Climate4you update May 2014

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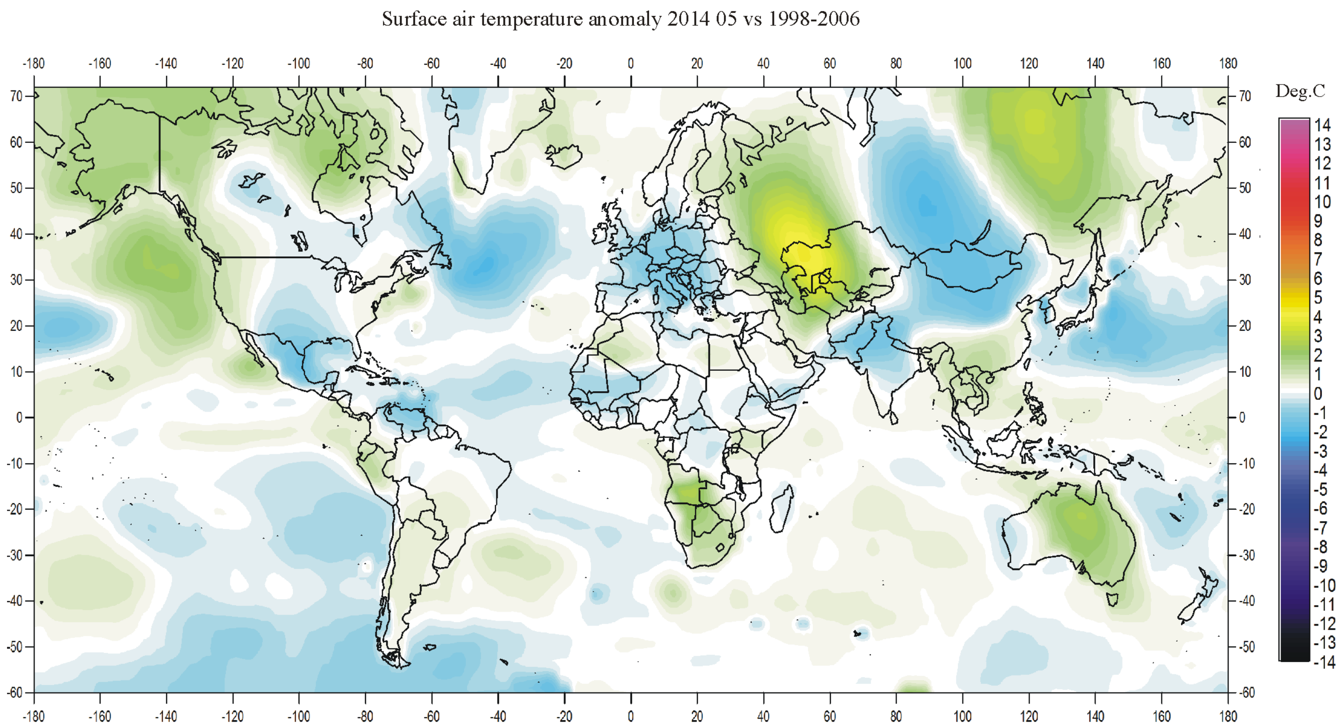
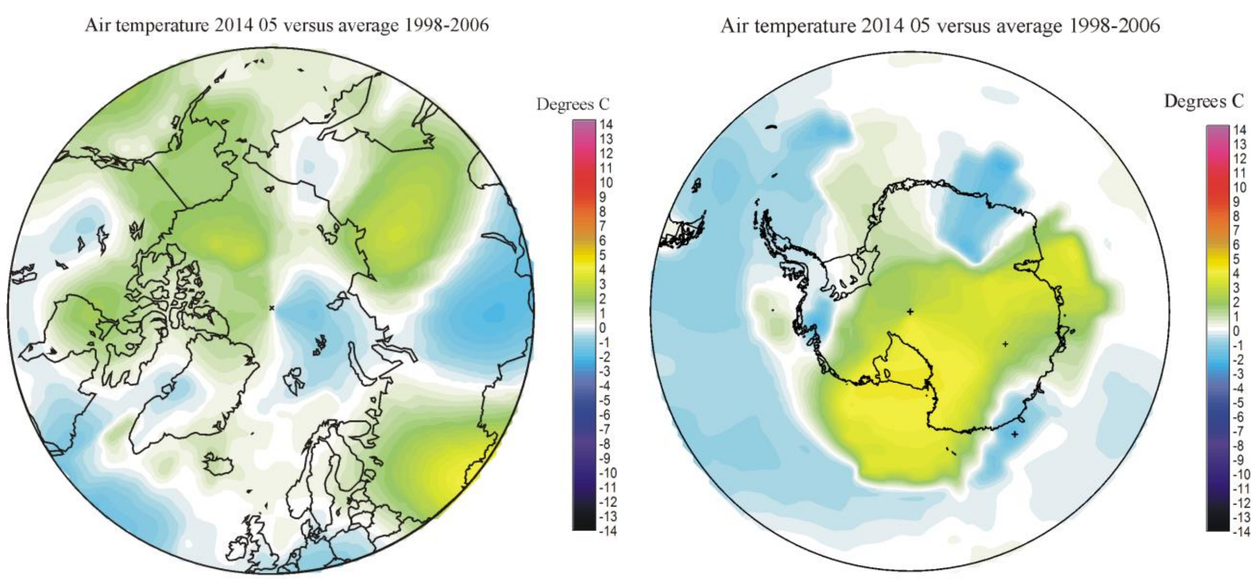
All diagrams in this newsletter as well as links to the original data are available on www.climate4you.com

May 2014 global surface air temperature overview





May 2014 surface air temperature compared to the May 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 May 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 20th 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.

May 2014 global surface air temperatures

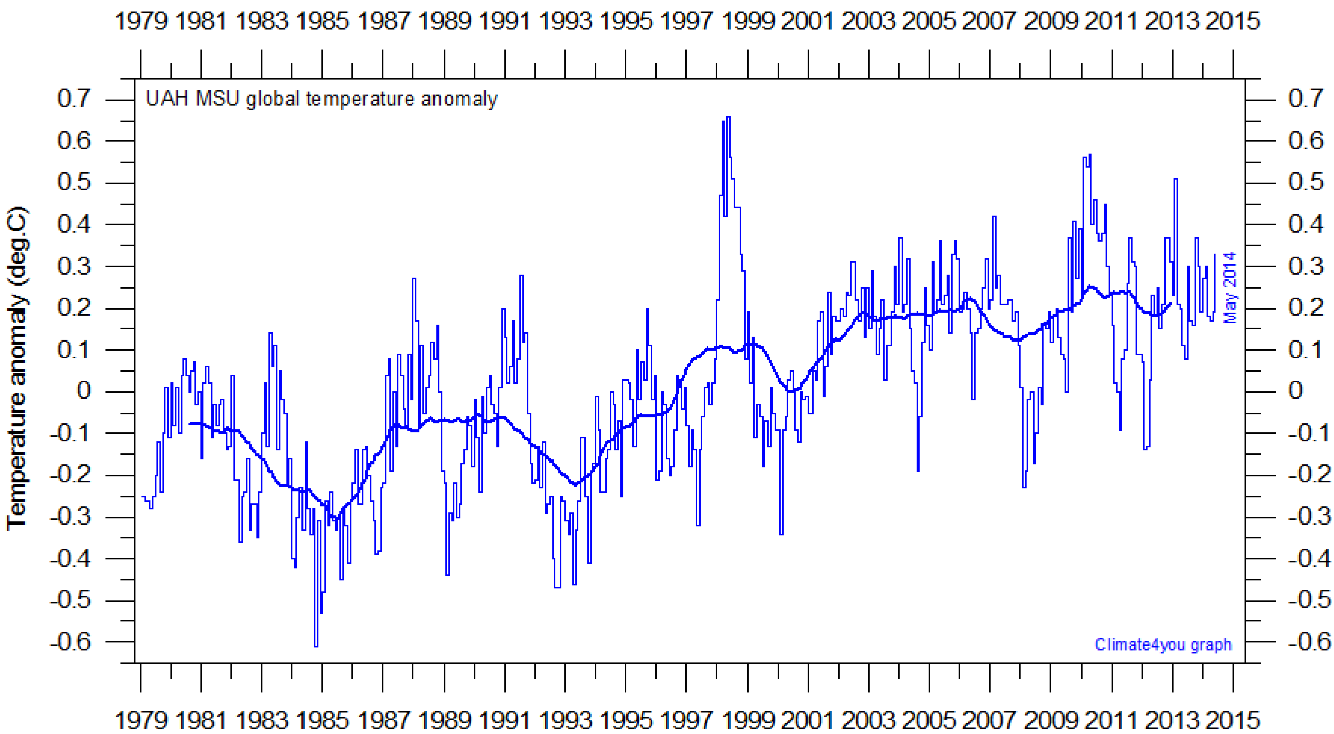
General: In general, the global air temperature was near the 1998-2006 average.

The Northern Hemisphere was characterised by regional air temperature contrasts, although smaller than during NH-winter. Most of southern and eastern North America experienced below average temperatures, while northern and western North America saw above average temperatures. An area of below 1998-2006 average temperatures extended from North America across the North Atlantic to Western Europe. Russia and Siberia was divided into relatively warm, cold, warm and cold regions, from west towards east. The North Atlantic generally had temperatures near or below average. In the Arctic the American and Siberian sectors had above average temperatures, while the European and the Russian sector generally had below average temperatures. In the areas near the North Pole the temperature pattern shown on page 2 is strongly influenced by the interpolation procedure followed by GISS, and not too much attention should be paid to such interpolation artefacts.

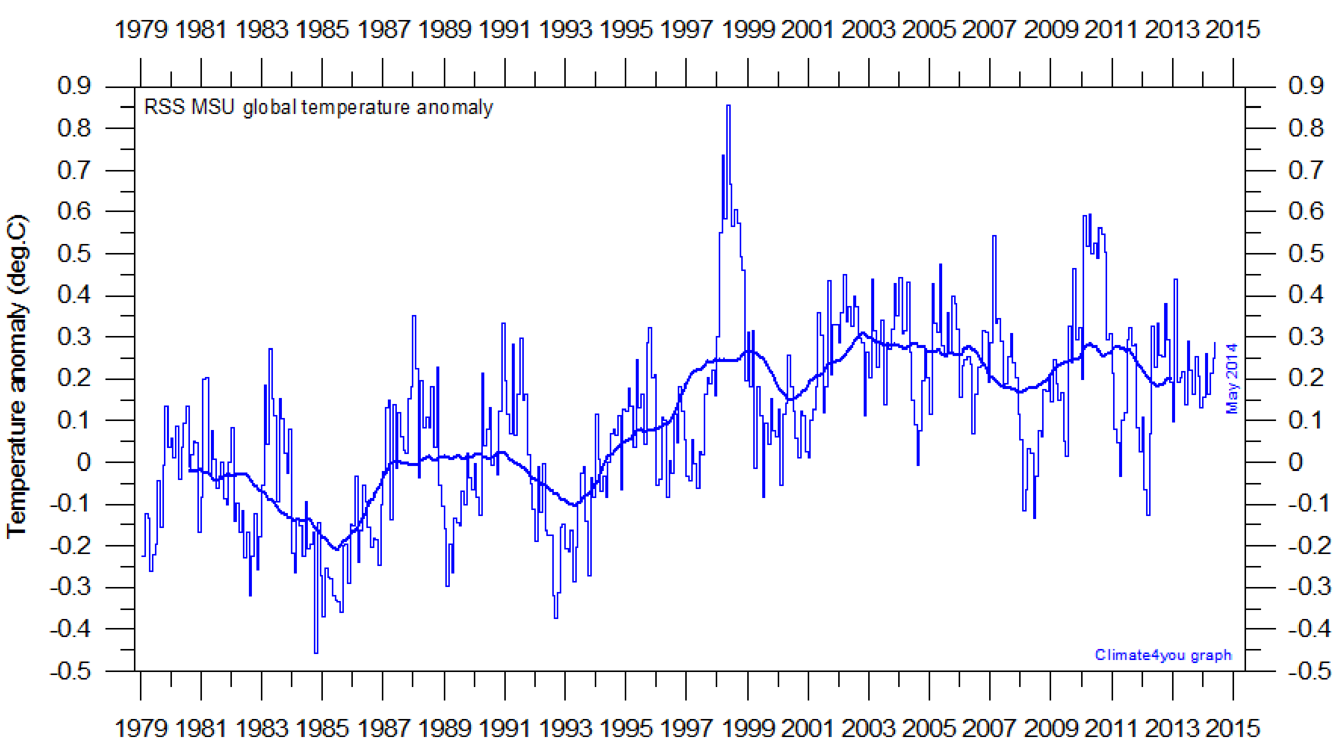
Near the Equator temperatures conditions were somewhat below the 1998-2006 average in the Atlantic-African sector, and above in the Pacific sector.

The Southern Hemisphere temperatures were mainly below or near average 1998-2006 conditions. The only major exceptions from this were central Antarctic, eastern Australia and the southern part of Africa.

Lower troposphere temperature from satellites, updated to May 2014

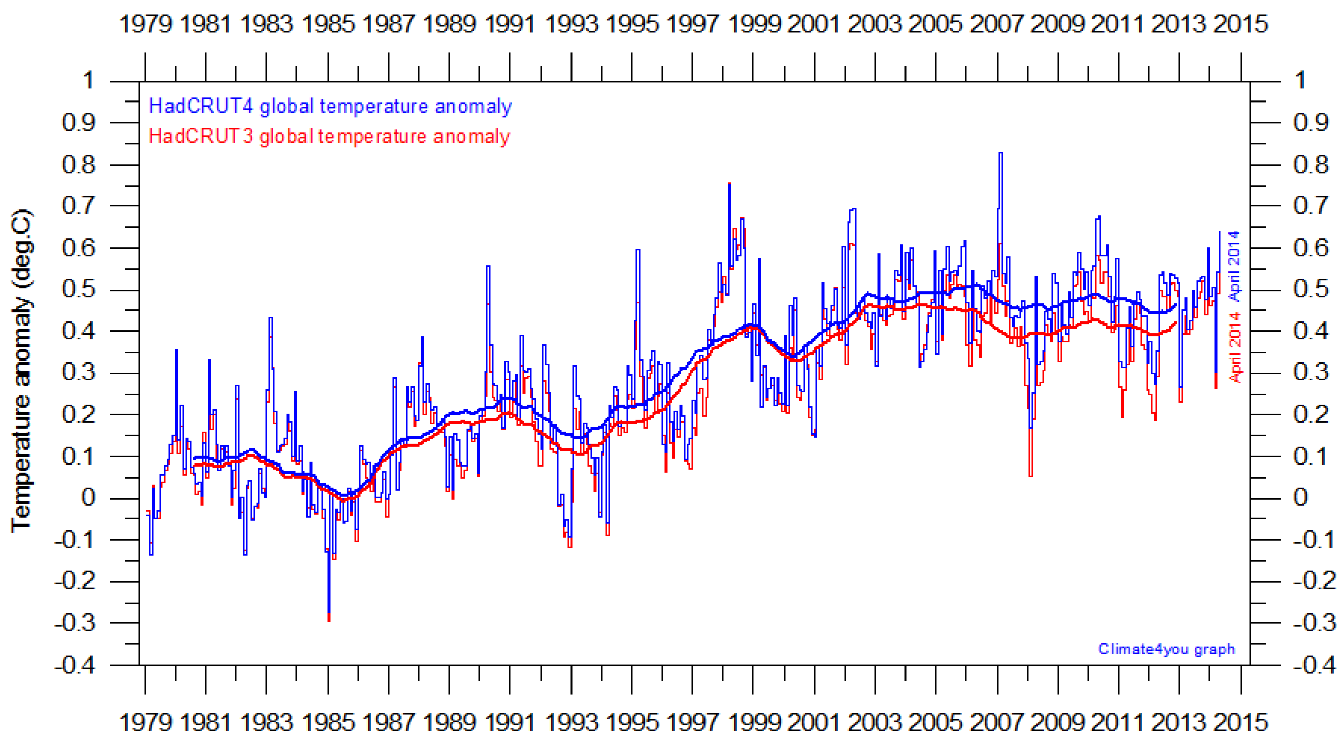


Global monthly average lower troposphere temperature (thin line) since 1979 according to University of Alabama at Huntsville, USA. The thick line is the simple running 37 month average.

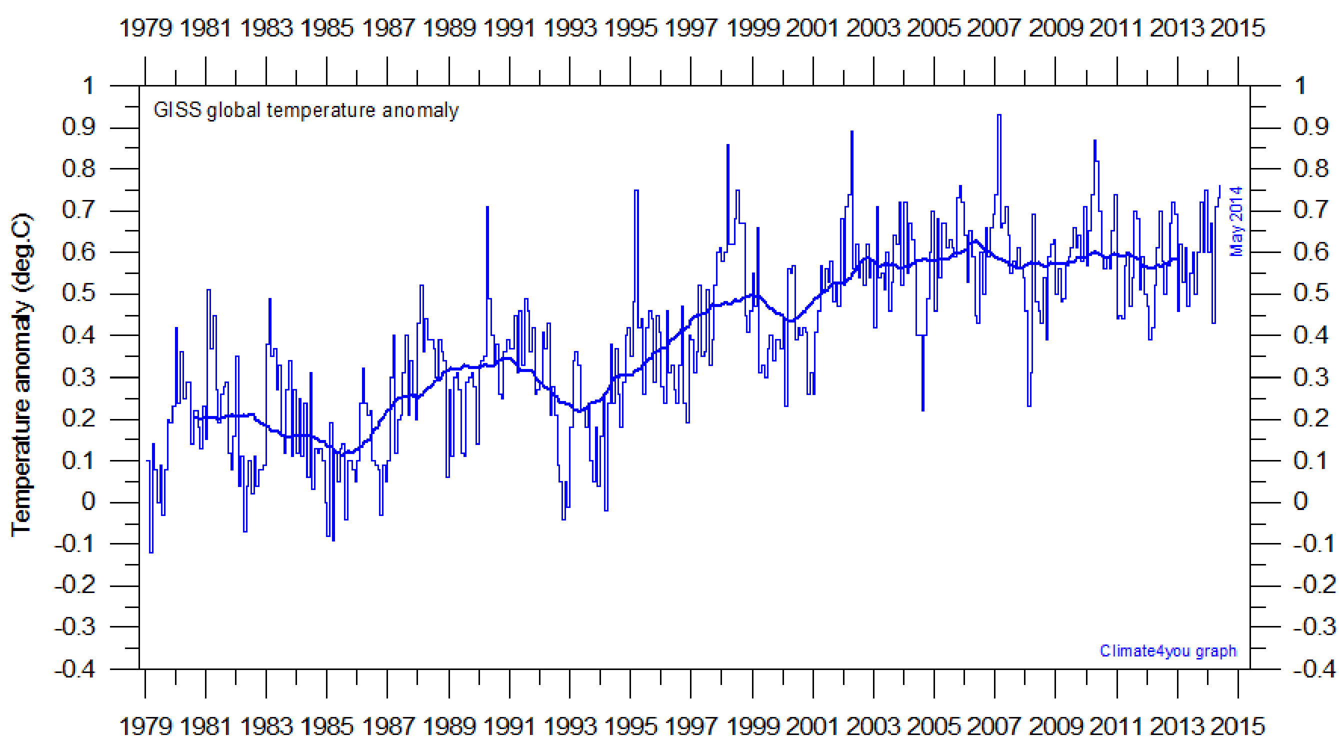


Global monthly average lower troposphere temperature (thin line) since 1979 according to according to Remote Sensing Systems (RSS), USA. The thick line is the simple running 37 month average.

