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What If Sea Levels Could Have Been 6-9 Metres Higher 125,000 Years Ago with Same Global Temperatures

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Abstract

The latest climate doom paper "*Sea-level rise due to polar ice-sheet mass loss during past warm periods*" uses inaccurate proxies of sea levels and temperatures of past periods to conclude that even without any further increase of temperatures we could have soon sea level rises of 6-9 metres. The paper ignores the evidence that the global temperatures are not warming over this century, as the global sea levels are nor significantly rising nor accelerating, and the Antarctic sea ice growth has ultimately outpaced the Arctic sea ice shrinking, while the carbon and hydrocarbon fuel usage has been further escalating, suggesting a decoupling between the three parameters and the carbon emission. In soccer, the intergovernmental players inadvertently strike the ball into their own team's goal. If with temperatures claimed as of today and about same carbon dioxide concentrations of 1890 the sea levels have been 6-9 metres higher 125,000 years ago, because parts of the Antarctic and the Greenland ice sheets have melted for other reasons than global warming, this does not mean we should try harder to change the climate by supporting not working renewable energies and paying carbon taxes. Preferably, we should do just nothing different from using our natural resources without feeling guilty for something it does not depends on us to achieve about same result. Sea levels may rise of up to 6-13 metres, or even fall, and even if the science of climate is settled we haven't understood yet why.

Keywords

Sea Levels, Temperatures, Sea Ice, Global Warming

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1. Another Claim of Climate Doom

According to the latest climate doom paper "*Sea-level rise due to polar ice-sheet mass loss during past warm periods*", Ref. [1], three times in the recent geological past, sea levels were at least 6 metres higher than current levels when global average temperatures were similar to today. Figure 1 (from [1]) presents their peak global mean temperature, atmospheric CO_2, maximum global mean sea level (GMSL), and source(s) of meltwater. Blue shading indicates (optimistic) uncertainty of GMSL maximum. Red pie charts over Greenland and Antarctica denote fraction (not location) of ice retreat. The paper does not mention the everything but perfect accuracy of their "*global*" mean sea level, "*global*" temperature, and North and South Pole ice sheet estimations for the very far past, three parameters that are very far from being tracked down within reasonable accuracy over the last century. The wrong conclusion of the work is the claim that even less than a 2°C warming vs. their "*preindustrial levels*", or even keeping on with their taken-for-true present 1°C warming vs. their "*preindustrial levels*", will not save us from the rising waters.

We do not know with certainty the global temperature of 1890. There are no gridded data that we may trust that covers

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the world land and ocean since 1890. But the available data tell us a completely different story. The actual unbiased thermometer measurements, for example from the rural stations of Australia, tell us that the temperatures were possibly even higher in the end of the 1800s than todays. Therefore, all the temperature values of Figure 1 are possibly subject to an accuracy error larger than the claimed trend. Similarly, with only two tide gauges covering all the southern hemisphere since 1890, and not that many tide gauges and located only in selected areas covering the northern hemisphere, any claim of sea level rise since 1890 is also subject to an error exceeding the trend. Some areas of the world have locally rising seas, some others locally falling seas, difficult to say what the sea levels could have been where no measurement was taken.

The intergovernmental team claim that during the last interglacial warm period between ice ages occurred 125,000 years ago the global average temperature was similar to the present and about 1°C higher than "*preindustrial levels*" and the sea level was 6-9 metres higher due to the melting of ice in Greenland and Antarctica. The intergovernmental team also claim that around 400,000 years ago with global average temperatures 1-2°C higher than the "*preindustrial levels*" the sea level reached 6-13 metres more. The intergovernmental team then discusses these claims within the framework of the present climate model predictions, or climate models inspired misrepresentations of actual evidence, forgetting to note how the melting of the North Pole sea ice is more than compensated by the increasing sea ice of Antarctica, that has never been proved to decline, the global temperatures have been so far mostly naturally oscillating and very marginally warming, and similarly, there is no sign of sharply rising sea levels anywhere in the world a tide gauge returns a measurement. However, the results of Figure 1 are trumpeted in many press release as a proof sea levels may rise even more than the up to 1 metre by 2100, even if the reason why they should rise become actually more and more obscure.

