

SEA LEVELS

ISSUE:

III.C.1. 18898 *There is strong evidence that global sea level gradually rose in the 20th century and is currently rising at an increased rate.*

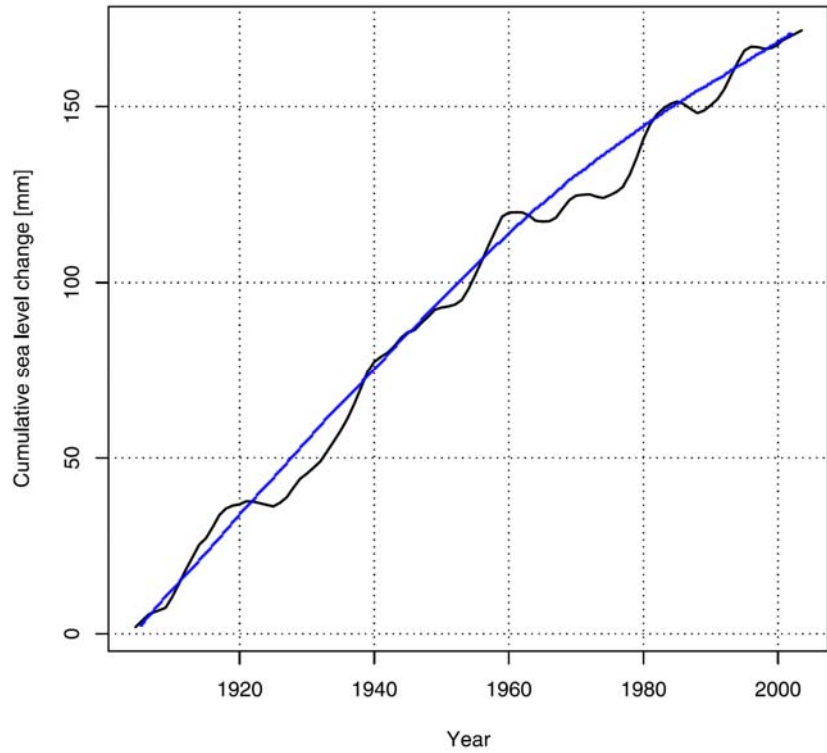
COMMENT SUMMARY

This is an incorrect statement. There are numerous recent peer review papers and a satellite data set that finds this is not true and in fact that the sea level rises have slowed in recent decades, most dramatically in the past few years as the oceans have cooled and contracted. Many of these peer reviewed papers were available by the deadlines for IPCC and CCSP review and all in time for the EPA reviewers to consider in their findings. These papers were ignored in deference to GCM forecasts, which are failing.