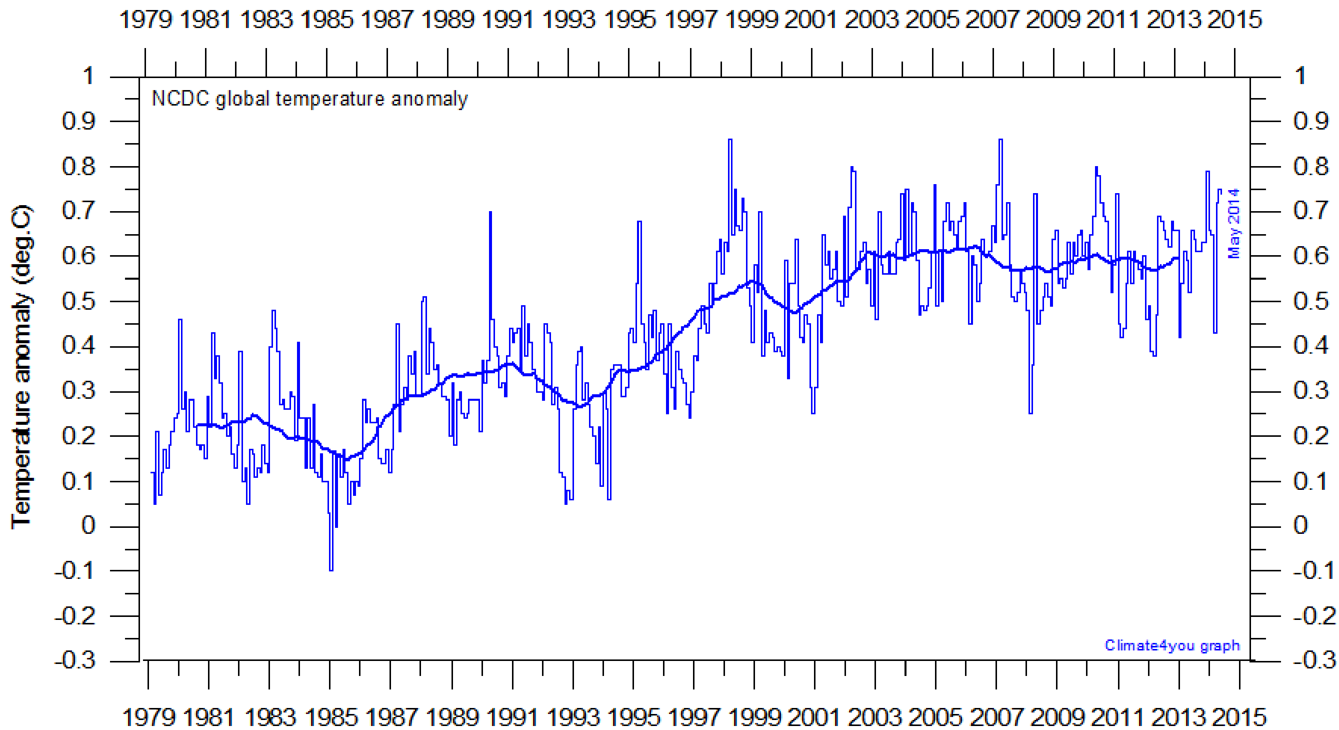
Global surface air temperature, updated to May 2014



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 April 2013.



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.

<u>A note on data record stability:</u>

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 (go to: *Global Temperature*, followed by *Temporal Stability*).

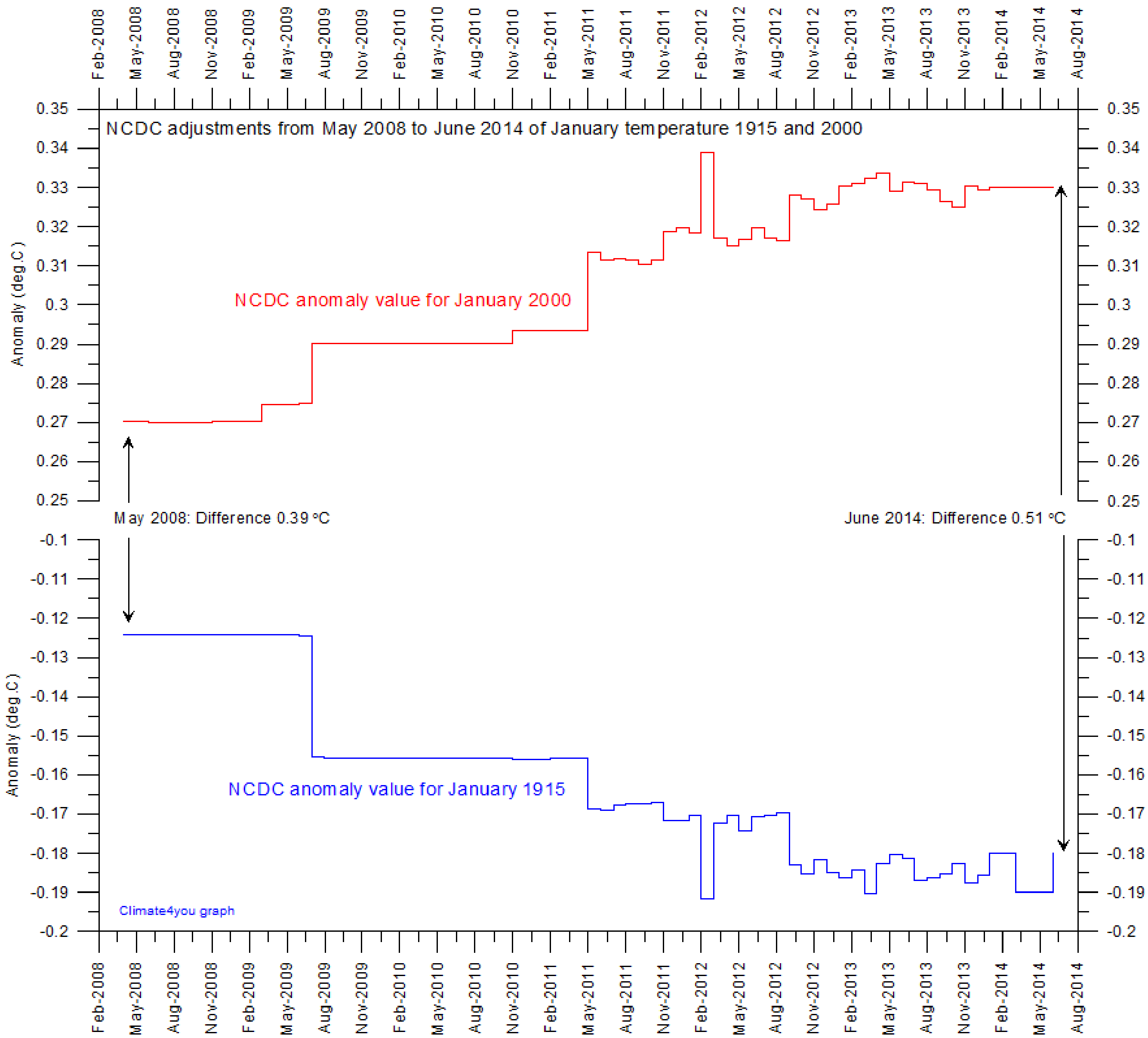


Diagram showing the adjustment made since May 2008 by the National Climatic Data Center (NCDC) in the anomaly values for the two months January 1915 and January 2000.

Note: The administrative upsurge of the temperature increase between January 1915 and January 2000 has grown from 0.39 (in May 2008) to 0.51 °C (in June 2014), representing an about 33% administrative temperature increase over this period.

Global air temperature linear trends updated to April 2014

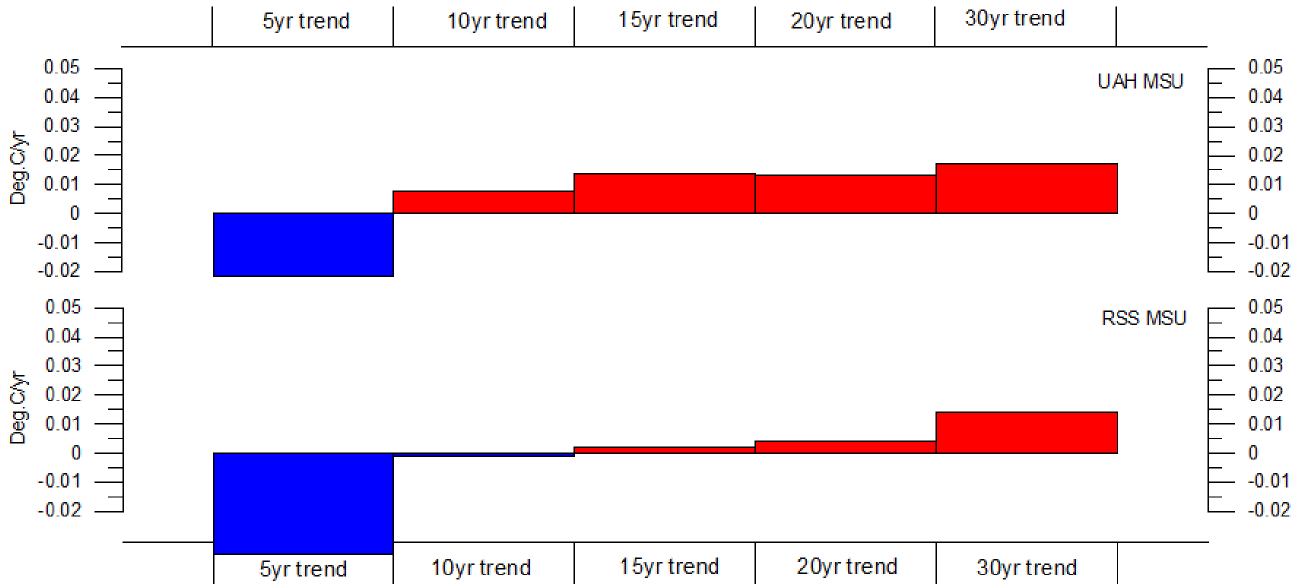


Diagram showing the latest 5, 10, 20 and 30 yr linear annual global temperature trend, calculated as the slope of the linear regression line through the data points, for two satellite-based temperature estimates (UAH MSU and RSS MSU). Last month included in analysis: April 2014.

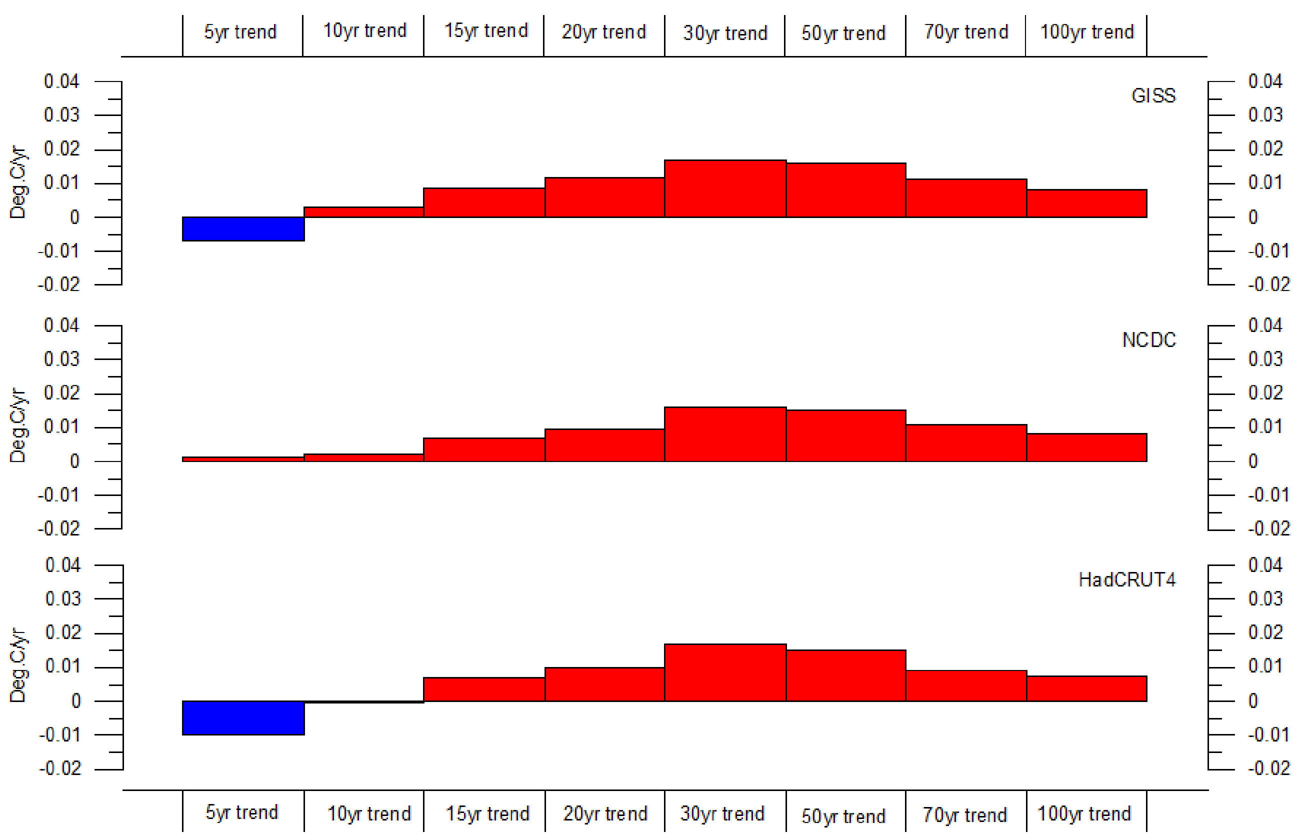
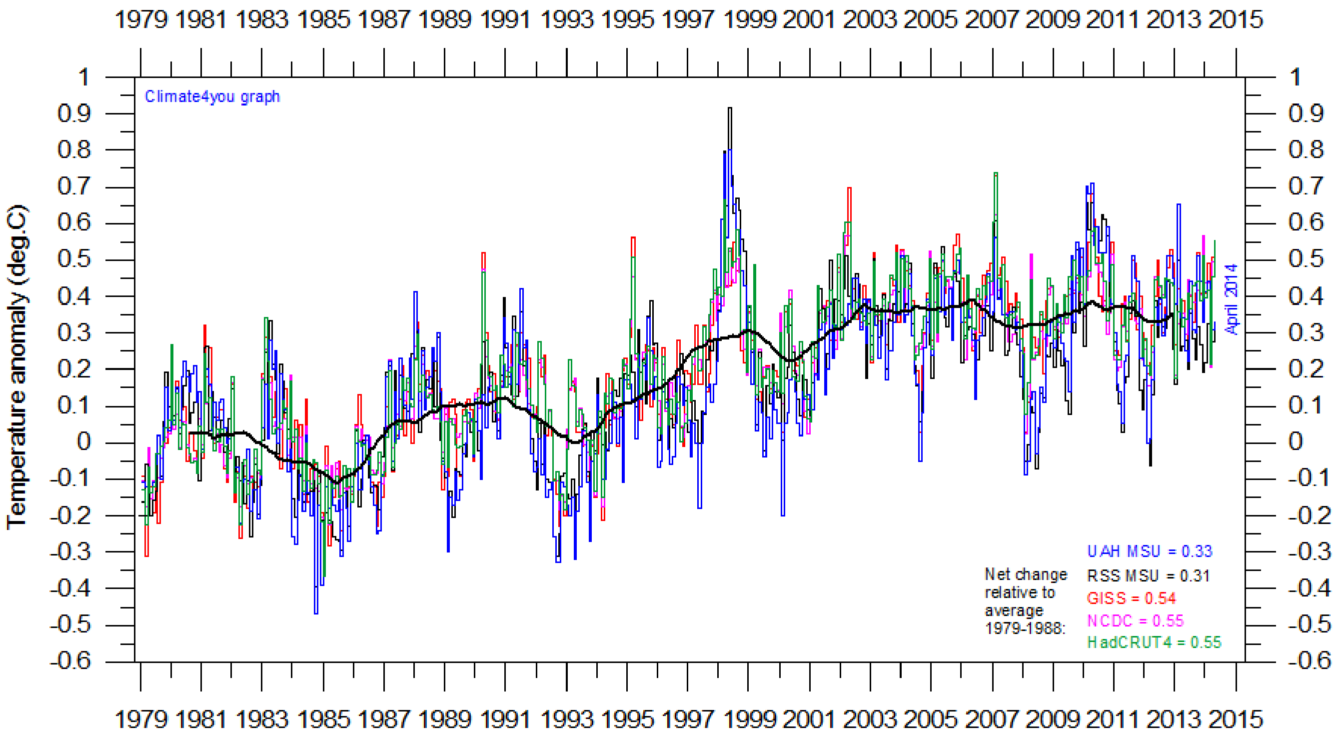


Diagram showing the latest 5, 10, 20, 30, 50, 70 and 100 year linear annual global temperature trend, calculated as the slope of the linear regression line through the data points, for three surface-based temperature estimates (GISS, NCDC and HadCRUT4). Last month included in all analyses: April 2014.

All in one, updated to April 2014

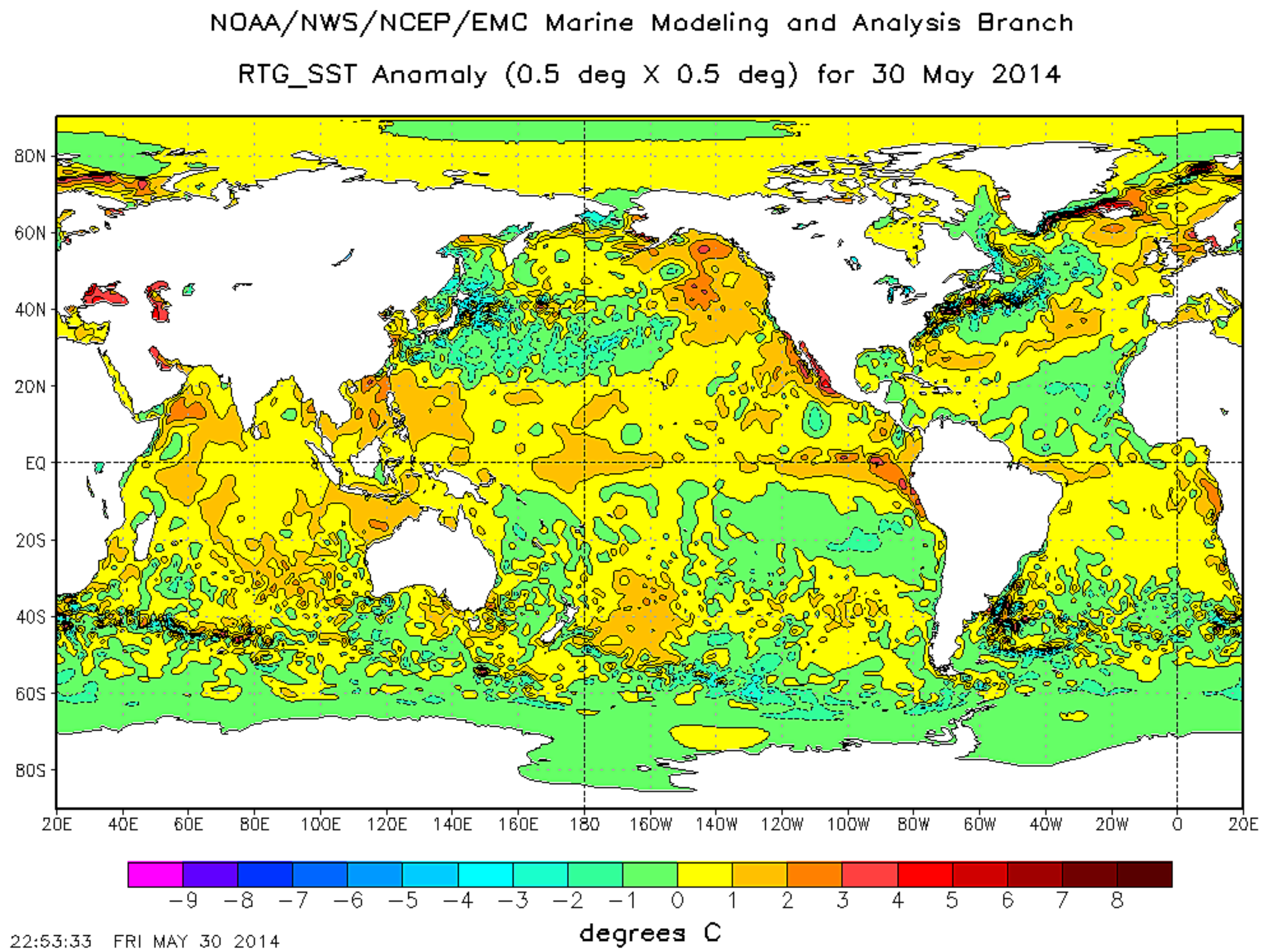


Superimposed plot of all five global monthly temperature estimates. As the base period differs for the individual temperature estimates, they have all been normalised by comparing with the average value of the initial 120 months (10 years) from January 1979 to December 1988. The heavy black line represents 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 late May 2014