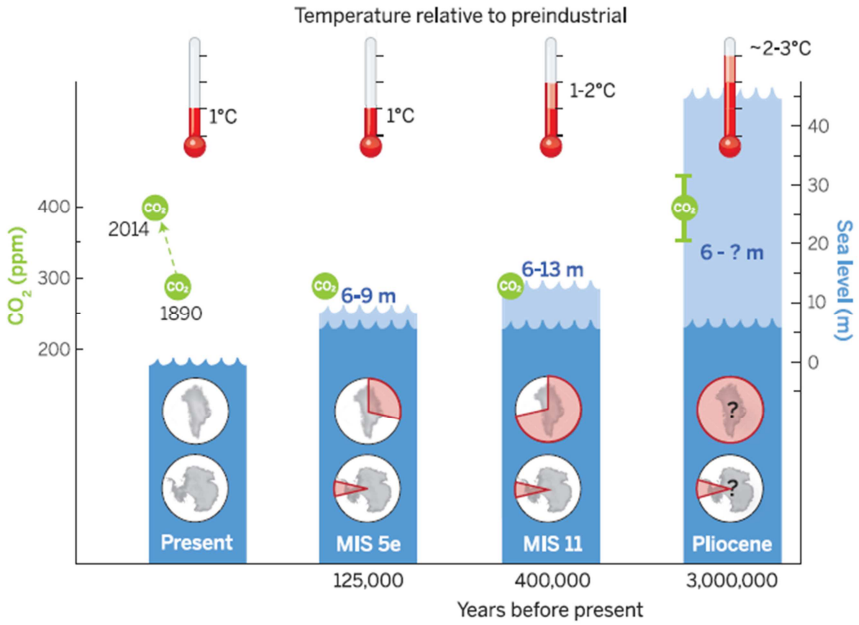


Figure 1. Peak global mean temperature, atmospheric CO_2, maximum global mean sea level (GMSL), and source(s) of meltwater. Blue shading indicates uncertainty of GMSL maximum. Red pie charts over Greenland and Antarctica denote fraction and not location of ice retreat. Image from [1]. Considering the inaccuracies in evaluating global temperatures, CO_2 and sea level, the graph basically tells us that no matter what is our consumption of carbon and hydrocarbon fuels, we may get 6-9 metres of sea level rise even without any further increase of temperature.

2. The Present Global Sea-Level Trend

By considering the local sea levels measured by the tide gauges, it happens that the sea levels are locally rising or falling at about the same rate at least over the full length of the age of climate doom spanning roughly the last 3 decades. This may be understood by linearly fitting all the measured monthly averaged sea levels in specific locations, and then repeating the exercise, obviously in the same locations, after only introducing freshly measured new data. A quick look at the subsequent surveys by the Permanent Service on Mean Sea Levels, Ref. [2], for the globe, or the National Oceanic and Atmospheric Administration, Ref. [3], for the United States, permits to conclude that the sea levels are rising or falling at about the same rate in the different locations that are monitored, with smaller differences from one survey to

the other between the surveyed stations having enough length to clear the relative sea level rise trend of the natural multi-decadal variability, but positive or negative changes globally cancelling each other. On average, the sea levels are therefore slow rising and without any acceleration. The present global sea level trend is therefore characterised by small positive and negative sea level rises, in the naïve average negligibly small positive, and without any acceleration component, and this is in striking contrast with the contemporary climate model predictions. This presently stable pattern of sea levels is shown locally and globally in the analyses of Ref. [9-20].

3. Consistency with the Global Temperature Trend

This result is consistent with the global temperature trend, as well as the trend for the sea ice of both North and South Poles. The authors of [1] are certainly unfamiliar with the satellite measurements of the lower troposphere temperatures (LTT), or the satellite measurements of sea ice extensions, that opposite to the satellite measurements of the global mean sea levels (GMSL) are not arbitrarily corrected by glacial isostatic adjustment (GIA) before being proposed as experimental evidence. Both these monitoring products that started to produce results in the end of the 1970s, a decade where a positive warming phase replaced a negative cooling phase of natural multi-decadal temperature oscillations of quasi-60 years periodicity, do not show any global warming or global loss of sea ice since more than 18 years. The pure coincidence of the temperature warming phase mid-1970s to end of 1990s with the contemporary increased use of carbon and hydrocarbon fuels, is therefore cleared out by the latest complete decoupling over about same length time window suggesting the two phenomena are more likely unrelated.

Looking at the lower troposphere data, Ref. [4], the short term time series of the global temperaturesDecember 1978 to July 2015 may be fitted with a line $y = y0 + m \cdot x$ of parameter $m=1.13 \cdot 10^{-2}$, Figure 2.a. This would suggest the temperatures are presently warming at a rate of 1.13°C/century. If we then apply subsequent sinusoidal fittings $y=y0+A \cdot \sin(\pi \cdot (x-xc)/w)$, it is then possible to understand the presence of inter-annual variability, but not of the longer term variability of quasi-60 years that however we know very well it exists. The three subsequent sinusoidal fittings of the residuals return oscillations of periodicities $2 \cdot w=3.74$, 7.4 and 2.42, Figure2.b.

