Climate4you update July 2011

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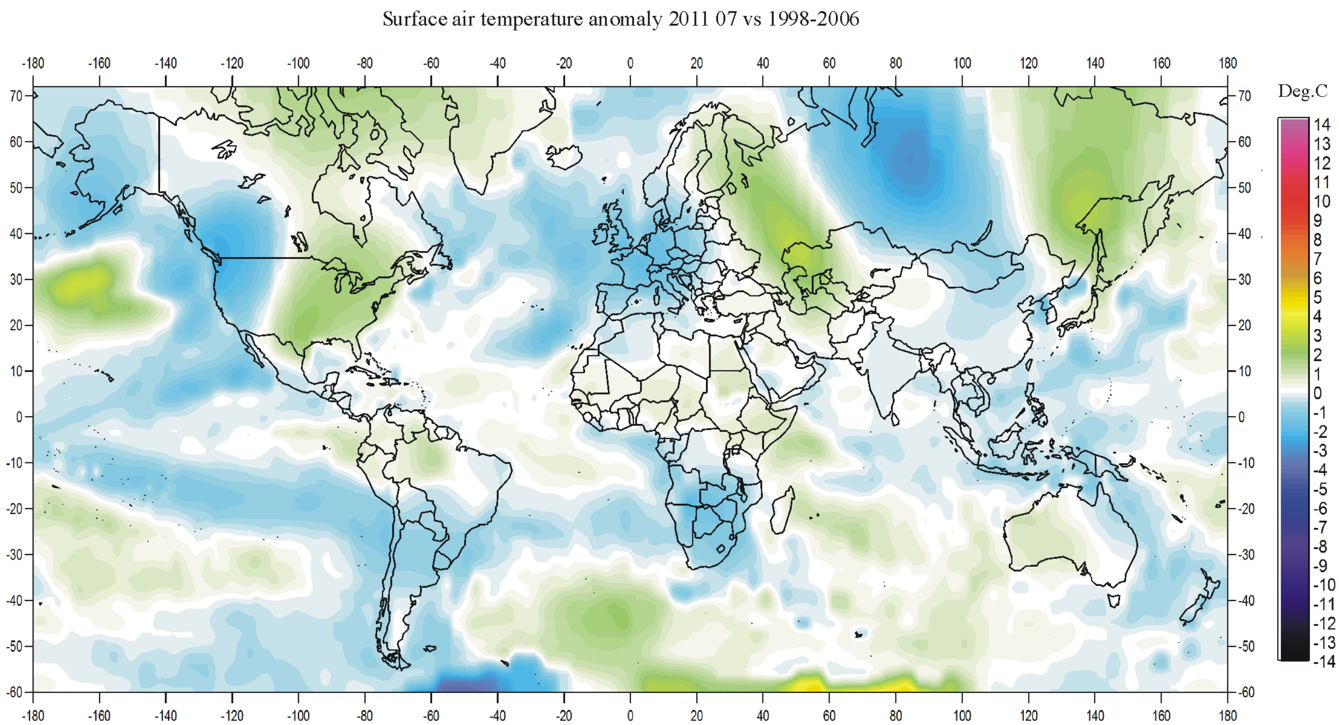
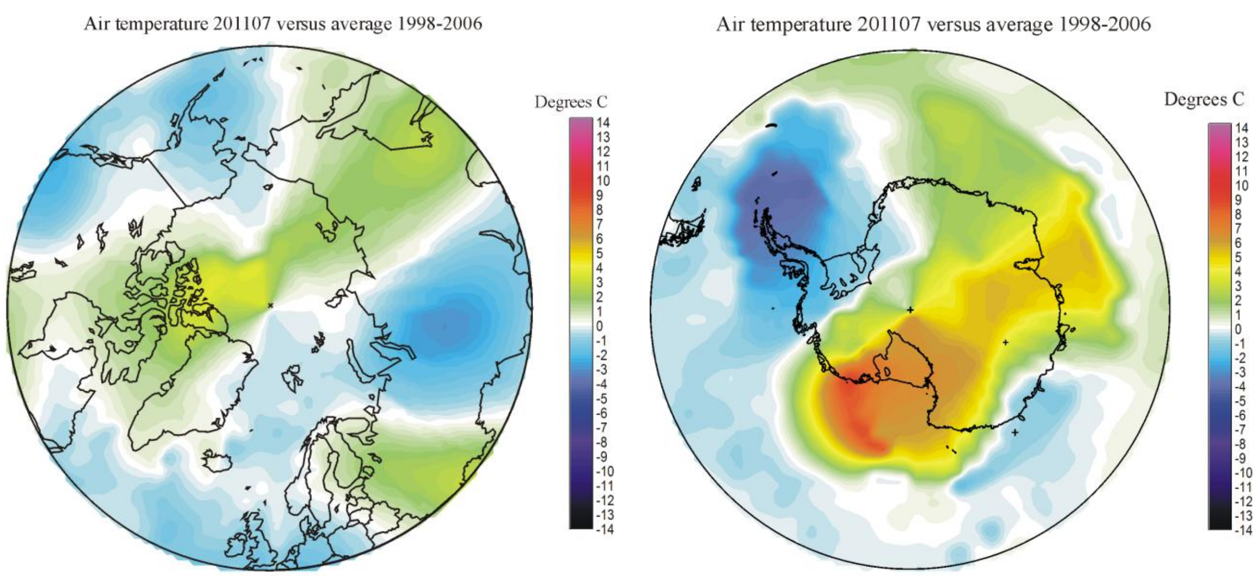
July 2011 global surface air temperature overview





