Commentary

Signs of uncooperative climate also emerging for the Arctic sea ice

Abstract

The observed short term decline in the Arctic sea ice may have a natural variability component much larger than what has been considered so far. Based on experiments, it is shown that presently the Arctic temperatures and sea ice extension and volume are very likely started a cooling and recovery phase part of the same quasi-60 years' oscillation that was responsible of most of the warming since the late 1970s. We show experimental evidence of how the Arctic natural variability is actually very likely turning towards a cooling phase, and the recent warming was actually mostly the warming phase of the same oscillation, as temperatures were in the early 1940s higher than in the 2000s, and presently not warming since then.

Keywords: Arctic, sea ice, temperature, climate models, simulations, experiments

The Arctic temperature and sea ice

The "*smoking gun*" of catastrophic anthropogenic global warming (CAGW) is the rapidly warming Arctic. Yet it is well documented the Arctic warmed up rapidly since 1920 to peak in the early 1940s before temperatures dropped to the mid-1970s to start rising up to today's values that are about the early 1940s values. Tilling and co-authors [3] have published a work showing the existence of some signs of recovery in the Arctic ice volume during 2013 from the Cryosat-2 monitoring. The findings are consistent with the other evidence, as the UAH lower troposphere temperatures and the NSIDC sea ice extension, and other Arctic ice volume evaluations as PIOMAS. Even if few more years are certainly needed to better understand a change in the declining trend, it is very likely that the Arctic sea ice has started to recover as the Arctic temperatures have started to cool down as part of a

strong quasi-60 years' natural oscillation unfortunately often downplayed in the monitoring of climate parameters.

In the latest news, one more ship of climate change researchers has been trapped by the Arctic ices. A carefully organised 115-day scientific expedition on board a floating research vessel, the CCGS Amundsen, has been wrecked as an icebreaker was called to set free the ship from ices heavier than the expected in Hudson Bay [1]. Last year it was the case of Antarctica [2], this year it is the case of the Arctic. This year, though without too much emphasis and with very weak conclusions, Tilling and co-authors [3] have published a work showing the existence of some signs of recovery in the Arctic ice volume during 2013. In this work, the satellite altimetry from Cryosat-2 is used for the Arctic ice thickness similarly to a paper [4] we recently criticised [5] did for the Antarctic ice thickness however with diametrically opposed conclusions.

While the results of the Antarctic paper were inconsistent with the sea ice extension and the lower troposphere temperature (LTT) results from other studies, the findings of Tilling and co-authors [3] are finally consistent with the other evidence of temperature and sea ice extension.

The authors of [3] presents an assessment of the changes in Northern Hemisphere sea ice thickness and volume using five years of CryoSat-2 measurements. Between autumn 2010 and 2012, there was a 14% reduction in Arctic sea ice volume, in keeping with the long-term decline in extent. However, we observe 33% and 25% more ice in autumn 2013 and 2014, respectively, relative to the 2010–2012 seasonal mean, which offset earlier losses. The increase is suggested to have been caused by the retention of thick sea ice northwest of Greenland during 2013 associated with a 5% drop in the number of days on which melting occurred, while the springtime Arctic sea ice volume has remained stable. The sharp increase in sea ice volume after just one cool summer advocates that Arctic sea ice may be more resilient than has been previously considered.

The sign of a likely present recovery of the Arctic ice volume are also confirmed by other products as the Arctic sea ice volume anomaly from the Pan-Arctic Ice Ocean Modeling and Assimilation System (PIOMAS) [19]. Over the last few years also this product shows some signs of recovery.

Apart from the consistency with other evidence, what makes the results of [3] trustworthy is the fact that the satellite monitoring of the ice thickness for the Arctic does not need to use a Glacial Isostatic Adjustment (GIA) model as needed to compute the thickness of the Antarctic ice in [4], as in the Arctic the ice shelves are floating while in the Antarctic the ice shelves are mostly on land, the only exception being West Antarctica.