This assessment of present warming is not correct, as the temperature trend is everything but linear, as may be easily understood by using higher order polynomial fittings of the same data. We may then decide to apply first the three sinusoidal fittings $y=y0+A \cdot \sin(\pi \cdot (x-xc)/w)$, and then the fitting with a line $y = y0 + m \cdot x$. In this case the sinusoidal oscillations came out to have periodicities $2 \cdot w=54.28$, 3.74, 7.8, Figure 2.c. The value of m is then $3.63 \cdot 10^{-4}$. In this case, the warming trend is only 0.03632°C/century. There is in this case a multi-decadal oscillation of quasi-60 years evidenced, 54.28 years or $2 \cdot w$ to be precise.

What is the then the correct present warming trend? Difficult to say with accuracy. It may certainly be something in between the 0.03632°C/century that is certainly an underestimation overrating a quasi-60 years' oscillation, or the 1.13°C/century, that with same certainty is an overestimation underestimating the presence of the multi-decadal natural oscillations. Is this warming rate part of a longer term natural oscillation? Very hard to say, as what has not been measured with accuracy is not known.

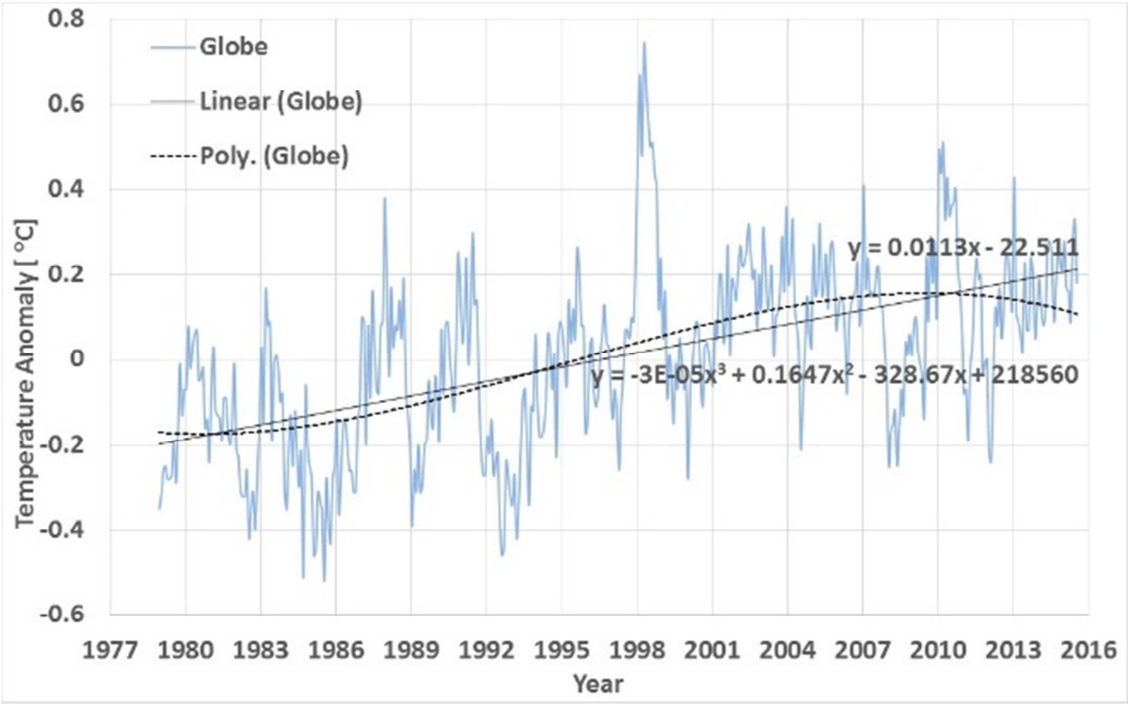
The occasional correlation of warming and anthropogenic carbon dioxide emissions from the end of the 1970s to the end of the 1990s is nowhere to be seen in the 2000s and 2010s. Very likely, the temperatures will follow the same trend of no warming possibly until about 2030, as warming and cooling oscillations about the trend should have about 30 years length. The linear global warming trend of 1.13°C/century will therefore drops even further in the next few years. The present global temperature trend is therefore characterised by small warming, and significant multi-decadal variability, in striking contrast with the climate model predictions.