July 2011 surface air temperature compared to the 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 July 2011 global surface air temperature overview

General: This newsletter contains graphs showing a selection of key meteorological variables for July 2011. 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 relatively cold period 1945-1980. Almost any comparison with such a low average value will therefore appear as high or 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 this consideration, the recent temperature development suggests that the time window 1998-2006 may roughly represent a global temperature peak. If so, negative temperature anomalies will gradually become more and more widespread as time goes on. However, if positive anomalies instead gradually become more widespread, this reference period only represented a temperature plateau.

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 several of the 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 on www.Climate4you.com.

Most diagrams shown in this newsletter are also available for download on www.climate4you.com

The average global surface air temperatures July 2011:

The Northern Hemisphere was characterised by regional variability. Below average temperatures extended across western North America, most of the North Atlantic and Europe, and central Russia. Above average temperatures characterised eastern North America, western Russia and eastern Siberia.

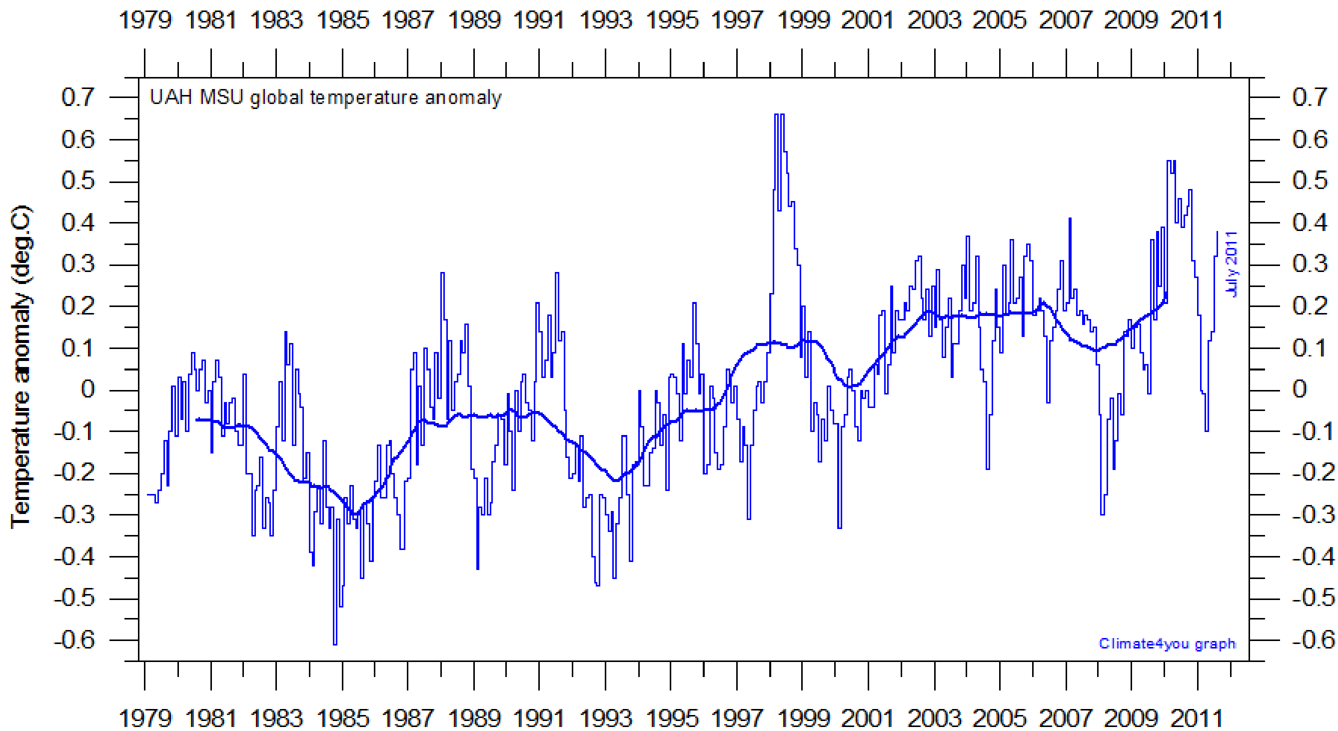
The Southern Hemisphere in general was close to average 1998-2006 conditions, with the exception of parts of the Antarctic. Most other land regions experienced below average temperatures.

Also the near Equator temperatures conditions were close to average 1998-2006 conditions.