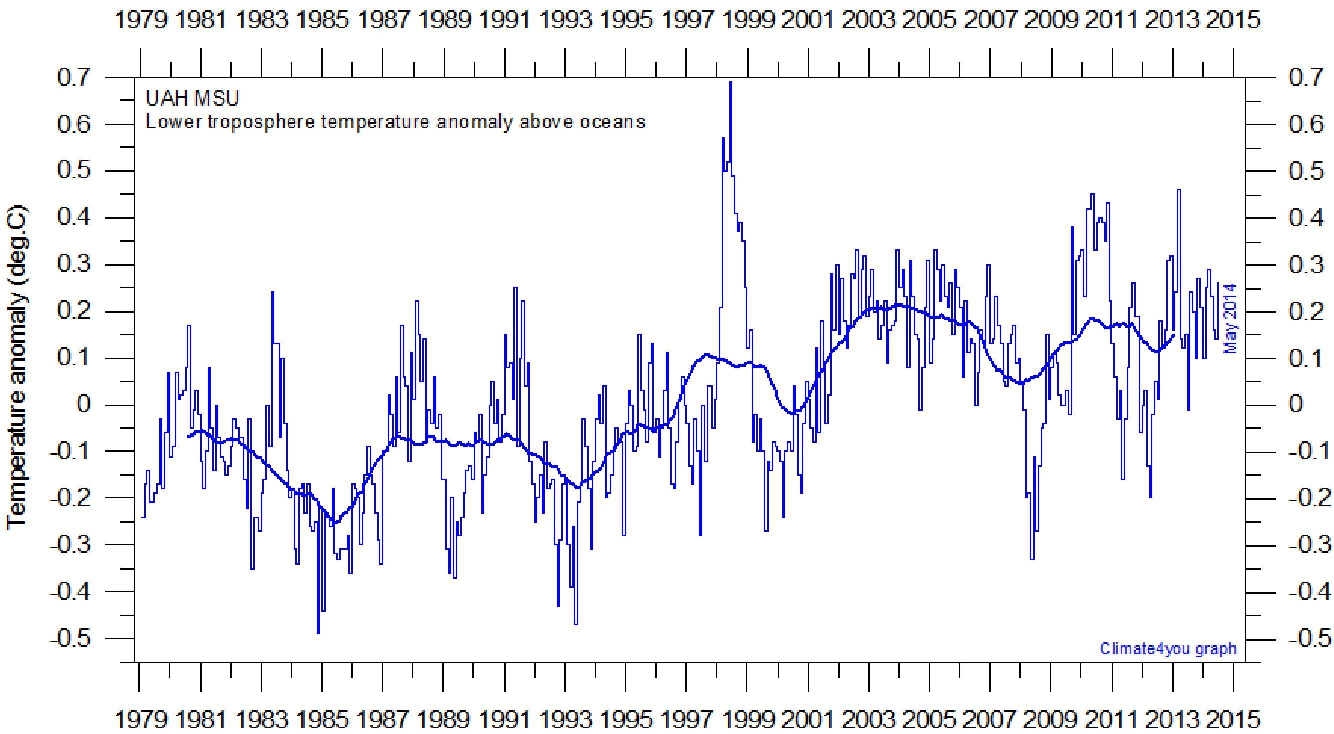
Sea surface temperature anomaly on 30 May 2014. Map source: National Centers for Environmental Prediction (NOAA).

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).

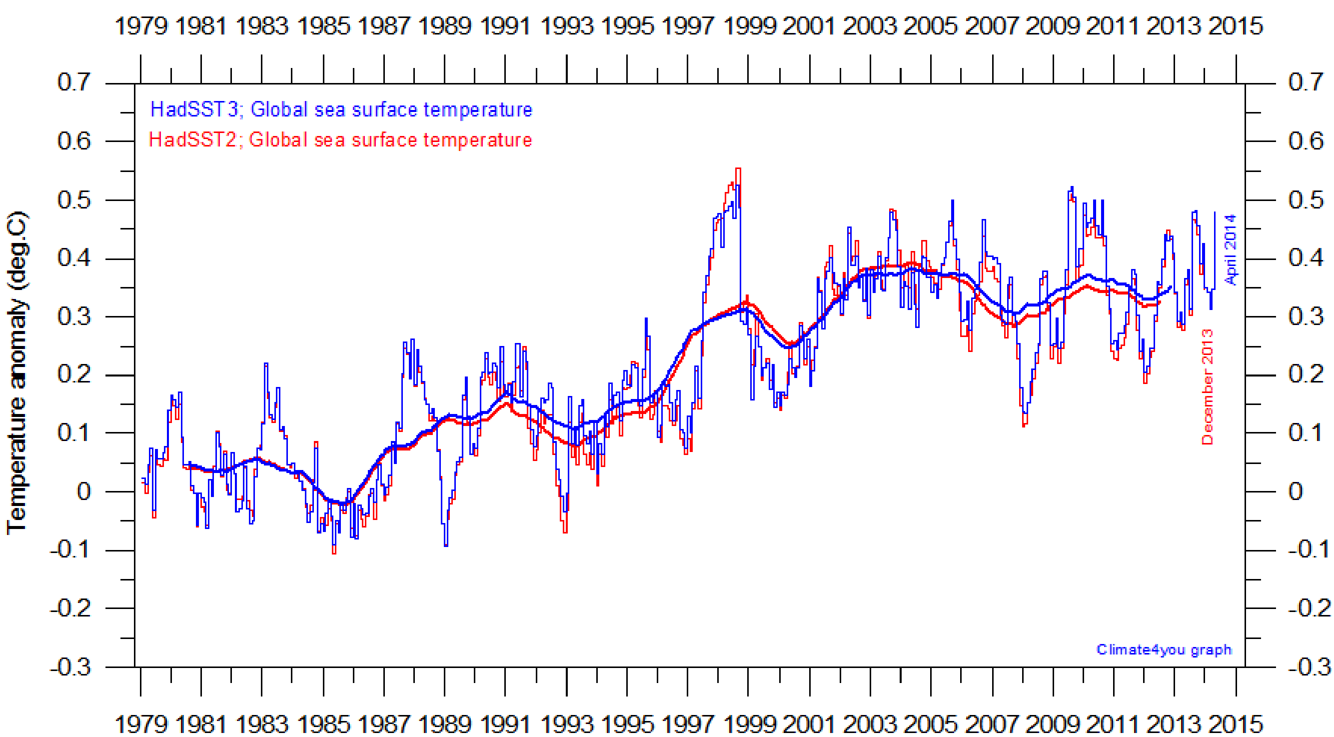
Relatively warm water is dominating the Pacific Ocean and Indian Ocean near the Equator, and is influencing global air temperatures now and in the months to come.

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.

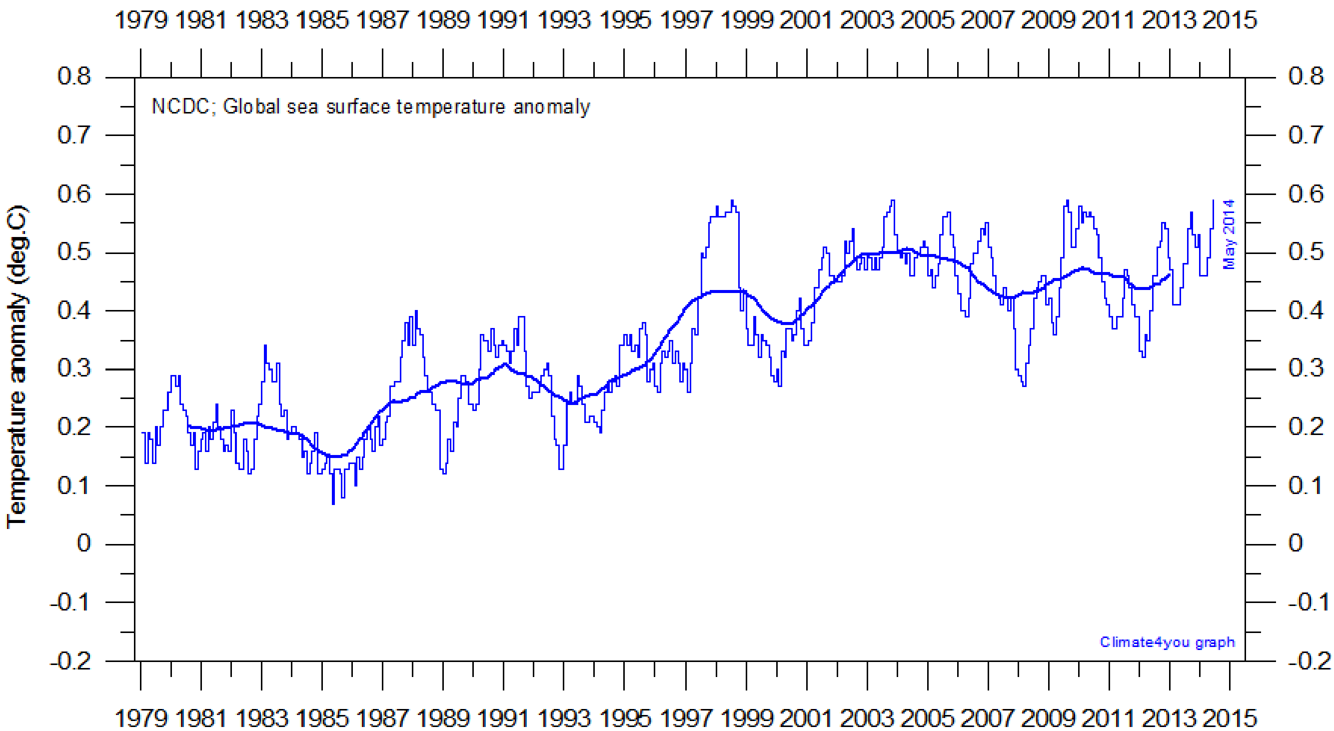
However, this does not reflect similar changes in the total heat content of the atmosphere-ocean system. In fact, global net changes can be small and such heat exchanges may mainly reflect redistribution of energy between ocean and atmosphere. What matters is the overall temperature development when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

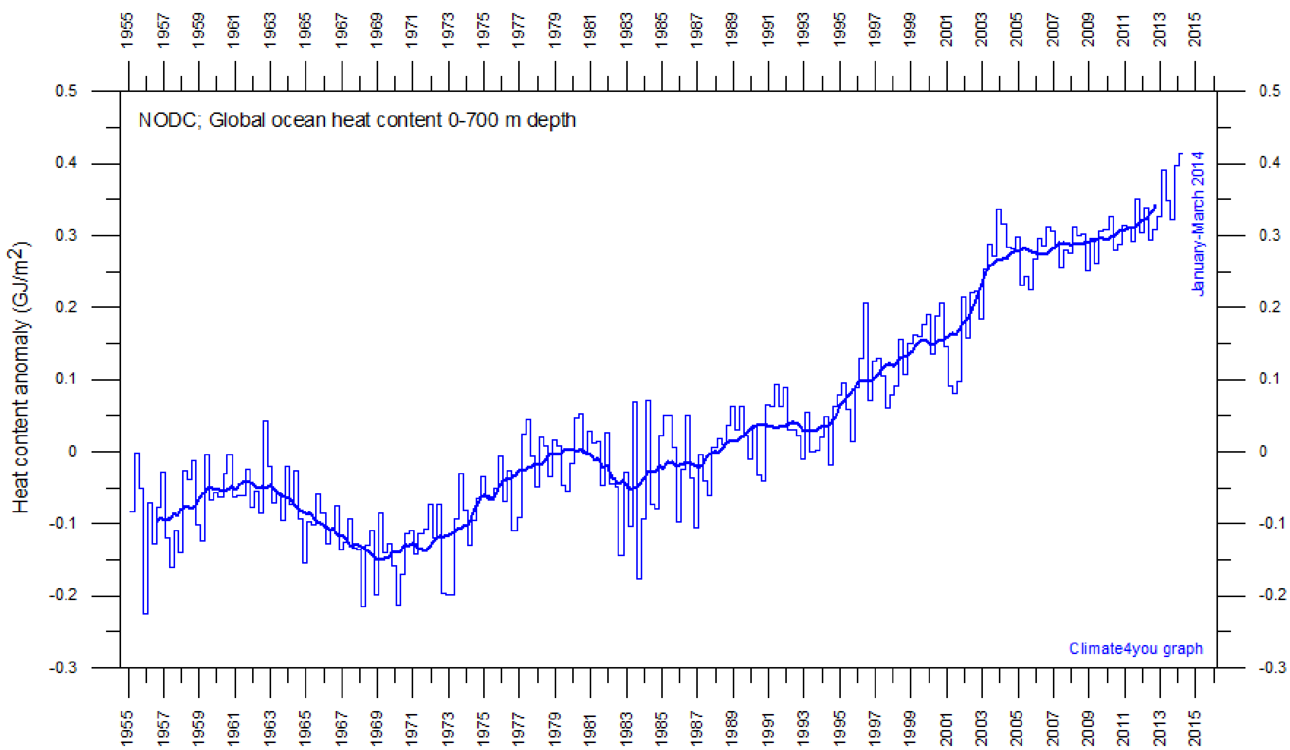


Global monthly average sea surface temperature since 1979 according to University of East Anglia's [Climatic Research Unit](#) ([CRU](#)), UK. Base period: 1961-1990. The thick line is the simple running 37 month average. Please note that this diagram is not yet updated beyond April 2014.

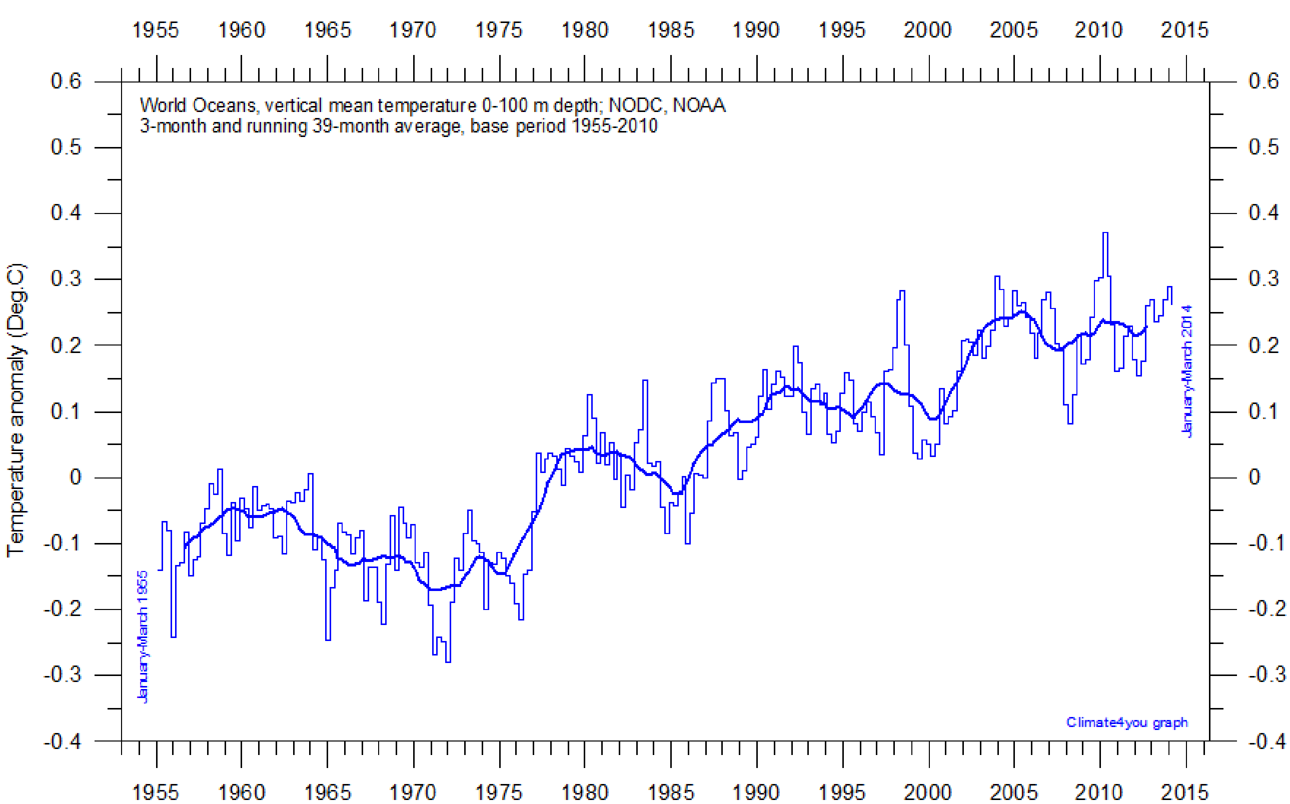


Global monthly average sea surface temperature since 1979 according to the [National Climatic Data Center](#) (NCDC), USA. Base period: 1901-2000. The thick line is the simple running 37 month average.

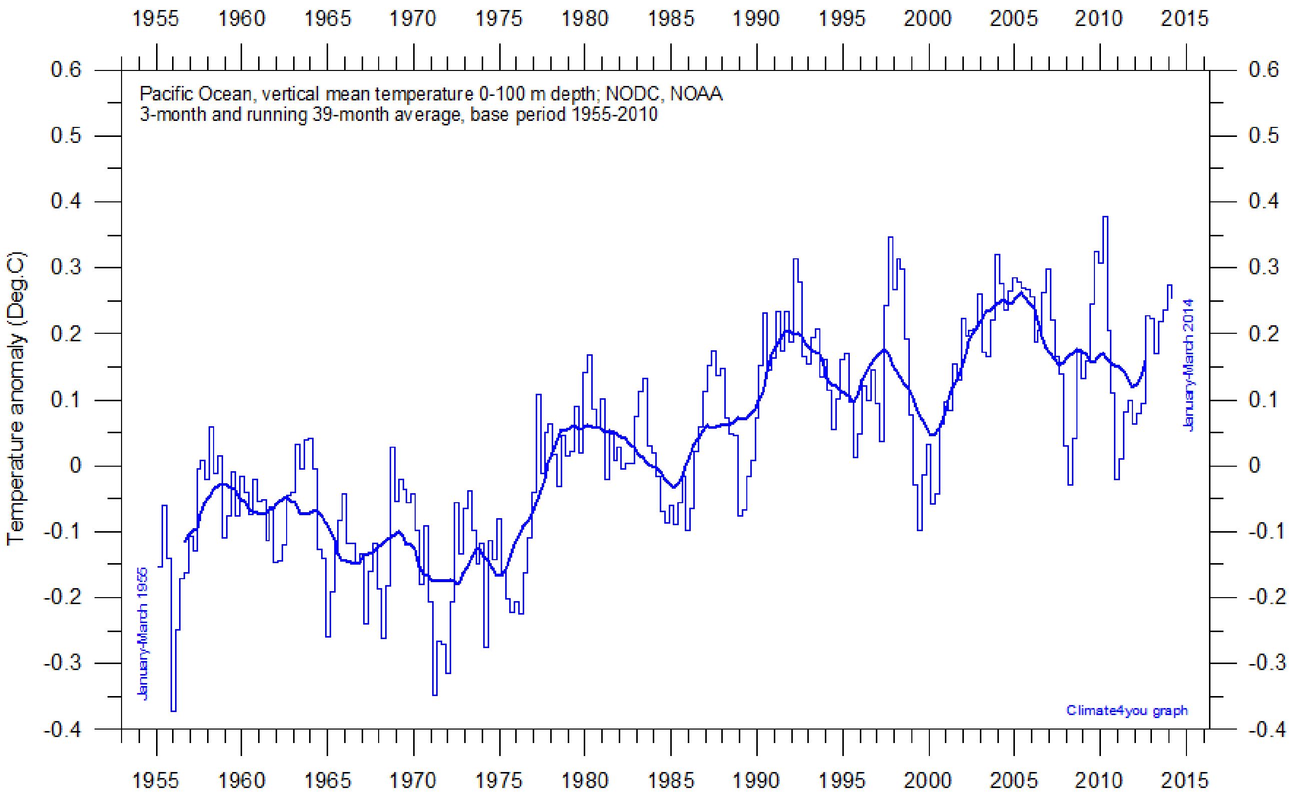
Ocean heat content uppermost 100 and 700 m, updated to March 2014