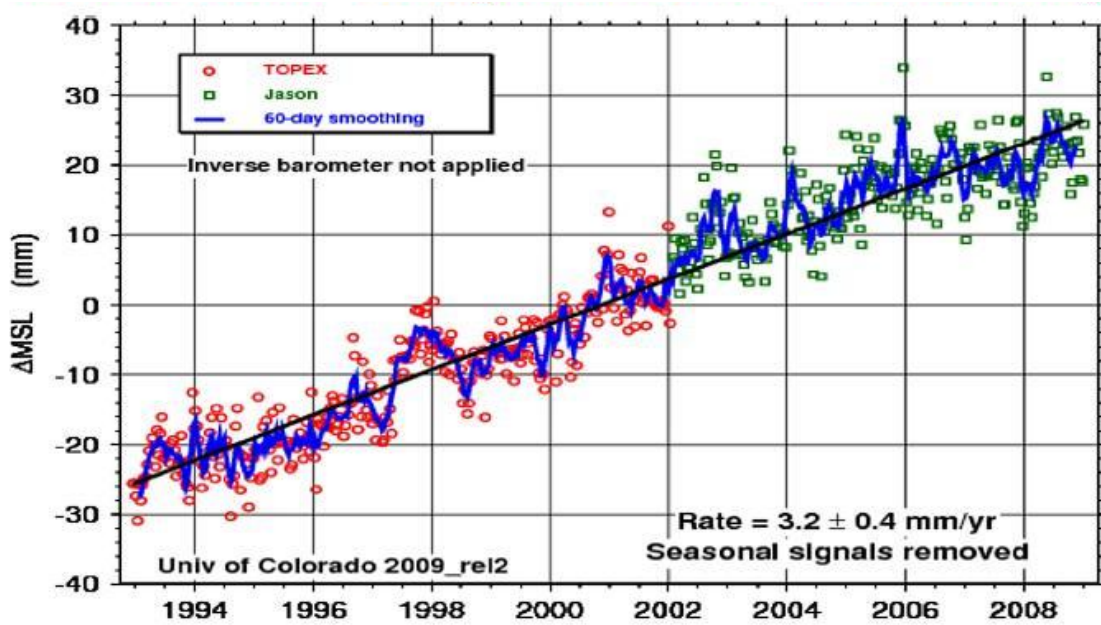
DETAILED COMMENTS

Holgate (2007) calculated that the mean rate of global sea level rise was "larger in the early part of the last century (2.03 ± 0.35 mm/yr 1904-1953), in comparison with the latter part (1.45 ± 0.34 mm/yr 1954-2003)."

[Idso](#) noted with respect to the Holgate study "the century-long sea level history portrayed in the figure below is suggested by the blue curve we have fit to it, which indicates that mean global sea level may have been rising, in the mean, ever more slowly with the passage of time throughout the entire last hundred years, with a possible acceleration of that (declining) trend over the last few decades."

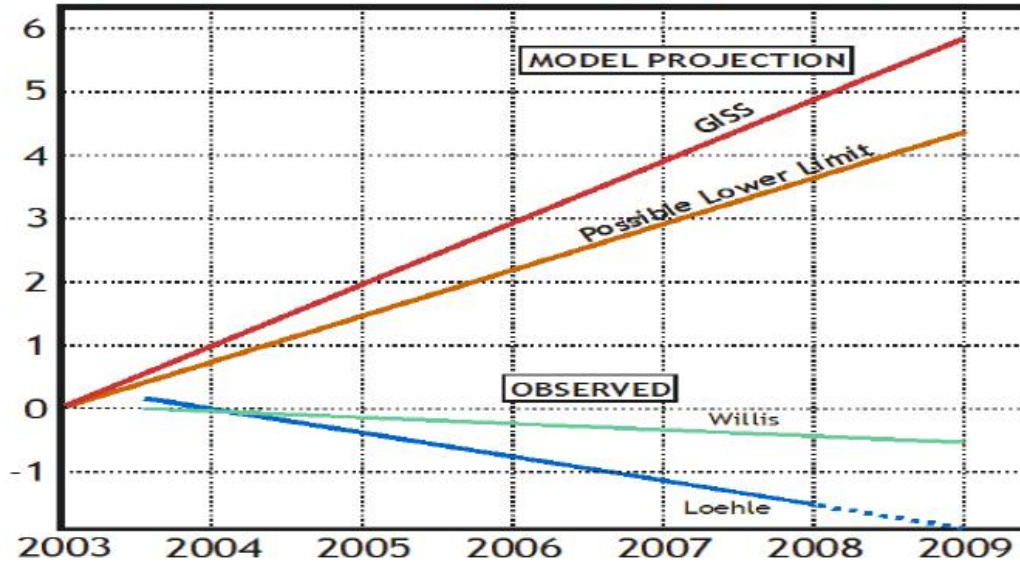


This is supported also by the sea levels as measured by Jason TOPEX.