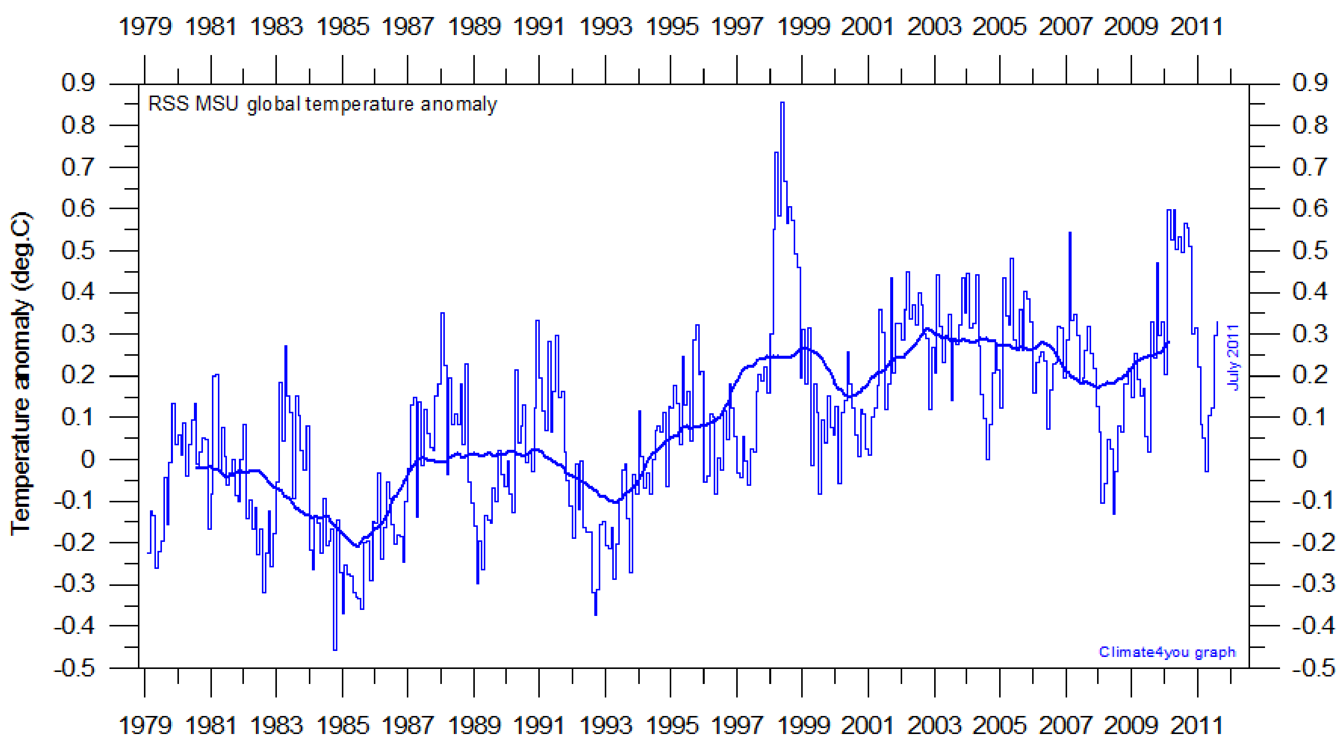
The Arctic was characterized by a relatively high variability of surface air temperature deviations from the 1998-2006 average. The European Arctic sector had below average temperatures, and also Alaska and parts of Russia and western Siberia were relatively cold. Most of the Canadian sector and eastern Siberia experienced above average temperatures.

Most of the Antarctic continent experienced high average temperatures, the only major exception being the Antarctic Peninsula.