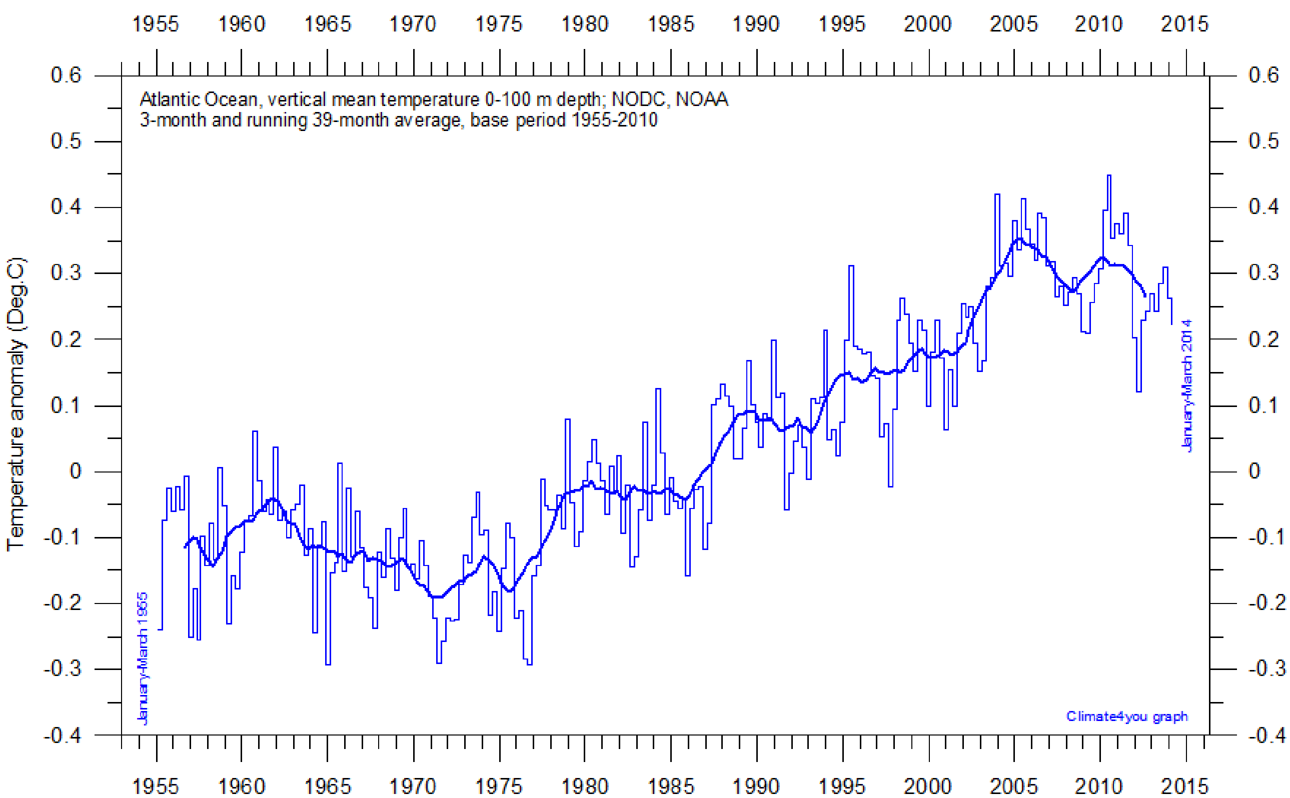
Global monthly heat content anomaly (GJ/m2) in the uppermost 700 m of the oceans since January 1955. Data source: National Oceanographic Data Center(NODC).



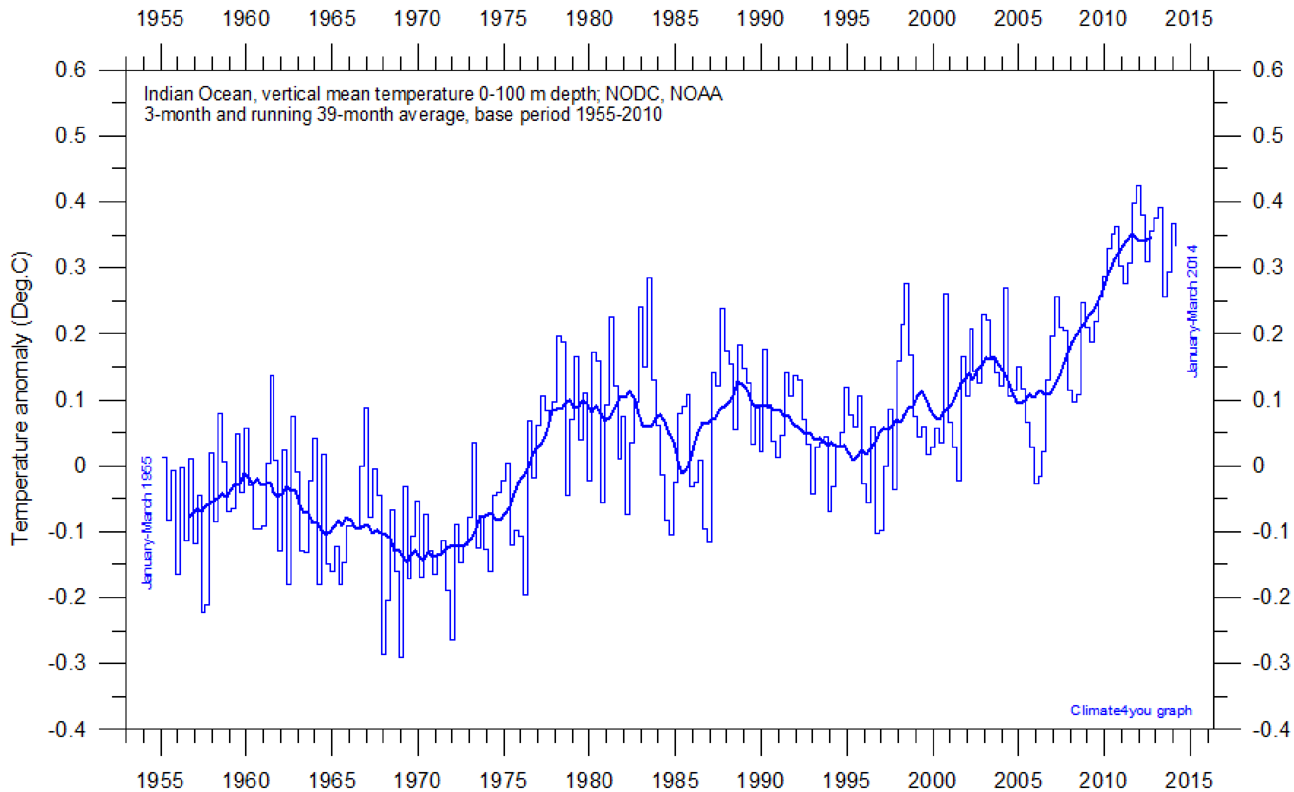
World Oceans vertical average temperature 0-100 m depth since 1955. The thin line indicate 3-month values, and the thick line represents the simple running 39-month (c. 3 year) average. Data source: NOAA National Oceanographic Data Center (NODC). Base period 1955-2010.



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.

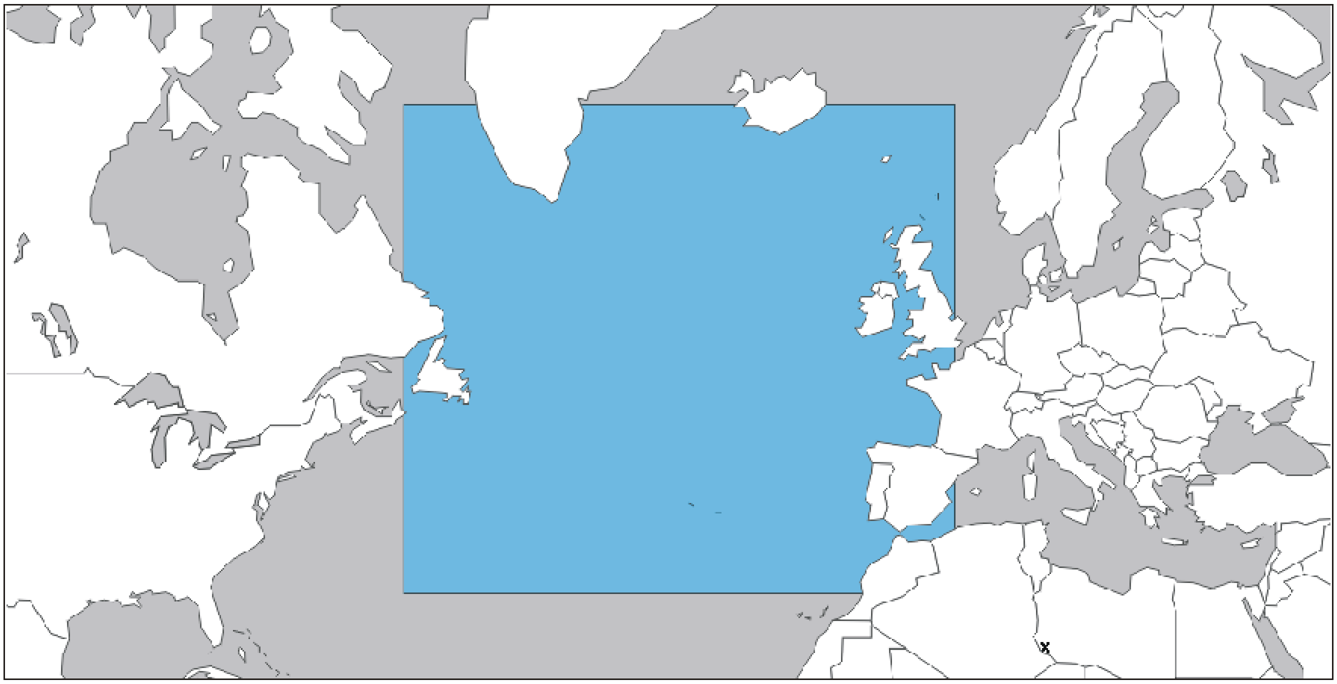


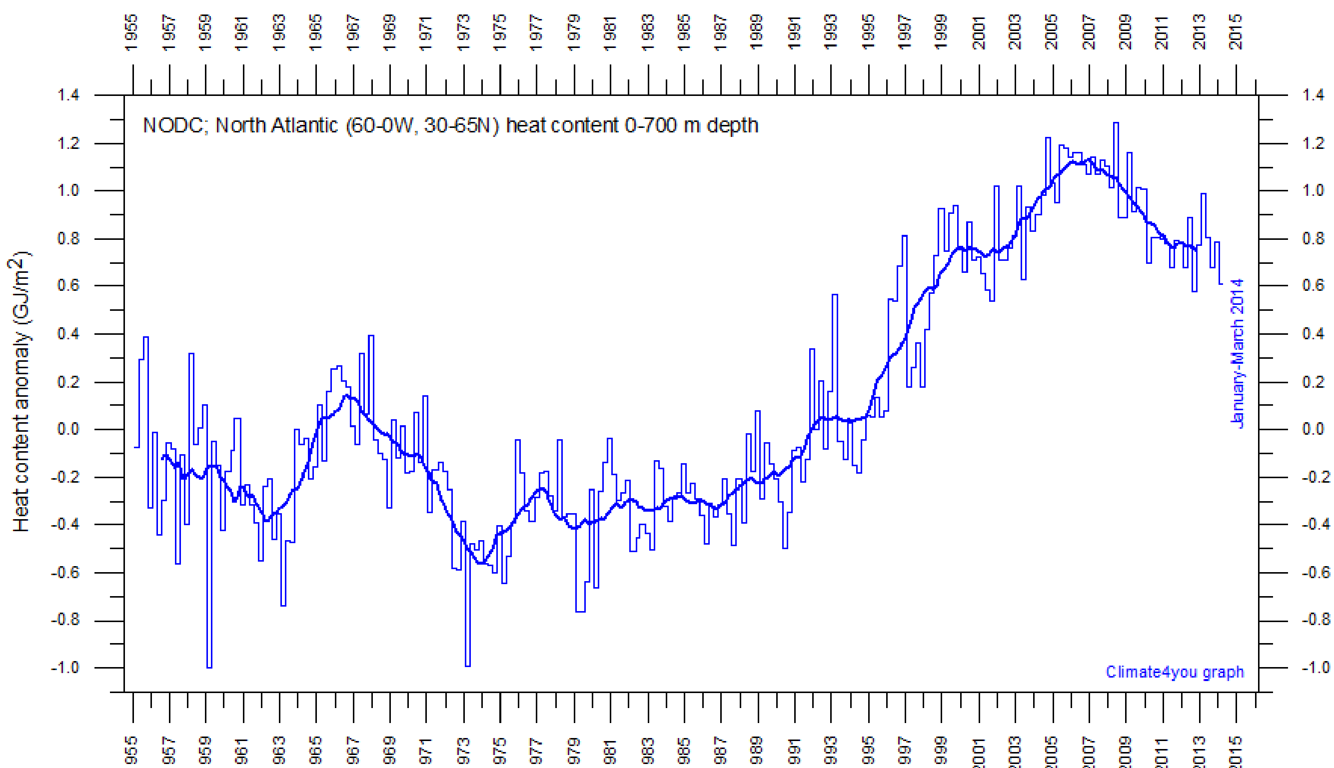
Atlantic Ocean vertical average temperature 0-100 m depth since 1955. The thin line indicate 3-month values, and the thick line represents the simple running 39-month (c. 3 year) average. Data source: NOAA National Oceanographic Data Center (NODC). Base period 1955-2010.



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). Base period 1955-2010.

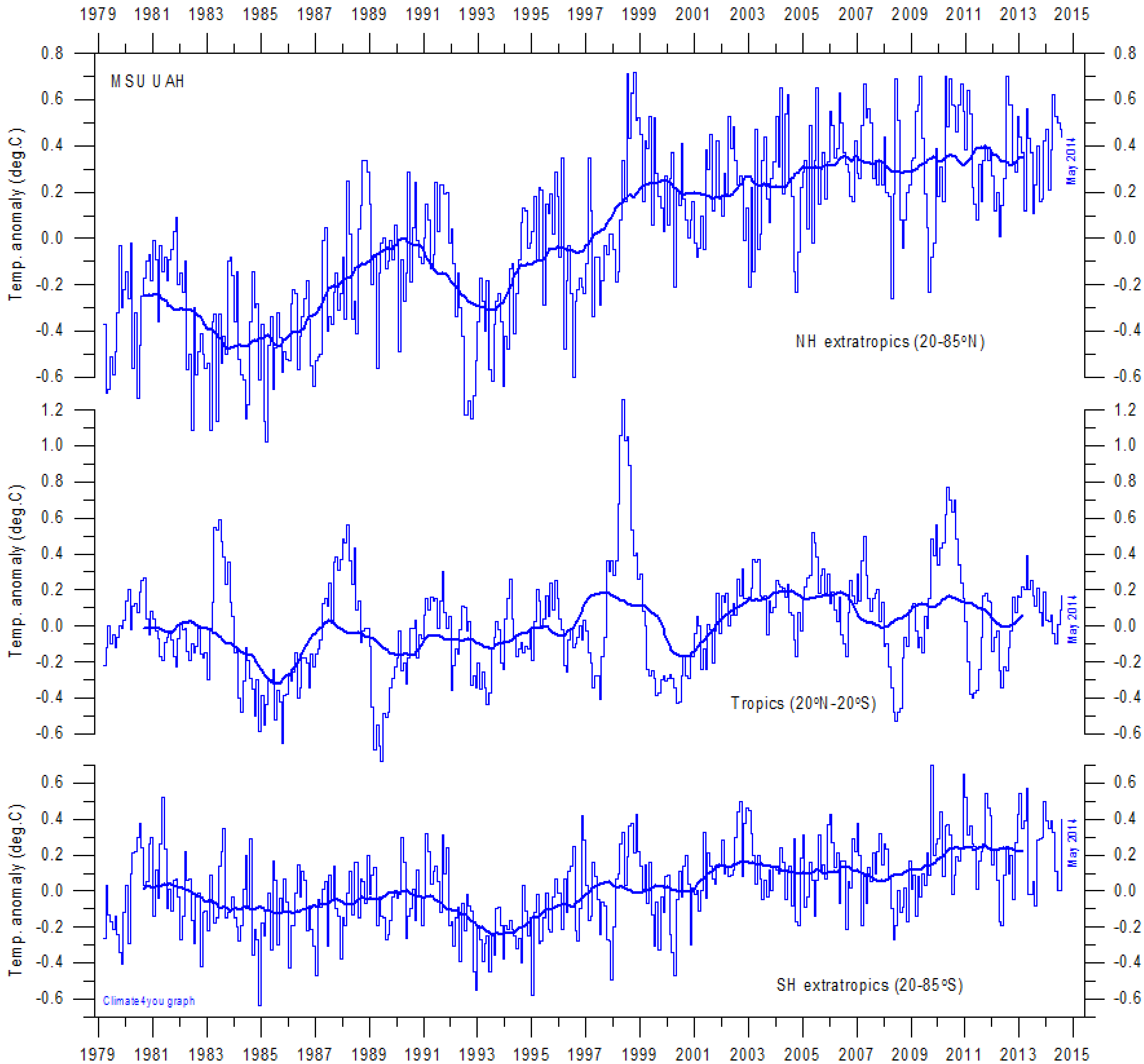
North Atlantic heat content uppermost 700 m, updated to March 2014





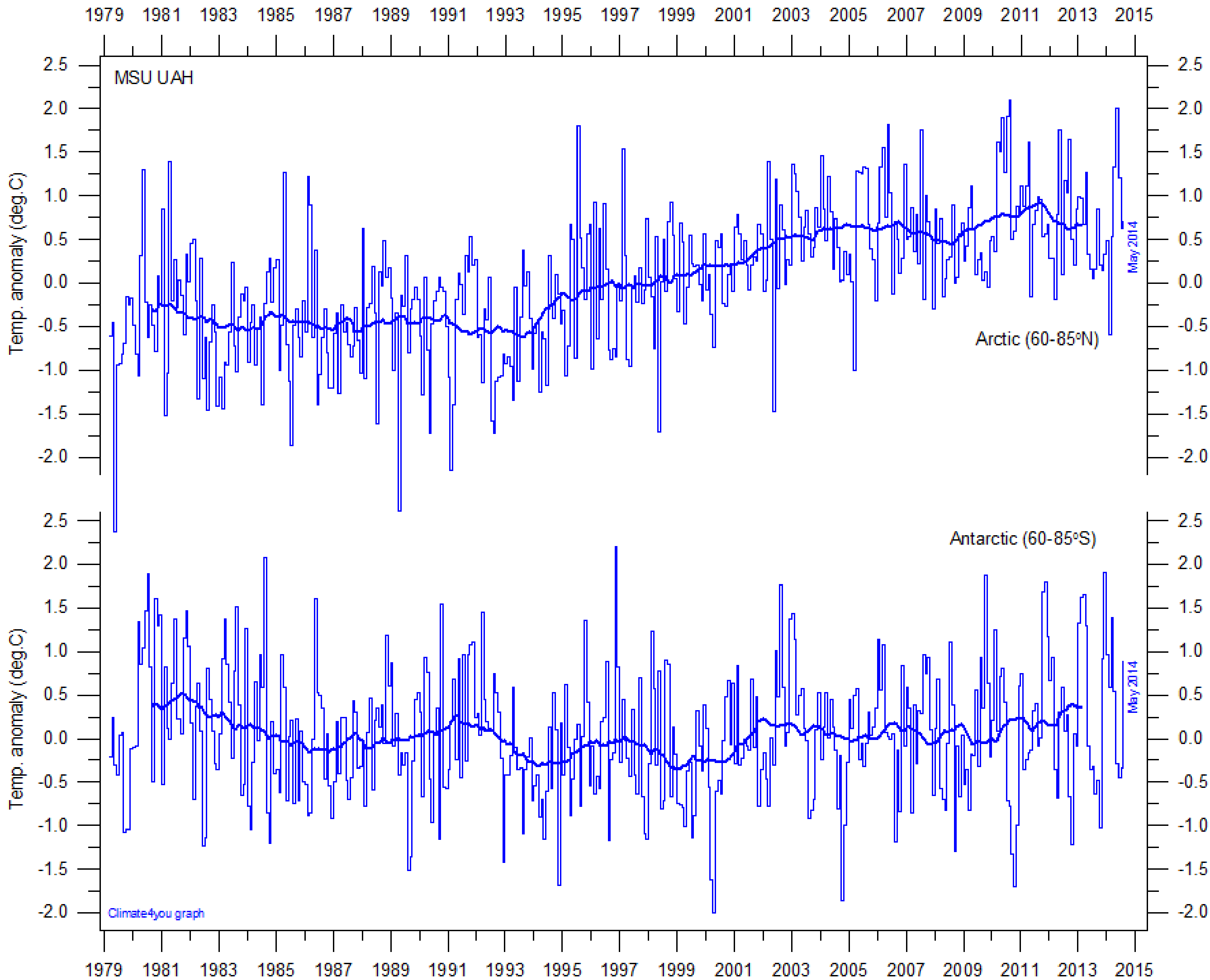
Global monthly heat content anomaly (GJ/m2) in the uppermost 700 m of the North Atlantic (60-0W, 30-65N; see map above) *ocean since January 1955. The thin line indicates monthly values, and the thick line represents the simple running 37 month (c. 3 year) average. Data source: National Oceanographic Data Center (NODC).*