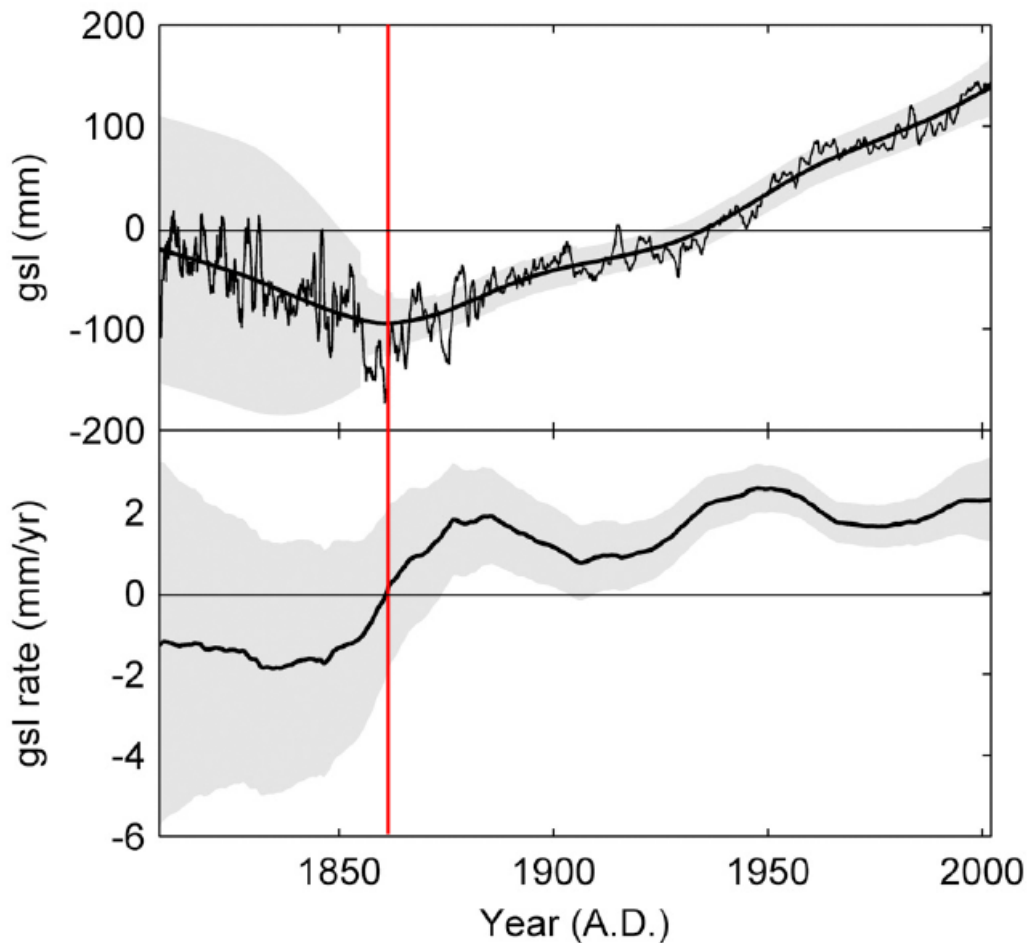


This decline is consistent with cooling oceans as determined by Willis (2008) and most recently Loehle (2009).

Five years' global ocean cooling: reality yet again disobeys models



Church *et al.* (2004) pointed out that with decadal variability in the computed global mean sea level, it is not possible to detect a significant increase in the rate of sea level rise over the period 1950-2000. Jevrejeva *et al.* (2006) say their findings show that "global sea level rise is irregular and varies greatly over time," noting that "it is apparent that rates in the 1920-1945 period are likely to be as large as today's." In addition, they report that their "global sea level trend estimate of 2.4 ± 1.0 mm/yr for the period from 1993 to 2000 matches the 2.6 ± 0.7 mm/yr sea level rise found from TOPEX/Poseidon altimeter data."



Wunsch et al (2004) noted "the advent of high-accuracy satellite altimetry has led to estimates that, since about 1993, global average sea level has been rising at a rate of 2.8 ± 0.4 mm/year." They thus suggest "it is desirable to buttress [this finding] through independent means," which is what they set out to do. "Using about 2.1×10^9 observations of many different types, all individually weighted, during the period 1992-2004 and a 1° horizontal resolution, 23-layer general circulation model," they derived estimates of "regional trends in global sea level." This analysis found "a global mean of about 1.6 mm/year, or about 60% of the pure altimetric estimate, of which about 70% is from the addition of freshwater." However, they note that there is "great regional variability in trend values, sometimes up to two orders of magnitude larger than the apparent spatial mean." The three researchers state that "at best, the determination and attribution of global-mean sea level change lies at the very edge of knowledge and technology," and that "it remains possible that the database is insufficient to compute mean sea level trends with the accuracy necessary to discuss the impact of global warming -- as disappointing as this conclusion may be." As a result, they conclude that the altimetry result is "currently untestable against in situ datasets."