Lower troposphere temperature from satellites, updated to July 2011

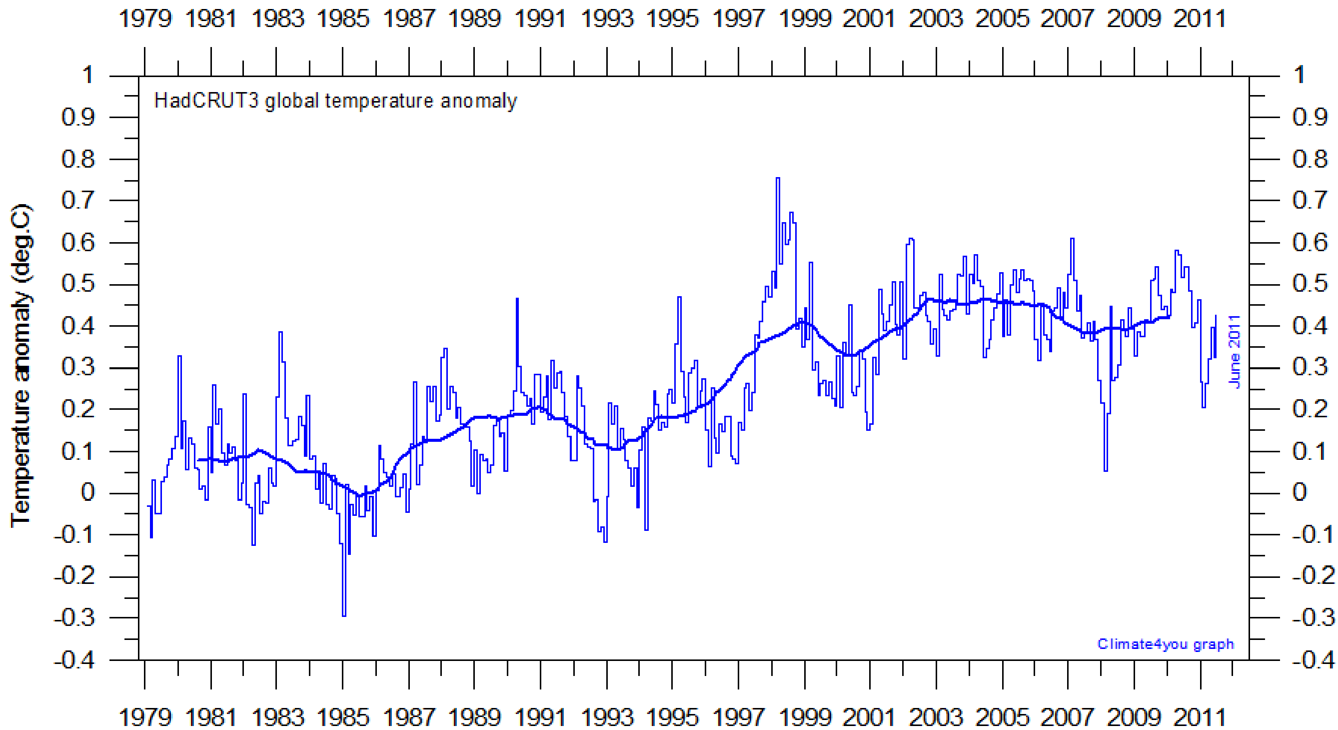


Global monthly average lower troposphere temperature (thin line) since 1979 according to University of Alabama at Huntsville, USA. The thick line is the simple running 37 month average.

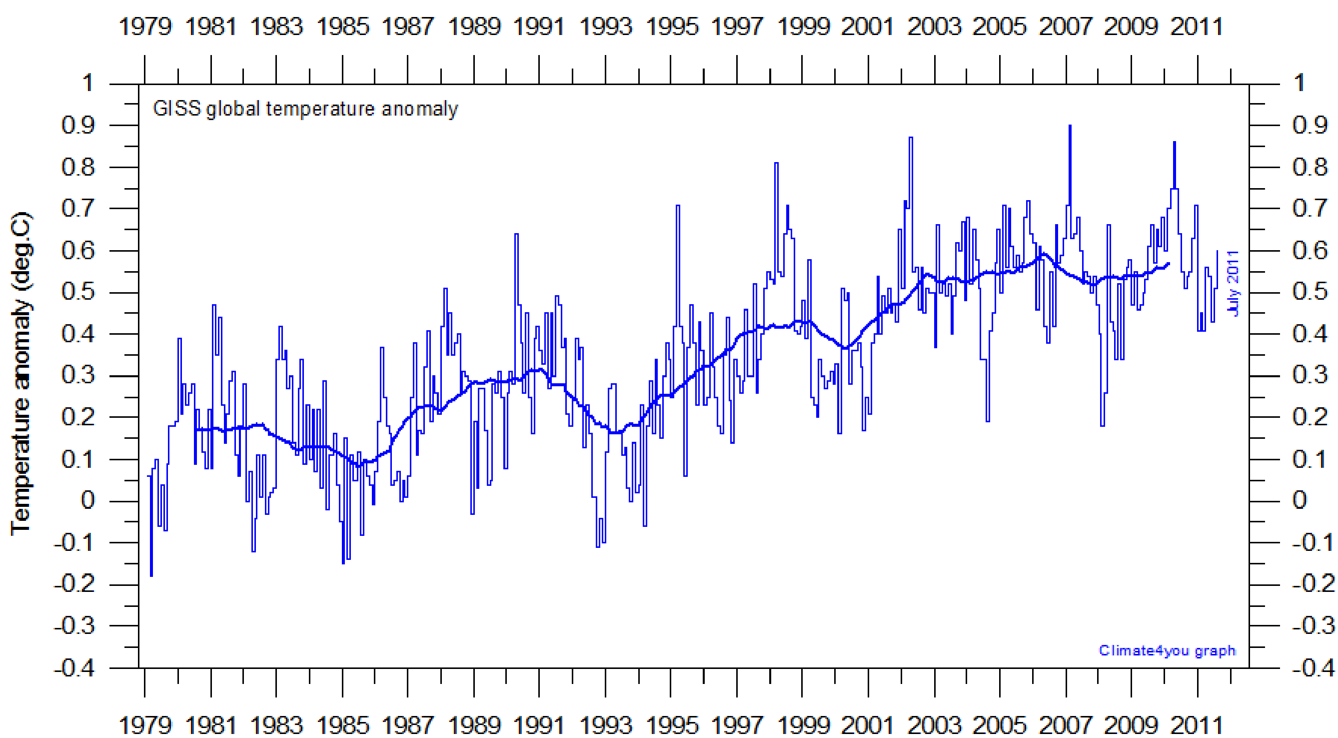


Global monthly average lower troposphere temperature (thin line) since 1979 according to according to Remote Sensing Systems (RSS), USA. The thick line is the simple running 37 month average.