Zonal lower troposphere temperatures from satellites, updated to May 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 May 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 April 2014

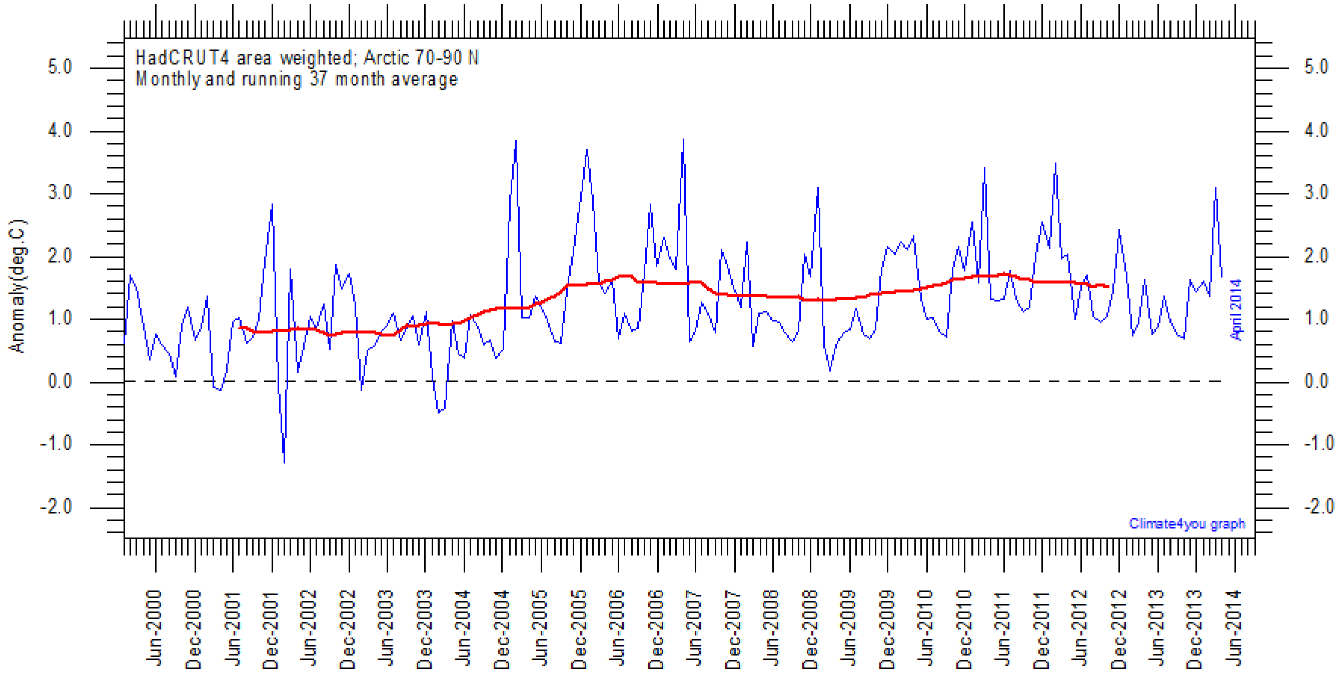


Diagram showing area weighted Arctic (70-90^{o}N) monthly surface air temperature anomalies ([HadCRUT4]) since January 2000, in relation to the WMO [normal period] 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 37 month (c.3 yr) average.

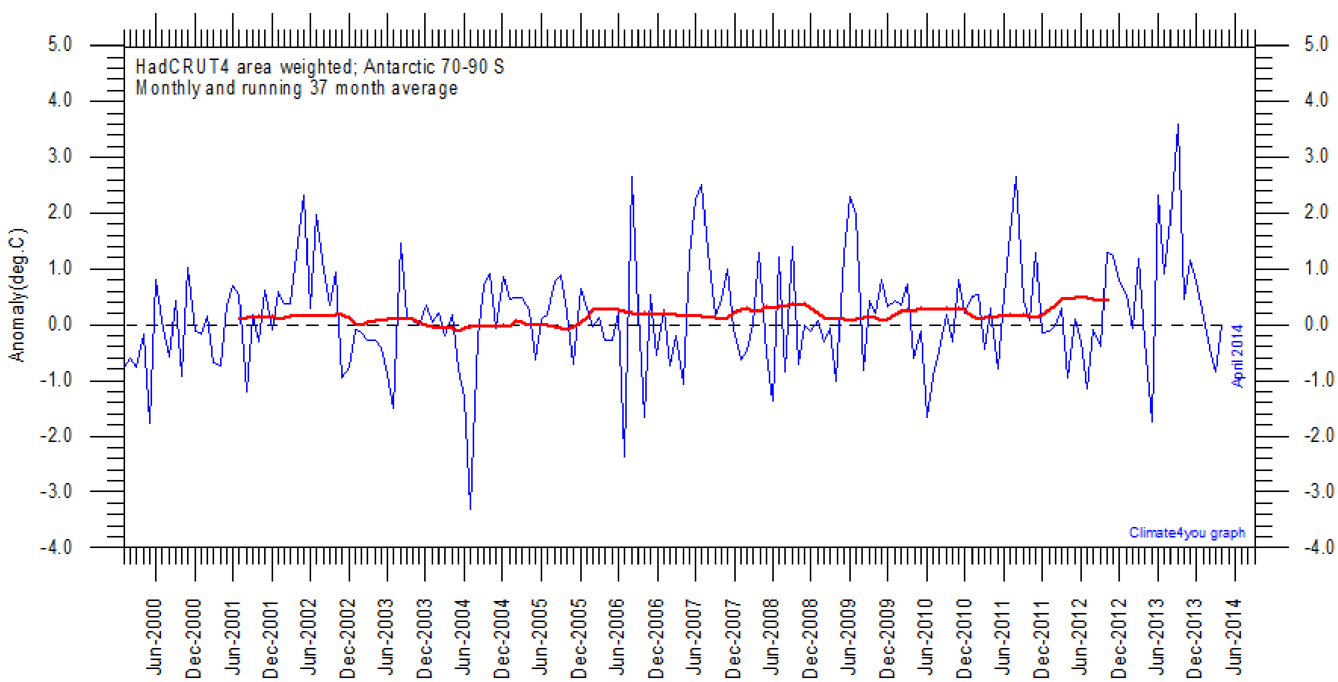


Diagram showing area weighted Antarctic (70-90^{o}N) monthly surface air temperature anomalies ([HadCRUT4]) since January 2000, in relation to the WMO [normal period] 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 37 month (c.3 yr) average.

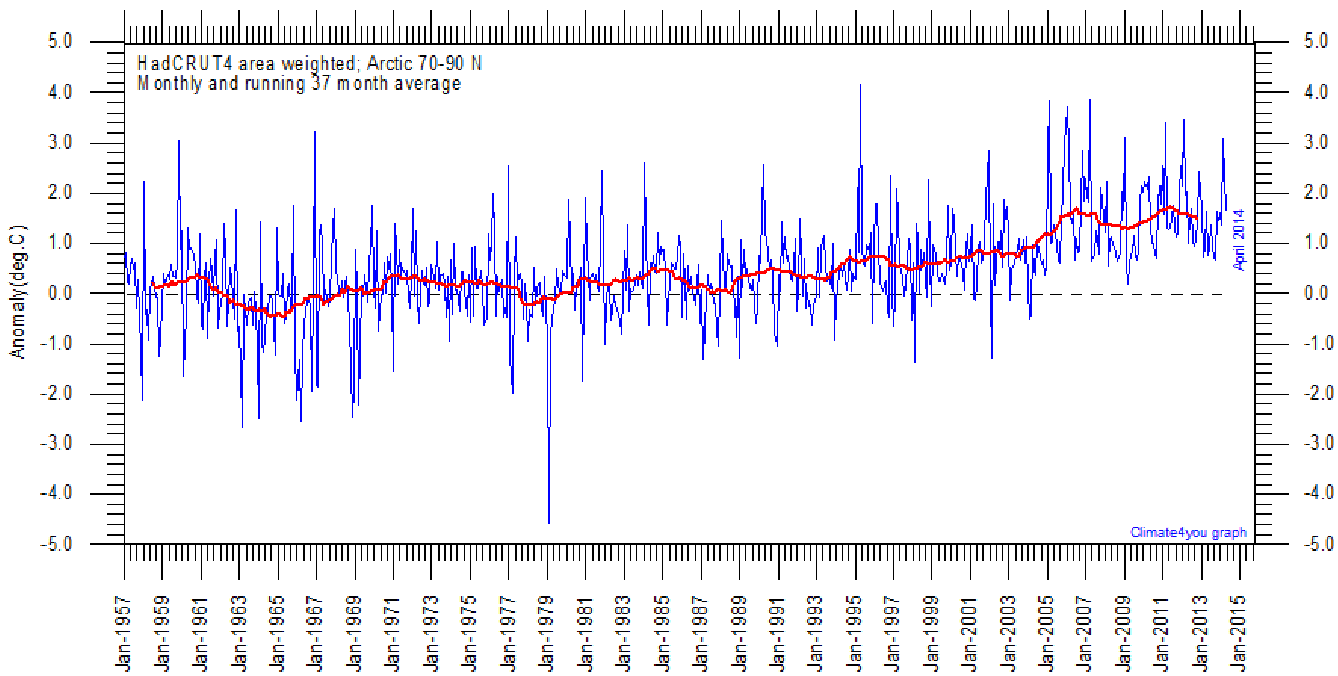


Diagram showing area weighted Arctic (70-90°N) monthly surface air temperature anomalies ([HadCRUT4]) since January 1957, in relation to the WMO [normal period] 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 37 month (c.3 yr) average.

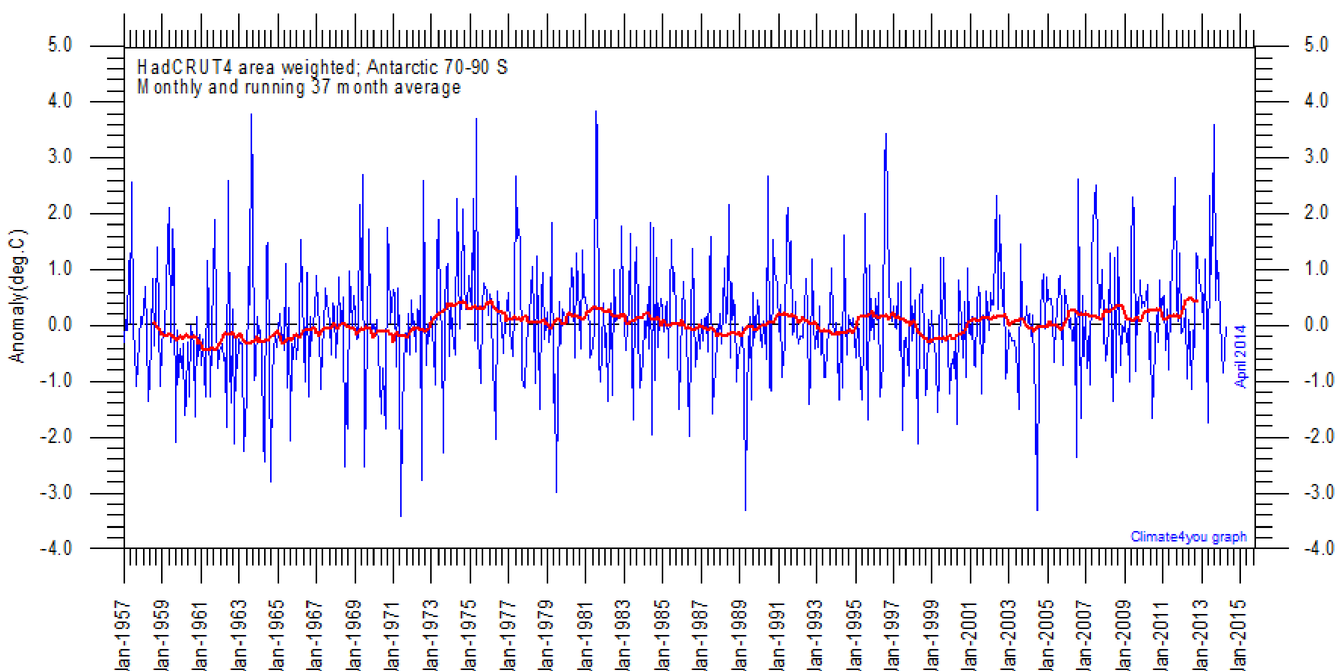


Diagram showing area weighted Antarctic (70-90°N) monthly surface air temperature anomalies ([HadCRUT4]) since January 1957, in relation to the WMO [normal period] 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 37 month (c.3 yr) average.

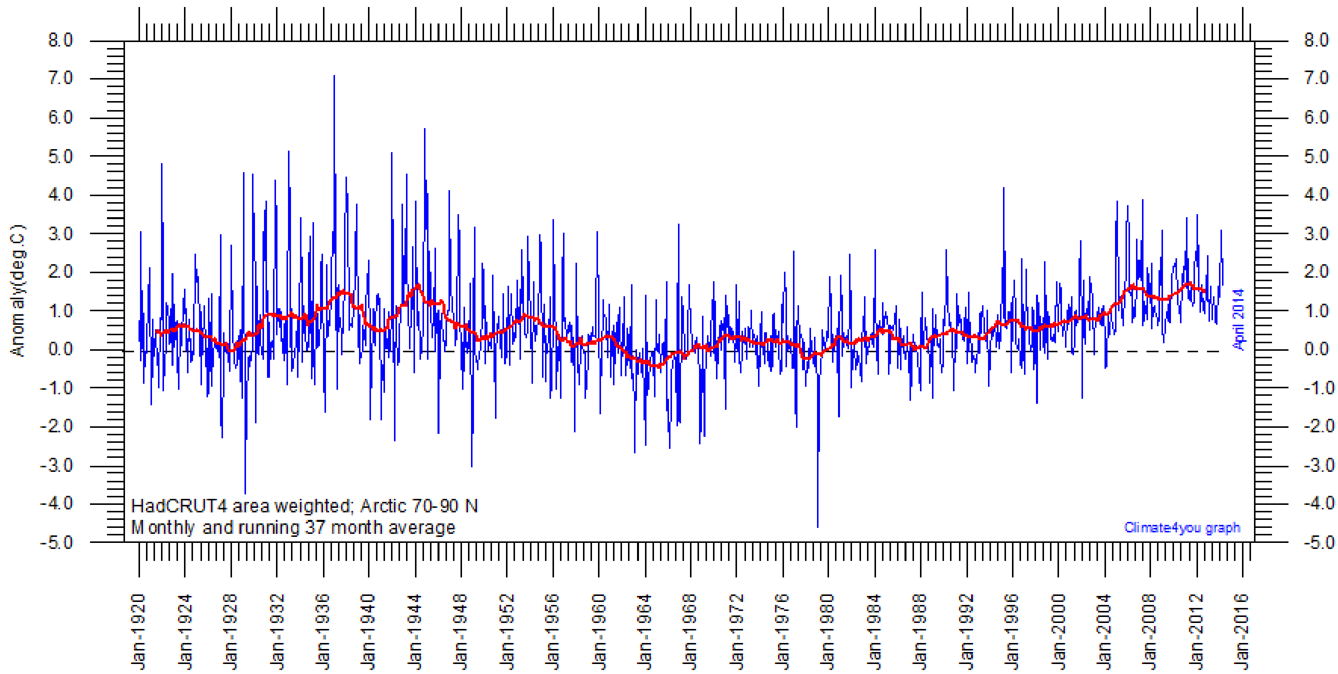


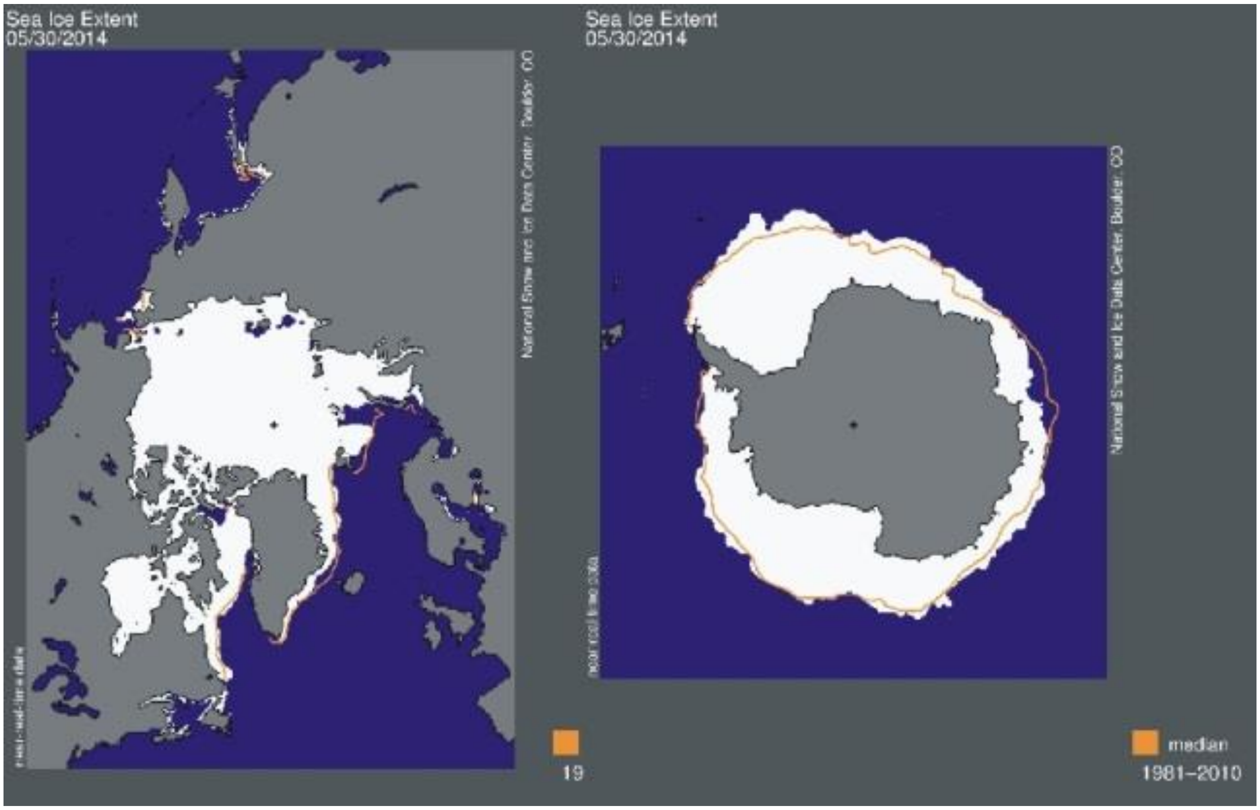
Diagram showing area weighted Arctic (70-90°N) monthly surface air temperature anomalies ([HadCRUT4]) since January 1920, in relation to the WMO [normal period] 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 37 month (c.3 yr) average. 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 [Gillet et al. 2008] which calculated a simple average, with no consideration to the surface area represented by the individual 5°x5° grid cells.

