

# Climate4you update February 2014

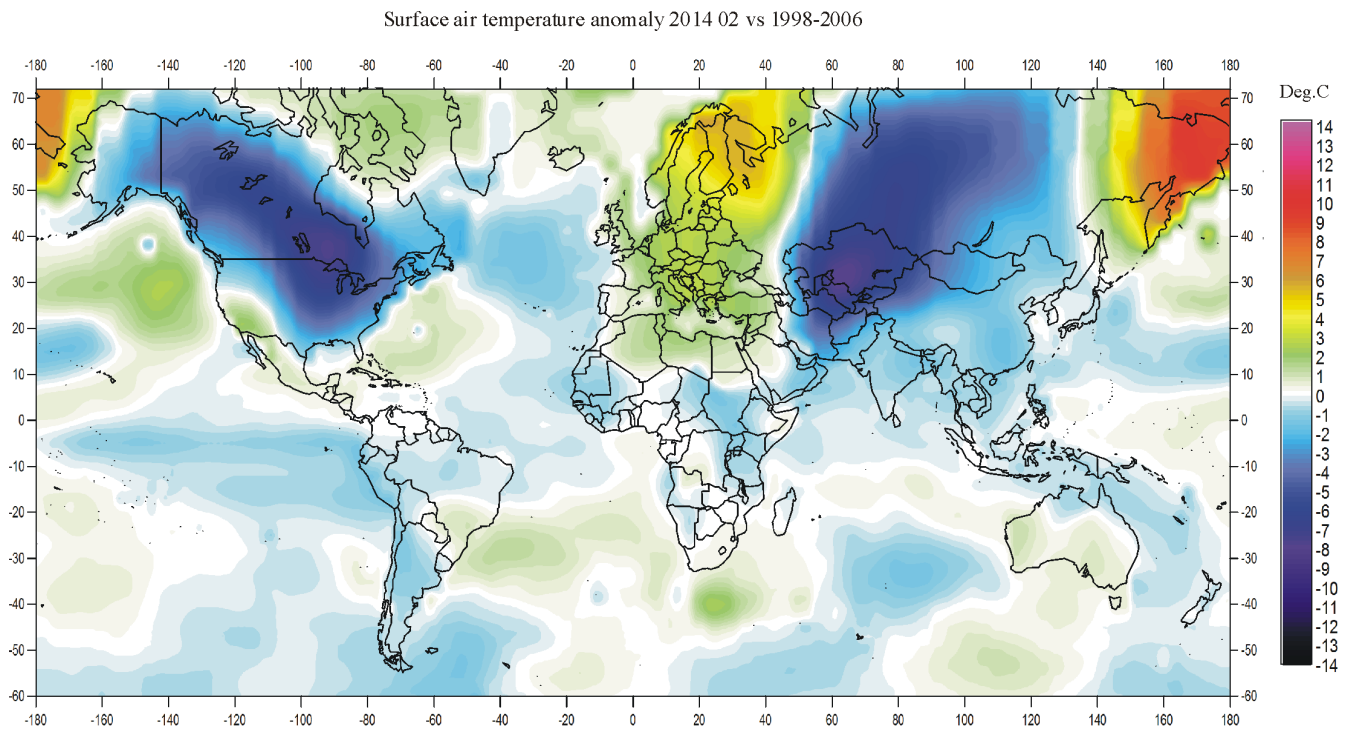


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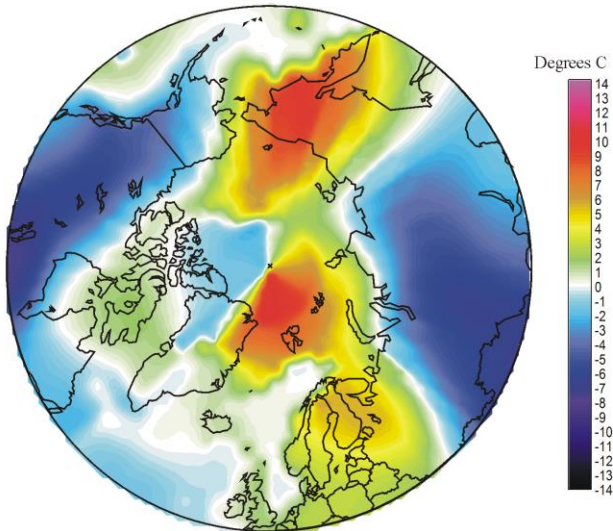
All diagrams in this newsletter as well as links to the original data are available on [www.climate4you.com](http://www.climate4you.com)

## February 2014 global surface air temperature overview

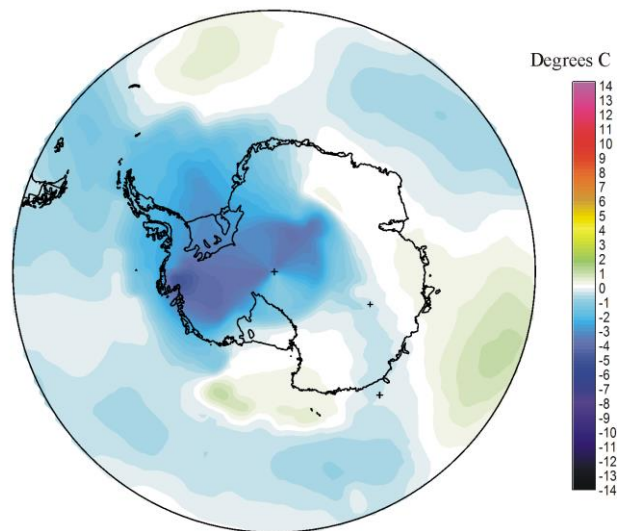


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Air temperature 2014 02 versus average 1998-2006



Air temperature 2014 02 versus average 1998-2006



February 2014 surface air temperature compared to the February average 1998-2006. Green-yellow-red colours indicate areas with higher temperature than the 1998-2006 average, while blue colours indicate lower than average temperatures. Data source: [Goddard Institute for Space Studies \(GISS\)](#).

## Comments to the February 2014 global surface air temperature overview

General: This newsletter contains graphs showing a selection of key meteorological variables for the past month. All temperatures are given in degrees Celsius.

In the above maps showing the geographical pattern of surface air temperatures, the period 1998-2006 is used as reference period. The reason for comparing with this recent period instead of the official WMO 'normal' period 1961-1990, is that the latter period is affected by the cold period 1945-1980. Most comparisons with such a low average value will therefore appear as warm, and it will be difficult to decide if modern surface air temperatures are increasing or decreasing. Comparing with a more recent period overcomes this problem.

In addition to the above consideration, the recent temperature development suggests that the time window 1998-2006 may roughly represent a global temperature peak (see, e.g., p. 4-6). However, it might be argued that the time interval 1999-2006 or 2000-2006 would better represent a possible temperature peak period. However, by starting in 1999 (or 2000) the cold La Niña period 1999-2000 would result in a unrealistic low reference temperature by excluding the previous warm El Niño in 1998. These two opposite phenomena must be considered together to obtain a representative reference average, and this why the year 1998 is included in the adopted reference period.

Finally, the GISS temperature data used for preparing the above diagrams show a pronounced temporal instability for data before 1998 (see p. 7). Any comparison with the WMO 'normal' period 1961-1990 is therefore influenced by monthly changing values for the so-called 'normal' period, which is therefore not suited as reference.

In the other diagrams in this newsletter the thin line represents the monthly global average value, and the thick line indicate a simple running average, in most cases a simple moving 37-month average, nearly corresponding to a three year average. The 37-month average is calculated from

values covering a range from 18 month before to 18 months after, with equal weight for every month.

The year 1979 has been chosen as starting point in many diagrams, as this roughly corresponds to both the beginning of satellite observations and the onset of the late 20<sup>th</sup> century warming period. However, several of the records have a much longer record length, which may be inspected in greater detail on [www.Climate4you.com](http://www.Climate4you.com).

### February 2014 global surface air temperatures

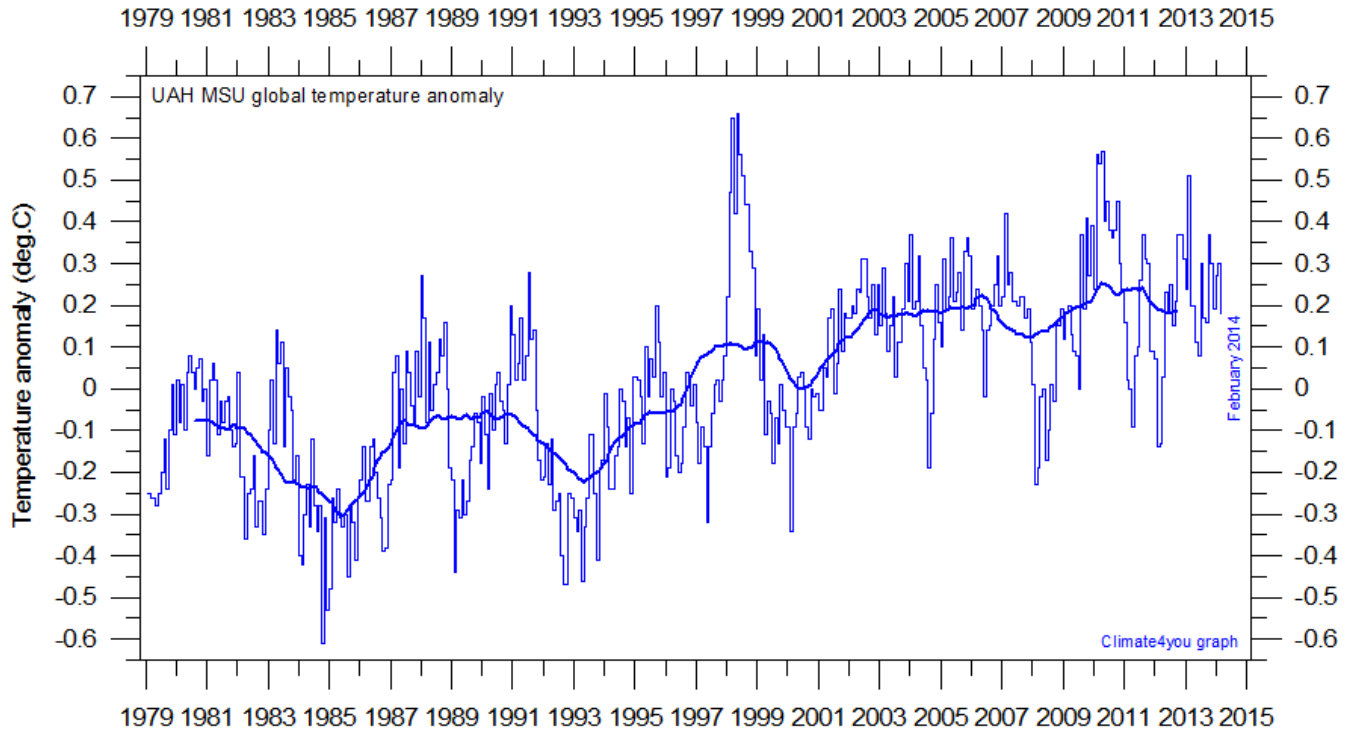
General: In general, global air temperatures were somewhat below the 1998-2006 average, but with a marked planetary North-South contrast.

The Northern Hemisphere was characterised by pronounced regional contrasts. Most of N America experienced below average temperatures, as did eastern central Russia. In contrast, most of Europe and eastern Siberia had above average temperatures. The North Atlantic generally had temperatures near or below average. The Arctic has a mixture of below and above average temperatures. In the areas near the North Pole the temperature pattern is strongly influenced by the interpolation procedure followed by GISS, and not too much attention should be paid to such interpolation artefacts.

Near Equator temperatures conditions were generally below the 1998-2006 average.

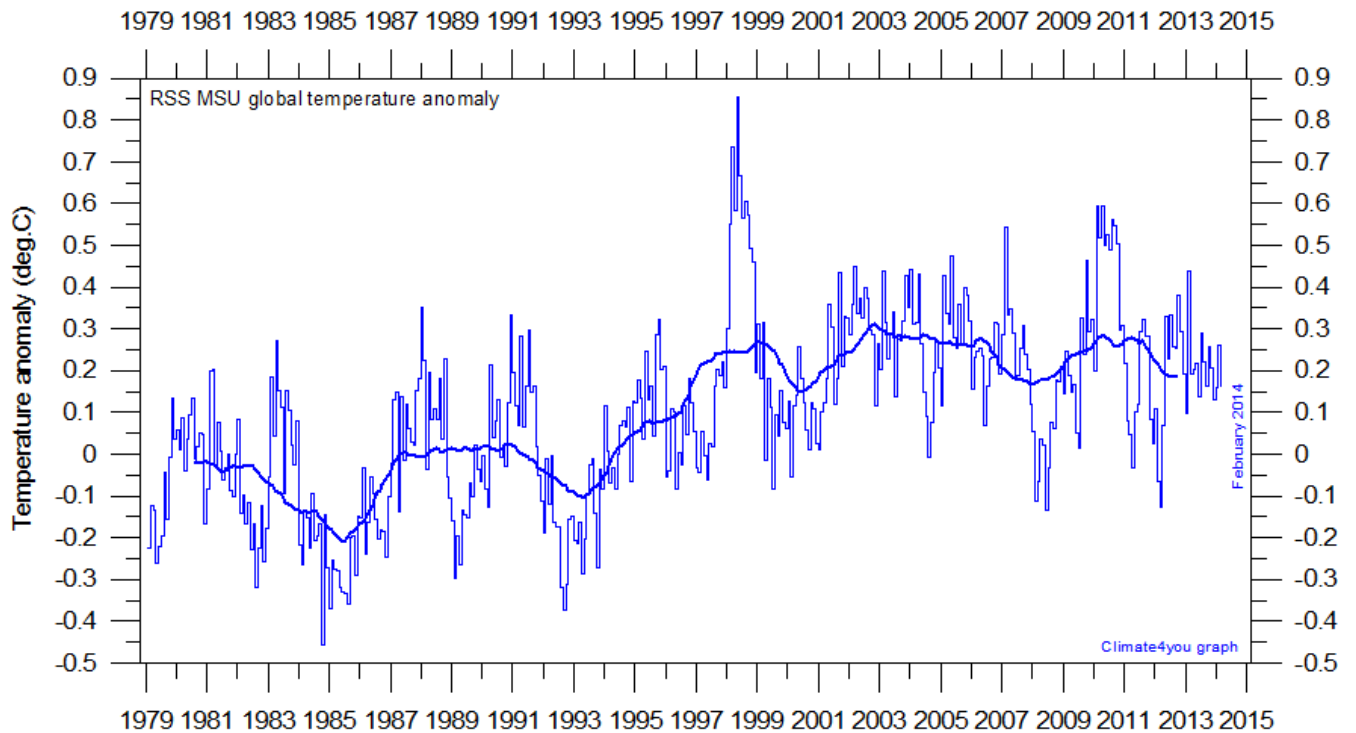
The Southern Hemisphere temperatures were mainly below or near average 1998-2006 conditions. The only major exception from this was the southern and western parts of Australia, which had temperatures a little above average. The Antarctic continent was divided between below average temperatures in the west and near average temperatures in the east.

## Lower troposphere temperature from satellites, updated to February 2014



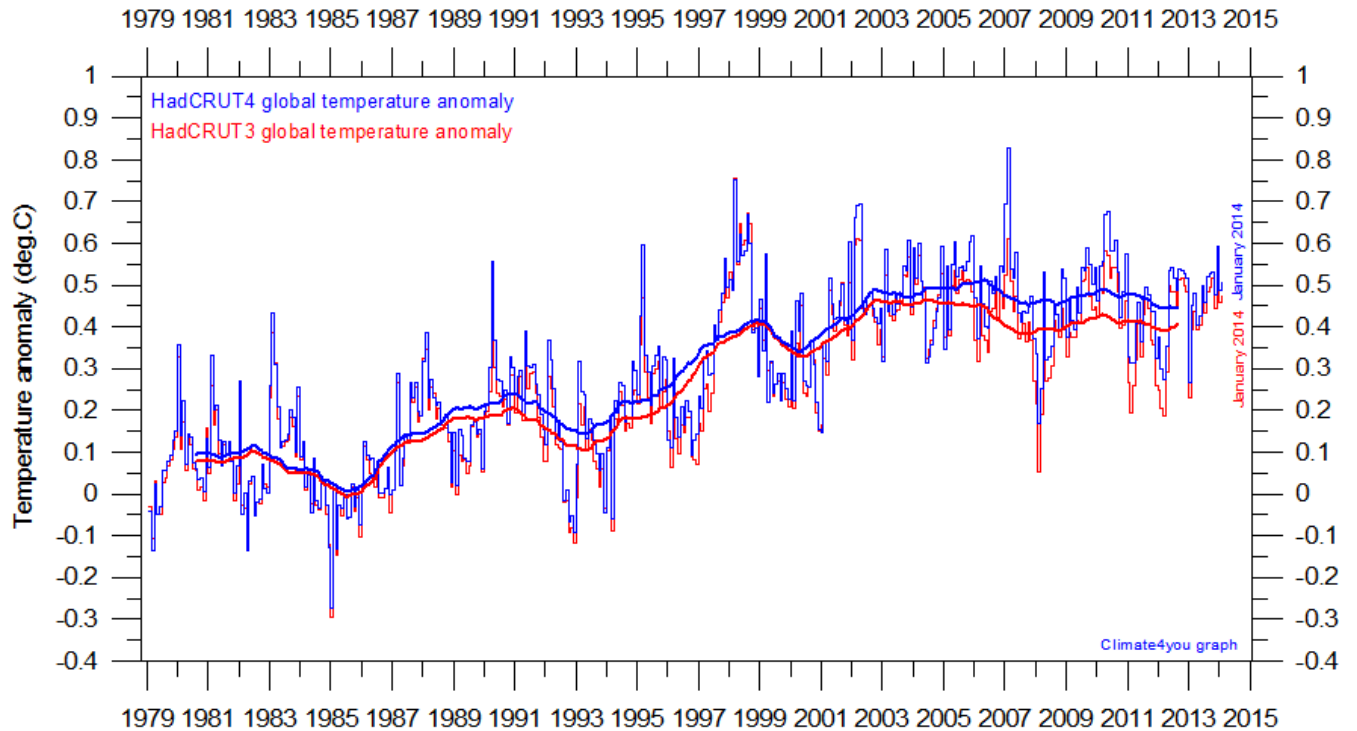
Global monthly average lower troposphere temperature (thin line) since 1979 according to [University of Alabama](#) at Huntsville, USA. The thick line is the simple running 37 month average.

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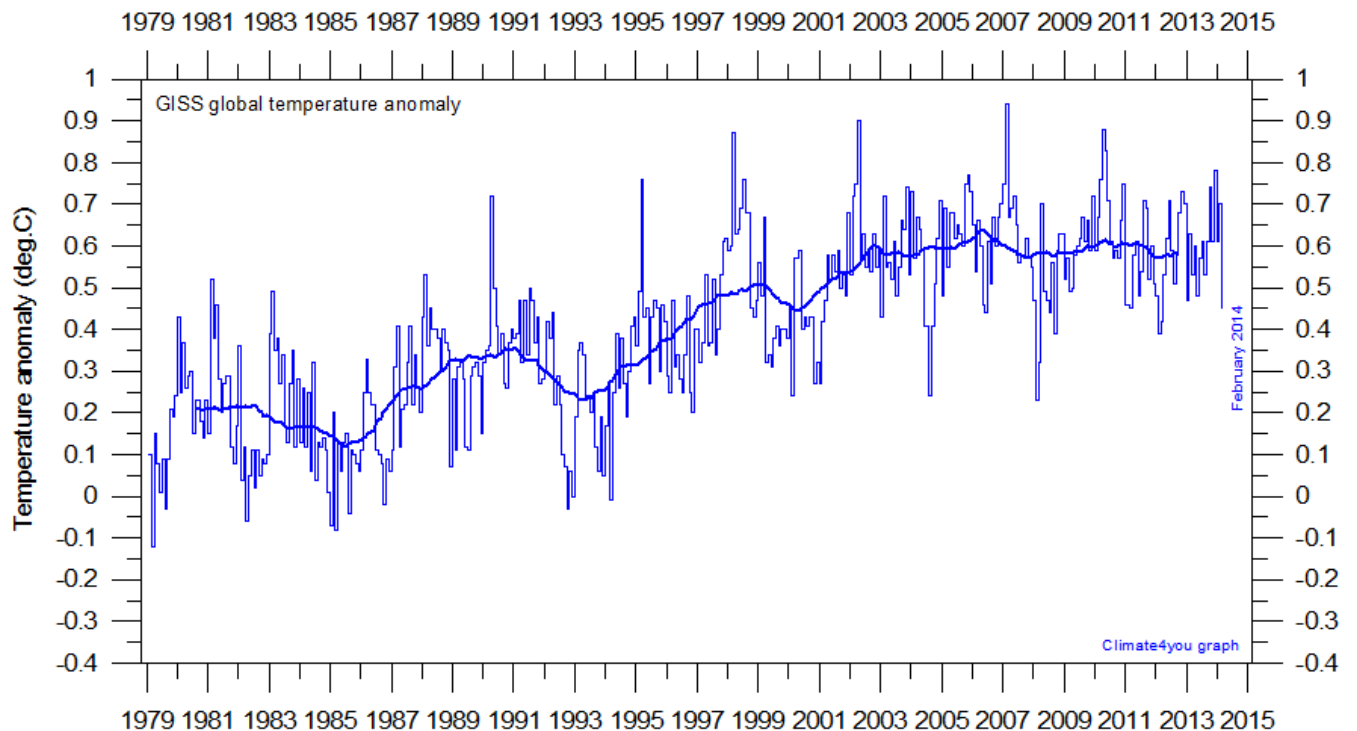
Global monthly average lower troposphere temperature (thin line) since 1979 according to according to [Remote Sensing Systems](#) (RSS), USA. The thick line is the simple running 37 month average.