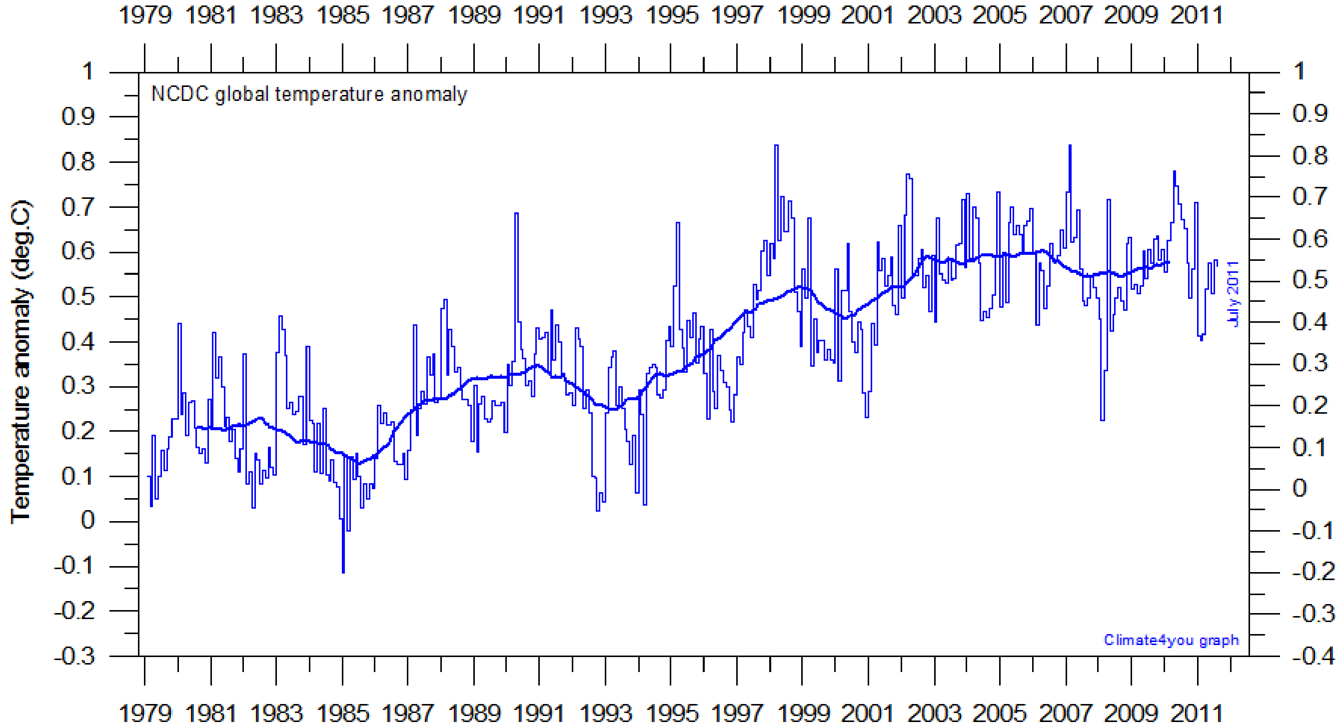
Global surface air temperature, updated to July 2011



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. Please note that the HadCRUT3 record is only updated to June 2011.



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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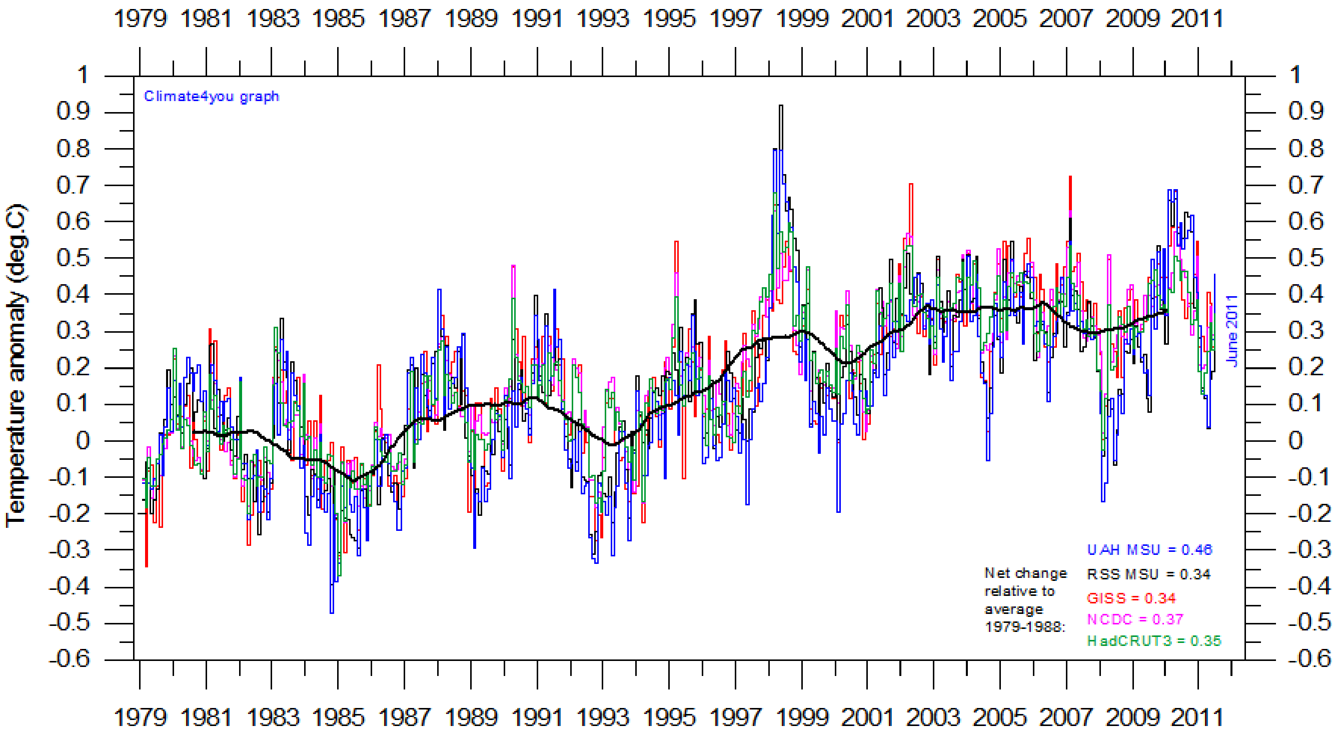
All the above temperature estimates display changes when one compare with previous monthly data sets, not only for the most recent months as a result of additional data being added, but actually for all months back to the very beginning of the records. The most stable temperature record over time of the five records shown above is the HadCRUT3 series.