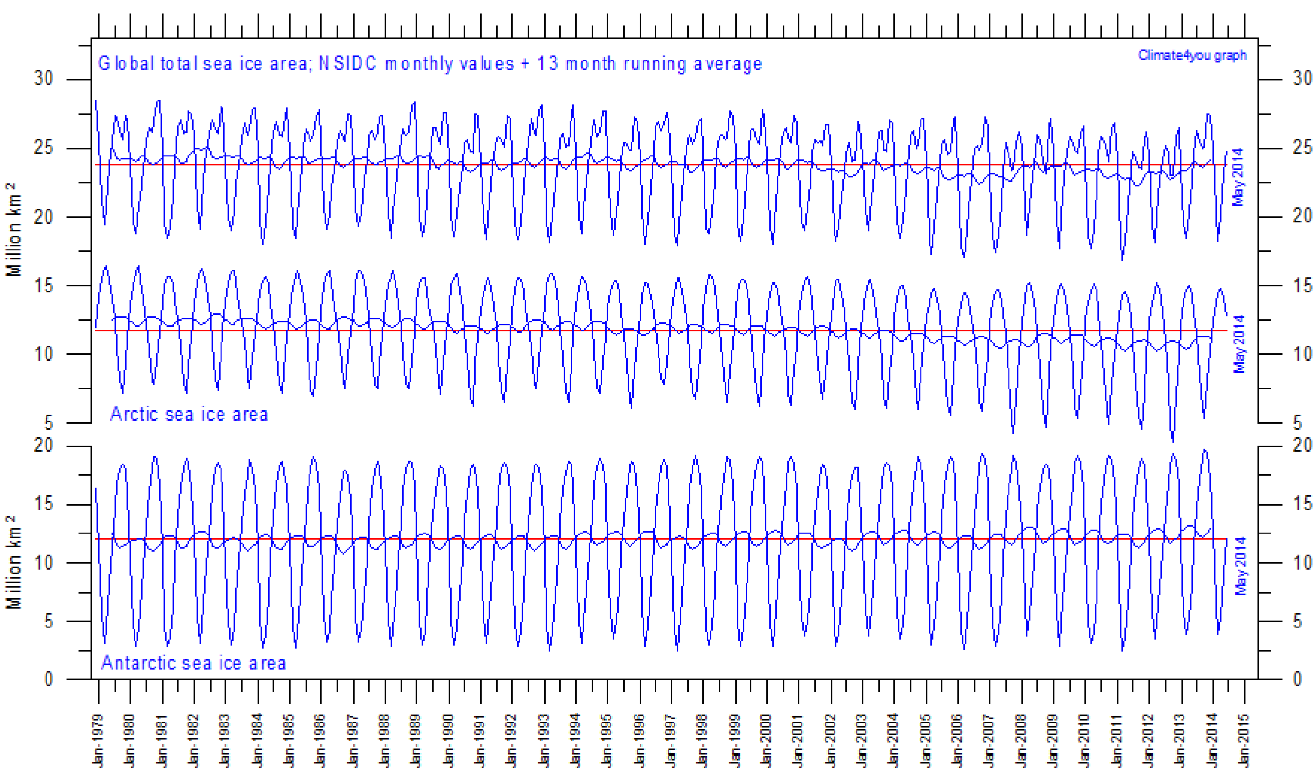
Literature:

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.

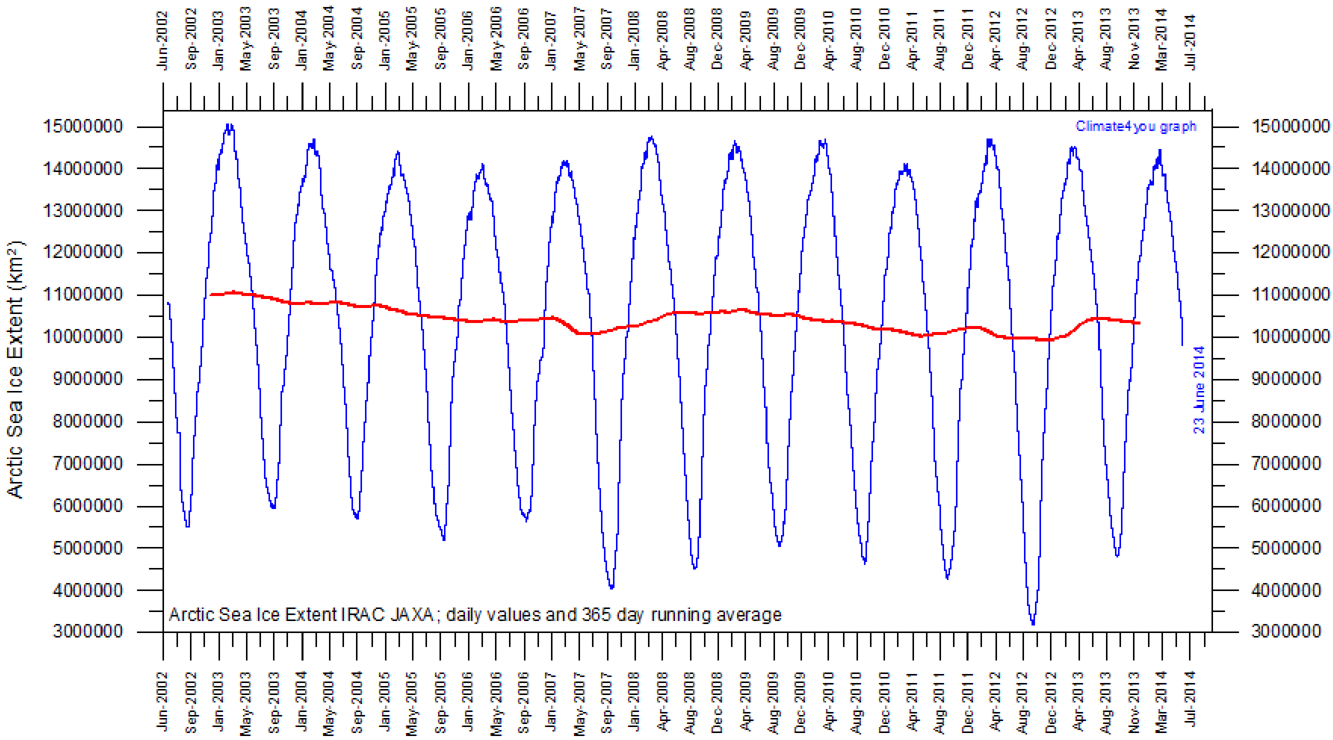
Arctic and Antarctic sea ice, updated to May 2014



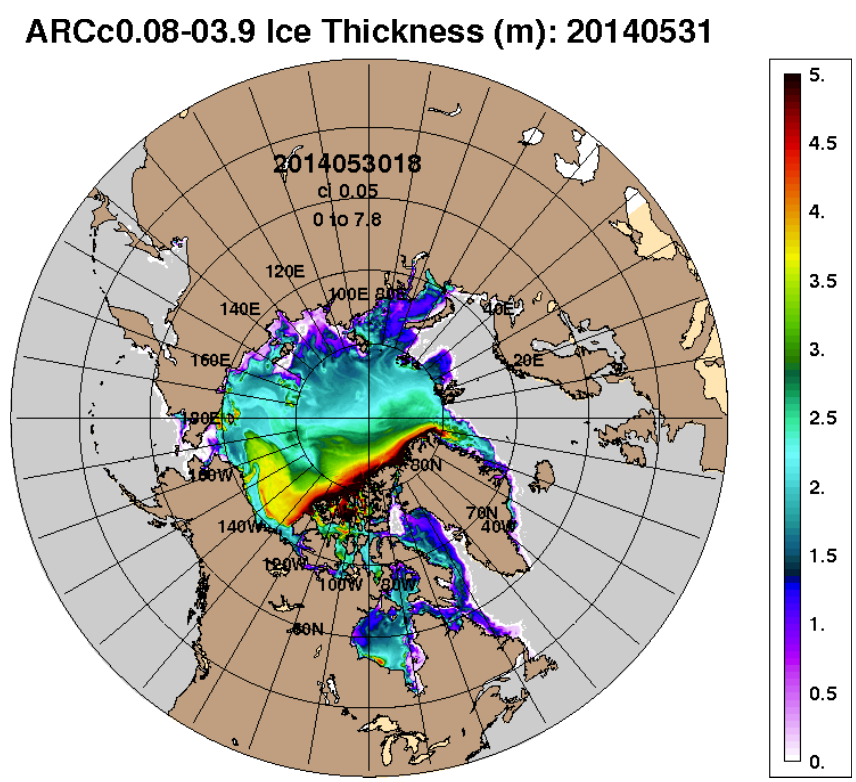
Sea ice extent 30 May 2014. The 'normal' or average limit of sea ice (orange line) is defined as 15% sea ice cover, according to the average of satellite observations 1981-2010 (both years inclusive). Sea ice may therefore well be encountered outside and open water areas inside the limit shown in the diagrams above. Map source: National Snow and Ice Data Center *(NSIDC).*



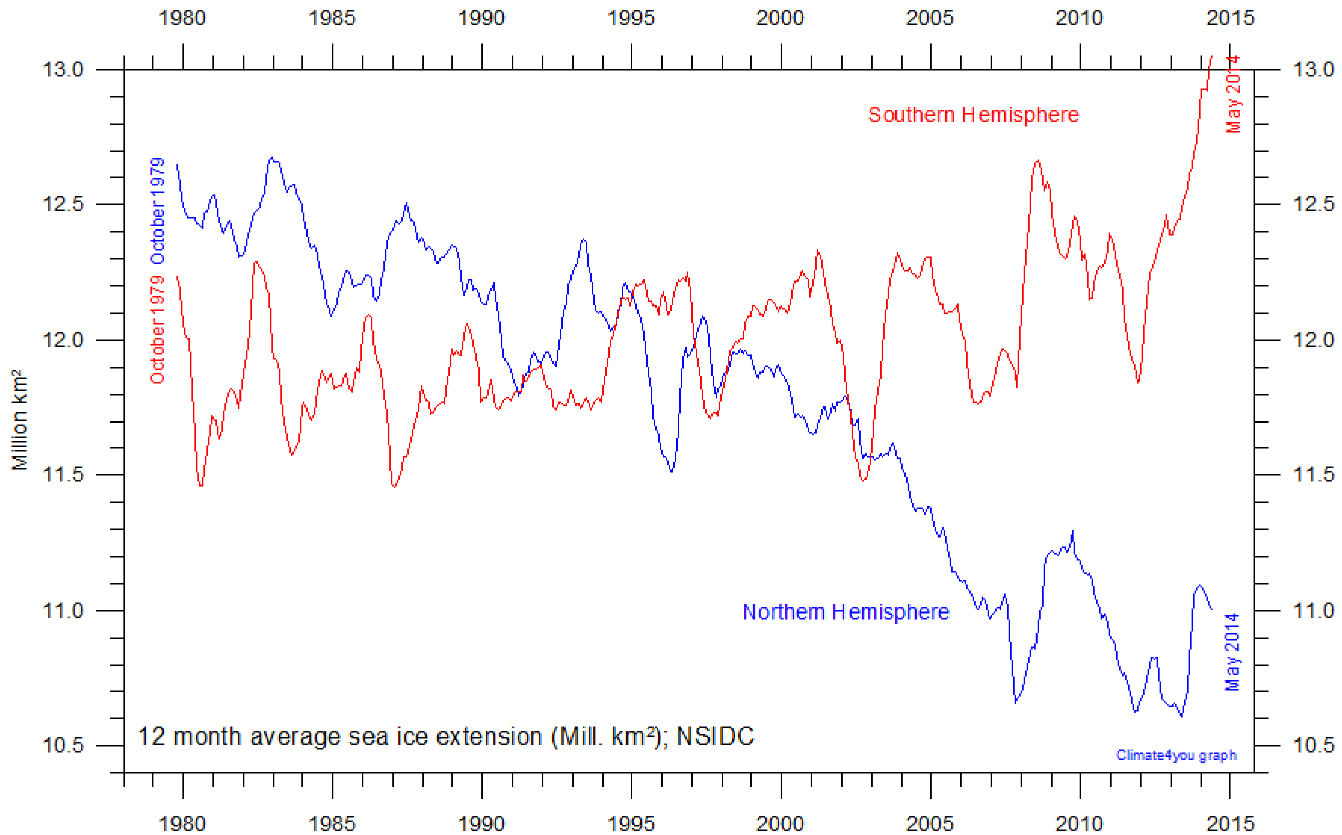
Graphs showing monthly Antarctic, Arctic and global sea ice extent since November 1978, according to the [National Snow and Ice data Center](#) (NSIDC).



Graph showing daily Arctic sea ice extent since June 2002, to 23 June 2014, by courtesy of [Japan Aerospace Exploration Agency](#) (JAXA).

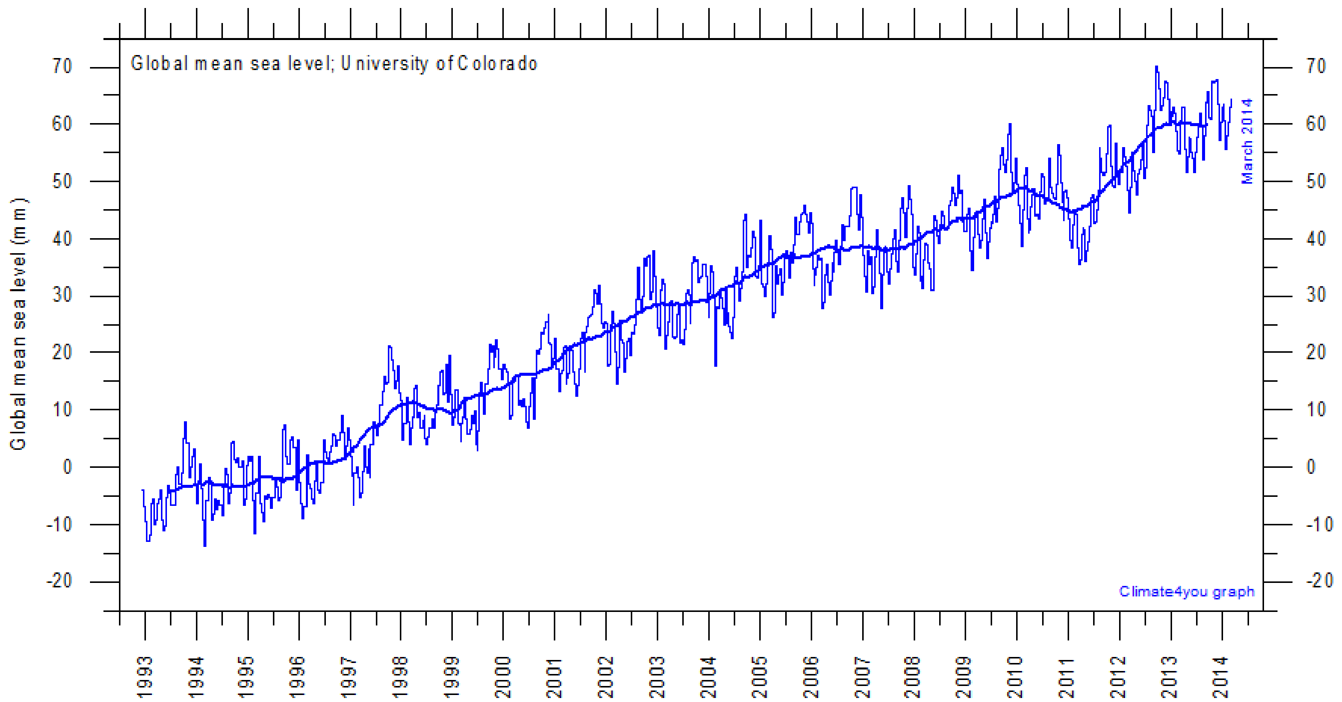


Northern hemisphere sea ice extension and thickness on 31 May 2014 according to the [Arctic Cap Nowcast/Forecast System](#) (ACNFS), US Naval Research Laboratory. Thickness scale (m) is shown to the right.

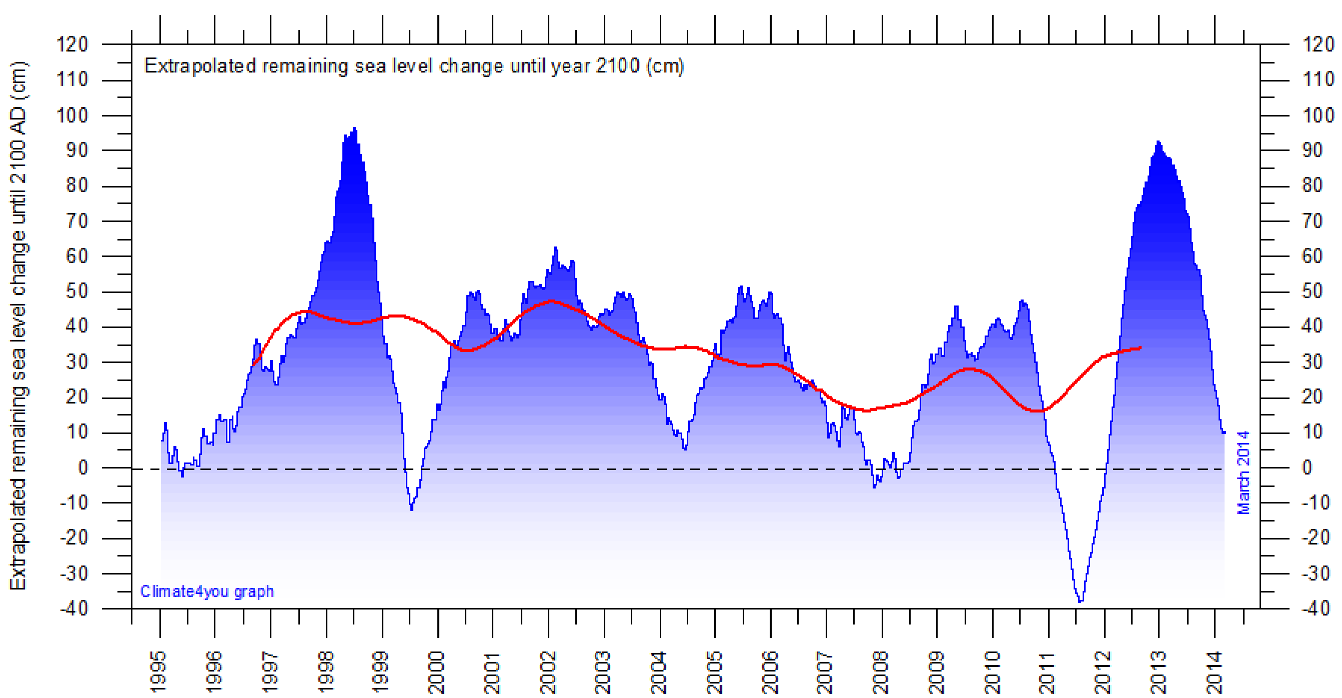


12 month running average sea ice extension in both hemispheres since 1979, the satellite-era. Data source: National Snow and Ice Data Center *(NSIDC).*

Global sea level, updated to March 2014

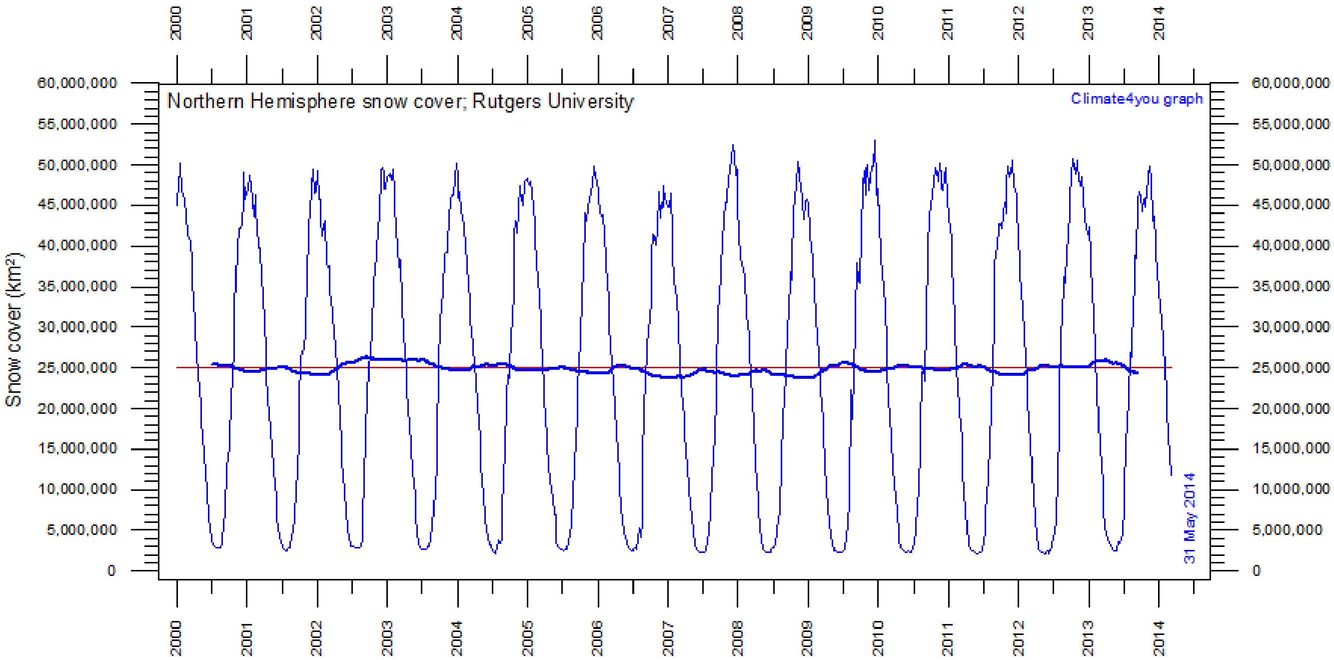


Globa lmonthly sea level since late 1992 according to the Colorado Center for Astrodynamics Research at University of Colorado at Boulder, USA. The thick line is the simple running 37 observation average, nearly corresponding to a running 3 yr average.