As the LTT are proposed for different geographical areas and for land and ocean components in addition to total, the time series for Northern Hemisphere (0-90N), Southern Hemisphere (90S-0), Tropics (20S-20N), Northern Extension (20N-90N), Southern Extension (90S-20S), North Pole (60N-90N) and South Pole (90S-60S) in addition to global, obviously 90S-90N, may suggest few interesting points to discuss. Worth of mention are the much larger warnings moving northwards, as well as the increasing magnitudes of the oscillations. It seems that global warming is actually mostly North Pole warming, with the differential pattern following the latitude very poorly represented in all the climate models proposed so far, Figure 2.d, e, f and g. The geographically variable warming not represented by models is a further discrepancy with the climate model predictions suggesting same dynamics from the Arctic to the Tropics and then the Antarctic that simply does not seem the case.

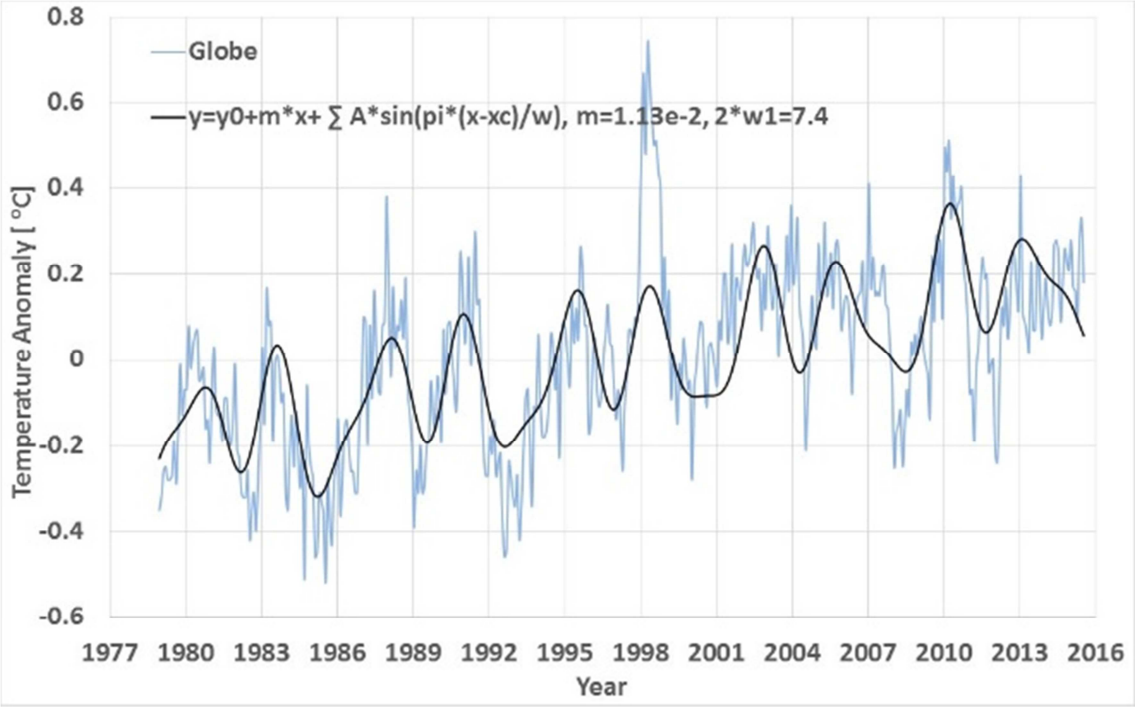
4. Consistency with the Global Sea Ice Trend

The North Hemisphere and South Hemisphere sea ice extension data, Ref. [5] and [6], Figure 2.h, i, j, show global