The interested reader may find more on the issue of temporal stability on [www.climate4you](#) (go to: Global Temperature and then Temporal Stability).

All in one, updated to June 2011

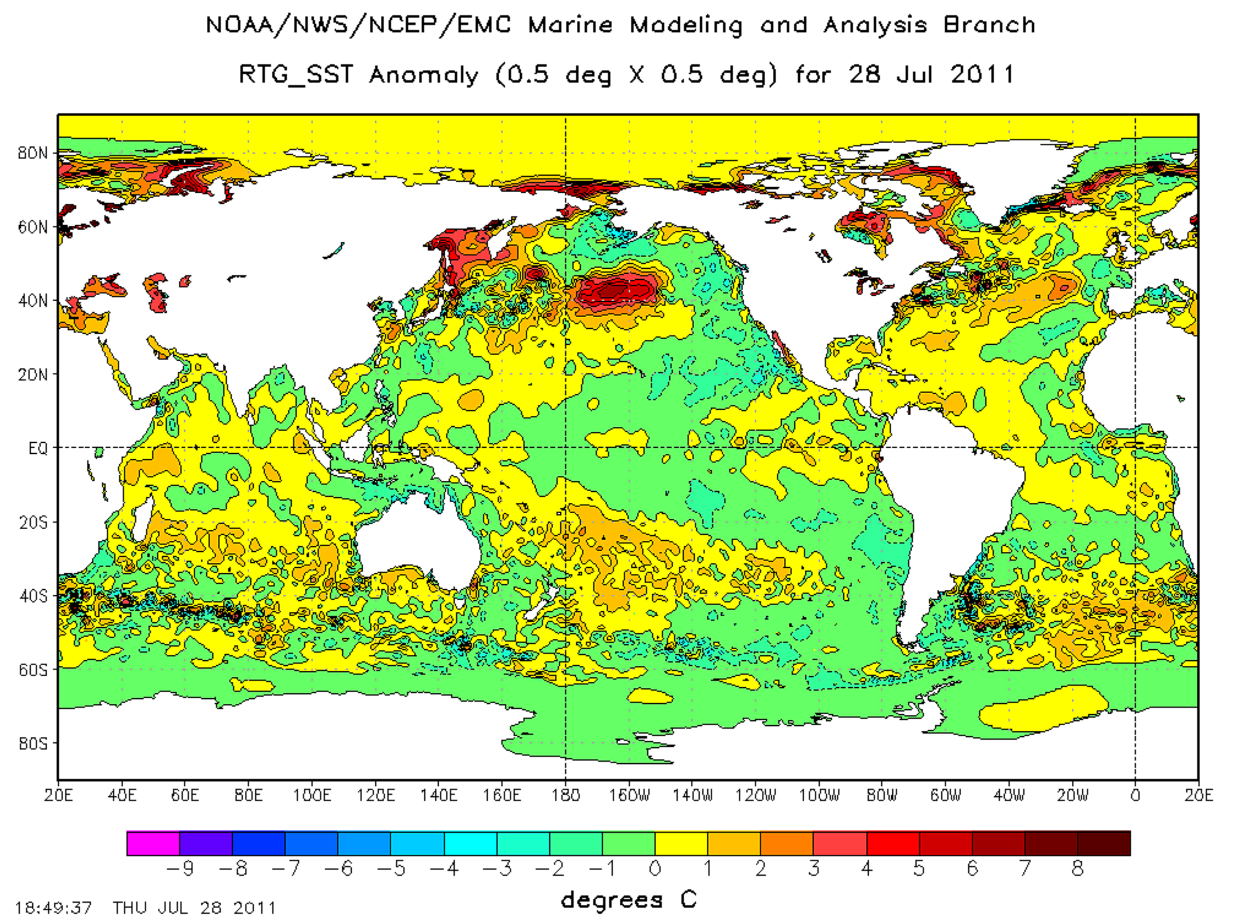


Superimposed plot of all five global monthly temperature estimates shown above. As the base period differs for the different temperature estimates, they have all been normalised by comparing to the average value of their initial 120 months (10 years) from January 1979 to December 1988. The heavy black 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 above mentioned 10 yr average.

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 in principle may be 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 may be considerable differences between the individual records.

All five global temperature estimates presently show 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 within the coming years. Time will show which of these two possibilities is correct.