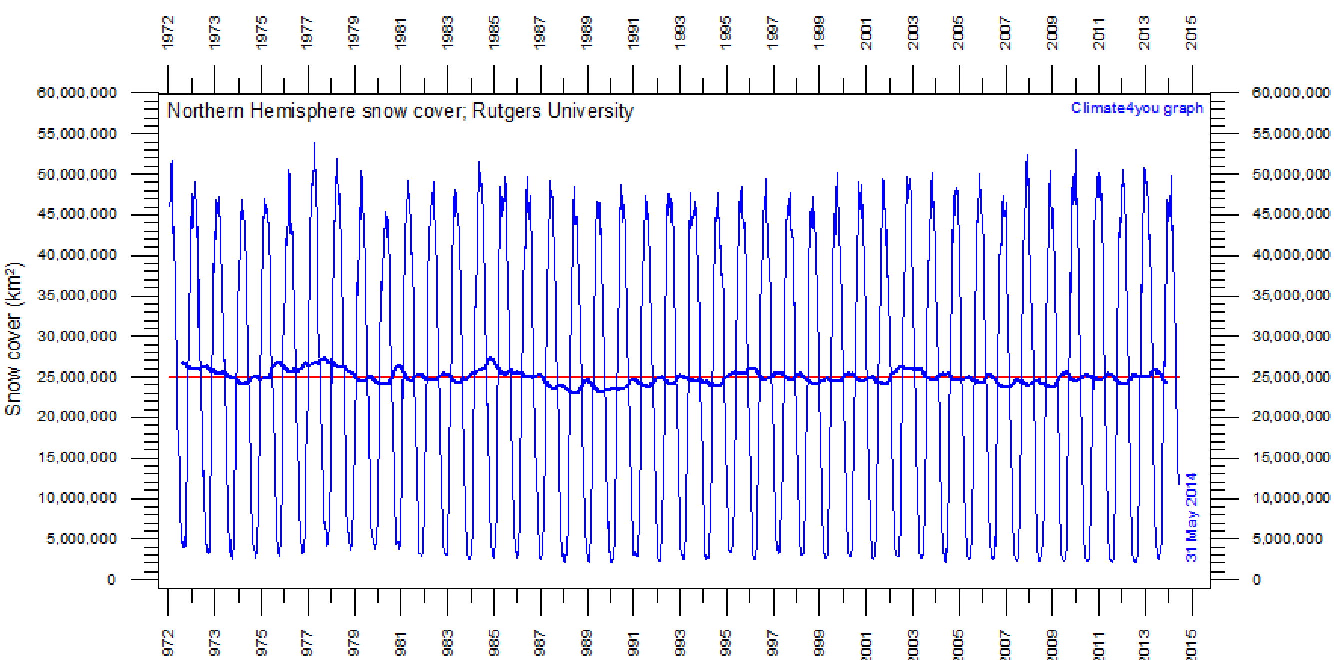


Forecasted change of global sea level until year 2100, based on simple extrapolation of measurements done by the Colorado Center for Astrodynamics Research at University of Colorado at Boulder, USA. The thick line is the simple running 3 yr average forecast for sea level change until year 2100. Based on this (thick line), the present simple empirical forecast of sea level change until 2100 is about +34 cm.

Northern Hemisphere weekly snow cover, updated to late May 2014

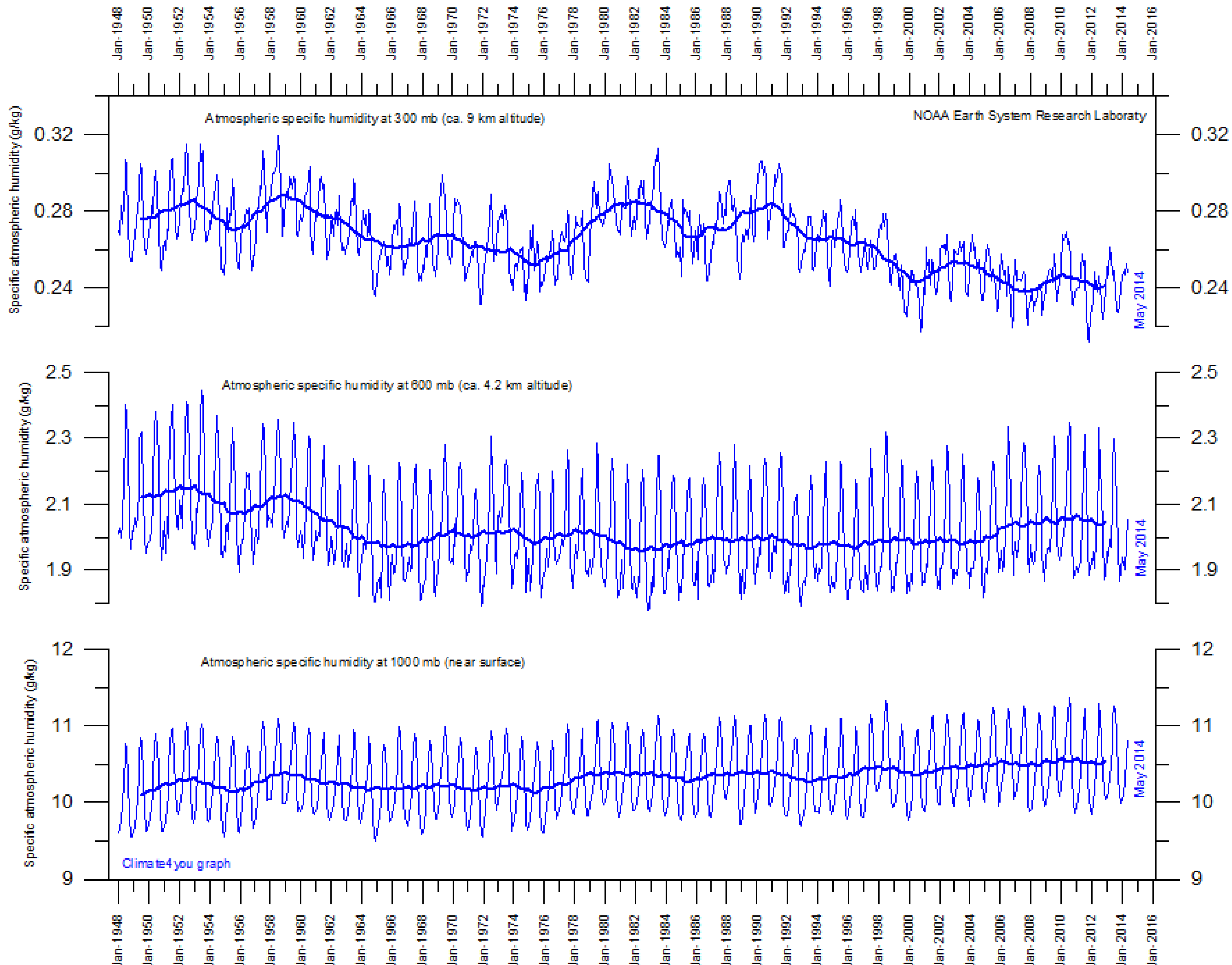


Northern hemisphere weekly snow cover since January 2000 according to Rutgers University Global Snow Laboratory. The thin blue line is the weekly data, and the thick blue line is the running 53 week average (approximately 1 year). The horizontal red line is the 1972-2013 average.



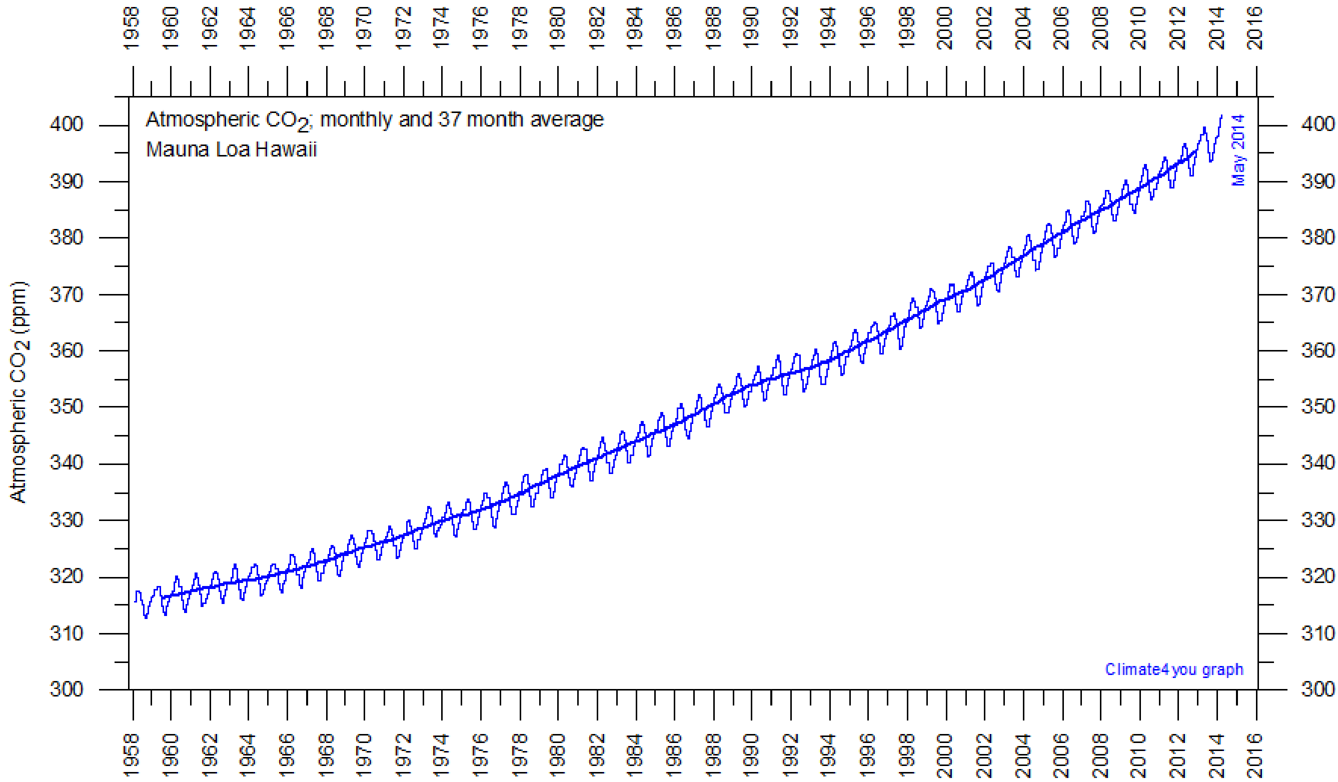
Northern hemisphere weekly snow cover since January 1972 according to Rutgers University Global Snow Laboratory. The thin blue line is the weekly data, and the thick blue line is the running 53 week average (approximately 1 year). The horizontal red line is the 1972-2013 average.

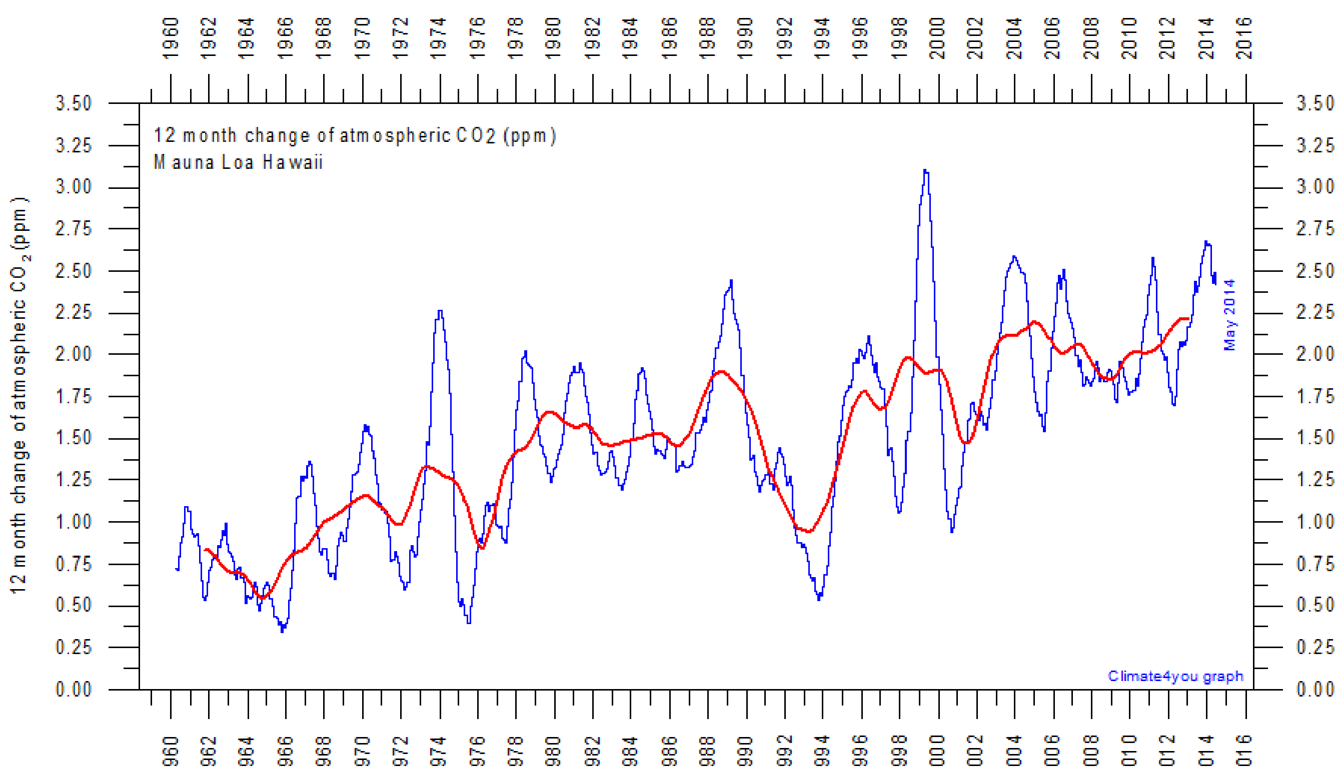
Atmospheric specific humidity, updated to May 2014



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).

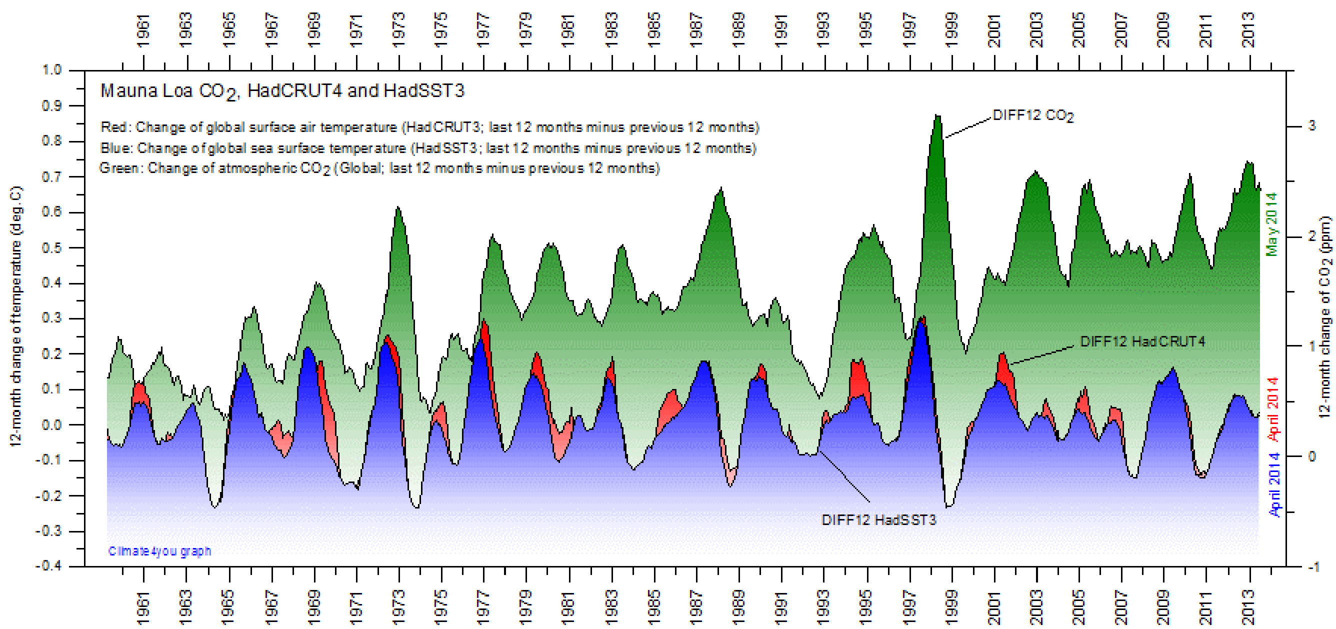
Atmospheric CO_2, updated to May 2014





Monthly amount of atmospheric CO_2 (upper diagram) and annual growth rate (lower diagram); average last 12 months minus average preceding 12 months, blue line) of atmospheric CO_2 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_2 and global temperature, updated to May 2014