## Global surface air temperature, updated to February 2014

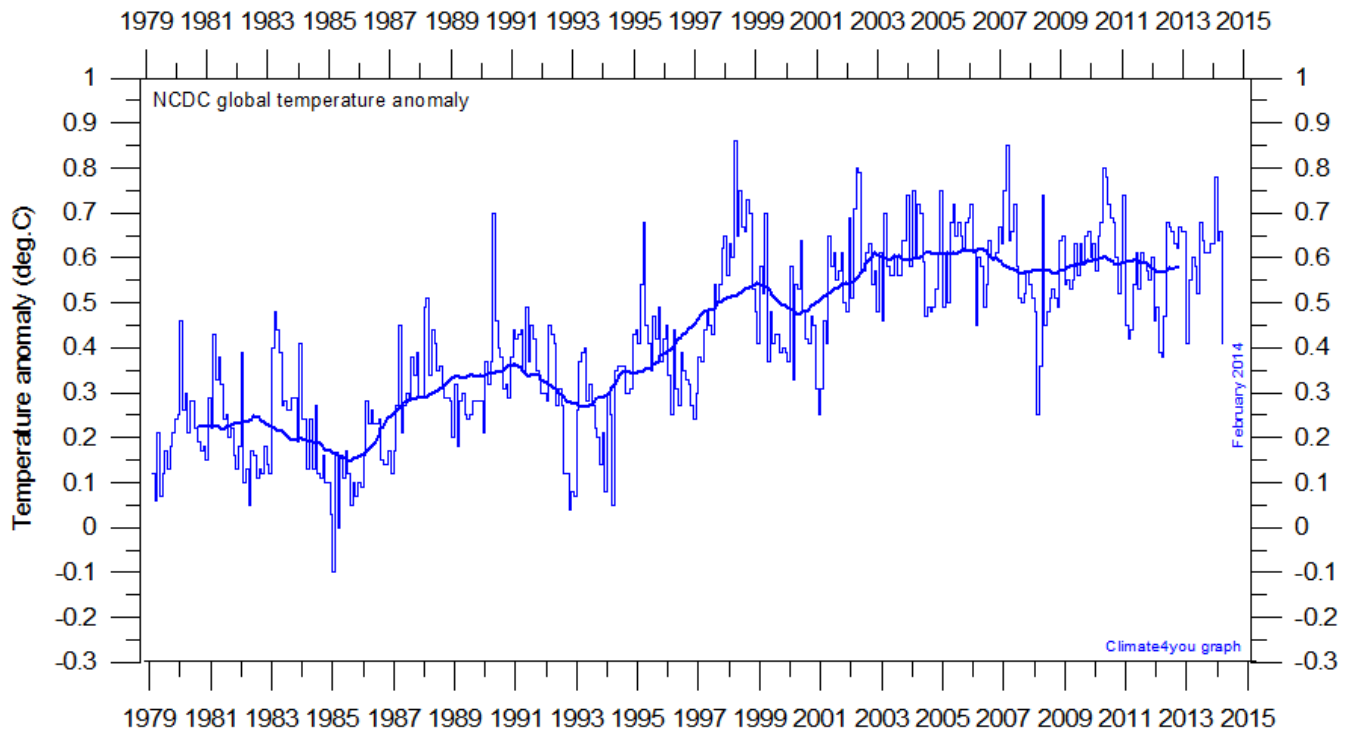


Global monthly average surface air temperature (thin line) since 1979 according to according to the Hadley Centre for Climate Prediction and Research and the University of East Anglia's [Climatic Research Unit \(CRU\)](#), UK. The thick line is the simple running 37 month average. Version HadCRUT4 (blue) is now replacing HadCRUT3 (red). Please note that this diagram is not yet updated beyond December 2013.

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Global monthly average surface air temperature (thin line) since 1979 according to according to the [Goddard Institute for Space Studies \(GISS\)](#), at Columbia University, New York City, USA. The thick line is the simple running 37 month average.



Global monthly average surface air temperature since 1979 according to according to the [National Climatic Data Center](#) (NCDC), USA. The thick line is the simple running 37 month average.

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A note on data record stability:

All the above temperature estimates display changes when one compare with previous monthly data sets, not only for the most recent months as a result of supplementary data being added, but actually for all months back to the very beginning of the records, more than 100 years ago. Presumably this reflects recognition of errors, changes in the averaging procedure, and the influence of other unknown phenomena.

None of the temperature records are stable over time (since 2008). The two surface air temperature records, NCDC and GISS, show apparent systematic changes over time. This is exemplified the diagram on the following page showing the changes since May 2008 in the NCDC global surface temperature record for January 1915 and January 2000, illustrating how the difference between the early and late part of the temperature records gradually is growing by administrative adjustments.

You can find more on the issue of lack of temporal stability on [www.climate4you](http://www.climate4you) (go to: *Global Temperature*, followed by *Temporal Stability*).

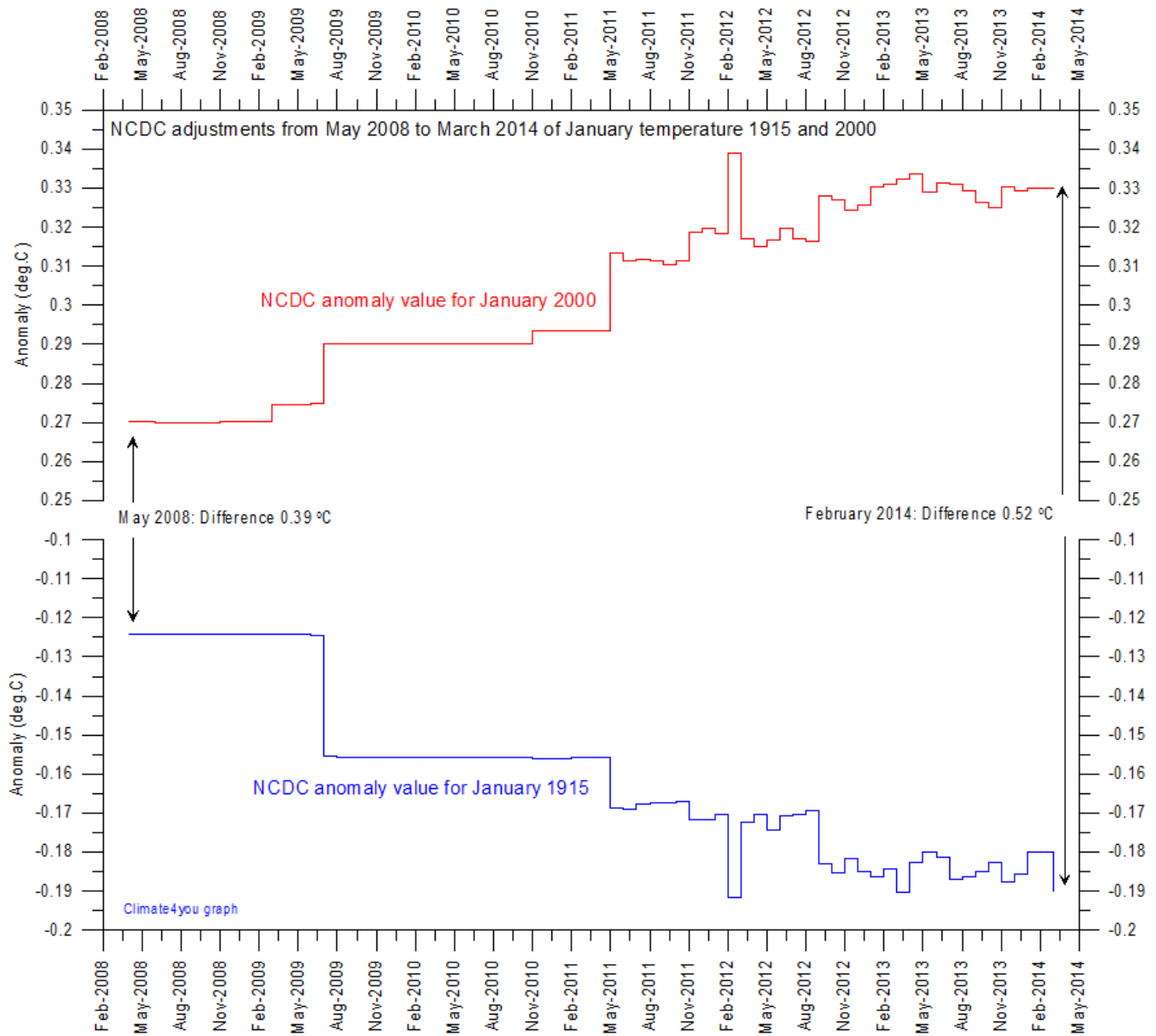


Diagram showing the adjustment made since May 2008 by the [National Climatic Data Center](#) (NCDC) in the anomaly values for the two months January 1915 and January 2000.

**Note:** The administrative upsurge of the temperature increase between January 1915 and January 2000 has grown from 0.39 (in May 2008) to 0.52 °C (March 2014), representing an about 33% administrative temperature increase.

**Global air temperature linear trends**

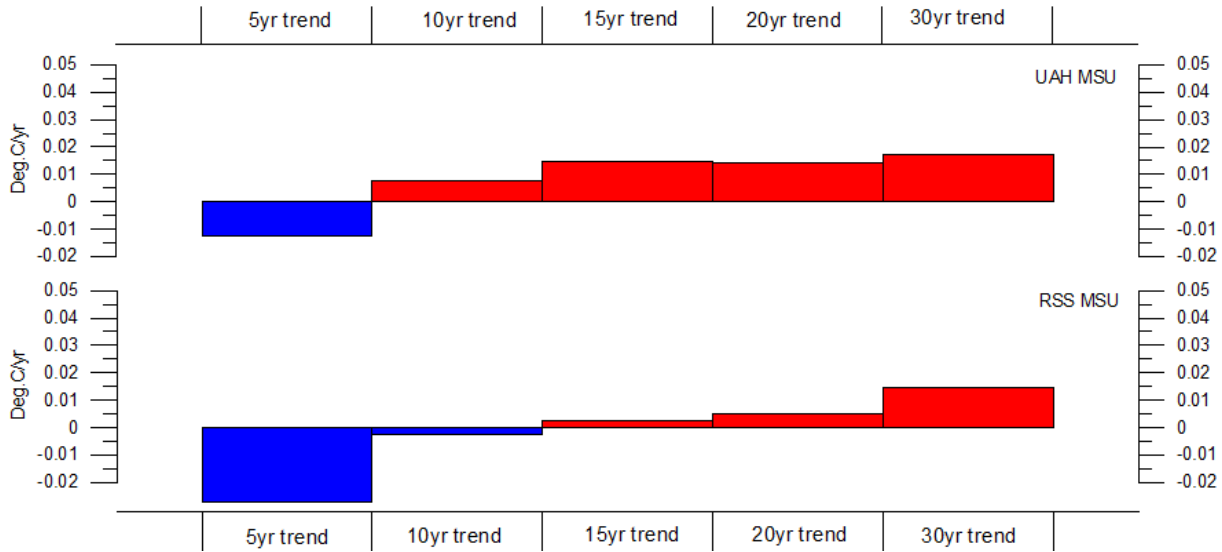


Diagram showing the latest 5, 10, 20 and 30 yr linear annual global temperature trend, calculated as the slope of the linear regression line through the data points, for two satellite-based temperature estimates (UAH MSU and RSS MSU). Last month included in analysis: January 2014.

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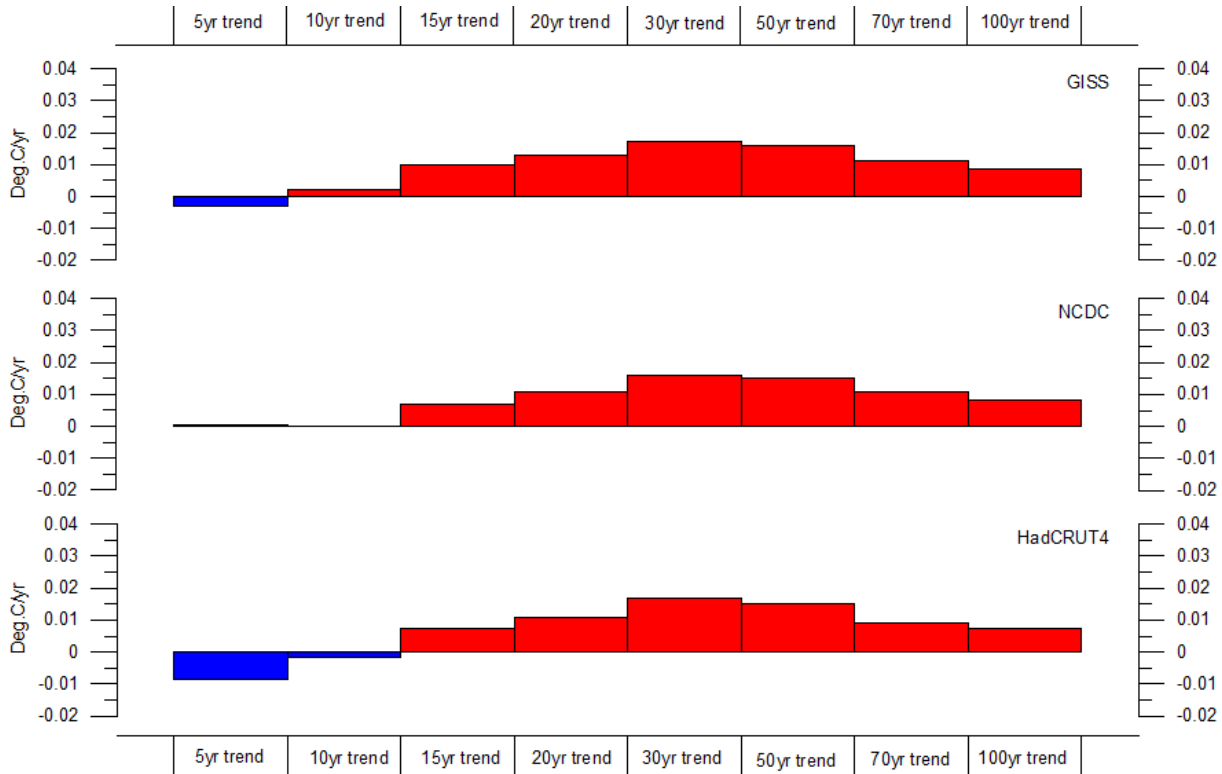
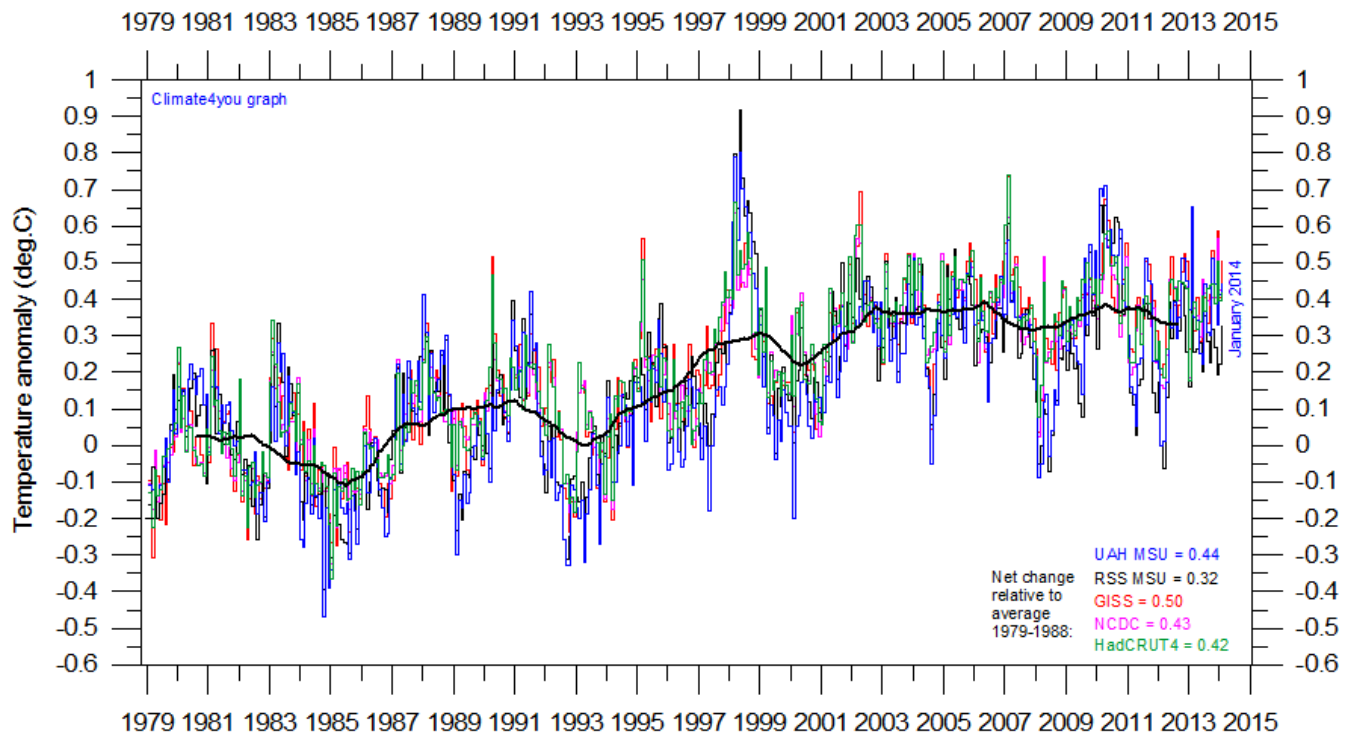


Diagram showing the latest 5, 10, 20, 30, 50, 70 and 100 year linear annual global temperature trend, calculated as the slope of the linear regression line through the data points, for three surface-based temperature estimates (GISS, NCDC and HadCRUT4). Last month included in all analyses: January 2014.





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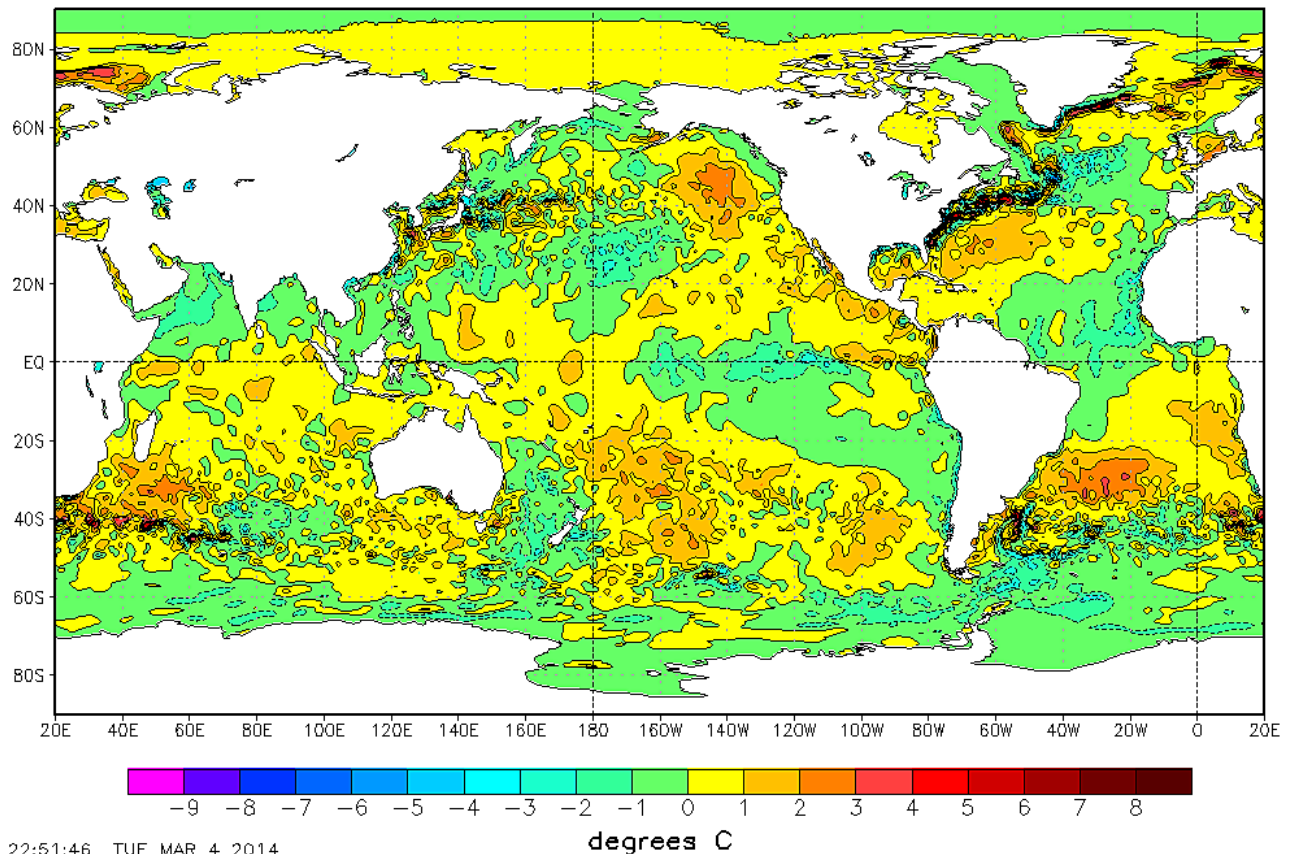
*Superimposed plot of all five global monthly temperature estimates. As the base period differs for the individual temperature estimates, they have all been normalised by comparing with the average value of the initial 120 months (10 years) from January 1979 to December 1988. The heavy black line represents the simple running 37 month (c. 3 year) mean of the average of all five temperature records. The numbers shown in the lower right corner represent the temperature anomaly relative to the individual 1979-1988 averages.*

It should be kept in mind that satellite- and surface-based temperature estimates are derived from different types of measurements, and that comparing them directly as done in the diagram above therefore may be somewhat problematical. However, as both types of estimate often are discussed together, the above diagram may nevertheless be of some interest. In fact, the different types of temperature estimates appear to agree quite well as to the overall temperature variations on a 2-3 year scale, although on a shorter time scale there are often considerable differences between the individual records.