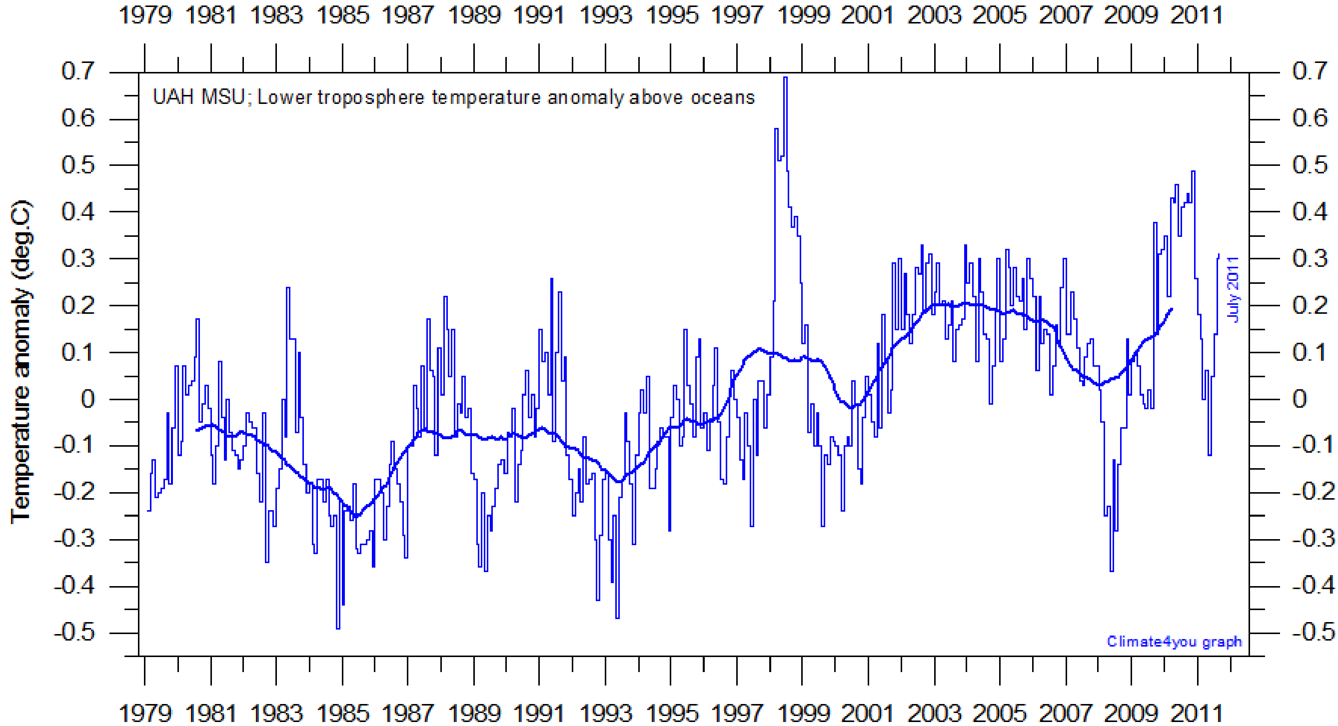
Global sea surface temperature, updated to end of July 2011



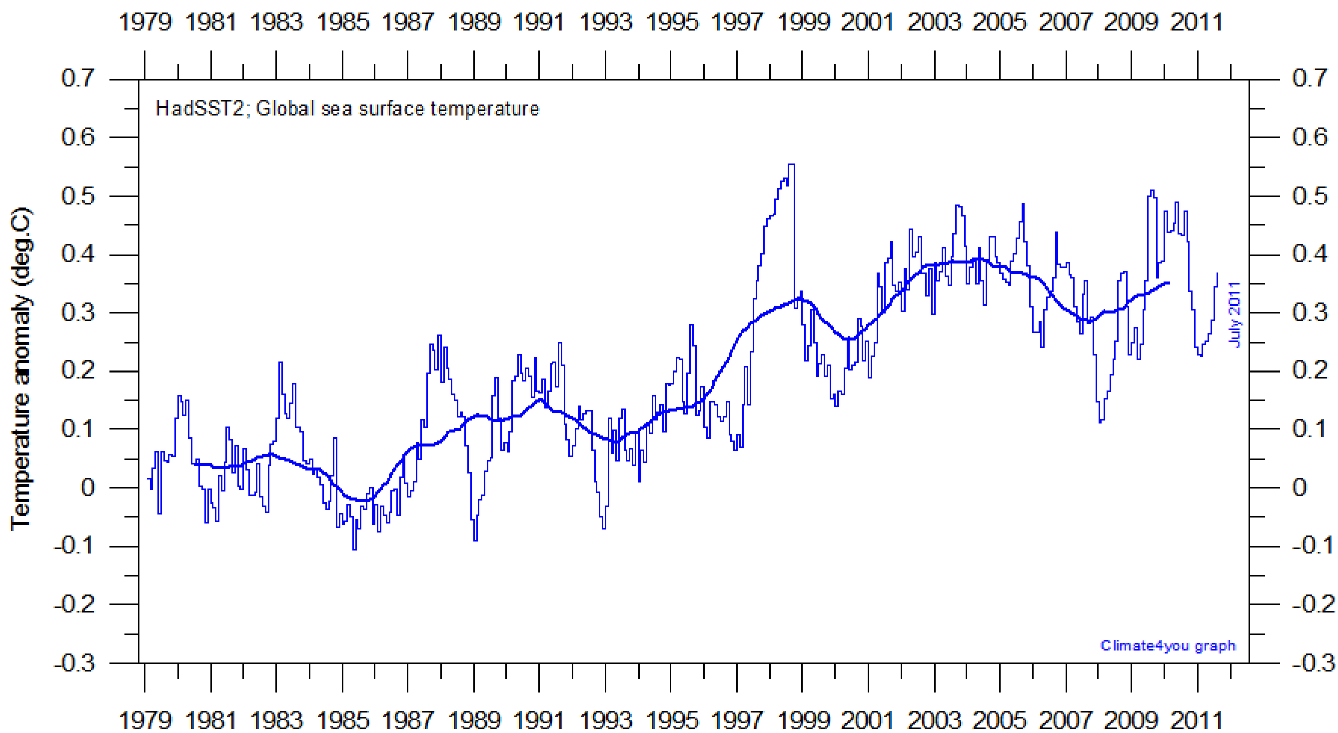
Sea surface temperature anomaly at 28 July 2011. Map source: National Centers for Environmental Prediction (NOAA).

