005.

With regard to Arctic sea ice, Summerhayes *et al*. (2025b) admit that there is a still-stand of September ice, which is probably due to natural fluctuations, of course calling it a "pause". The future will tell us whether it is a short pause or rather a major shift. The Antarctic sea ice showed a positive trend between 1978 and 2015. After this period, a negative trend emerged, showing that the Southern Ocean seems to behave in an opposite fashion to the Arctic Ocean.

The above-mentioned findings – the rather asynchronous pattern of global temperature change, long-term fluctuations in OHC, global sea level fluctuations, the mass balance of GIS and AIS, changes in active layer depth, and fluctuations in sea ice cover – undermine the notion of an unprecedented global temperature rise due to anthropogenic GHGs emissions.

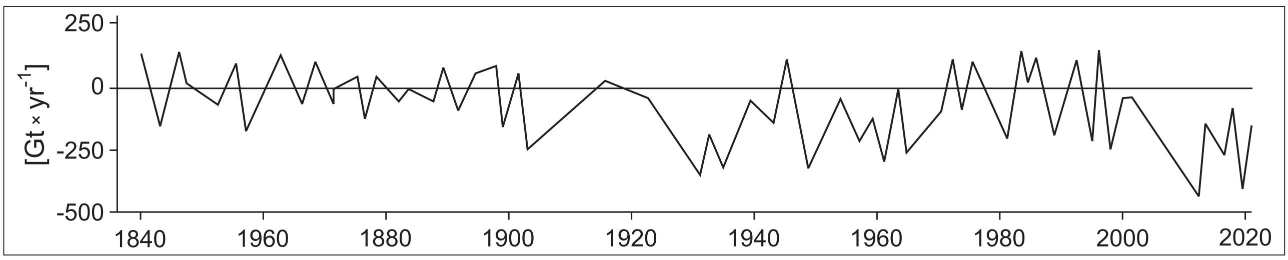

Fig. 5. Fluctuations of Greenland Ice Sheet (Mankoff *et al*., 2021, simplified)

CLIMATE-RELATED DISRUPTIVE EVENTS

Summerhayes *et al.* (2025b) do not comment evidence provided in my publication (Dąbski, 2025) about the number or intensity of floods and strong winds. A flagship example of the IPCC's flawed forecast is the trend of tropical cyclones. There has been no rising trend in their frequency or power, despite the warming of the tropical ocean (Fig. 6), as was recently admitted by the NOAA Geophysical Fluid Dynamics Laboratory (Knutson, 2024).

Instead, my critics concentrate on rising global aridity and argue after Gebrechorkos *et al.* (2025) that it rose by 40% in the period 1901–2022. However, they do not question my explanation of this hazard (Dąbski, 2025). The extended data included in that publication (Gebrechorkos *et al.*, 2025) shows that the aridity rise was driven mainly by the rapid increase in the last few years. Such a short event should be rather attributed to weather phenomena. It is obvious that Summerhayes *et al.* (2025b) associate the climate change only with bad things (according to the mainstream narrative) and claim that arid regions are becoming even more arid. This is clearly not true, as it disagrees with the fact that traditionally dry Sahel is currently undergoing wetting and greening (Giannini *et al.*, 2020; Nkiaka *et al.*, 2025), which is reflected in the current growth of Lake Chad (Sylvestre *et al.*, 2024) and is beneficial for food producers in this region.

The concentration on rising deaths due to heatwaves is also an example of bias because death rates due to cold spells drop very quickly and the balance is positive when total death rates due to extreme temperature are analysed (see references in Dąbski, 2025). This fact is not commented by Summerhayes *et al.* (2025b). They also spread disinformation by writing: "Martines-Villalobos (2025) found that as global temperature has risen, heatwaves are not only becoming hotter but their duration is increasing faster than the rate of temperature rise […]". The study of Martines-Villalobos (2025) is based solely on modelling of the future and does not involve real analysis of long-term trends (and, of course, the models are based on CO_2 concentration). However, long-term air temperature records (Heat Wave Index, 2025), especially those from outside of growing cities which exert an increasing Urban Heat Island effect (Serra *et al.*, 2024), show that the summer temperatures fluctuate much and do not exhibit a clear rising trend (Fig. 7).

Death rates and material losses due to disruptive climate-related events significantly decline (Formetta, Feyen, 2019; *Liu et al.*, 2024). I would like to quote DeAngelo and Carry (2025): "The actual risks of fossil-fuel-generated climate change are not nearly as great as portrayed in the drumbeat of worried discussions of global warming in public discourse that the Apocalyptic climate narrative has fostered".