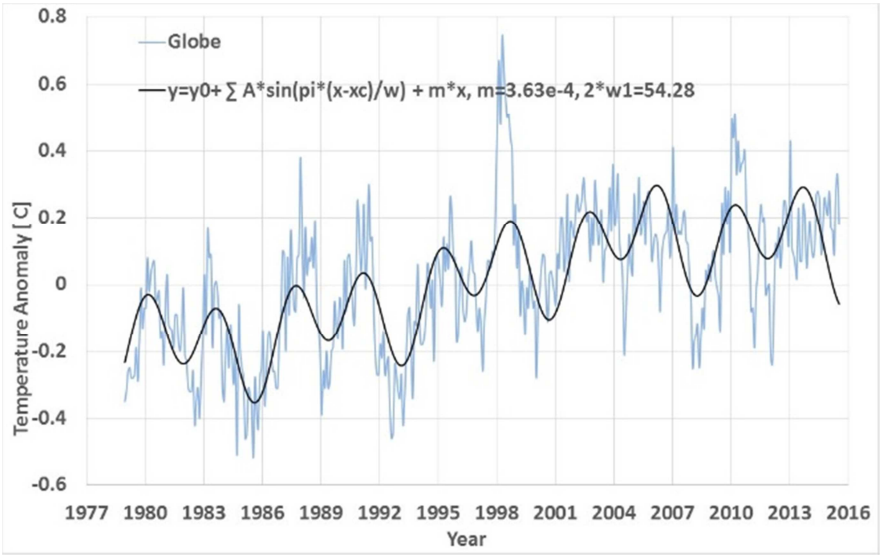
consistency with the sea level result, but also some significant discrepancies of the local sea ices vs. the local temperature patterns, possibly suffering the effect of the strength of the ocean circulation. The global sea ice extension has a very close relation with the global temperatures data, as it should not be a surprise as also the global warming narrative claims the sea ice is melting because the temperatures are warming. The work [1] actually questions this correlation, as they say the sea level may have been 6-9 meters higher when temperatures may have been about same of today. This is essentially same of saying sea levels may change without any relation to temperature, because the Greenland and Antarctica ice sheets may melt without affecting the global temperature.



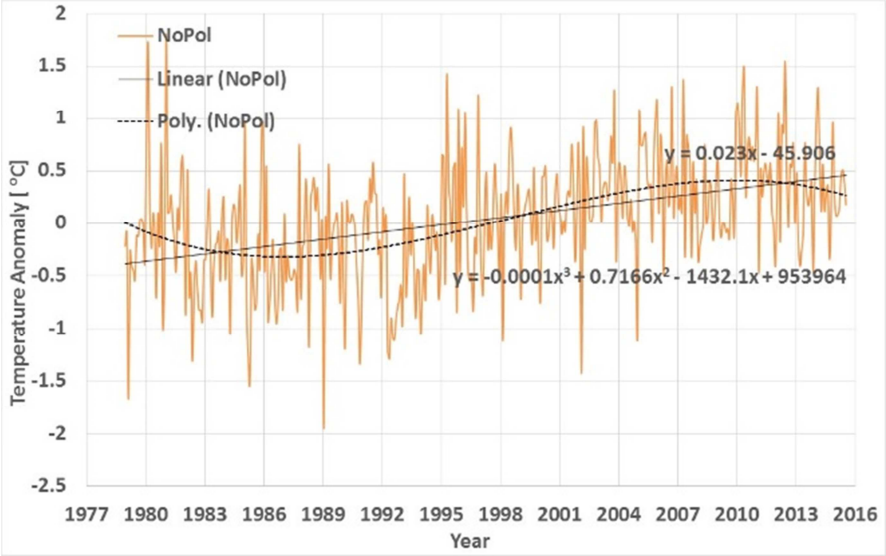
a



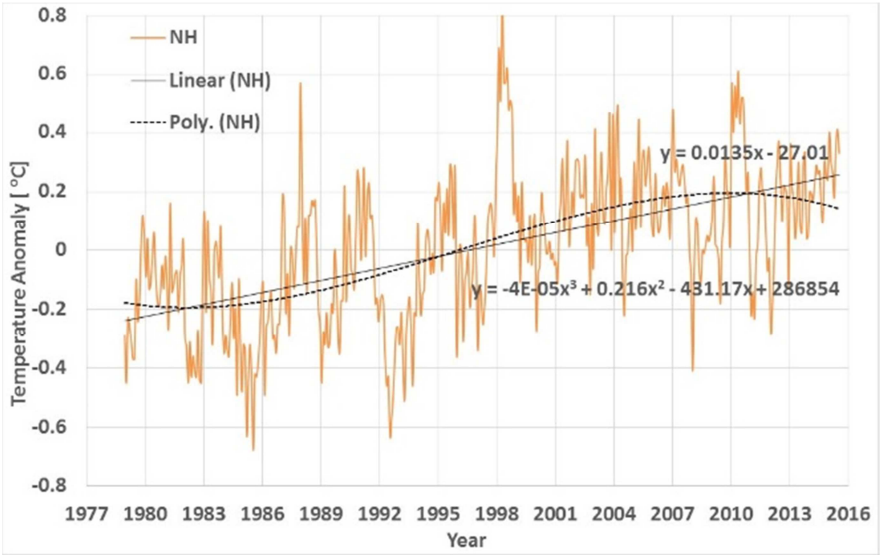
b


Globe
y=y0+ ∑ A*sin(pi*(x-xc)/w) + m*x, m=3.63e-4, 2*w1=54.28
Temperature Anomaly [C]
Year