Because of that, the now a few years relatively stable Arctic sea ice thickness turns out as being stable in [3], while by GIA adjustment, unfortunately an argument often used to revert the results of non-cooperative missions towards compliance with the CAGW narrative (like the satellite altimeter or the satellite gravimeter estimation of sea levels as exposed in [6]), the otherwise increasing thickness of the Antarctic ice was turned shrinking in [4], even with a trend much smaller than the accuracy error [5].

The relatively stable Arctic ice volume and the otherwise expanding Antarctic ice volume during the very last few years are confirmed by other "*evidences*" as proposed in Figure 1. Those to thrust more are the National Snow and Ice Data Center (NSIDC) satellite sea ice extension [7], a parameter that is much easier to measure than the ice thickness or the ice volume, and the University of Alabama at Huntsville (UAH) satellite lower troposphere temperature [8]. These two parameters have not been subjected to same arbitrary corrections of other parameters less directly related to actual measurements and involving many more computational steps, and are therefore trustworthy. Clearly, Figure 1, there are signs the Arctic ice volume is turning stable and possibly on the way of at least a partial recovery, while the Antarctic ice volume is still expanding, with the sea ice extension and the temperature behaving consistently.

If there is "*evidence*" that the climate is not cooperating that much with the CAGW narrative during this century, the tampering of information to manufacture CAGW compliant climate patterns has progressed even further over this century of lack of any warming of temperatures, lack of any acceleration of sea levels, and now lack of any shrinking ices (on average), and the past, corrupted information does not help to understand how the latest trends are an indication of an Arctic sea ice recovery, as the satellite monitoring time window is too short.

One of the most unreliable data set is certainly the NASA Goddard Institute for Space Studies (NASA GISS) reconstruction of global temperatures, were to compensate for the lack of really warmer temperatures today, the temperature of the past up to even more than a century ago are made arbitrarily cooler one update after the other. For what concerns the Arctic, where the temperatures in the early 1940s were even larger than the early 2000s, the manipulation of the records is well exposed by Paul Homewood [9]. It is well documented the Arctic warmed up rapidly to peak in the mid-1940s before temperatures dropped to the mid-1970s to start rising up to today's values. Also NASA GISS previously admitted under prior managements [10, 11, 12 and 13] the existence of the warm Arctic of the mid-1940s. The "*cooling the past*" adjustments for the Arctic have been enforced in nearly every current station from Greenland to Siberia, from Iceland to Canada, is the removal of the most part of the 1940s warm and the most part of the drop in temperatures during the subsequent cold decades. The latest NASA GISS temperature anomalies [14] tell us a completely different story for the Arctic.

Figure 2 presents the Arctic temperatures as proposed in the 2003 study of [11] and as claimed in the latest annual mean Land-Ocean Temperature Index (LOTI) of [14], sources GHCN-v3 1880-06/2015 + SST: 1880-06/2015 ERSST v4, base period: 1951-1980, from 64N to 90N. If we look at the UAH LTT Arctic temperatures of Figure 1, the warming over this century is minimal while the warming of the NASA GISS Arctic LOTI product, Figure 2.b is significant. Similarly, since 1979,

the NASA GISS Arctic LOTI product is warming almost 4 times the UAH LTT Arctic product. Finally, the 2003 reconstruction, Figure 2.a, has a much higher 1940 peak and definitively much less warming, about 5 times smaller, over the past century.

Figure 2 also shows why measuring Arctic ice or temperatures from 1979, Figure 1, is a trickery, as incidentally the latest 1970s are a valley of the peaks and valleys oscillations. Starting from a valley of a peaks & valleys pattern, the rate is always positive for any time window if not exactly a multiple of the periodicity.

As sea ice data for the past century is controversial [15], which version of Arctic temperatures we want to believe makes a lot of difference to understand if the signs of recovery for the Arctic sea ice are an indication of larger or smaller recoveries to expect in the next few years.