Church et al.'s (2005) "best estimate" of the rate of globally-averaged sea level rise over the last half of the 20th century is 1.8 ± 0.3 mm yr⁻¹. They further note that "decadal

variability in sea level is observed, but to date there is no detectable secular increase in the rate of sea level rise over the period 1950-2000." They also report that no increase in the rate of sea level rise has been detected for the entire 20th century, citing the work of Woodworth (1990) and Douglas (1992)."

White et al.(2005) concluded that their results confirmed earlier findings of "no significant increase in the rate of sea level rise during this 51-year period," i.e., over the last half of the 20th century, including the last two decades that are typically demonized by climate alarmists for their supposedly "unprecedented" rate of temperature increase.

SEA LEVEL RISES DUE TO PROJECTIONS OF MELTING ICECAPS

Of course, the alarmism about sea level rises relates to model forecasts of melting in Greenland and ideas that melting will take place in a major way in the West Antarctic near the peninsula.

Greenland warming has not been remarkable and in fact, the current warming cycle fell short of the one in the 1930s to 1950s. Many recent studies have addressed Greenland mass balance. Using satellite radar altimetry Zwally *et al.* (2005) found that although "the Greenland ice sheet is thinning at the margins," it is "growing inland with a small overall mass gain," as previously described, and as has also been demonstrated by Johannessen *et al.* (2005), who found that "below 1500 meters, the elevation-change rate is -2.0 ± 0.9 cm/year, in qualitative agreement with reported thinning in the ice-sheet margins," but that "an increase of 6.4 ± 0.2 cm/year is found in the vast interior areas above 1500 meters." Spatially averaged over the bulk of the ice sheet, therefore, the net result, according to Johannessen *et al.* is a mean *increase* of 5.4 ± 0.2 cm/year, "or ~60 cm over 11 years, or ~54 cm when corrected for isostatic uplift," as we have also previously described.

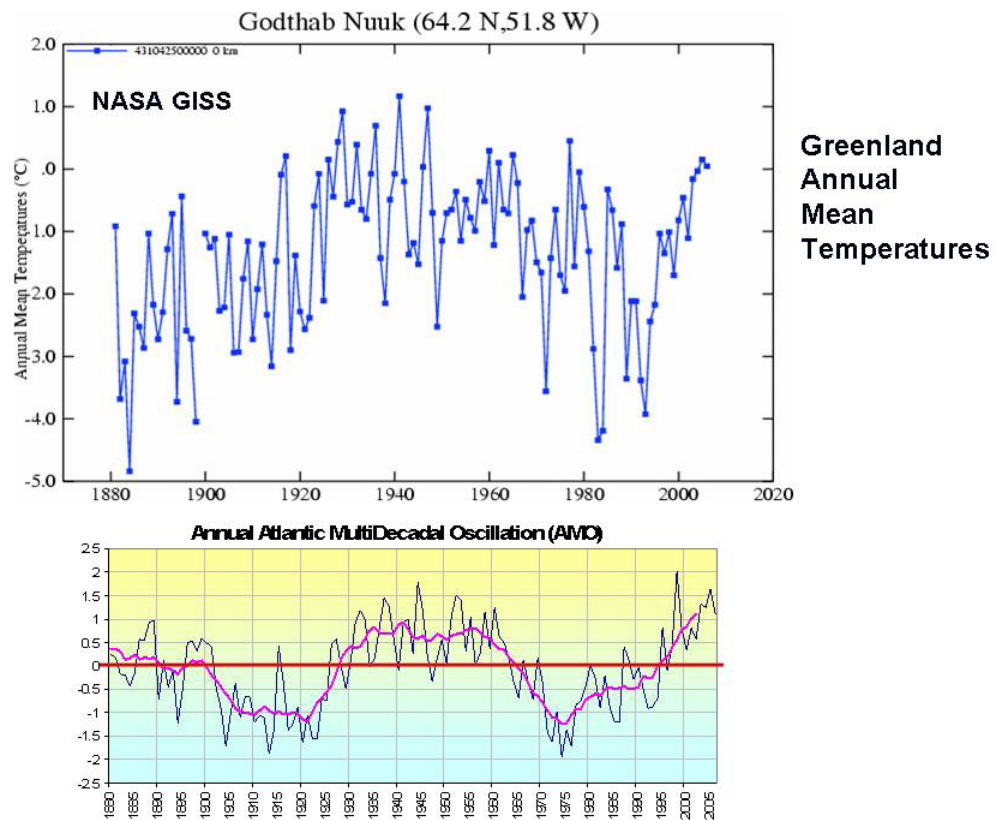
However, interannual variability is very large, driven mainly by variability in summer melting and sudden glacier accelerations. Consequently, the short time interval covered by instrumental data is of concern in separating fluctuations from trends.