All five global temperature estimates presently show an overall stagnation, at least since 2002. There has been no increase in global air temperature since 1998, which however was affected by the oceanographic El Niño event. This stagnation does not exclude the possibility that global temperatures will begin to increase again later. On the other hand, it also remain a possibility that Earth just now is passing a temperature peak, and that global temperatures will begin to decrease during the coming years. Time will show which of these two possibilities is correct.

## Global sea surface temperature, updated to early March 2014

NOAA/NWS/NCEP/EMC Marine Modeling and Analysis Branch  
RTG\_SST Anomaly (0.5 deg X 0.5 deg) for 04 Mar 2014



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*Sea surface temperature anomaly on 4 March 2014. Map source: National Centers for Environmental Prediction (NOAA).*

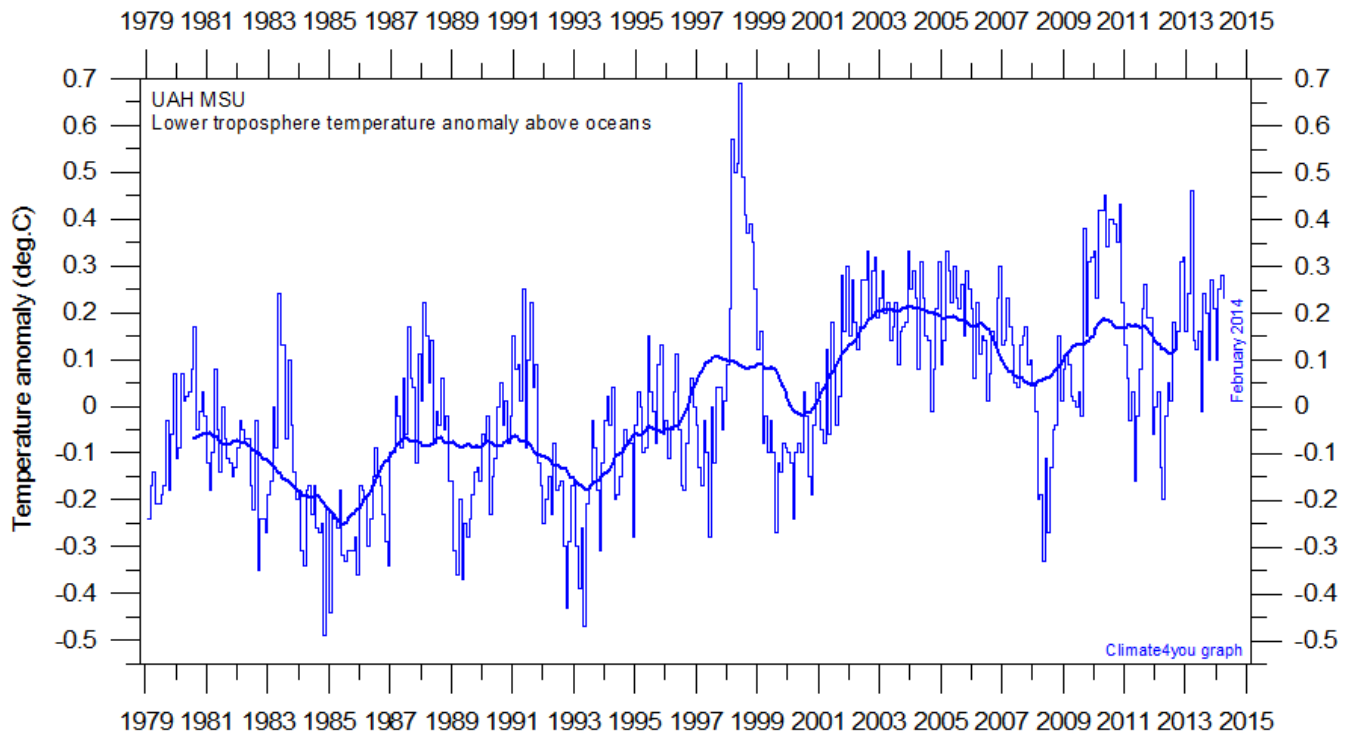
Because of the large surface areas near Equator, the temperature of the surface water in these regions is especially important for the global atmospheric temperature (p.4-6).

Relatively cold water is slowly spreading across the Pacific Ocean near the Equator, and may influence global air temperatures in the months to come.

The significance of any such short-term cooling or warming reflected in air temperatures should not be over stated. Whenever Earth experiences cold La Niña or warm El Niño episodes (Pacific Ocean)

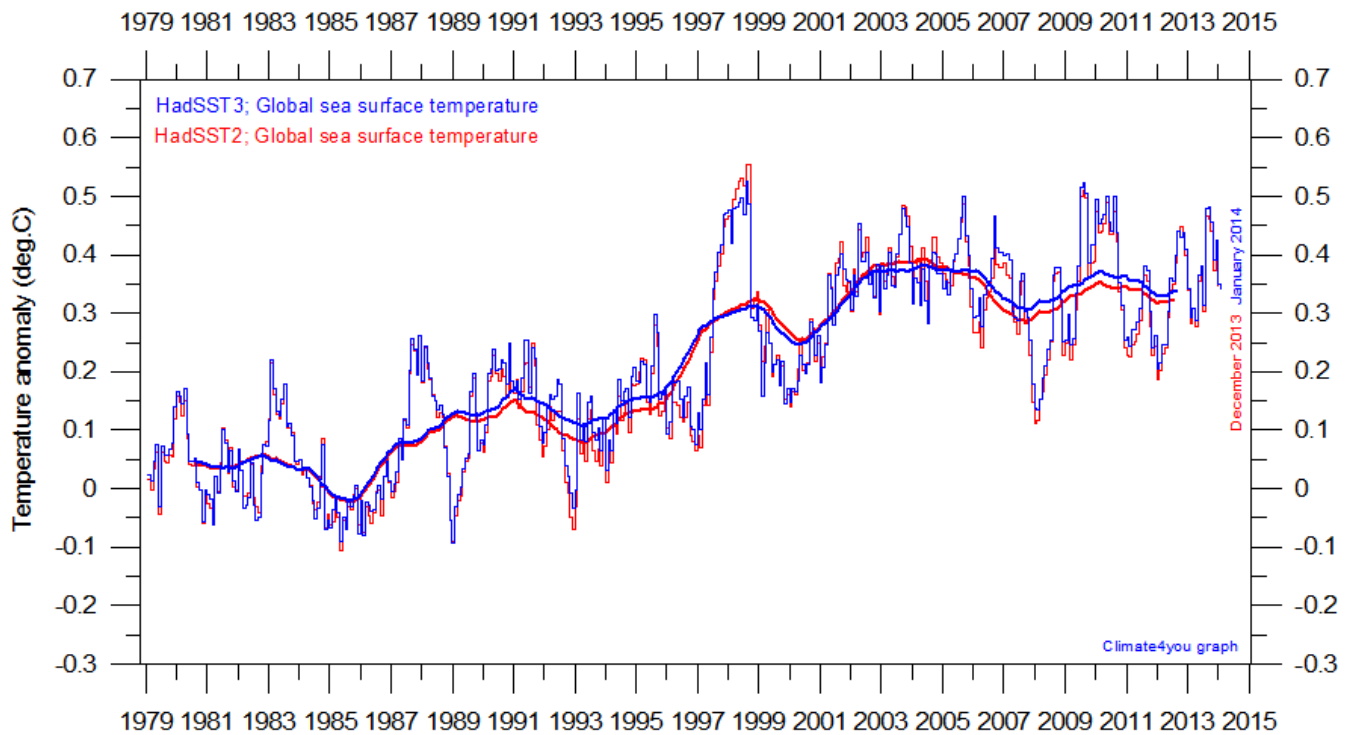
major heat exchanges takes place between the Pacific Ocean and the atmosphere above, eventually showing up in estimates of the global air temperature.

However, this does not reflect similar changes in the total heat content of the atmosphere-ocean system. In fact, global net changes can be small and such heat exchanges may mainly reflect redistribution of energy between ocean and atmosphere. What matters is the overall temperature development when seen over a number of years.

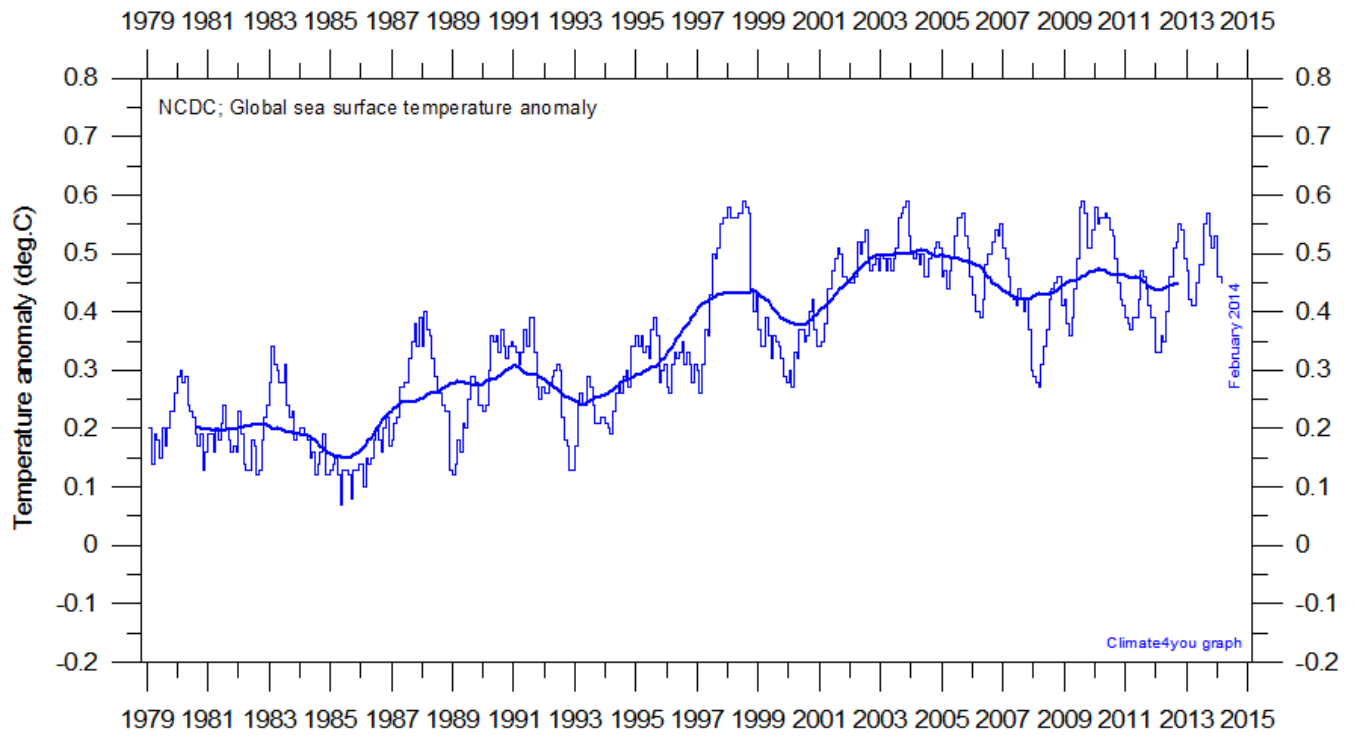


Global monthly average lower troposphere temperature over oceans (thin line) since 1979 according to [University of Alabama](#) at Huntsville, USA. The thick line is the simple running 37 month average.

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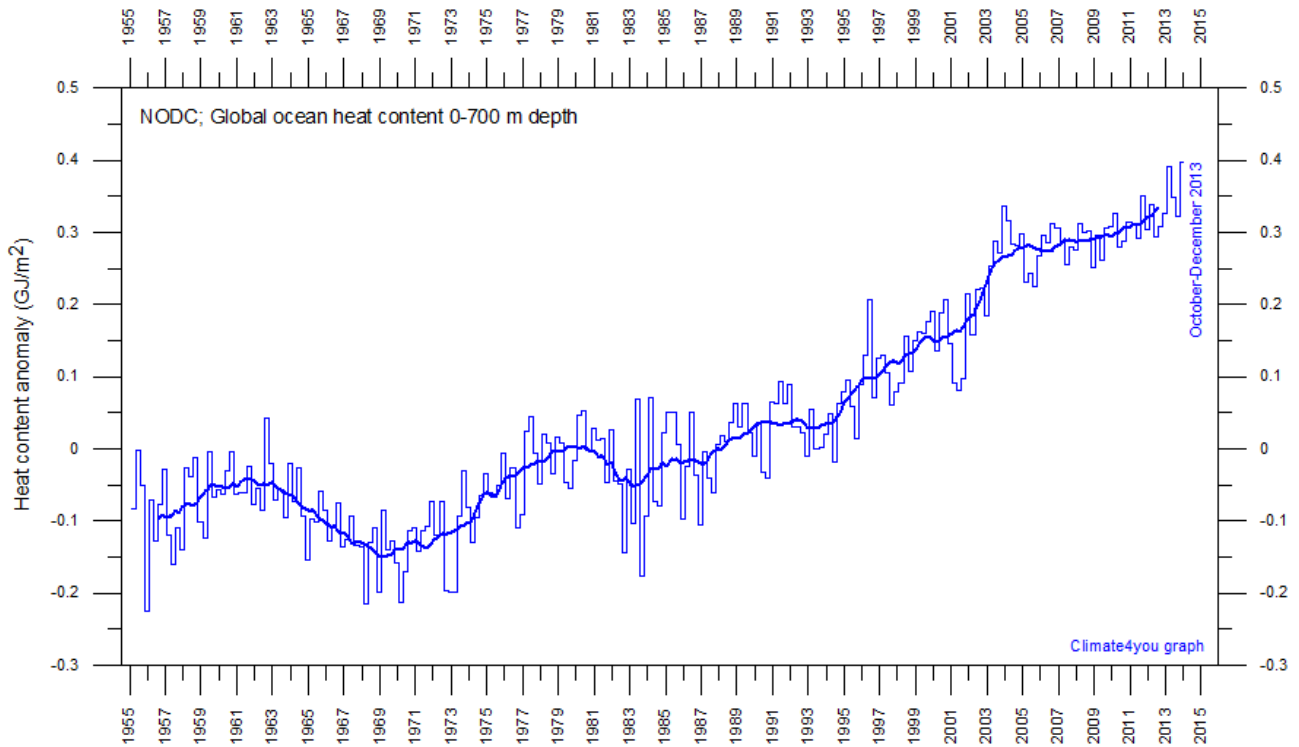


Global monthly average sea surface temperature since 1979 according to University of East Anglia's [Climatic Research Unit \(CRU\)](#), UK. Base period: 1961-1990. The thick line is the simple running 37 month average. Please note that this diagram is not yet updated beyond January 2014.



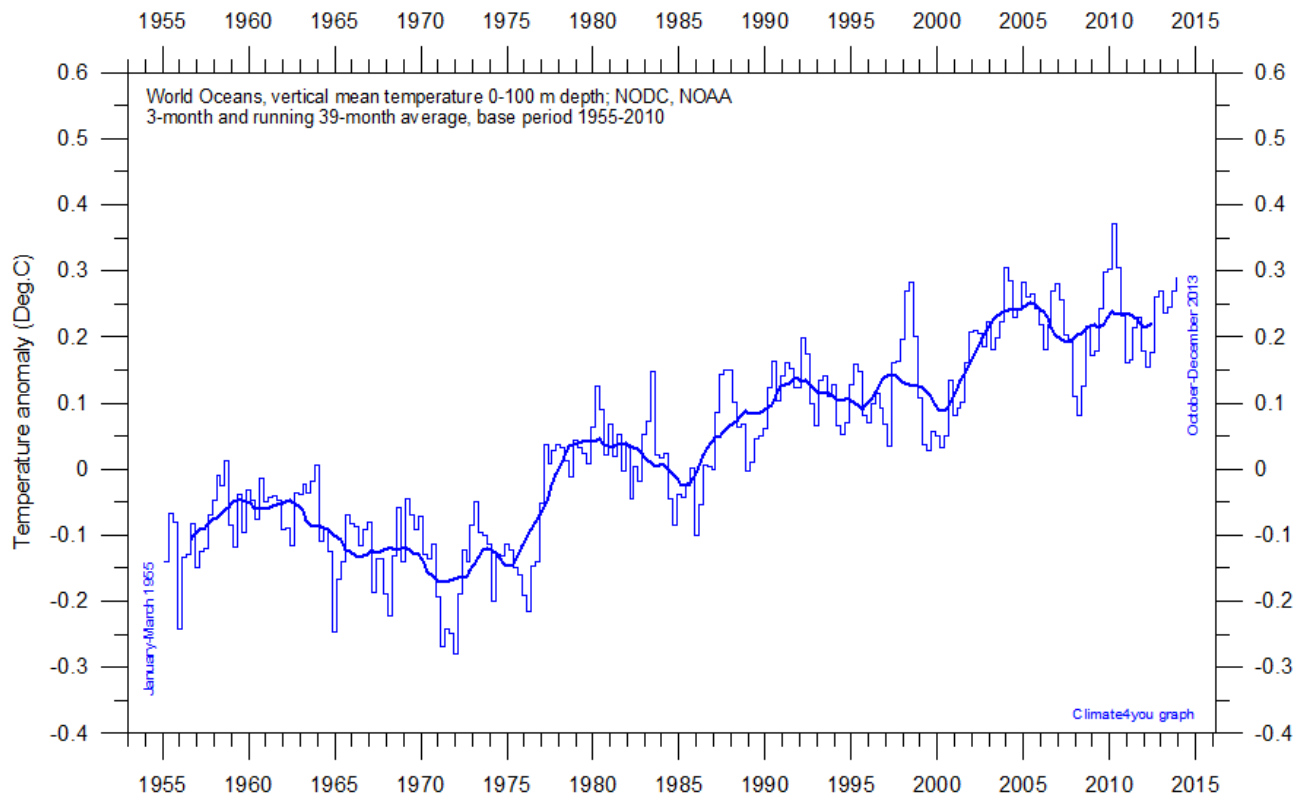
Global monthly average sea surface temperature since 1979 according to the [National Climatic Data Center \(NCDC\)](#), USA. Base period: 1901-2000. The thick line is the simple running 37 month average.