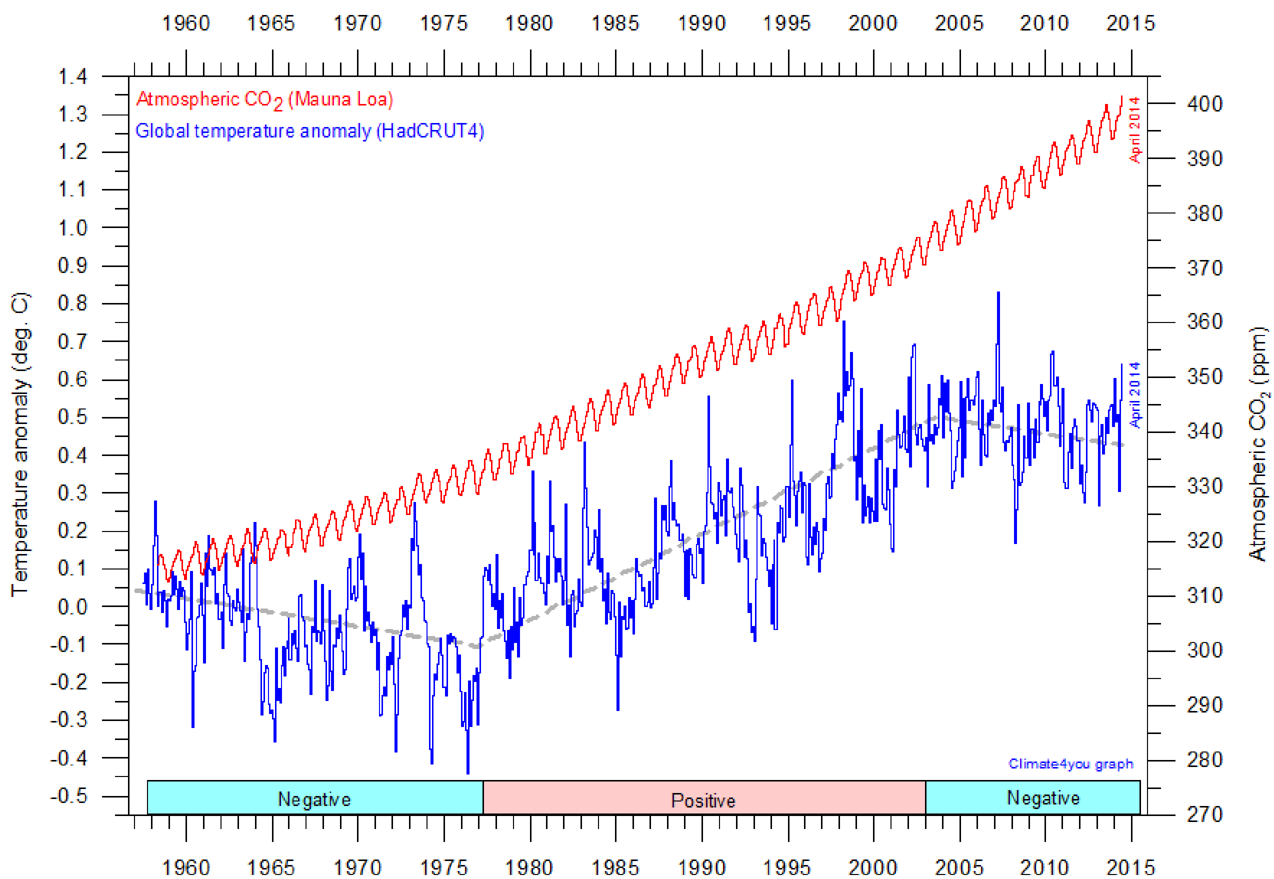


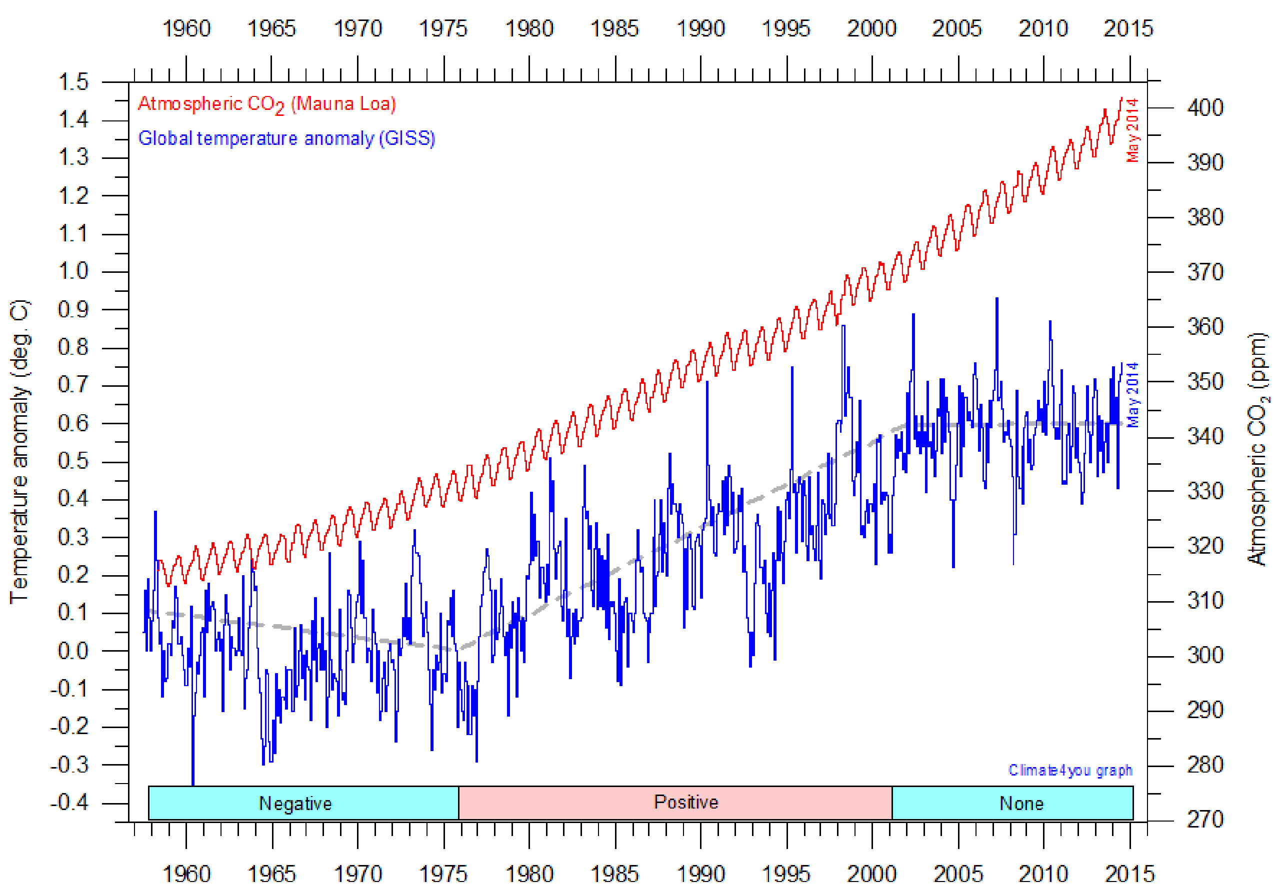
12-month change of global atmospheric CO_2 concentration (Mauna Loa; green), global sea surface temperature (HadSST3; blue) and global surface air temperature (HadCRUT4; red dotted). All graphs are showing monthly values of DIFF12, the difference between the average of the last 12 month and the average for the previous 12 months for each data series.

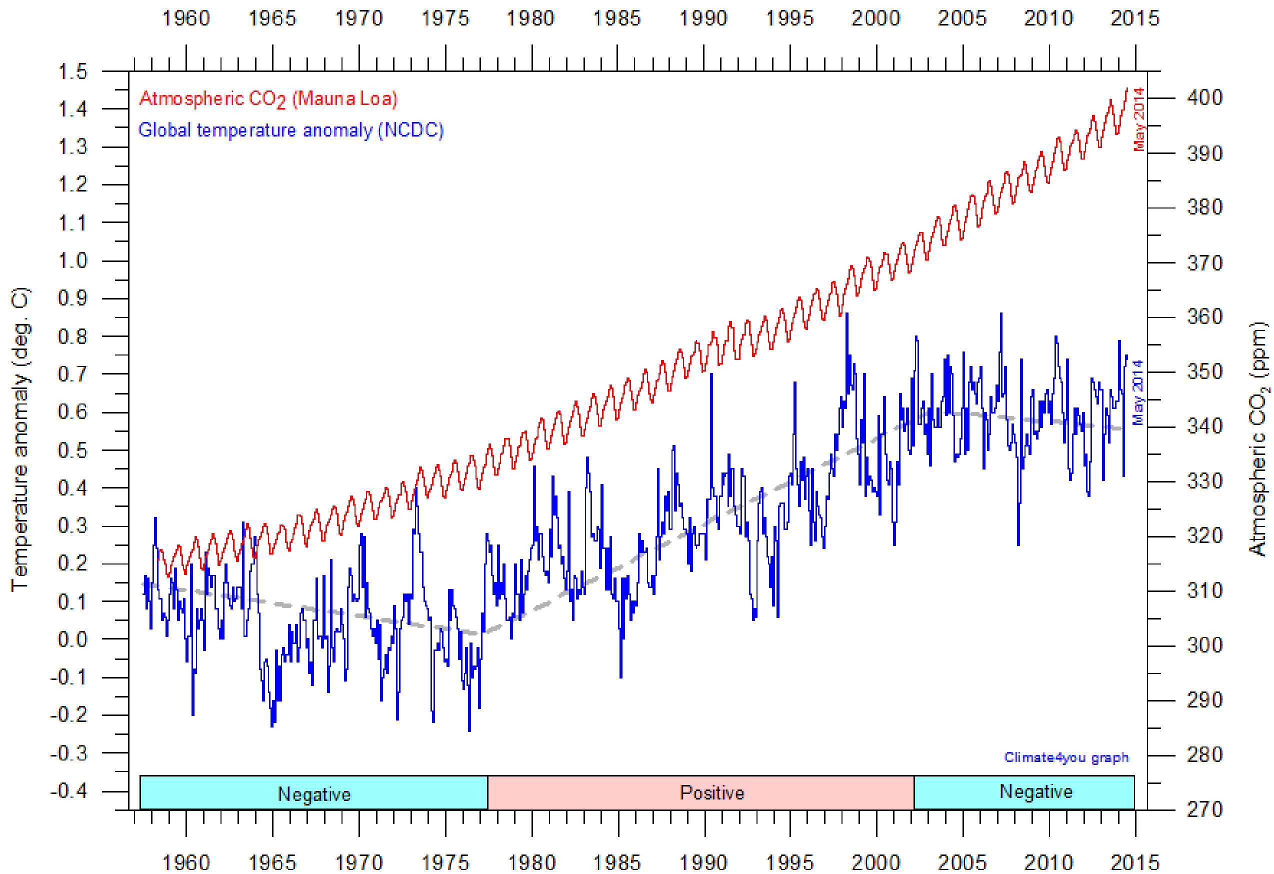
References:

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_2, updated to May 2014







Diagrams showing HadCRUT3, GISS, and NCDC monthly global surface air temperature estimates (blue) and the monthly atmospheric CO_2 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_2 concentrations (before 1958) are not incorporated in this diagram, as such past CO_2 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_2 and global surface air temperature, negative or positive. Please note that the HadCRUT4 diagram is not yet updated beyond April 2014.

Most climate models assume the greenhouse gas carbon dioxide CO_2 to influence significantly upon global temperature. It is therefore relevant to compare different temperature records with measurements of atmospheric CO_2, 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_2 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_2 for global temperatures. Any such meteorological record value may well be the result of other phenomena.

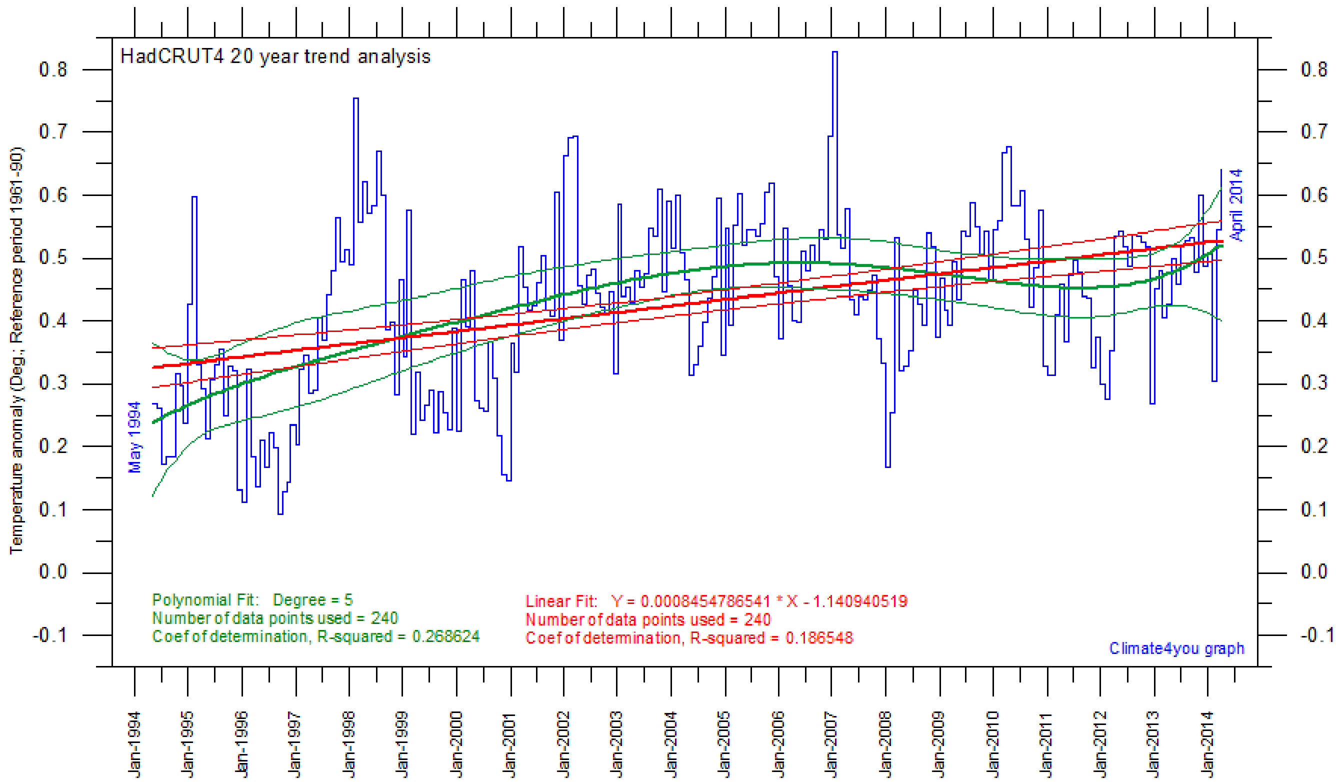
What exactly defines the critical length of a relevant time period to consider for evaluating the alleged importance of CO_2 remains elusive, and is still a topic for discussion. However, the critical period length must be inversely proportional to the temperature sensitivity of CO_2, including feedback effects. If the net temperature effect of atmospheric CO_2 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_2. After about 10 years of concurrent global temperature- and CO_2-increase, IPCC was established in 1988. For obtaining public and political support for the CO_2-hyphotesis the 10 year warming period leading up to 1988 in all likelihood was important. Had the global temperature instead been decreasing, politic support for the hypothesis would have been difficult to obtain.

Based on the previous 10 years of concurrent temperature- and CO_2-increase, many climate scientists in 1988 presumably felt that their understanding of climate dynamics was sufficient to conclude about the importance of CO_2 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_2 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_2 has been indicated in the lower panels of the diagrams above.

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



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.

1801: The first battle of Copenhagen

The Battle of Copenhagen, as painted by Nicholas Pocock (left). Vice Admiral Horatio Lord Nelson (right).

In the years leading up to 1801, Denmark was in dispute with Britain over the right to search neutral ships. As a neutral country to the conflict between Britain and France, Denmark claimed the right to trade with any country and to transport any goods except for a narrow range defined as specific war materials. Britain on her side saw the right to stop and search neutral ships as a matter of stopping French expansion under Napoleon, and ultimately the very survival of the British Isles. For Denmark it primarily meant money. Because of the British-French war, neutral ships were in huge demand and the Danish merchant fleet was making massive profits.

Before the Battle of the Nile (August 1, 1798), the British Navy had been on the defensive, with little spare capacity to deal with neutral ships, but Nelson's victory had changed all that. The Mediterranean was now under the control of the British Navy, and suddenly ships were available to enforce a tight blockade of French and Spanish ports. What until now for Denmark had been merely profiteering now became a point of political principle. Britain maintained the right to search Danish ships, while Denmark denied that right. Danish convoys began to be escorted by Danish warships, but these were usually outnumbered by British warships.

For Denmark the political answer to this situation was an alliance with other neutral nations, to actively protect their merchant ships from being stopped and investigated. Denmark actively prompted Russia to instigate such an alliance, the League of Armed Neutrality. This was, however, not an entirely prudent move by Denmark, as Tsar Paul was considered insane and his actions therefore not always quite predictable. The treaty was ratified by Russia, Sweden, Prussia and

Denmark in Copenhagen on 4 November 1800. According to the treaty, if war for some reason broke out between Russia and Britain, Denmark would be forced to take Russia's side.

On the very day the treaty was ratified in Copenhagen, the erratic Tsar Paul decided to place an embargo on all British ships in Russian ports and arrested all British citizens. Tsar Paul's objective presumably was to use the new alliance to enable a joint Russian and French domination of the European continent, using Denmark and Sweden as buffer states against Britain. Suddenly Denmark was now effectively an enemy of Britain, and it was no longer just a question of preventing neutral ships from being searched. On the other hand, if Denmark did not live up to the treaty, this could well prompt a Russian invasion and the loss of everything.

The British government rapidly decided to take out the Danish fleet, which was strategically well placed at the entrance to the Baltic. In early 1801, a powerful British fleet was assembled at Great Yarmouth under the command of Admiral Sir Hyde Parker with Vice-Admiral Lord Nelson under him. The British fleet sailed from Yarmouth on 12 March 1801.

According to the treaty, Denmark should expect assistance from both the Russian and the Swedish fleets, which together with the Danish fleet would be able to muster a formidable force with no less than 123 ships of the line (battleships). So things did not look so bad for Denmark, after all.

Winters were generally cold during this part of the Little Ice Age, and the Danish government realized that there would come no assistance from the Russian fleet, as it still was locked by solid sea ice in its bases Kronstad and Reval, near St. Petersburg. At the same time, promised naval support for the Danes from Sweden did not arrive perhaps because of adverse winds. The Prussians had only minimal naval forces and too could not assist in any way. On 30 March, the British force passed through the narrows between Denmark and Sweden, sailing close to the Swedish coast to put themselves as far from the Danish guns as possible; fortunately for the British, the Swedish batteries remained silent.

On the afternoon of 1 April 1801 Nelson took his ships south in Øresund and anchored off the southern tip of the Middle Ground Shoal, south-east of Copenhagen, ready to attack the following day. The next morning, 2 April, there was a favourable wind to take the British ships north past the anchored Danish warships and floating batteries.

This was a hazardous enterprise. The water was shallow and only a single channel with deeper water existed in this particular part of Øresund. The exact position of this channel was not known, and the Danish had understandably removed all markings. Nelson's pilots refused to serve for fear of causing the whole fleet to be grounded (Harvey 2007). Captain Murrau in the *Edgar* then led the way. The previous night he had been sent by Nelson to take soundings in a muffled boat right under the nose of the Danish ships. Eventually, several of the British ships grounded during the battle, a situation which nearly ended in British defeat.

Some of the Danish ships were in poor condition, no more that grounded gun batteries, but at the northern end of the channel between Copenhagen and the island Saltholm to the east there were two strong forts. In total, quite a formidable Danish defence line. The battle that followed was hard. As the morning of the battle wore on, some Danish batteries ceased firering and a few of these surrendered, while others continued to put up a strong resistance. Many British ships were being badly mauled, and slowly Nelson's situation was beginning to look critical. Unlucky for the Danish defence, however, the Danish flagship *Dannebrog* then caught fire and began drifting down the Danish line. This sight had negative influence on the Danish efforts, and even more so when *Dannebrog* exploded later in the afternoon. 3 PM the Danes agreed to a cease-fire under the threat of Nelson to burn the captured Danish floating batteries with the Danish seamen still onboard.

Nearly 1100 km to the north-east, at St. Petersburg, Tsar Paul of Russia had been assassinated by strangling nine days earlier, on 24 March, an act widely attributed to the British secret service. At least, the intimate knowledge on the plot later disclosed by the British ambassador in St. Petersburg suggests British passive complicity (Harvey 2007).

The new Tsar, Alexander I, immediately reversed Russian foreign policy, releasing British merchant ships which had been seized, and signed an agreement with Britain under which British goods were again allowed to sail in Baltic waters. In summer, news of such a momentous event, travelling by sea, would have reached Copenhagen long before the battle on April 2. However, in the winter 1800-1801 the Russian ports were still ice-bound at that time, and for much of their journey couriers had to take a longer, overland route.

It is not entirely clear when the news about the assassination of Tsar Paul arrived in Copenhagen, but it has been suggested that it came while the battle was still raging, and influenced subsequent events. Had the winter 1800-1801 not been so cold and the intelligence therefore received earlier in Copenhagen, the whole melancholic affair today known as the First Battle of Copenhagen (Danish: Slaget på Rheden) might have been avoided (Adkins and Adkins 2006). And had the British Navy no intelligence on the Russian fleet still being ice-bound in March 1801, the First Battle of Copenhagen presumably would not have been fought at all. Chances are that the Second Battle of Copenhagen had not been fought, either.

References:

Adkins, R. and Adkins, L. 2006. *The War for All the Oceans. From Nelson at the Nile to Napoleon at Waterloo*. Abacus, London, 534 pp.

Harvey, R. 2007. *The Wars of Wars. The epic struggle between Britain and France 1789-1815*. Constable & Robinson Ltd., London, 962 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

Yours sincerely,

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