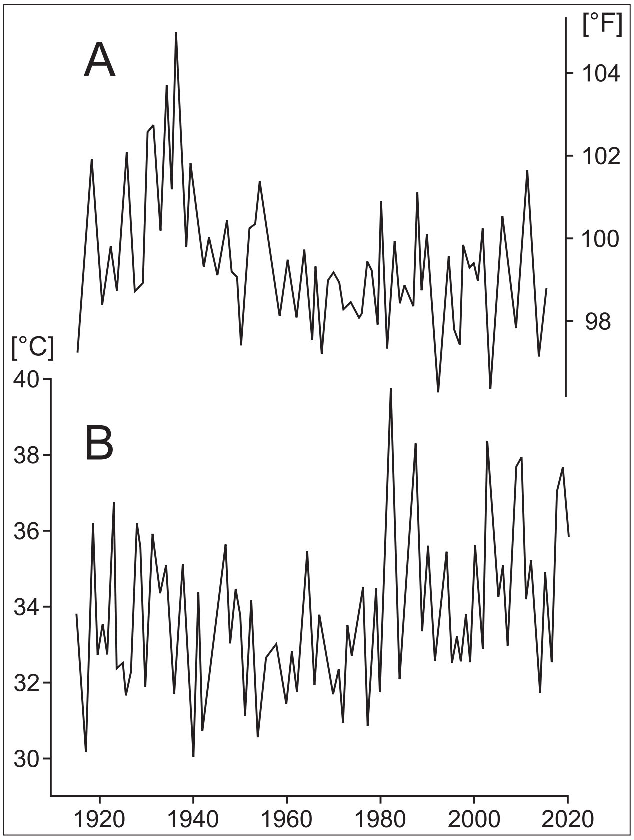

Fig. 7. A – highest daily air temperature in the contiguous USA (area-weighted average; Heat Wave Index, 2025), **B** – daily maximum summer air temperature in outskirts of Barcelona (Serra *et al.*, 2024, simplified)

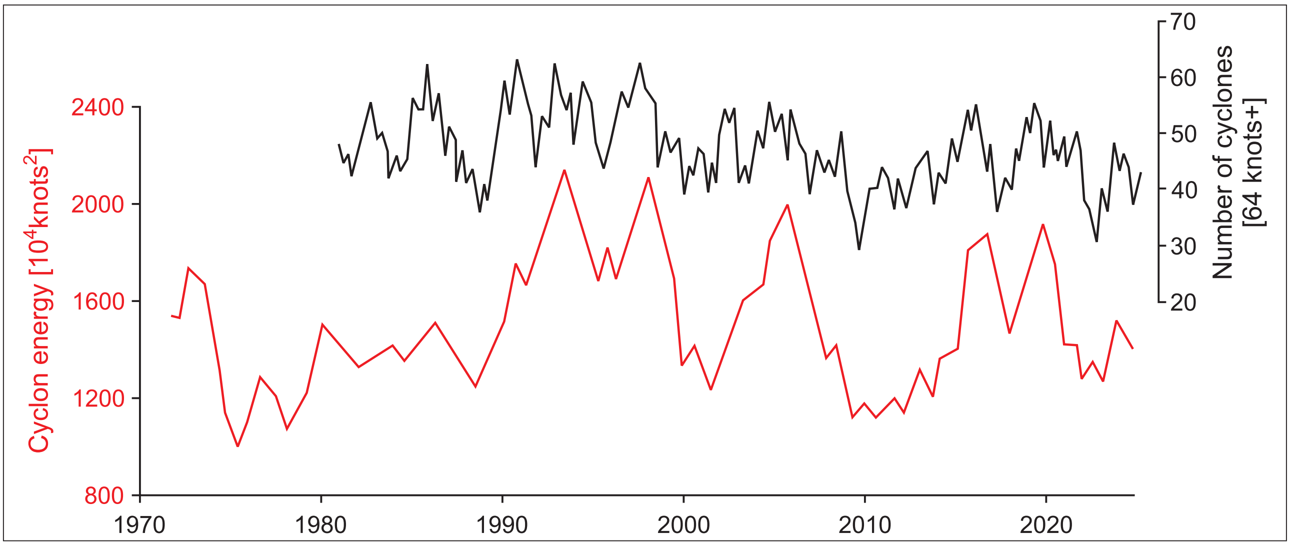

Fig. 6. Tropical cyclone frequency and yearly cumulated energy (Alimonti *et al.*, 2022; Maue, 2025, simplified)

CONCLUSIONS

There is a lot of academic malpractice in the field of current global climate change. The "scientific consensus" is a myth as it cannot be judged by the number of publications. Summerhayes *et al*. (2025a, b) did not provide unequivocal evidence for the leading role of anthropogenic greenhouse gases (GHGs). The modelled climatic sensitivity is still poorly known, especially due to unknown feedbacks. There is no evidence that current global warming is synchronous and unprecedented, as evidenced by the pattern of temperature change and ocean heat content fluctuation. There are natural processes which, apart from human activity, enhanced recent global warming. Unfortunately, my opponents neither acknowledge the increased total solar irradiance since pre-industrial (as shown by NOAA) nor the role of natural internal factors (e.g., AMO). Contrary to the mainstream claims that trends in climate-related disruptive events accelerate, the observational data do not show it. Summerhayes *et al*. (2025b) referred only to aridity but avoid confrontation with my other statements about tropical cyclones, floods, wildfires and declining social susceptibility to hydro-meteorological events on a global scale.

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