## Ocean heat content uppermost 100 and 700 m, updated to December 2013

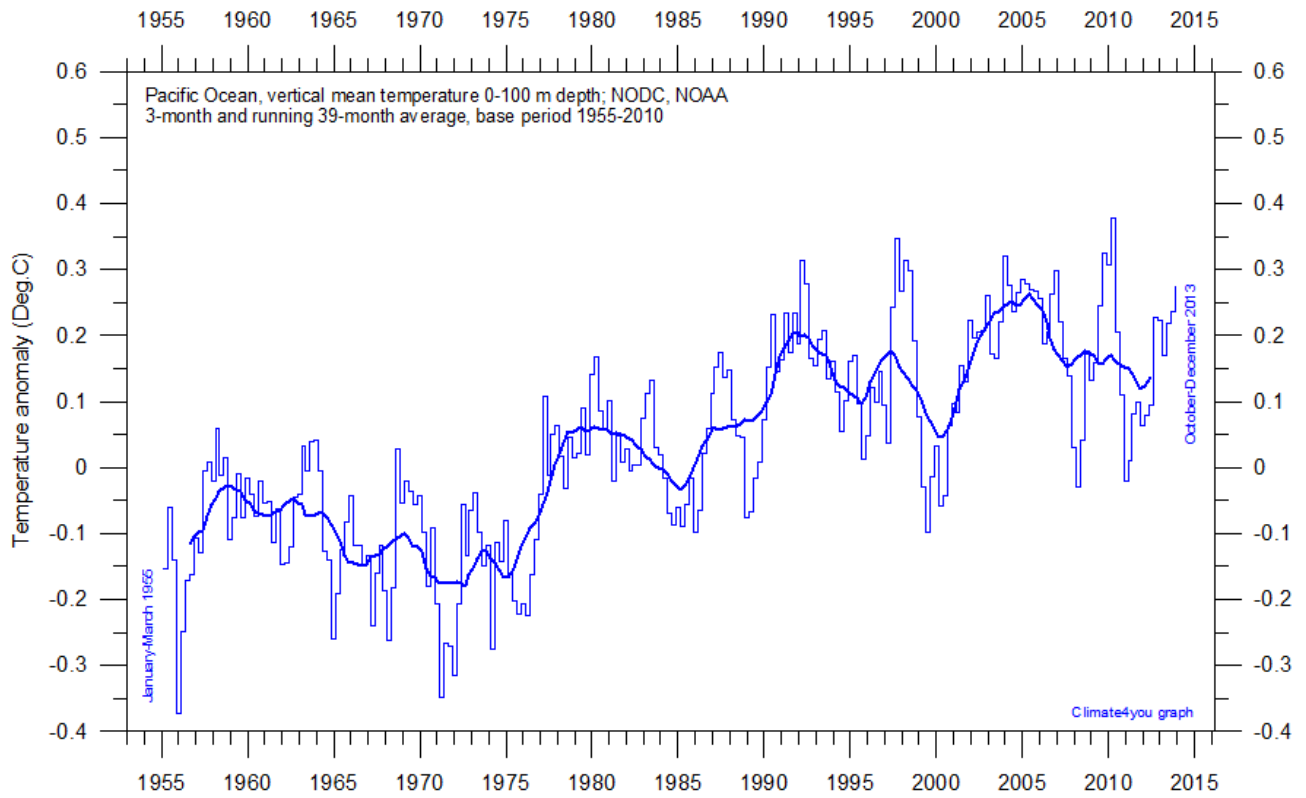


Global monthly heat content anomaly ( $GJ/m^2$ ) in the uppermost 700 m of the oceans since January 1955. Data source: National Oceanographic Data Center (NODC).

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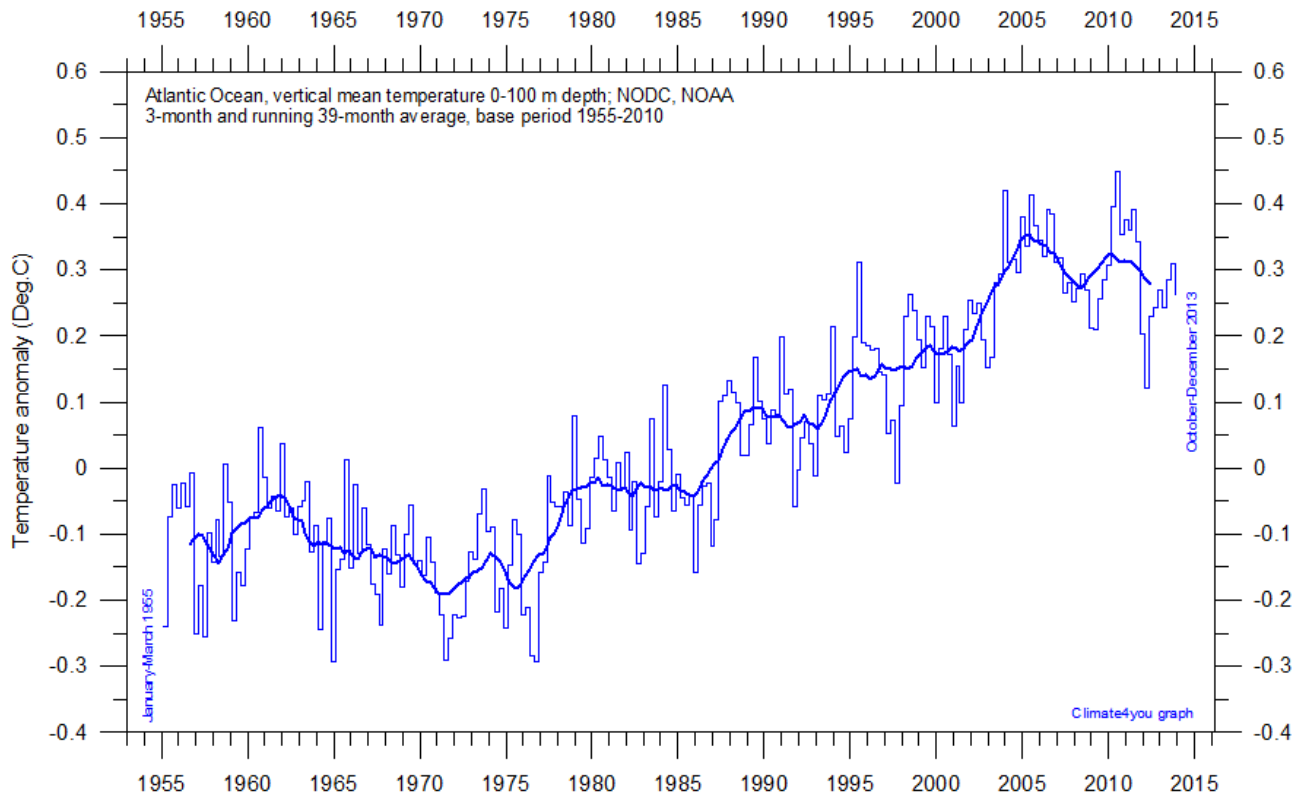


World Oceans vertical average temperature 0-100 m depth since 1955. The thin line indicate 3-month values, and the thick line represents the simple running 39-month (c. 3 year) average. Data source: [NOAA National Oceanographic Data Center \(NODC\)](#). Base period 1955-2010. Last period shown: October-December 2013.

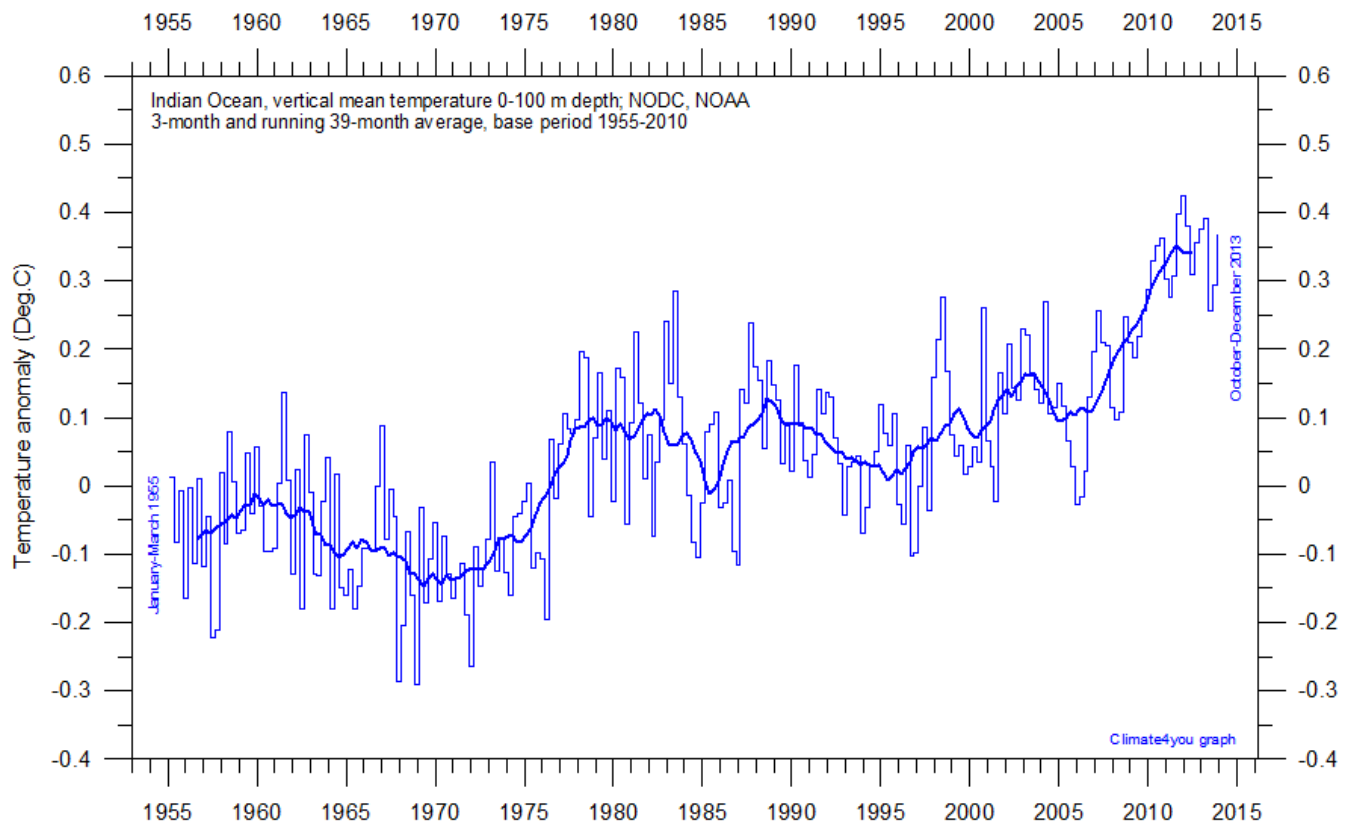


Pacific Ocean vertical average temperature 0-100 m depth since 1955. The thin line indicate 3-month values, and the thick line represents the simple running 39-month (c. 3 year) average. Data source: [NOAA National Oceanographic Data Center \(NODC\)](#). Base period 1955-2010. Last period shown: October-December 2013.

14

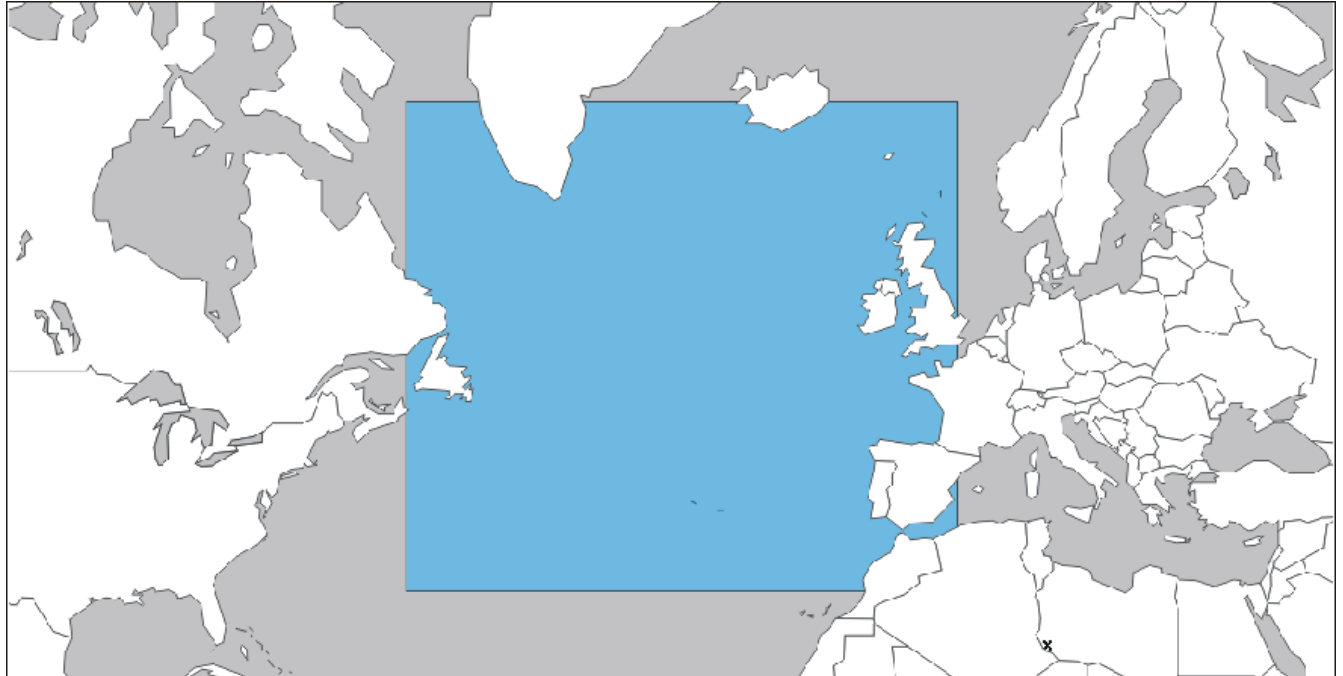


Pacific Ocean vertical average temperature 0-100 m depth since 1955. The thin line indicate 3-month values, and the thick line represents the simple running 39-month (c. 3 year) average. Data source: [NOAA National Oceanographic Data Center \(NODC\)](#). Base period 1955-2010. Last period shown: October-December 2013.

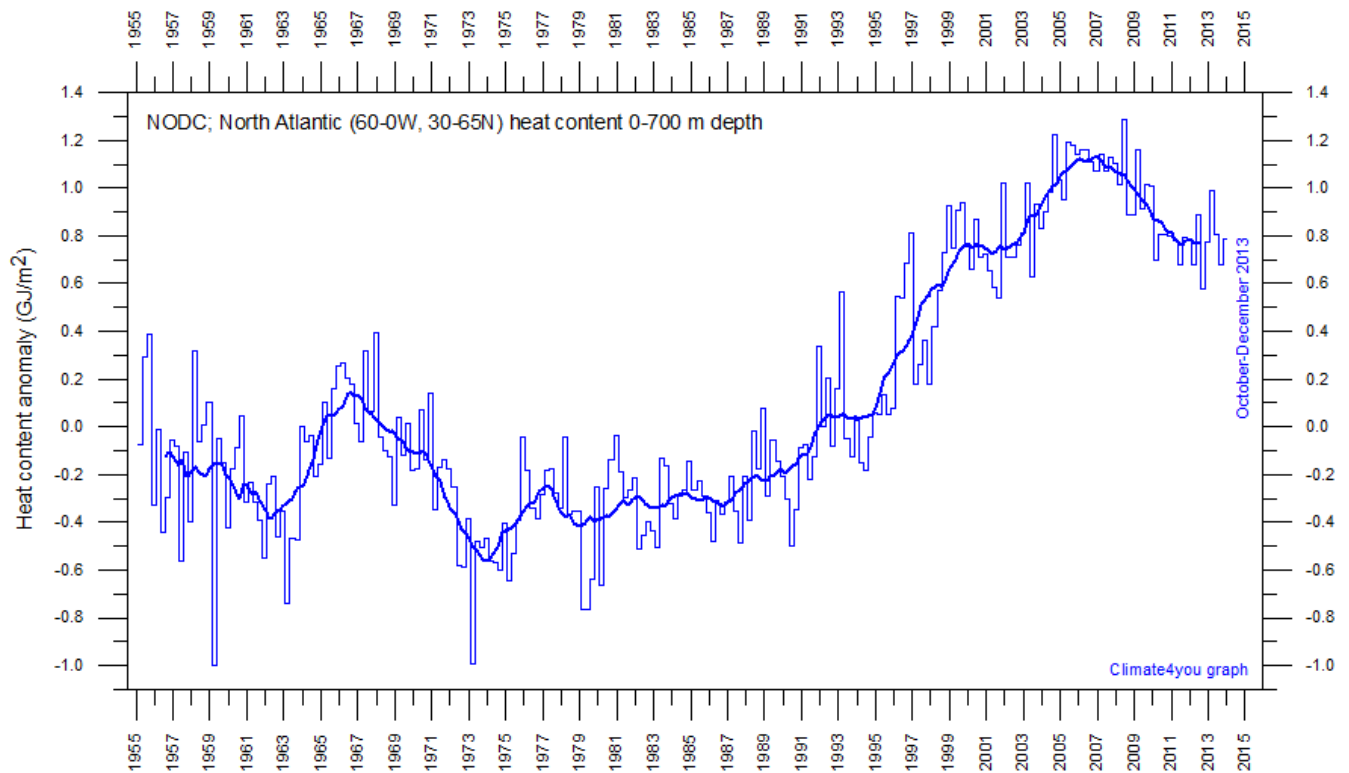


Indian Ocean vertical average temperature 0-100 m depth since 1955. The thin line indicate 3-month values, and the thick line represents the simple running 39-month (c. 3 year) average. Data source: [NOAA National Oceanographic Data Center \(NODC\)](http://www.nodc.noaa.gov). Base period 1955-2010. Last period shown: October-December 2013.

## North Atlantic heat content uppermost 700 m, updated to December 2012



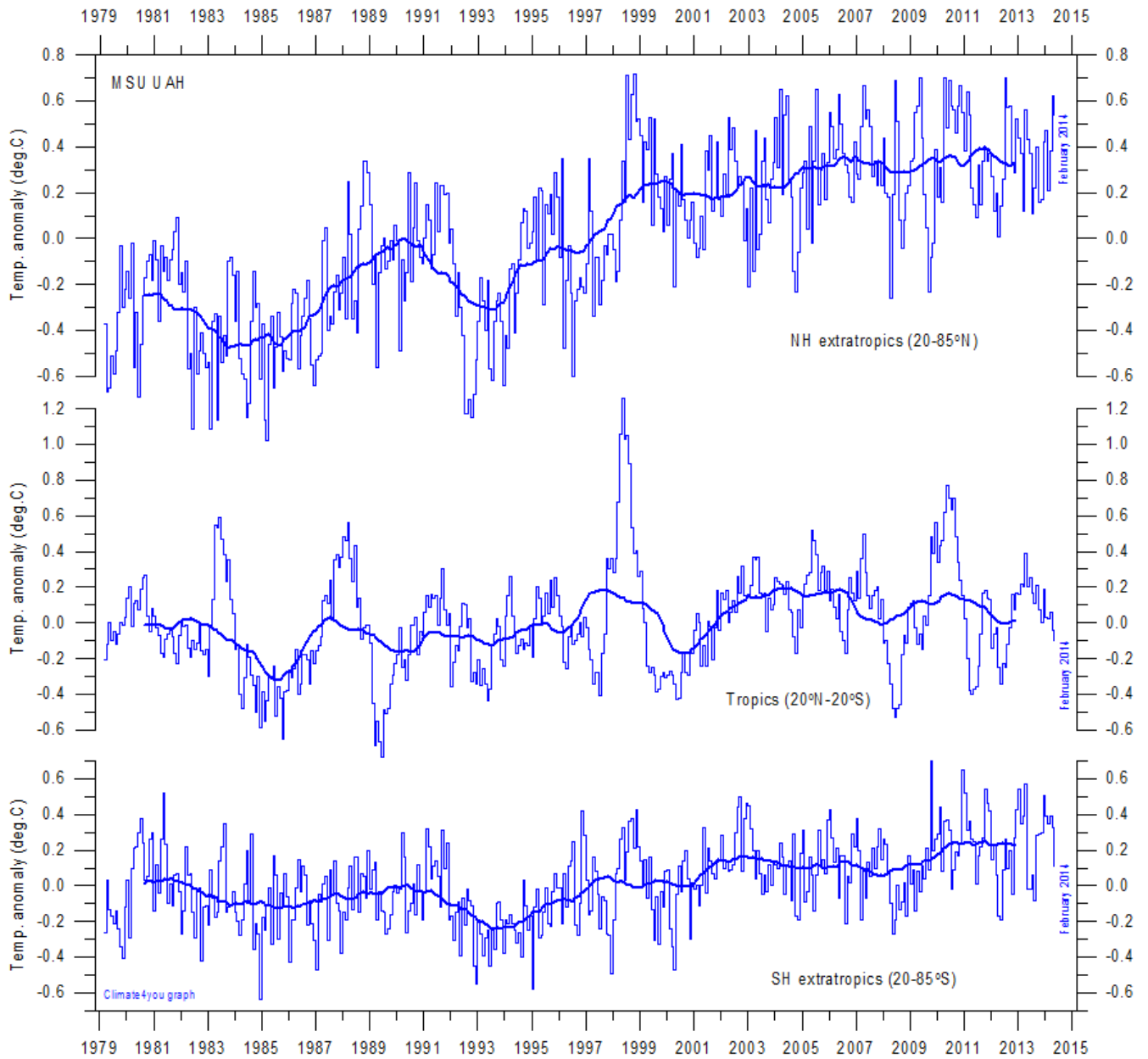
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Global monthly heat content anomaly (GJ/m<sup>2</sup>) in the uppermost 700 m of the North Atlantic (60-0W, 30-65N; see map above) ocean since January 1955. The thin line indicates monthly values, and the thick line represents the simple running 37 month (c. 3 year) average. Data source: [National Oceanographic Data Center](#) (NODC).