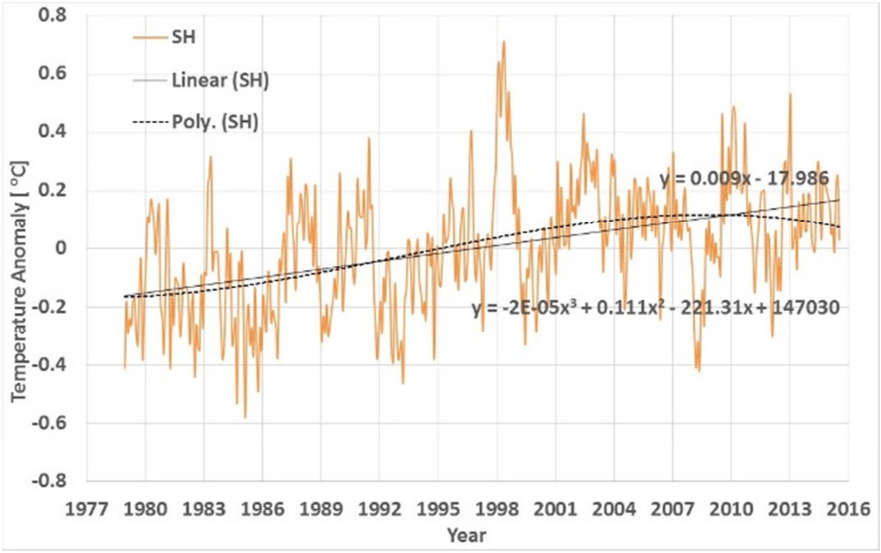
c


NoPol
Linear (NoPol)
Poly. (NoPol)
y = 0.023x - 45.906
y = -0.0001x³ + 0.7166x² - 1432.1x + 953964
Temperature Anomaly [°C]
Year

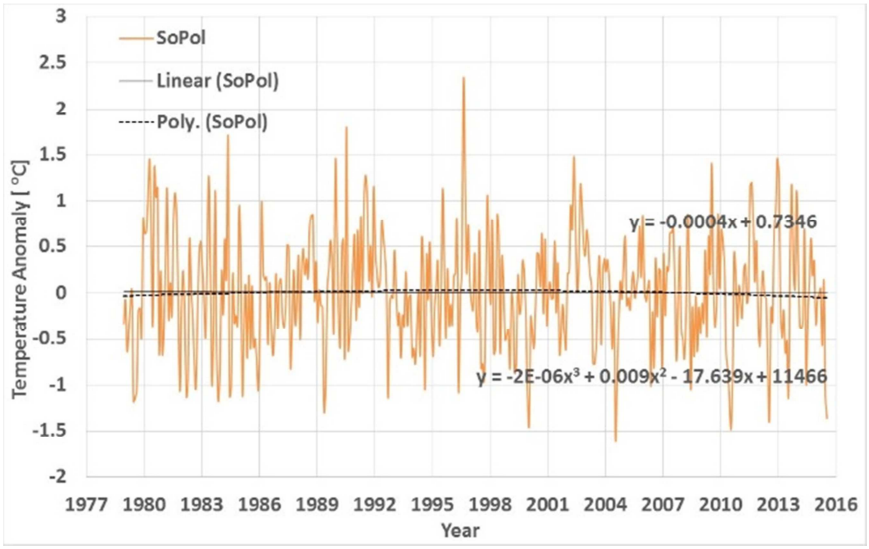
d


NH
Linear (NH)
Poly. (NH)
y = 0.0135x - 27.01
y = -4E-05x³ + 0.216x² - 431.17x + 286854
Temperature Anomaly [°C]
Year