In a paper published in Science in February 2007, Dr Ian Howat of the University of Washington paper published online this afternoon by Science reports that two of the largest glaciers have suddenly slowed, bringing the rate of melting last year down to near the previous rate. At one glacier, Kangerdlugssuaq, "average thinning over the glacier during the summer of 2006 declined to near zero, with some apparent thickening in areas on the main trunk."

Dr. Howat went on to add "Greenland was about as warm or warmer in the 1930's and 40's, and many of the glaciers were smaller than they are now. This was a period of rapid glacier shrinkage world-wide, followed by at least partial re-expansion during a colder period from the 1950's to the 1980's. Temperatures indeed were warmer in the 1930s and 1940s in Greenland. They cooled back to the levels of the 1880s by the 1980s and 1990s

before resuming a rise in the middle 1990s. The recent warming is not yet at the same level as that of the 1930s and 1940s.

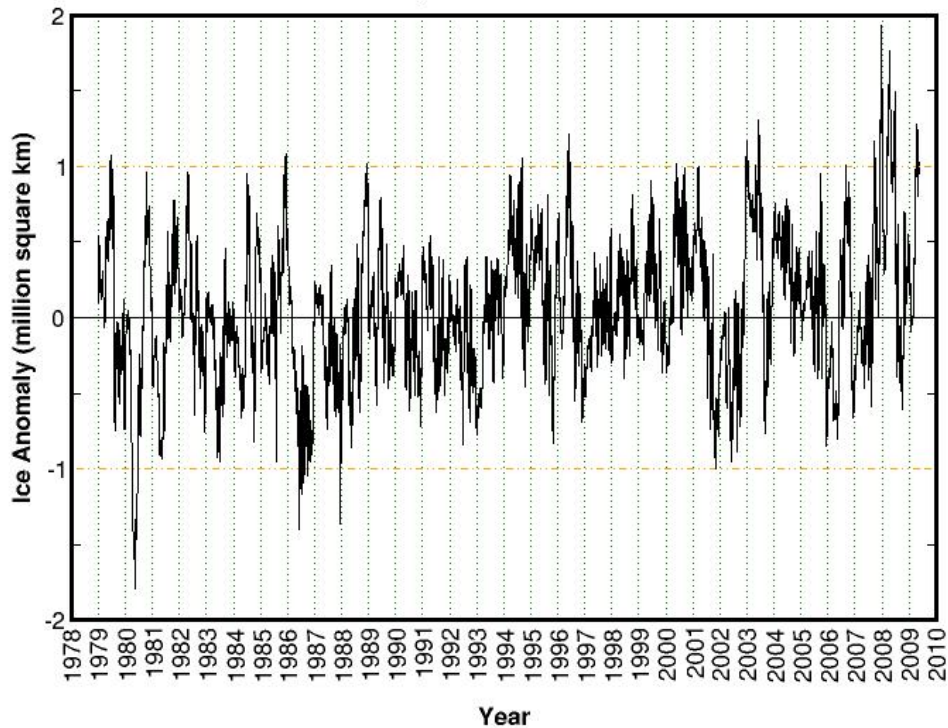
The cyclical behavior of temperatures and of icecap advance and retreat relate to the same Atlantic Multidecadal Oscillation shown below the temperature plot for Godthab Nuuk in southwest Greenland. Note how closely the temperatures track with the AMO (which is a measure of the Atlantic temperatures 0 to 70N). It should be noted that Greenland was cooling and its icecap growing the entire period from the late 1950s to the middle 1990s even as Greenhouse gases rose steadily.



Antarctic ice has been expanded and reached record extent in 2007 and is currently not far behind.

Southern Hemisphere Sea Ice Anomaly

Anomaly from 1979-2000 mean



Both Greenland and Antarctica lend no support for the acceleration of sea level rises. Observations agree. Sea level rises have not ACCELERATED as claimed.

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