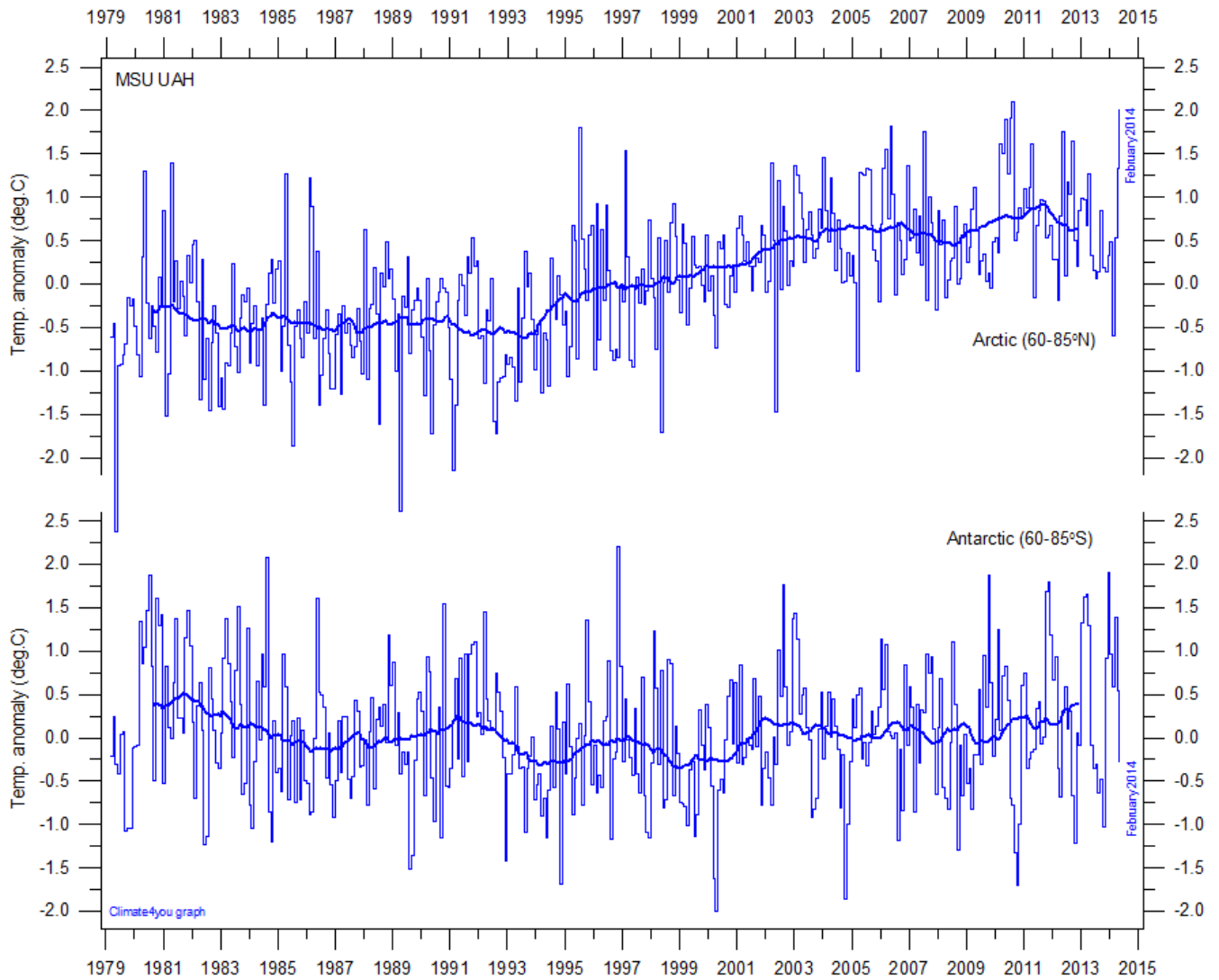


## Zonal lower troposphere temperatures from satellites, updated to February 2014



Global monthly average lower troposphere temperature since 1979 for the tropics and the northern and southern extratropics, according to [University of Alabama](#) at Huntsville, USA. Thin lines show the monthly temperature. Thick lines represent the simple running 37 month average, nearly corresponding to a running 3 yr average. Reference period 1981-2010.

## Arctic and Antarctic lower troposphere temperature, updated to February 2014



Global monthly average lower troposphere temperature since 1979 for the North Pole and South Pole regions, based on satellite observations ([University of Alabama](#) at Huntsville, USA). Thin lines show the monthly temperature. The thick line is the simple running 37 month average, nearly corresponding to a running 3 yr average.

## Arctic and Antarctic surface air temperature, updated to December 2013

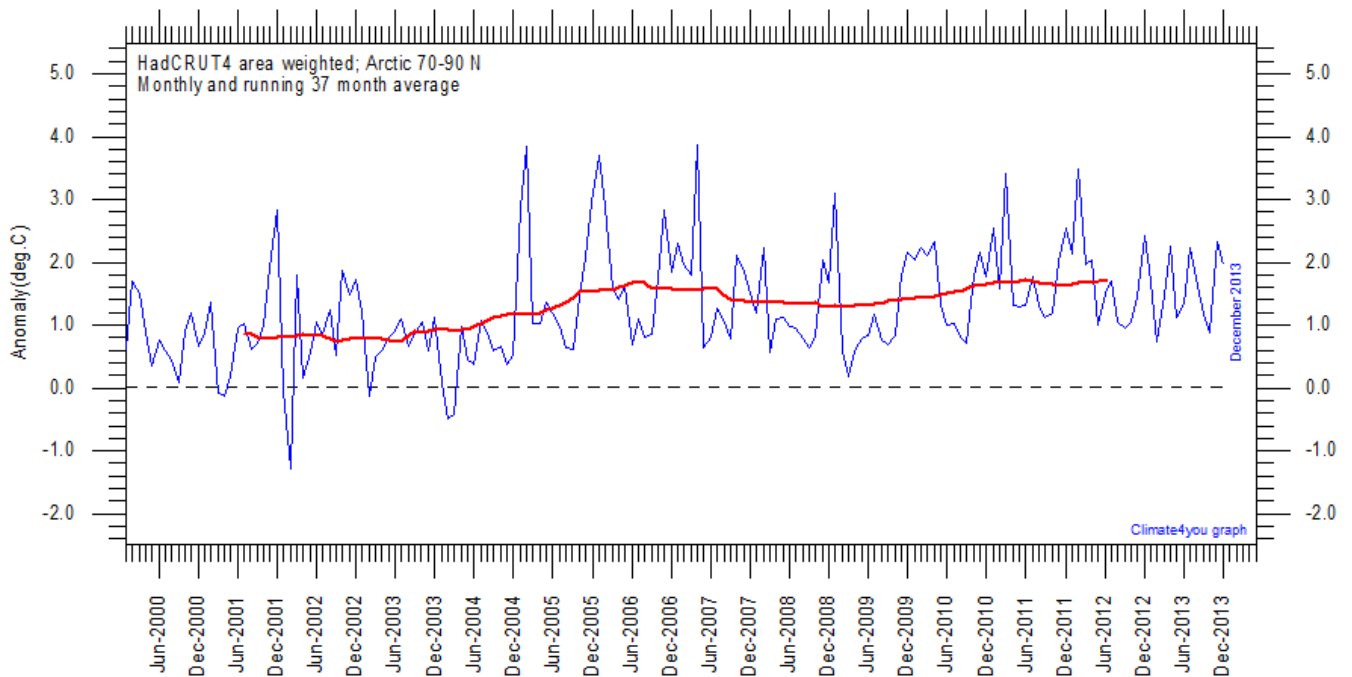


Diagram showing area weighted Arctic (70-90°N) monthly surface air temperature anomalies ([HadCRUT4](#)) since January 2000, in relation to the WMO [normal period](#) 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 37 month (c.3 yr) average.

19

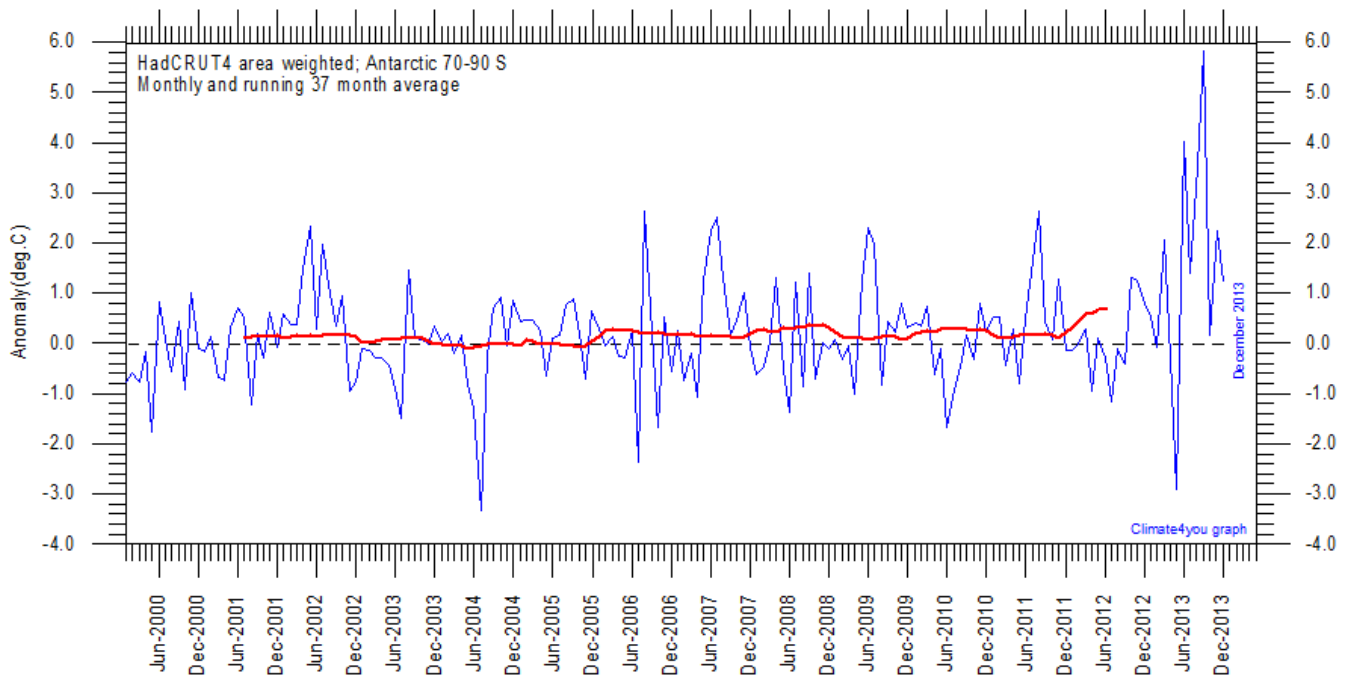


Diagram showing area weighted Antarctic (70-90°S) monthly surface air temperature anomalies ([HadCRUT4](#)) since January 2000, in relation to the WMO [normal period](#) 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 37 month (c.3 yr) average.

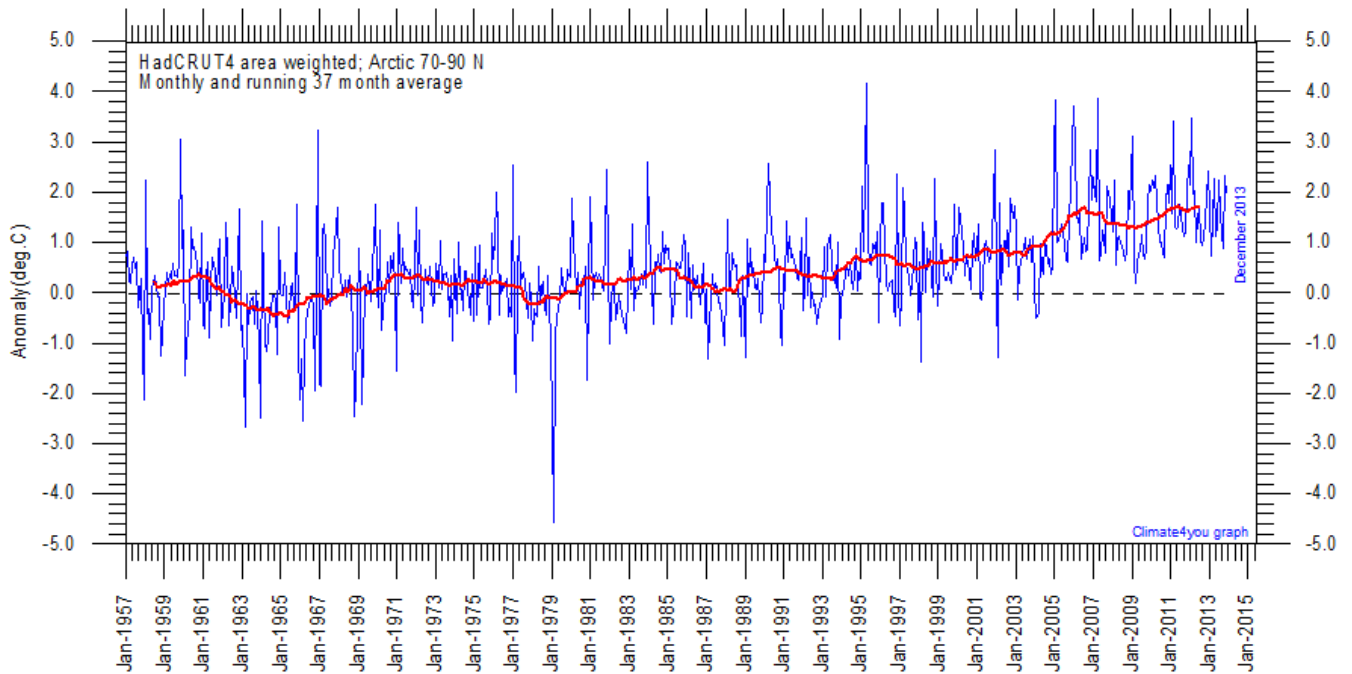


Diagram showing area weighted Arctic (70-90°N) monthly surface air temperature anomalies ([HadCRUT4](#)) since January 1957, in relation to the WMO [normal period](#) 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 37 month (c.3 yr) average.

20

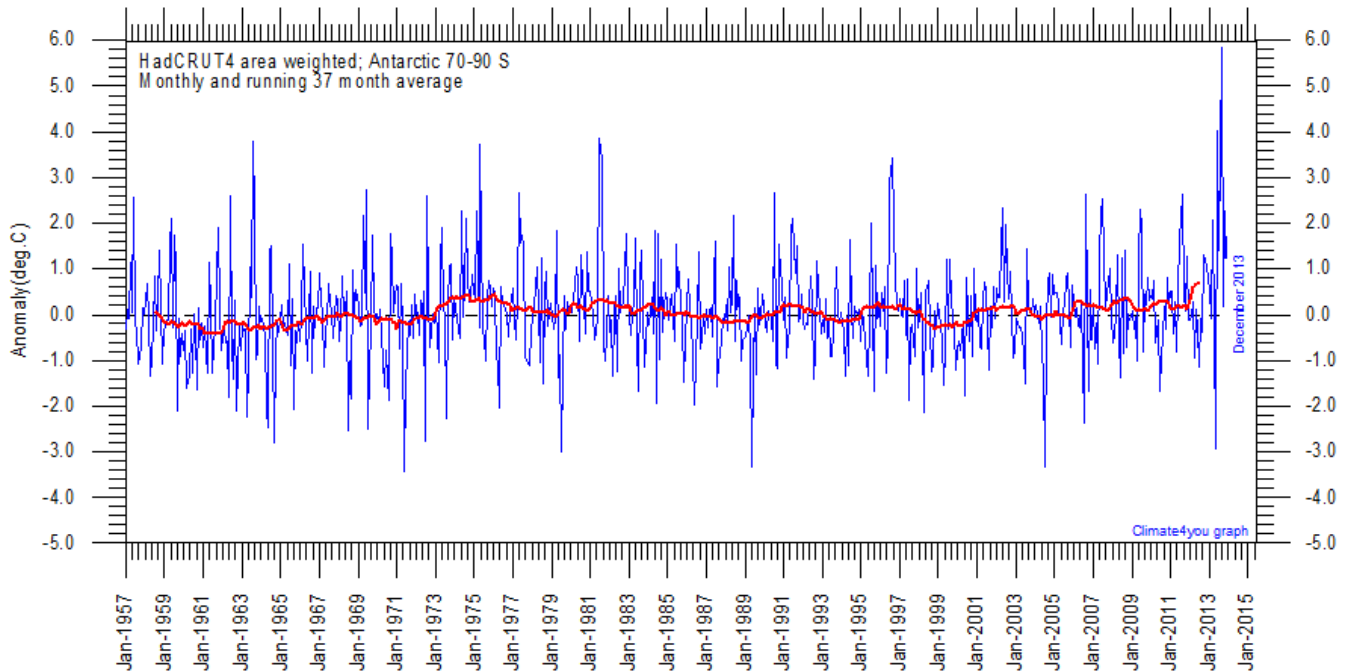


Diagram showing area weighted Antarctic (70-90°S) monthly surface air temperature anomalies ([HadCRUT4](#)) since January 1957, in relation to the WMO [normal period](#) 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 37 month (c.3 yr) average.

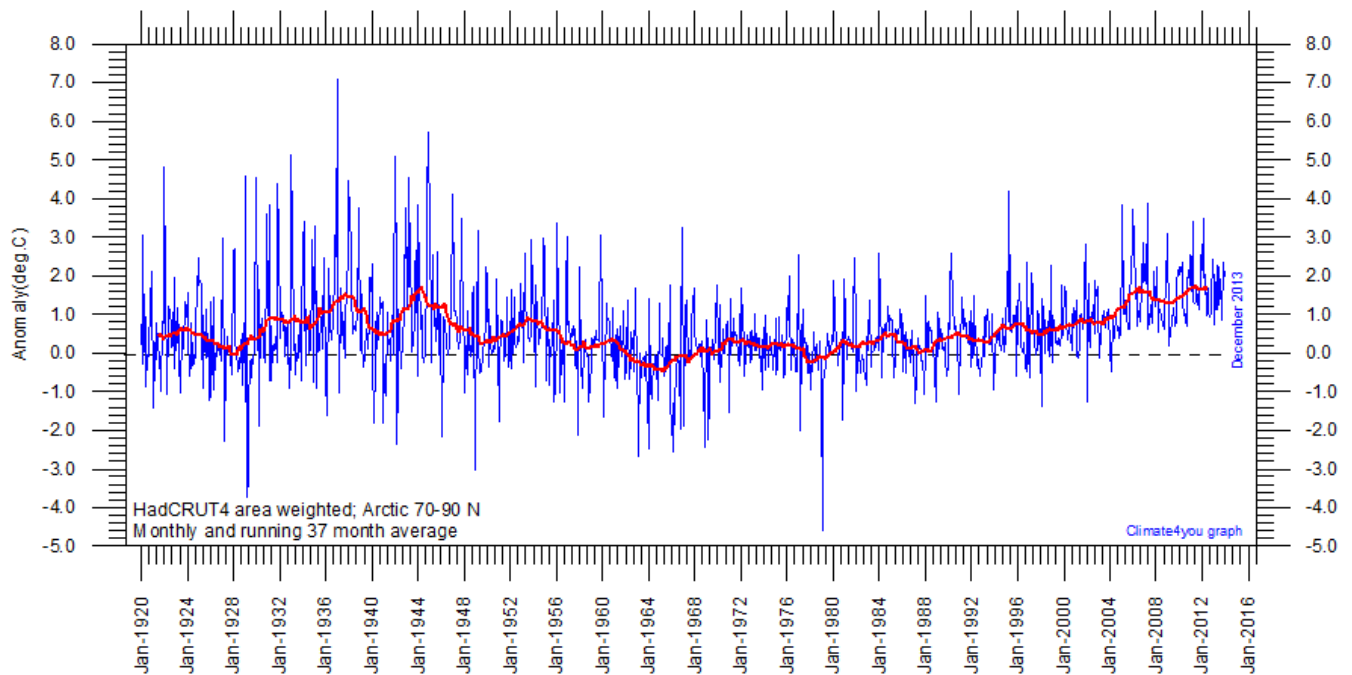


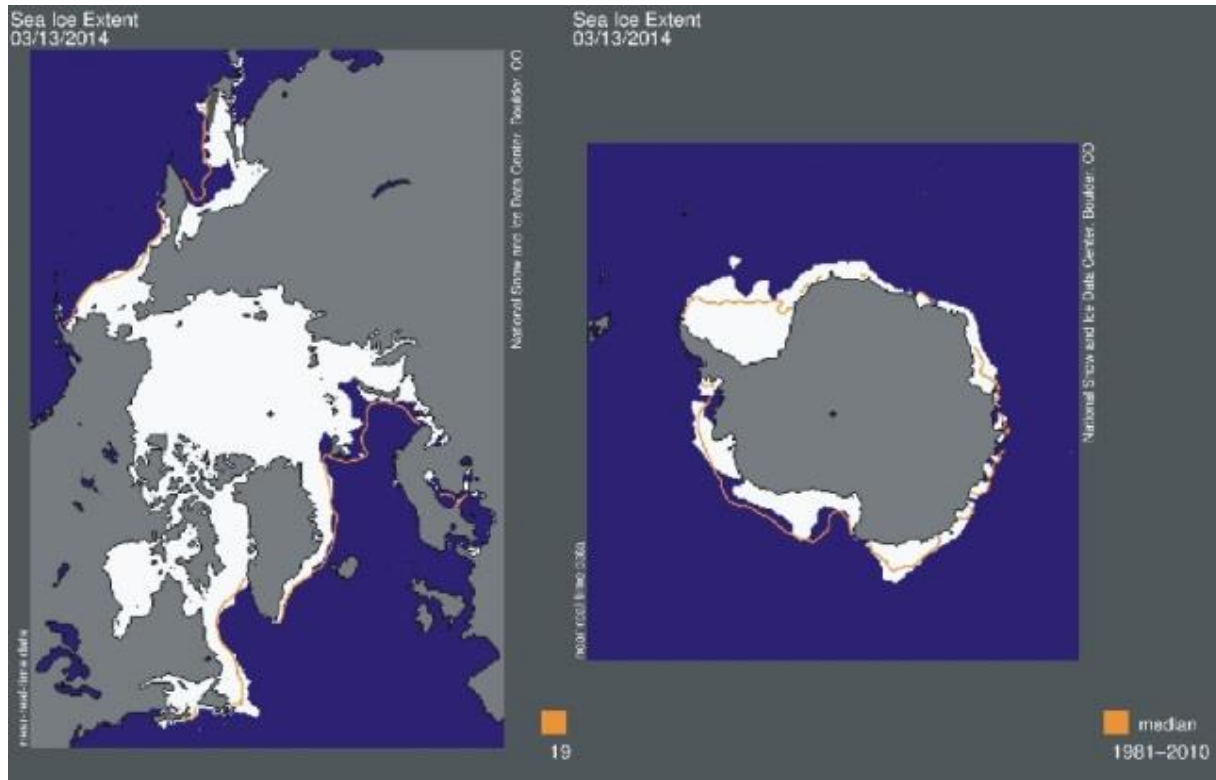
Diagram showing area weighted Arctic (70-90°N) monthly surface air temperature anomalies ([HadCRUT4](#)) since January 1920, in relation to the WMO [normal period](#) 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 37 month (c.3 yr) average. Because of the relatively small number of Arctic stations before 1930, month-to-month variations in the early part of the temperature record are larger than later. The period from about 1930 saw the establishment of many new Arctic meteorological stations, first [in Russia and Siberia](#), and following the 2nd World War, also in North America. The period since 2000 is warm, about as warm as the period 1930-1940.