If we do not want to accept the idea that prior NASA Arctic temperatures could have been more accurate than the present temperatures, we may at least accept the idea that the Iceland Met Office may know better the past temperatures for Iceland than NASA GISS does. The latest local evidence [16, 17] shows that the 20th century warming started in the 1920s and peaked in the early 1940s. This warming was followed by a cooling since the late 1970s then followed by about same warming until the end of the 20th century and the very first years of this century. Over the time window 1798 to 2007, the temperatures in Stykkishólmur have been increasing at the rate of +0.7°C per century. The warming has been very uneven but dominated by three cold periods and two warm ones, evidencing significant natural variability about the longer term trend. The comparison of the temperature in Stykkishólmur, Akureyri and Reykjavík over the time window 1950 to 2007 shows significant consistency and a minimal warming despite the starting year is after the mid-1940s peak.

Similarly, the CLIMAS (Climate information access system) project [18] that was a joint effort from the Max Planck Institute, Nansen Environmental and Remote Sensing Center and St Petersburg University to provide climate data for high latitudes, has data showing similar patterns. Godthaab

Nuuk (Greenland), Jan Mayen (Norway) and Akureyri (Iceland) have an early 1940s spike much larger than anything measured up to the year 2000, when unfortunately the CLIMAS data ends.

If the temperatures in the early 1940s were about todays' temperatures, and if the sea ice extension, thickness and volume follow the temperatures as also contemplated in the CAGW narrative, why then we should not expect some significant recovery also in the Arctic ice as part of a quasi-60 years natural oscillation now turning on the cooling side?. The latest work in Nature Geoscience [3] (but also the latest expedition trapped in the ices [1]) further supports the opportunity that this recovery may exists.

Conclusions

NSIDC sea ice extension, UAH lower troposphere temperature and now sea ice volume from Cryosat-2 [3] and other monitoring products as PIOMAS all consistently show the opportunity of a recovery, even if few more years of measurements are certainly needed to better understand the trend.