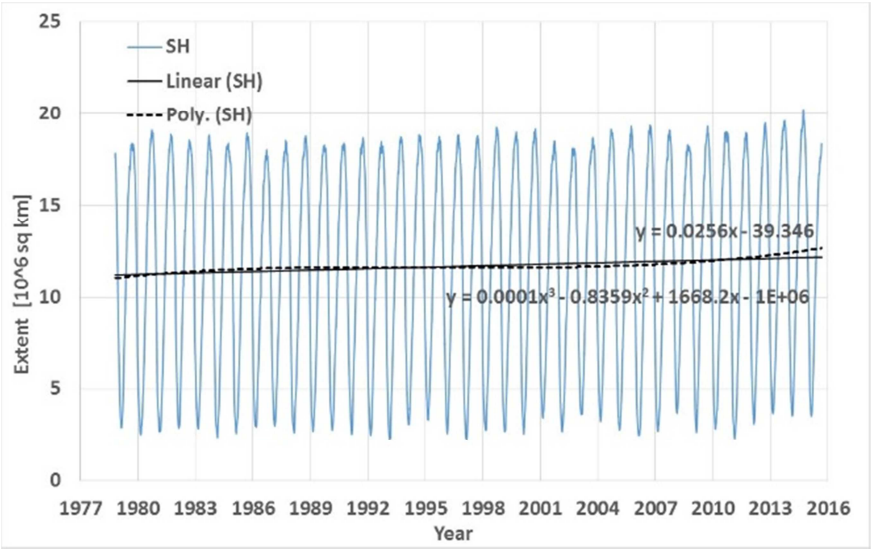
e


SH
Linear (SH)
Poly. (SH)
y = 0.009x - 17.986
y = -2E-05x³ + 0.111x² - 221.31x + 147030
Temperature Anomaly [°C]
Year

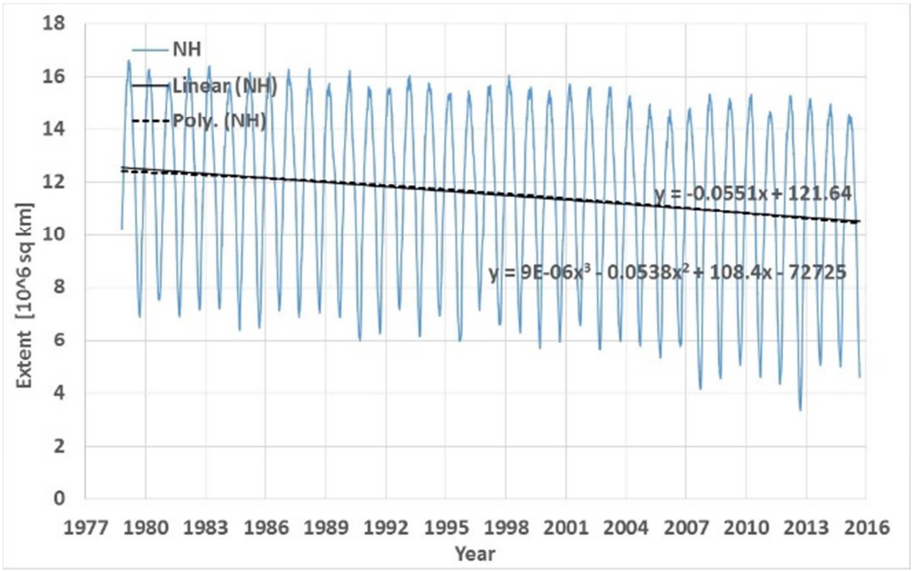
f


SoPol
Linear (SoPol)
Poly. (SoPol)
y = -0.0004x + 0.7346
y = -2E-06x³ + 0.009x² - 17.639x + 11466
Temperature Anomaly [°C]
Year

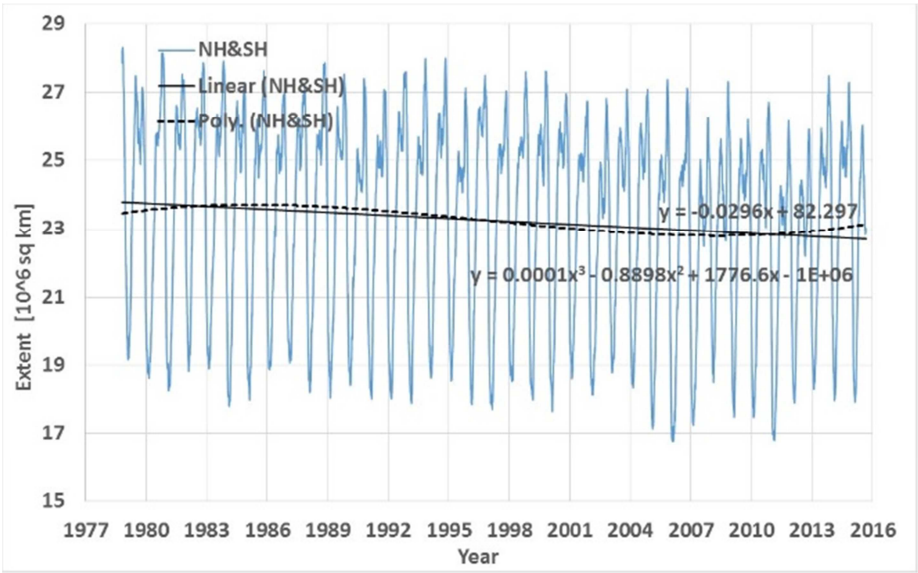
g


SH
Linear (SH)
Poly. (SH)
y = 0.0256x - 39.346
y = 0.0001x³ - 0.8359x² + 1668.2x - 1E+06
Extent [10^6 sq km]
Year

h



i



j

Figure 2. Diagram showing the lower troposphere temperature and the North and South Hemispjhere sea ice extent, both from satellite monitoring projects started at the end of the 1970s.