As the HadCRUT4 data series has improved high latitude coverage data coverage (compared to the HadCRUT3 series) the individual 5°x5° grid cells has been weighted according to their surface area. This is in contrast to [Gillett et al. 2008](#) which calculated a simple average, with no consideration to the surface area represented by the individual 5°x5° grid cells.

Literature:

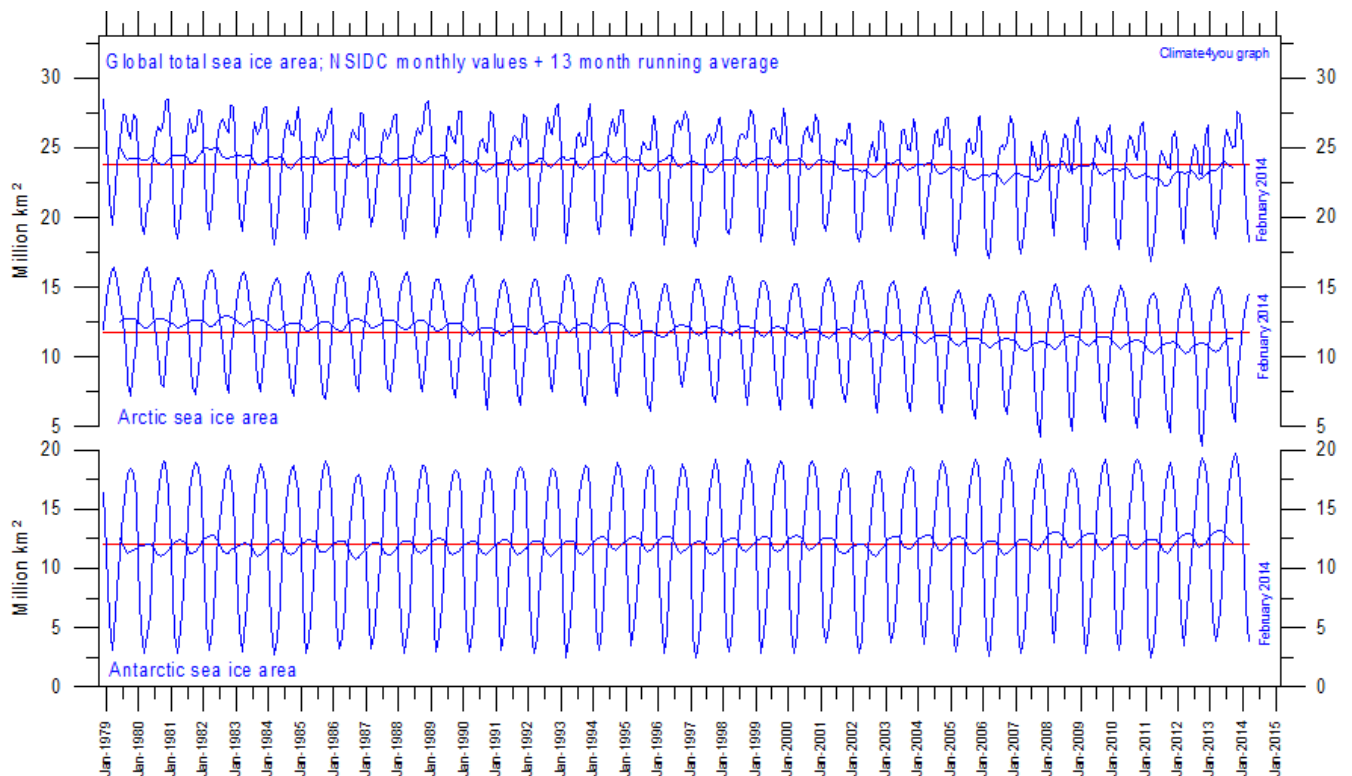
Gillett, N.P., Stone, D.A., Stott, P.A., Nozawa, T., Karpechko, A.Y.U., Hegerl, G.C., Wehner, M.F. and Jones, P.D. 2008. Attribution of polar warming to human influence. *Nature Geoscience* 1, 750-754.

## Arctic and Antarctic sea ice, updated to February 2014

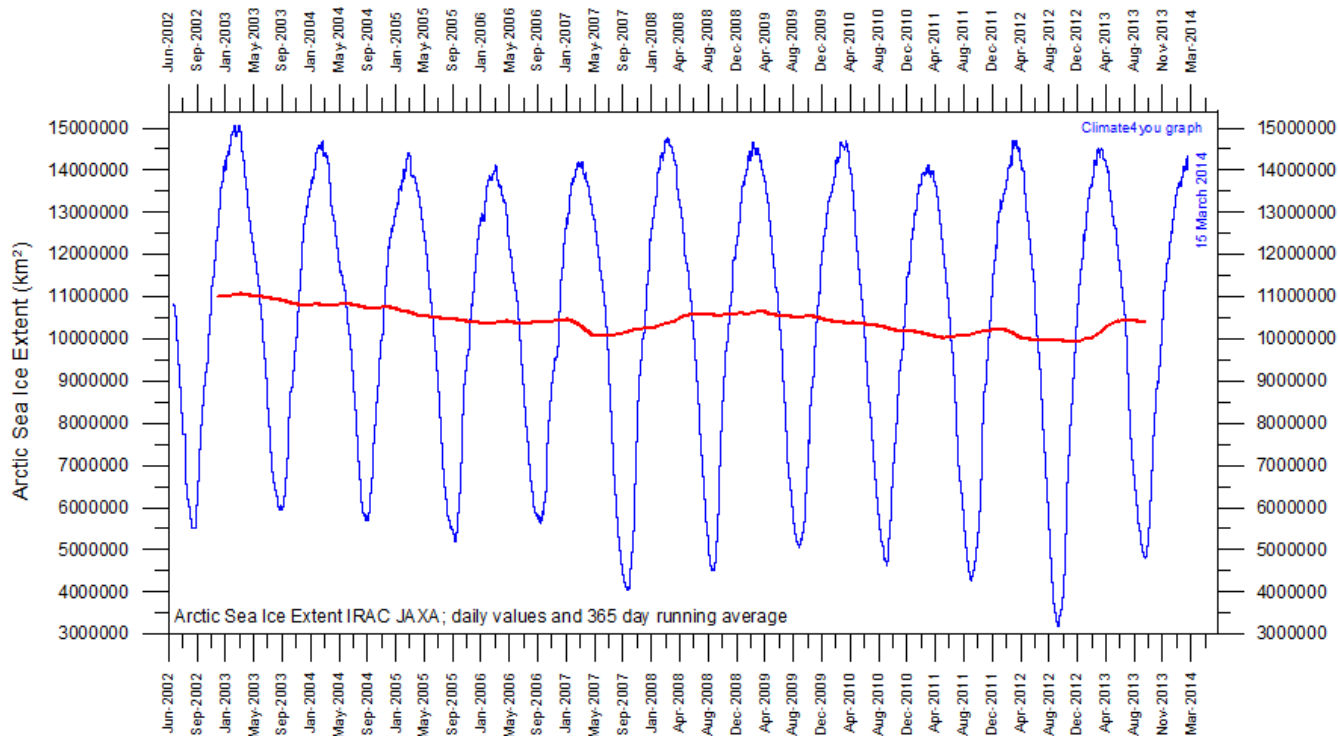


Sea ice extent 13 March 2014. The 'normal' or average limit of sea ice (orange line) is defined as 15% sea ice cover, according to the average of satellite observations 1981-2010 (both years inclusive). Sea ice may therefore well be encountered outside and open water areas inside the limit shown in the diagrams above. Map source: National Snow and Ice Data Center (NSIDC).

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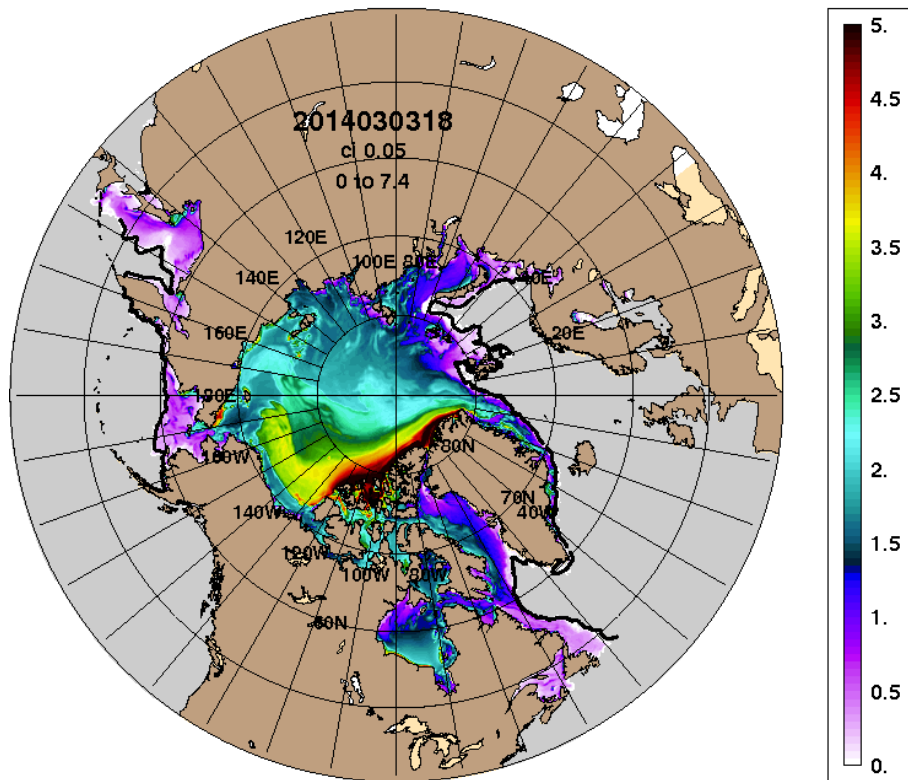


Graphs showing monthly Antarctic, Arctic and global sea ice extent since November 1978, according to the [National Snow and Ice data Center \(NSIDC\)](#).

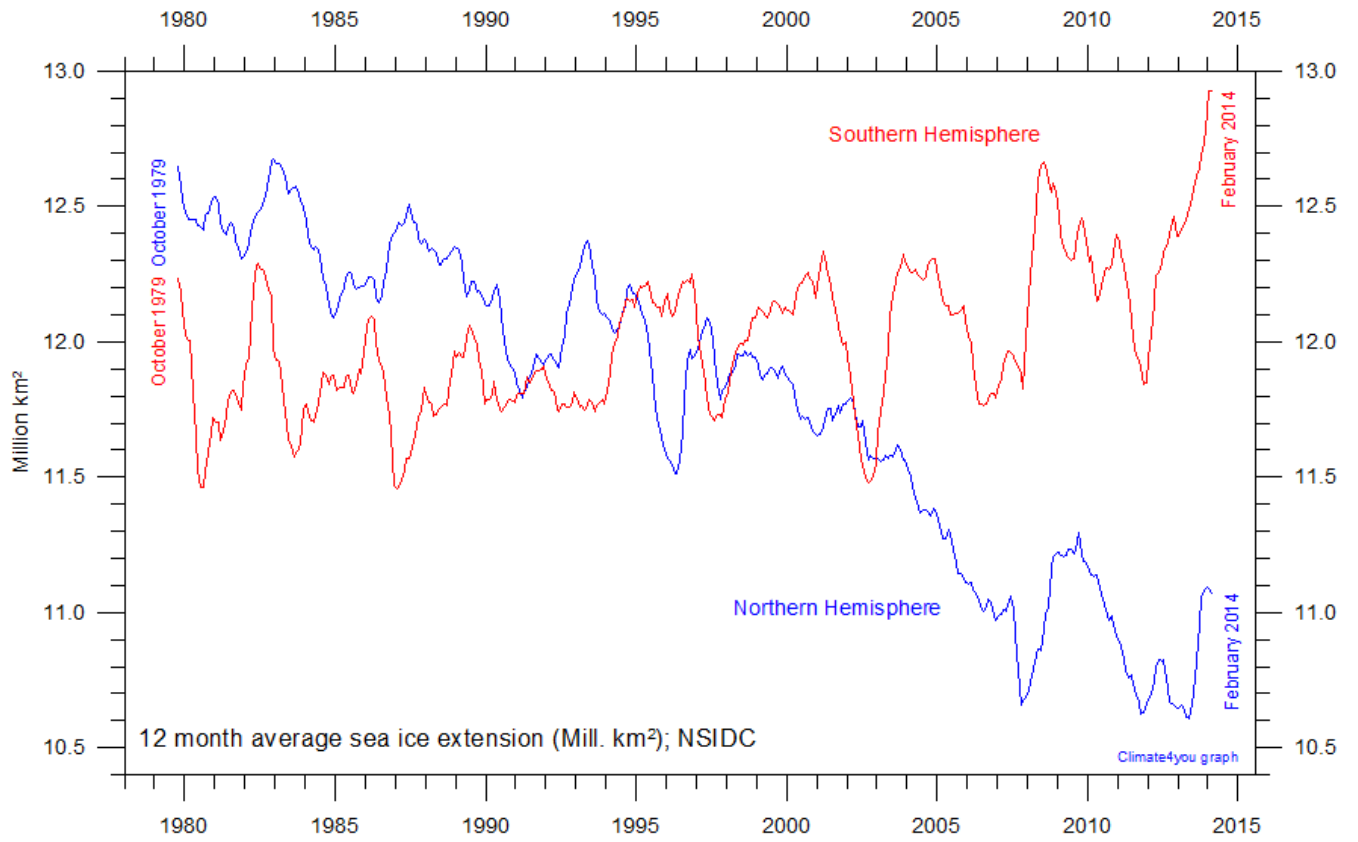


Graph showing daily Arctic sea ice extent since June 2002, to 15 March 2014, by courtesy of [Japan Aerospace Exploration Agency \(JAXA\)](http://www.jaxa.jp).

### ARCc0.08-03.8 Ice Thickness (m): 20140301



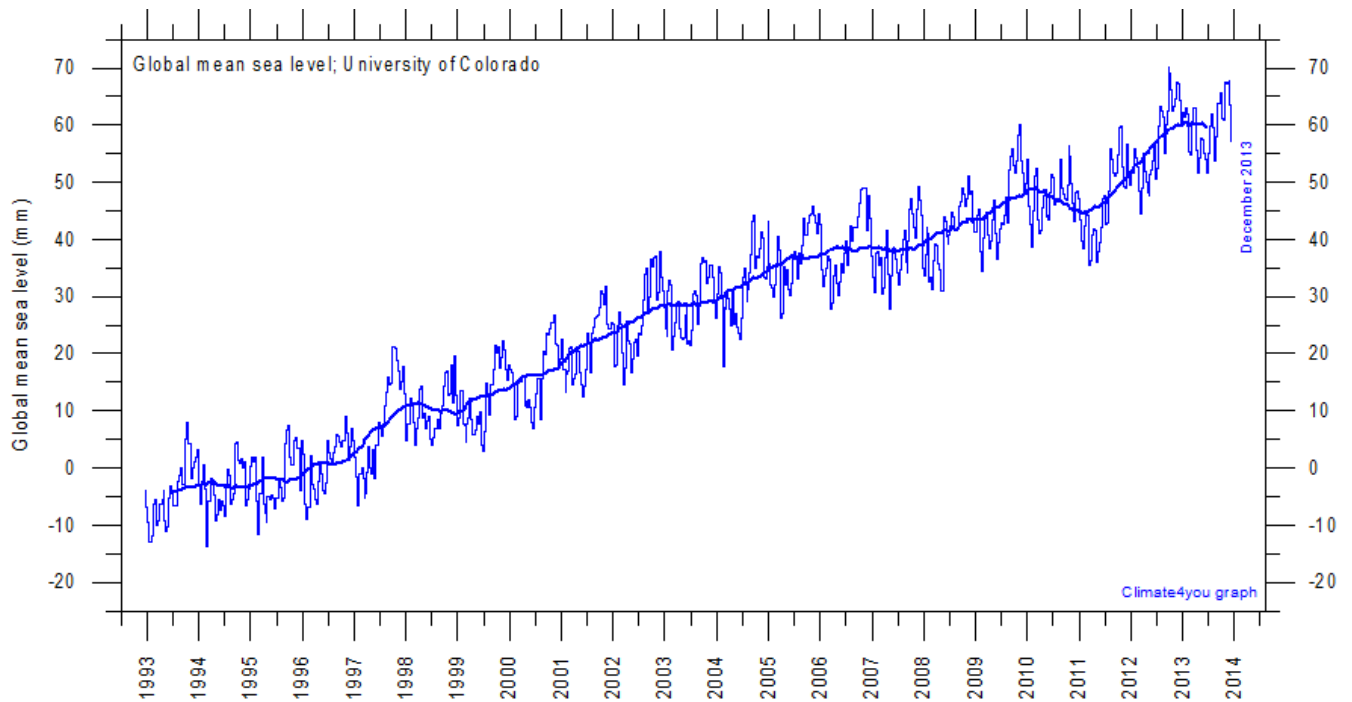
Northern hemisphere sea ice extension and thickness on 1 March 2014 according to the [Arctic Cap Nowcast/Forecast System \(ACNFS\)](http://www.acnfs.org), US Naval Research Laboratory. Thickness scale (m) is shown to the right.



12 month running average sea ice extension in both hemispheres since 1979, the satellite-era. Data source: National Snow and Ice Data Center (NSIDC).