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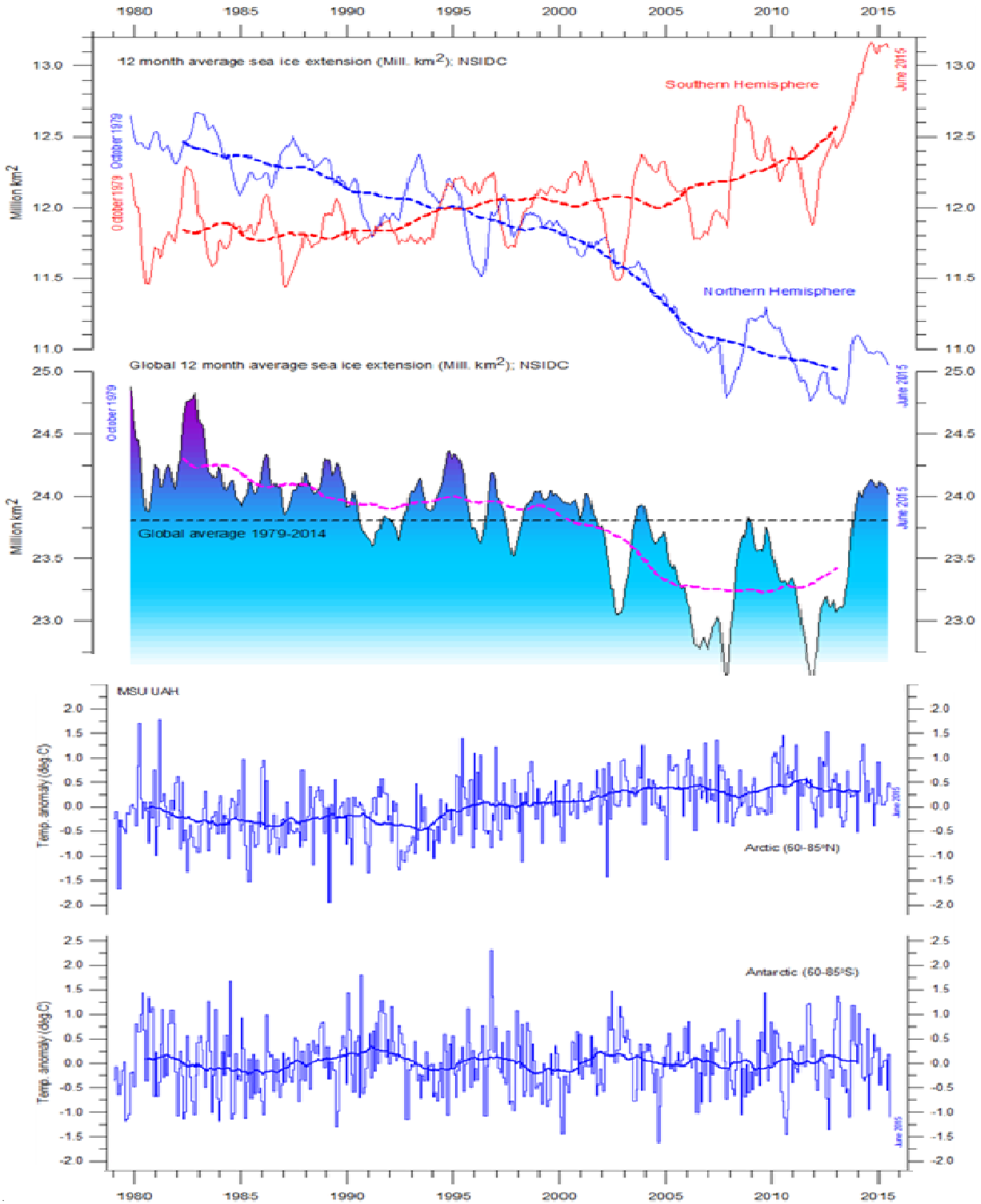
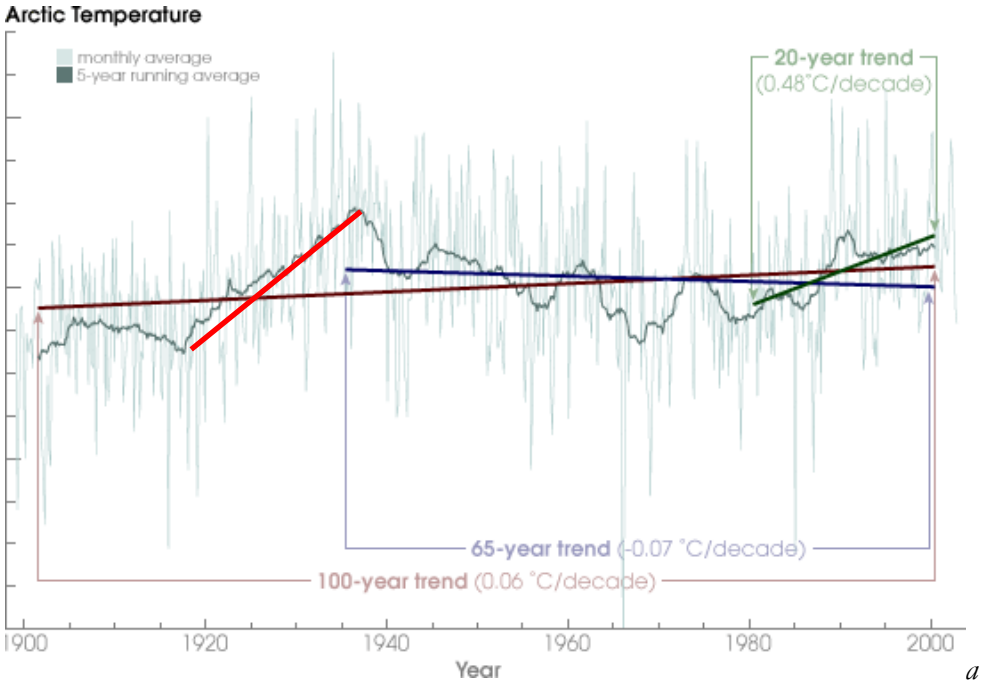
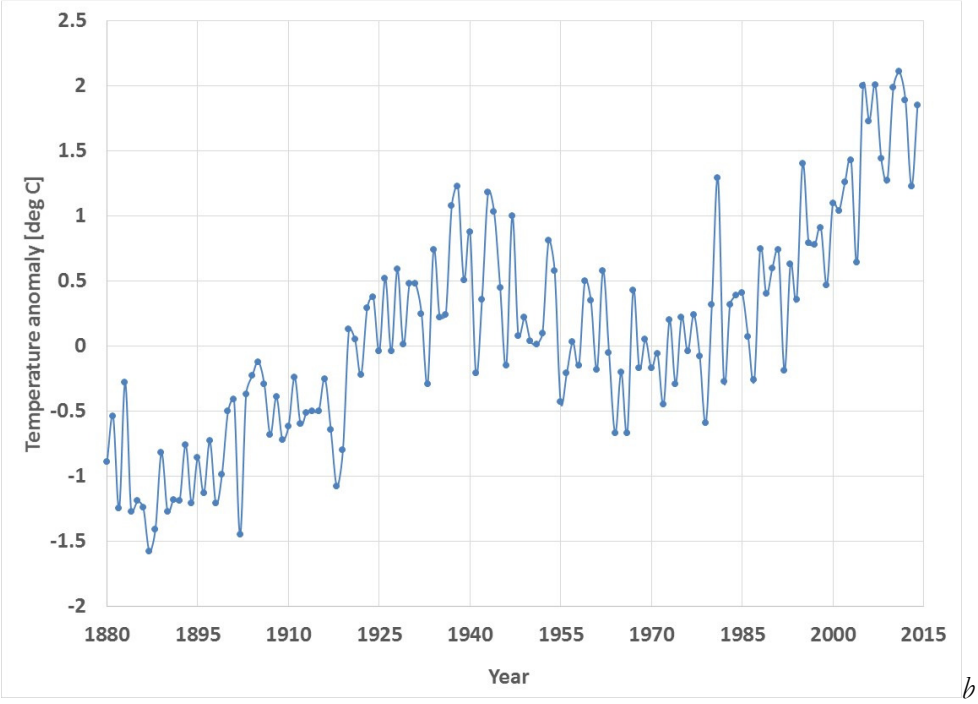


Figure 1 - Arctic and Antarctic sea ice extension (NCDIC) and lower troposphere temperature (UAH). Global and hemispheric 12 month running average of sea ice extension since 1979 have the stippled lines representing a 61 month average. Thick lines in the lower troposphere temperatures since December 1978 are the simple running 37 month

average. The Arctic ice volume is turning stable and possibly on the way of a partial recovery, and the Antarctic ice volume is expanding, as the sea ice extension and the temperatures are behaving consistently. Image modified after [20, 21].



177 *a*



178 *b*

179 *Figure 2 – a) Arctic temperature from [11]. The temperature about 1940 was largest than 2000 temperature. The*

180 *warming 1920 to 1940 was much stronger than the warming 1980 to 2000. Over one period of an evident quasi 60*

181 *years' oscillation there is no warming. Over a century the warming is about 0.6 C, possibly larger than the global*

182 *average, but everything but dramatic, and includes two complete warming phases and only one complete cooling phase.*

183 *Image modified after [11]. b) Arctic temperature from [14]. The carbon dioxide emission 2003 to 2015 has mostly*

184 *cooled down the temperatures of the past century to manufacture a completely different pattern. The temperature of*

185 *1940 is now smaller than the temperature of 2000.*