The melting is considerable in the North Hemisphere, while the South Hemisphere has a sea ice actually increasing. In both cases, there is the opportunity of a multi-decadal oscillation especially for the North Hemisphere, slightly shifted in phase vs. the global temperature oscillation. Globally, the sea ice extension is lately increasing. From these images, the most relevant research question is possibly what drives the North Hemisphere ice cap to melt.

There is certainly a multi-decadal oscillation also for the North Hemisphere sea ice in addition to the North Pole temperature, as the sea ice of the early 1940s was not that far from the sea ice of the latest 1990s, and the temperature of the early 1940s was even larger than the temperatures of the early 2000s, but a better understanding of the time evolution certainly requires further studies. The present North and South Hemisphere sea ice extension trend is therefore characterised by shrinking of ices in the North Hemisphere, and a stable or even expanding South Hemisphere sea ice, with more significant natural variability for the North Hemisphere. While the North Hemisphere sea ice puzzle is still far from being solved, globally the results are certainly in noticeable contrast with the climate model predictions. The shrinking of sea ice is absolutely not geographically uniform, and globally the latest sea ice is actually expanding. What to expect next is even more difficult to say than with temperatures.

5. Discussion

The opportunity sea levels are not driven by the carbon dioxide emission through global warming is supported by two other recent papers just published.

Ref [7] found that a well-known period of abrupt climate change 12,000 years ago occurred rapidly in northern latitudes but much more gradually in equatorial regions. The Younger Dryas cooling period started when the North Atlantic Current shut down. The event caused Earth's northern hemisphere to enter into a deep chill, with temperatures in Greenland dropping about 1 ºC in a decade, and rainfall to decrease as far away as the Philippines. The temperatures in Greenland responded quickly to the North Atlantic Current shutdown, and equally quickly responded to the North Atlantic Current reboot that occurred 1,000 years later. Conversely, hundreds of years were necessary for the rainfall in the Philippines to reduce and recover. The work is obviously based on proxies of temperature and precipitation that are not that accurate, and then on modelling exercises that have a significant component of speculation, as they may be developed to deliver almost any result. However, it is interesting to note the change in strength of the ocean currents may produce expansion or shrinking of ice sheets.

Ref. [8] analysed the middle Pliocene warm period, the last time in Earth's history, about 3 million years ago, when the carbon dioxide levels in the atmosphere may have been close to their present values, obviously within the inaccuracies we do know both parameters. Previous studies of the mid-Pliocene warm period used oxygen isotope records to determine the volume of Earth's ice sheets and then compute the sea level. The oxygen isotope records plus models suggested that the sea level was likely 25 to 30 meters higher during the Pliocene, due to a full deglaciation of the Greenland and the West Antarctica ice sheets. Ref. [8] now suggests that the global sea level of the Pliocene was significantly lower than the previous estimate and "*only*" 9 to 13.5 meters higher.

Clearly, our understanding of the climate of the past and present, and of the future climate is everything but settled science.

6. Conclusion

In relation to Figure 1, it is important to scientists to evaluate and compare the global temperatures, CO_2 and sea levels of palaeo (past), present and future, in the context of an actual knowledge of the parameters involved very far from being accurate. Likewise, Figure 2 discusses the crucial consistency of latest global temperatures and sea ice extensions with the sea levels as well as some significant discrepancies of the local sea ices vs. the local temperature patterns. This contribution is relevant to an open discussion.

If with about same temperatures of today the sea levels may have been 6-9 meters higher in the past, because part of the Greenland and Antarctica ice sheets were melted, this means the dynamic of the ice sheets may be decoupled from the global and local temperature patterns.

The 6-9 meters higher sea levels with same temperatures of 145,000 years ago and reduced atmospheric carbon dioxide levels tell us that not the carbon and hydrocarbon fuel consumption nor the global temperatures are drivers of higher sea levels, that are possibly driven by something else.

Rather than further bother with the global warming theorem, that therefore may be wrong, as also suggested by the recent sea level, temperature and sea ice data, the intergovernmental researchers should then accept the fact that the climate is not following the anthropogenic carbon dioxide emission and the mitigation strategies are nonsense.

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