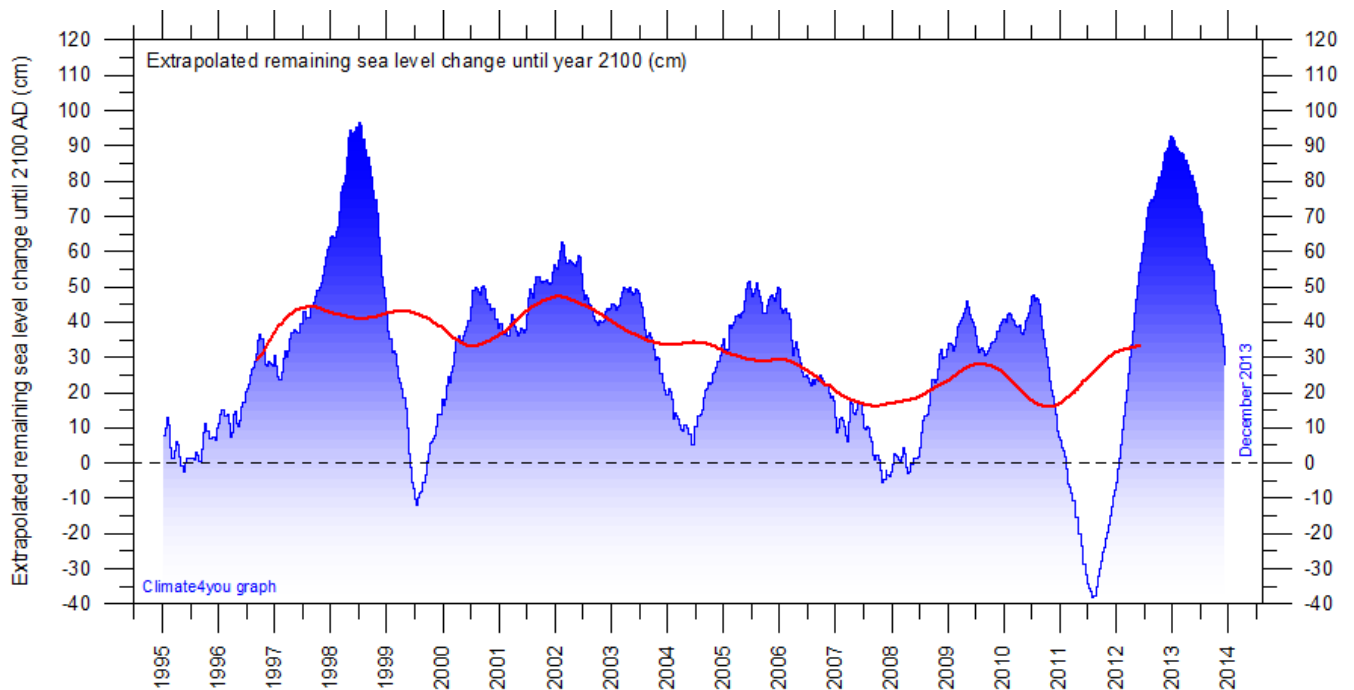


## Global sea level, updated to December 2013



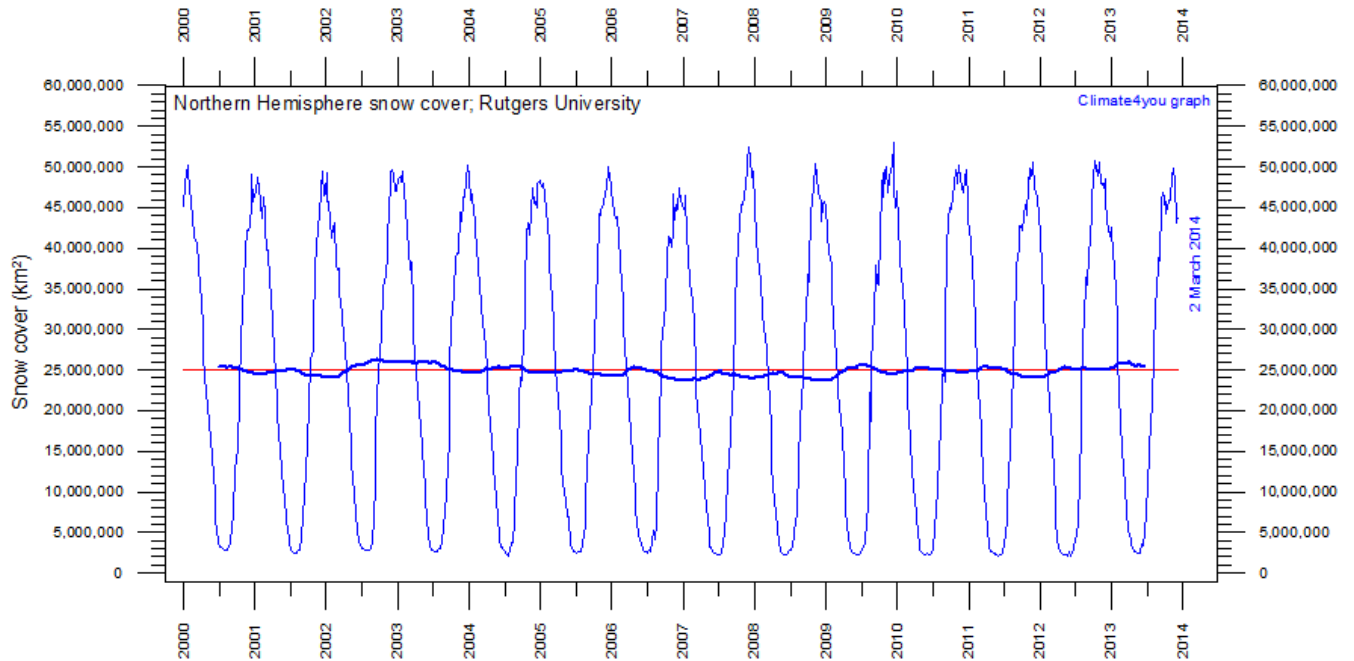
Global monthly sea level since late 1992 according to the Colorado Center for Astrodynamics Research at [University of Colorado at Boulder](#), USA. The thick line is the simple running 37 observation average, nearly corresponding to a running 3 yr average.

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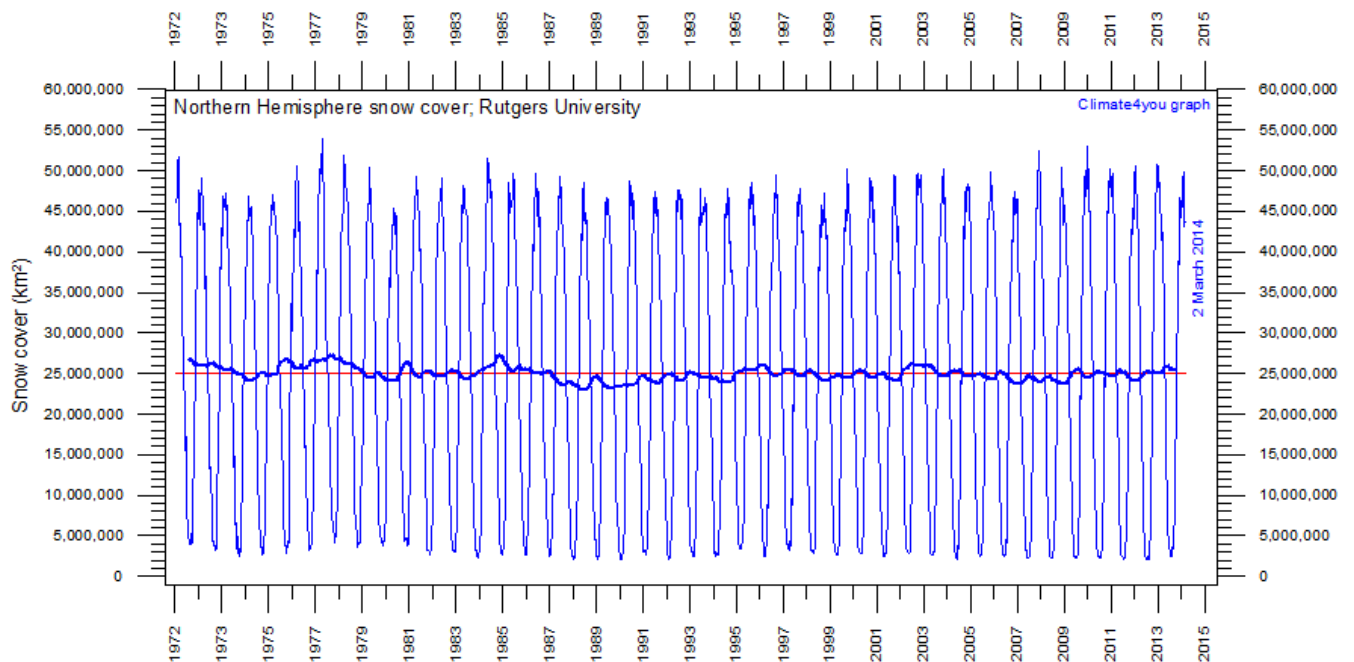


Forecasted change of global sea level until year 2100, based on simple extrapolation of measurements done by the Colorado Center for Astrodynamics Research at [University of Colorado at Boulder](#), USA. The thick line is the simple running 3 yr average forecast for sea level change until year 2100. Based on this (thick line), the present simple empirical forecast of sea level change until 2100 is about +31 cm.

## Northern Hemisphere weekly snow cover, updated to early March 2014

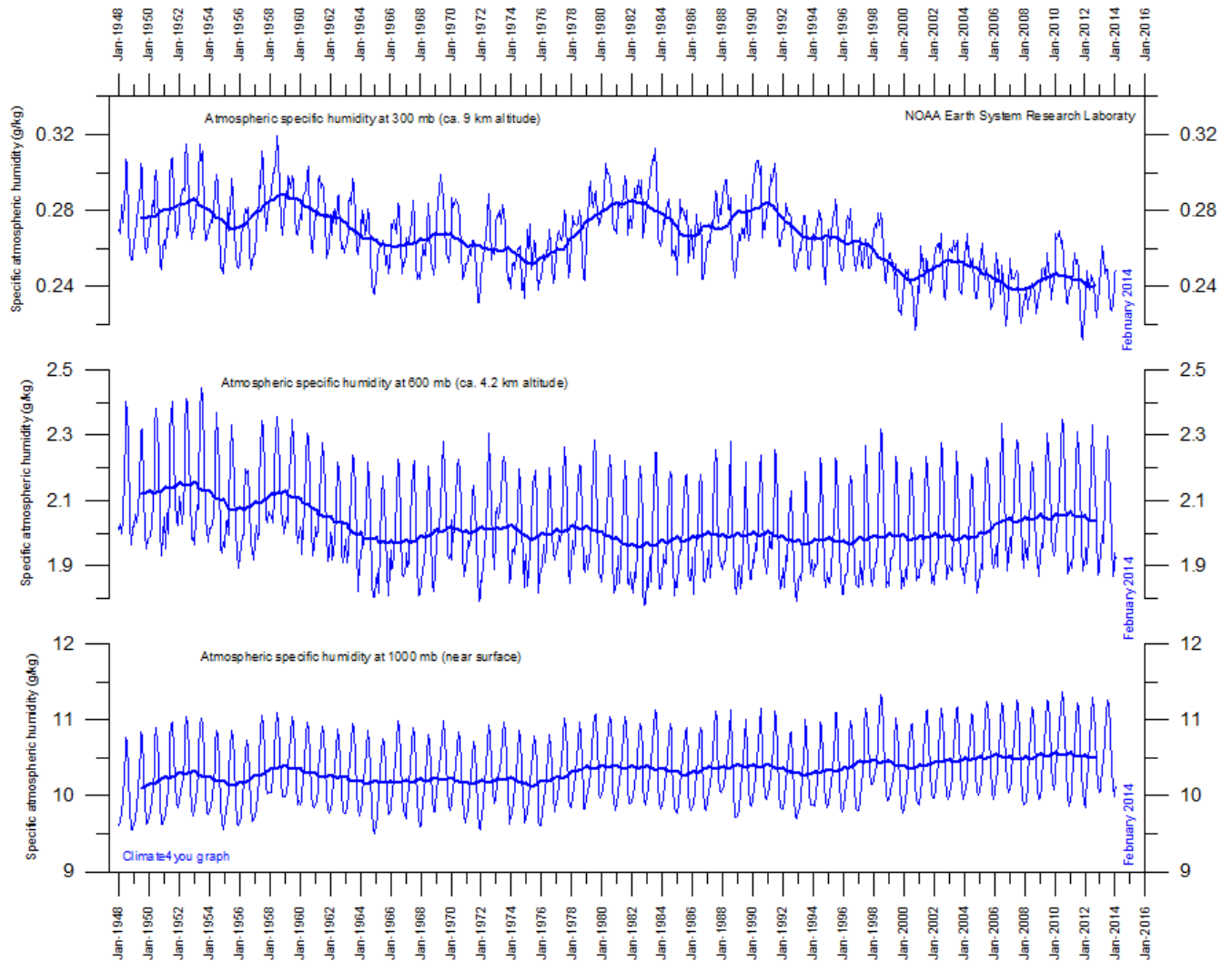


Northern hemisphere weekly snow cover since January 2000 according to Rutgers University Global Snow Laboratory. The thin blue line is the weekly data, and the thick blue line is the running 53 week average (approximately 1 year). The horizontal red line is the 1972-2013 average.



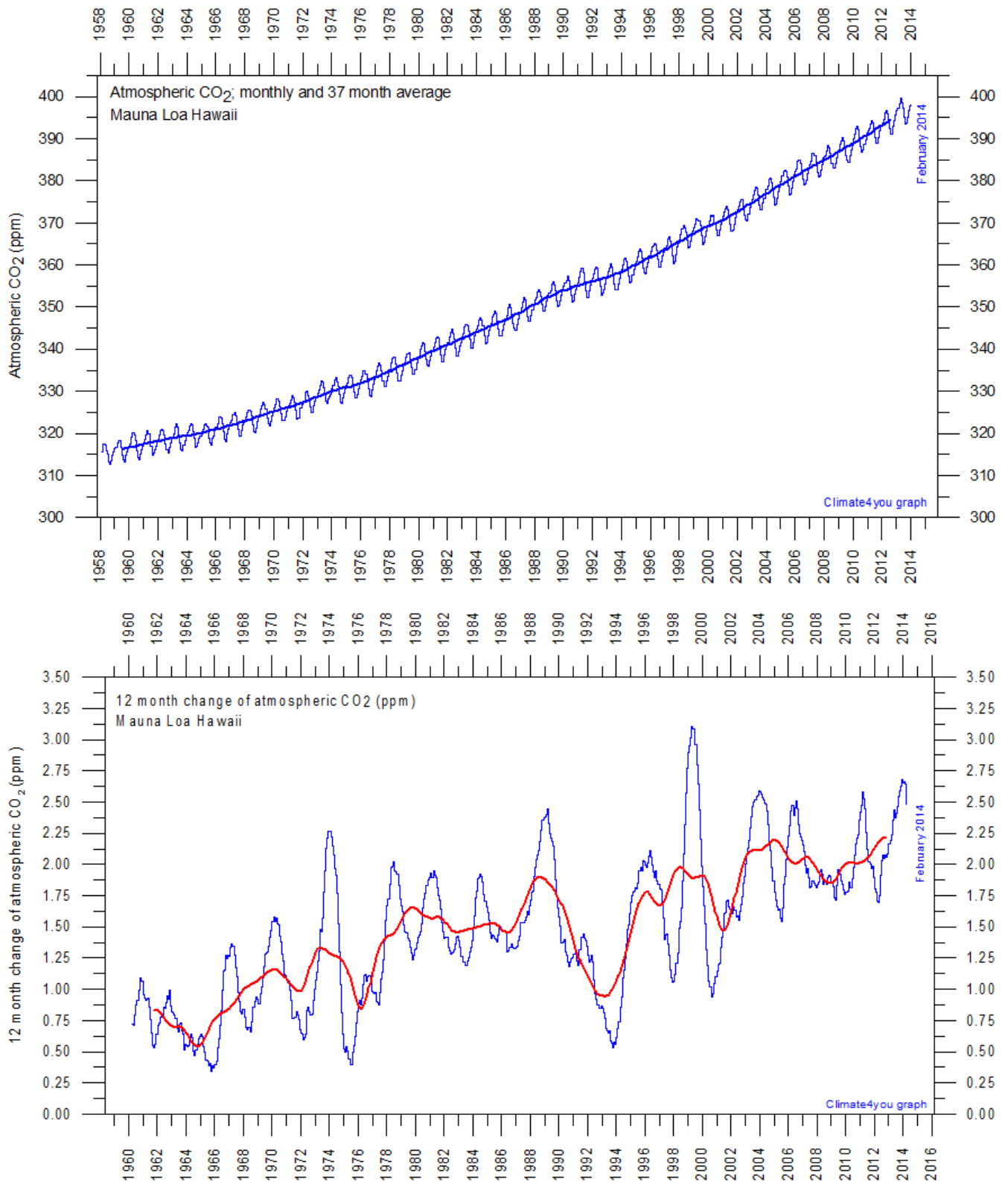
Northern hemisphere weekly snow cover since January 1972 according to Rutgers University Global Snow Laboratory. The thin blue line is the weekly data, and the thick blue line is the running 53 week average (approximately 1 year). The horizontal red line is the 1972-2013 average.

## Atmospheric specific humidity, updated to February 2014



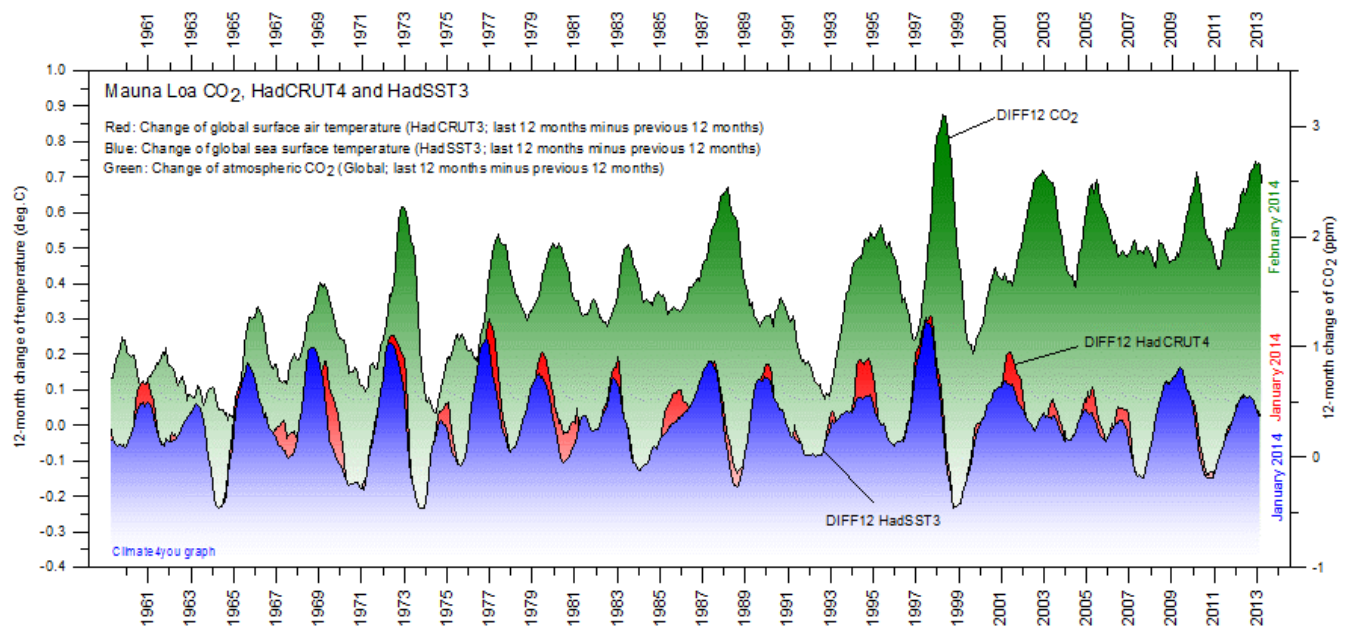
*Specific atmospheric humidity (g/kg) at three different altitudes in the lower part of the atmosphere ([the Troposphere](#)) since January 1948 ([Kalnay et al. 1996](#)). The thin blue lines shows monthly values, while the thick blue lines show the running 37 month average (about 3 years). Data source: [Earth System Research Laboratory \(NOAA\)](#).*

## Atmospheric CO<sub>2</sub>, updated to February 2014



Monthly amount of atmospheric CO<sub>2</sub> (upper diagram) and annual growth rate (lower diagram); average last 12 months minus average preceding 12 months, blue line) of atmospheric CO<sub>2</sub> since 1959, according to data provided by the [Mauna Loa Observatory](#), Hawaii, USA. The red line is the simple running 37 observation average, nearly corresponding to a running 3 yr average.

## The phase relation between atmospheric CO<sub>2</sub> and global temperature, updated to February 2014

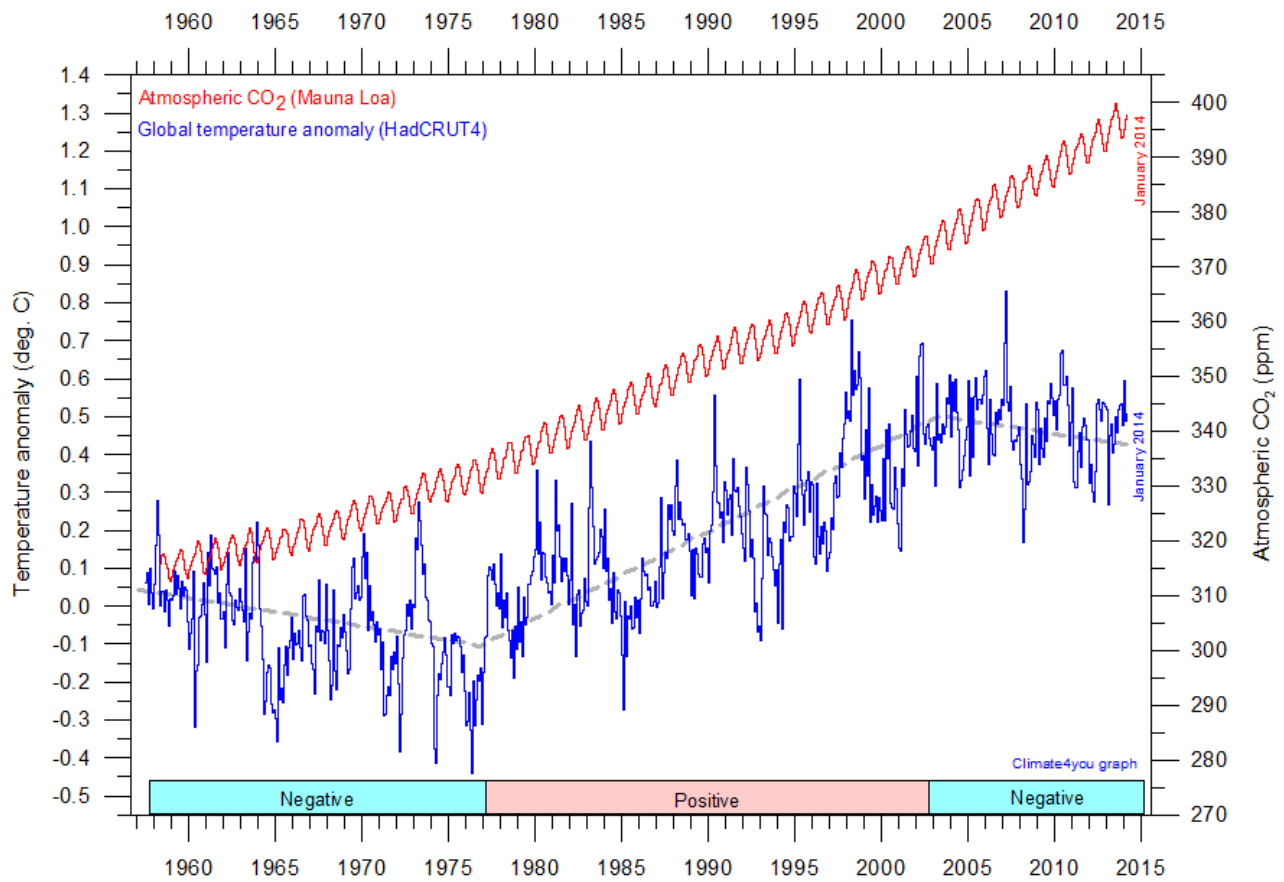


12-month change of global atmospheric CO<sub>2</sub> concentration ([Mauna Loa](#); green), global sea surface temperature ([HadSST3](#); blue) and global surface air temperature ([HadCRUT4](#); red dotted). All graphs are showing monthly values of DIFF12, the difference between the average of the last 12 month and the average for the previous 12 months for each data series.

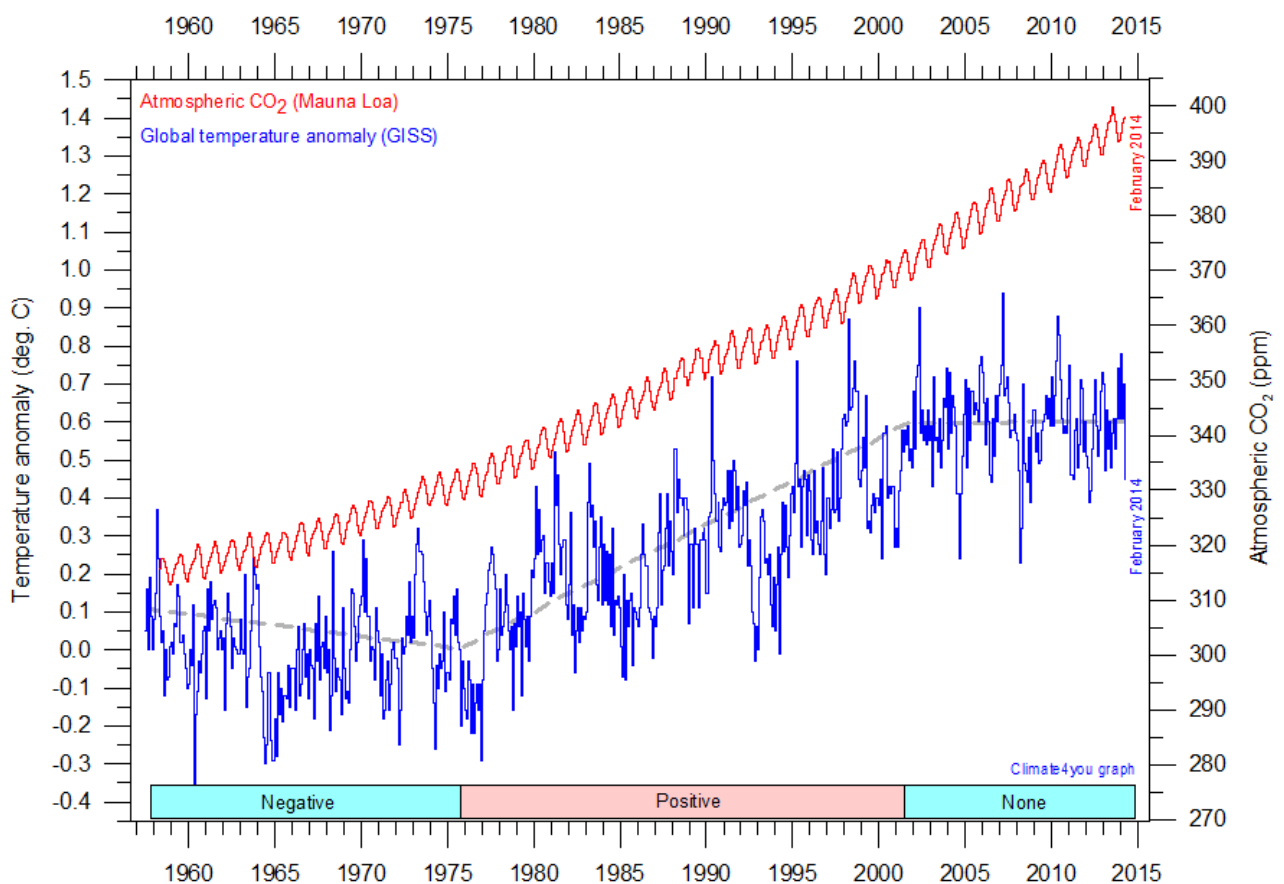
### References:

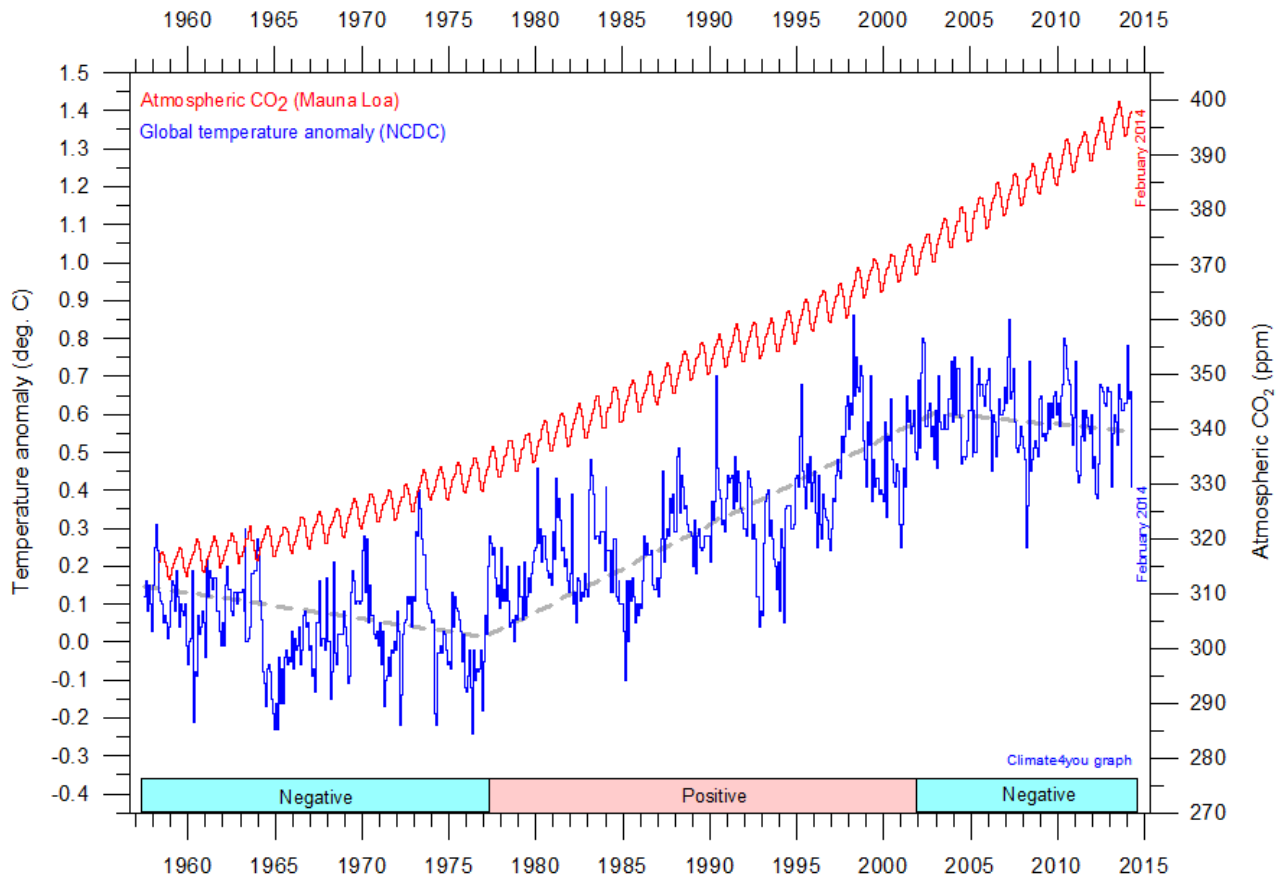
Humlum, O., Stordahl, K. and Solheim, J-E. 2012. The phase relation between atmospheric carbon dioxide and global temperature. *Global and Planetary Change*, August 30, 2012.  
<http://www.sciencedirect.com/science/article/pii/S0921818112001658?v=s5>

## Global surface air temperature and atmospheric CO<sub>2</sub>, updated to February 2014



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Diagrams showing HadCRUT3, GISS, and NCDC monthly global surface air temperature estimates (blue) and the monthly atmospheric CO<sub>2</sub> content (red) according to the [Mauna Loa Observatory](#), Hawaii. The Mauna Loa data series begins in March 1958, and 1958 has therefore been chosen as starting year for the diagrams. Reconstructions of past atmospheric CO<sub>2</sub> concentrations (before 1958) are not incorporated in this diagram, as such past CO<sub>2</sub> values are derived by other means (ice cores, stomata, or older measurements using different methodology), and therefore are not directly comparable with direct atmospheric measurements. The dotted grey line indicates the approximate linear temperature trend, and the boxes in the lower part of the diagram indicate the relation between atmospheric CO<sub>2</sub> and global surface air temperature, negative or positive. Please note that the HadCRUT4 diagram is not yet updated beyond January 2014.

Most climate models assume the greenhouse gas carbon dioxide CO<sub>2</sub> to influence significantly upon global temperature. It is therefore relevant to compare different temperature records with measurements of atmospheric CO<sub>2</sub>, as shown in the diagrams above. Any comparison, however, should not be made on a monthly or annual basis, but for a longer time period, as other effects (oceanographic, etc.) may well override the potential influence of CO<sub>2</sub> on short time scales such as just a few years. It is of cause equally inappropriate to present new meteorological record values, whether daily, monthly or annual, as support for the hypothesis ascribing high importance of atmospheric CO<sub>2</sub> for global

temperatures. Any such meteorological record value may well be the result of other phenomena.

What exactly defines the critical length of a relevant time period to consider for evaluating the alleged importance of CO<sub>2</sub> remains elusive, and is still a topic for discussion. However, the critical period length must be inversely proportional to the temperature sensitivity of CO<sub>2</sub>, including feedback effects. If the net temperature effect of atmospheric CO<sub>2</sub> is strong, the critical time period will be short, and vice versa.

However, past climate research history provides some clues as to what has traditionally been considered the relevant length of period over

which to compare temperature and atmospheric CO<sub>2</sub>. After about 10 years of concurrent global temperature- and CO<sub>2</sub>-increase, IPCC was established in 1988. For obtaining public and political support for the CO<sub>2</sub>-hypothesis the 10 year warming period leading up to 1988 in all likelihood was important. Had the global temperature instead been decreasing, political support for the hypothesis would have been difficult to obtain.

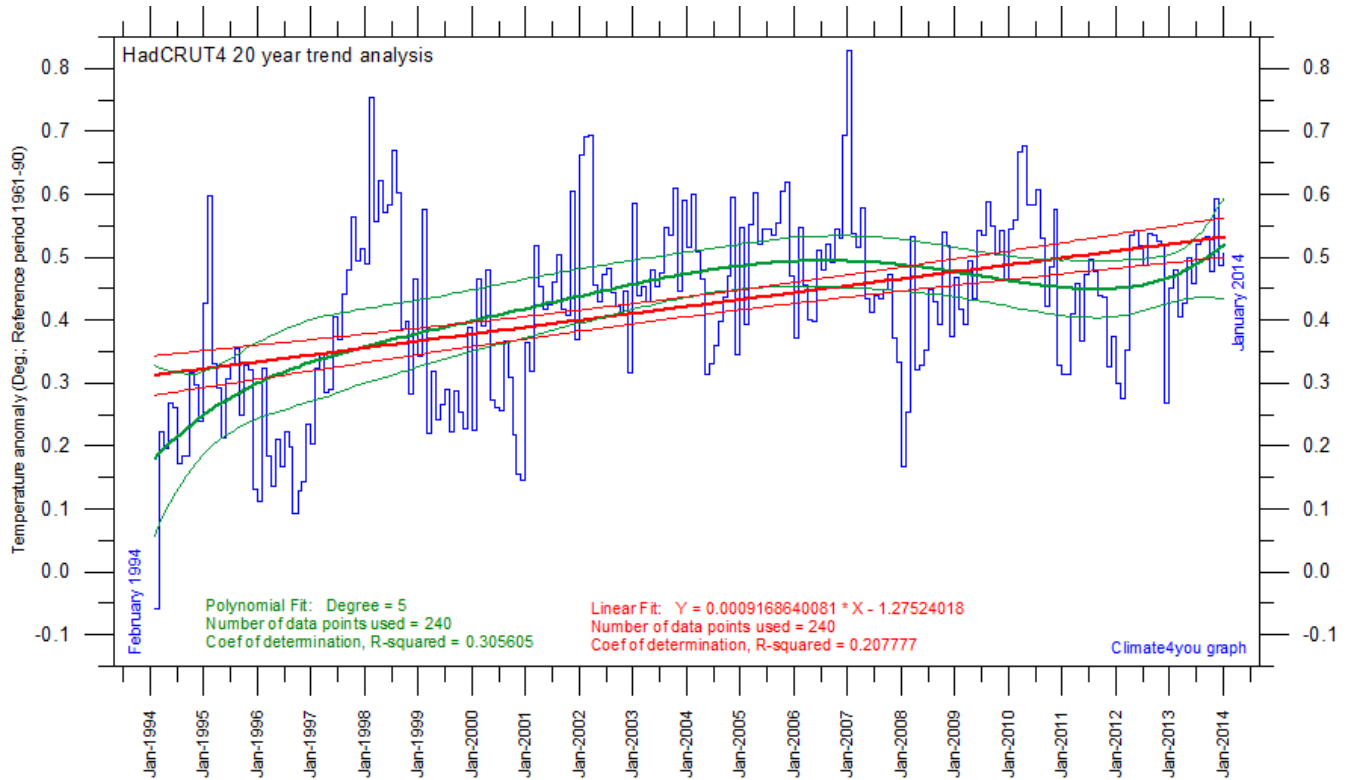
Based on the previous 10 years of concurrent temperature- and CO<sub>2</sub>-increase, many climate scientists in 1988 presumably felt that their

understanding of climate dynamics was sufficient to conclude about the importance of CO<sub>2</sub> for global temperature changes. From this it may safely be concluded that 10 years was considered a period long enough to demonstrate the effect of increasing atmospheric CO<sub>2</sub> on global temperatures.

Adopting this approach as to critical time length (at least 10 years), the varying relation (positive or negative) between global temperature and atmospheric CO<sub>2</sub> has been indicated in the lower panels of the diagrams above.



## Last 20 year monthly surface air temperature changes, updated to January 2014



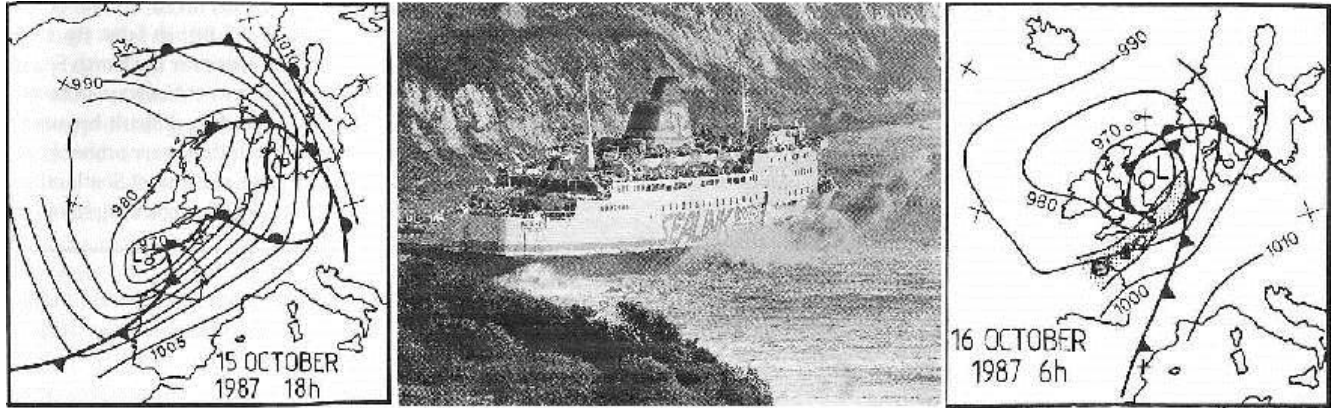
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Last 20 years global monthly average surface air temperature according to Hadley CRUT, a cooperative effort between the [Hadley Centre for Climate Prediction and Research](#) and the [University of East Anglia's Climatic Research Unit \(CRU\)](#), UK. The thin blue line represents the monthly values. The thick red line is the linear fit, with 95% confidence intervals indicated by the two thin red lines. The thick green line represents a 5-degree polynomial fit, with 95% confidence intervals indicated by the two thin green lines. A few key statistics is given in the lower part of the diagram (note that the linear trend is the monthly trend). Please note that the linear regression is done by month, not year.

It is quite often debated if the global surface temperature still increases, or if the temperature has levelled out during the last 10-15 years. The above diagram may be useful in this context, and demonstrates the differences between two often

used statistical approaches to determine recent temperature trends. Please also note that such fits only attempt to describe the past, and usually have limited predictive power.

## 1987: Storms affecting south-east England and southern Norway



*Meteorological diagram showing surface pressure October 15, 1987 (left). The Channel ferry Hengist driven aground on the Kent Coast at the Warren, 1 to 2 km east of Folkestone, October 16, 1987 (centre). Meteorological diagram showing surface pressure October 16, 1987.*

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After generally moderate or light winds from variable directions over the British Isles on October 15, 1987, winds rapidly strengthened over southern England after midnight (Lamb 1991). In the early morning, between 2h and 6h, gusts of around 100 knots were recorded on the Sussex coast, and more than 80 knots occurred in central London. In the eastern North Sea gusts exceeding 95 knots were measured. The highest reported gust speed anywhere in this storm was an estimated 119 knots on the west coast of Brittany, France. The strongest winds in most places were from about SSW.

There was enormous damage to buildings, trees, electricity and telephone lines (Lamb 1991). About 15 million trees were broken, felled or uprooted in southern England ([Met.Office](#)). On the streets of London, about 90,000 trees were lost. Electric power lines were brought down over a wide area, and hundreds of thousands of homes in southeast England were still without power the following

night and 2000 had not been reconnected after two weeks.

Hundreds of small boats were smashed or blown away. A Channel ferry was driven aground on the coast outside Folkestone (see photo above), and others were unable to get into port. In Dover harbour a bulk carrier capsized. At Harwich a ship being used as a detention centre for illegal immigrants broke adrift. In the North Sea off Lincolnshire a drifting vessel threatened an oil rig with 80 persons on board, which was also adrift (Lamb 1991).

In the afternoon of the 16th the storm struck south Norway causing flooding by the sea on parts of the south coast near Tønsberg. Tide levels were 1.0 to 1.9 m above normal at the coast between Stavanger and Oslo, the highest recorded since 1914. Hundreds of parked cars were destroyed by the salt water, and innumerable buildings near the coast and harbour installations were badly

damaged. In the forest the loss of timber was calculated at about £ 20 million (1987 value). Much of this destruction of forests was inland in southeastern and eastern Norway, between Oslo and Hedmark.

In England, newspapers and radio media were quick to suggest comparability of this storm with the great storm in 1703, since such events are rare in the extreme south and southeast of England (Lamb 1991). It's worthwhile to consider whether or not the storm was, in any sense, a hurricane - the description applied to it by so many people. In the Beaufort scale of wind force, Hurricane Force (Force 12) is defined as a wind of 64 knots or more, sustained over a period of at least 10 minutes. Gusts, which are comparatively short-lived (but

cause much of the destruction) are not taken into account. By this definition, Hurricane Force winds occurred locally but were not widespread.

The highest hourly-mean speed recorded in the UK was 75 knots ([Met.Office](#)), at the Royal Sovereign Lighthouse. Winds reached Force 11 (56-63 knots) in many coastal regions of south-east England. Inland, however, their strength was considerably less. At the London Weather Centre, for example, the mean wind speed did not exceed 44 knots (Force 9). At Gatwick Airport, it never exceeded 34 knots (Force 8).

The Great Storm of 1987 did not originate in the tropics and was not, by any definition, a hurricane - but it was certainly exceptional ([Met.Office](#)).

#### References:

Lamb, H.H. 1991. *Historical Storms of the North Sea, British Isles and Northwest Europe*. Cambridge University Press, Cambridge, 204 pp.

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All the above diagrams with supplementary information, including links to data sources and previous issues of this newsletter, are available on [www.climate4you.com](http://www.climate4you.com)

Yours sincerely,

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March 18, 2014.