The relative cold surface water dominating the regions near Equator in the eastern Pacific Ocean represents the remnants of the previous La Niña situation, but warmer water is slowly spreading west from the Peruvian coast. Because of the large surface areas involved (being near Equator) this cyclic oceanographic development will be affecting the global atmospheric temperature in the months to come.

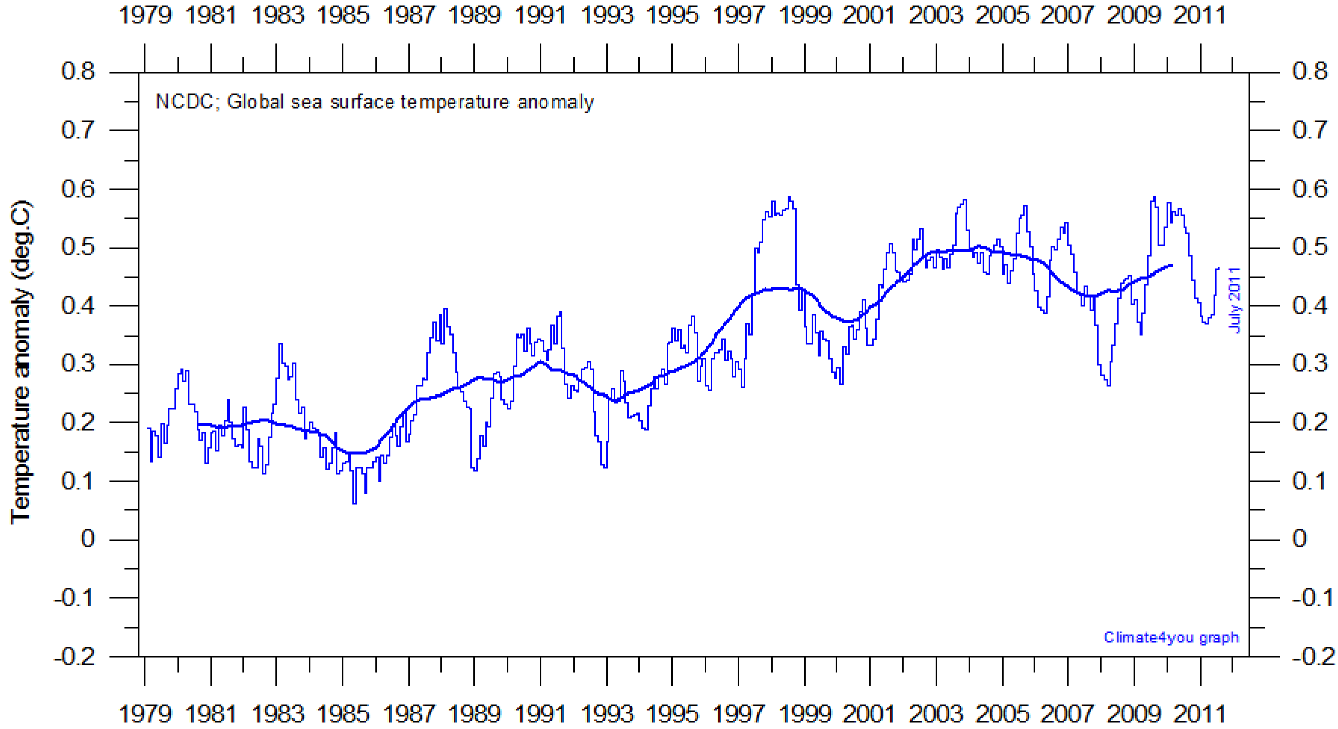
The significance of any such warming or cooling seen in surface air temperatures should consequently not be over stated. Whenever Earth experiences cold La Niña or warm El Niño episodes major heat exchanges takes place between the Pacific Ocean and the atmosphere above, eventually showing up in estimates of the global air temperature. However, this does not reflect similar changes in the total heat content of the atmosphere-ocean system. In fact, net changes may be small, as the above heat exchange mainly reflects a redistribution of energy between ocean and atmosphere. What matters is the overall temperature development when seen over some 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.

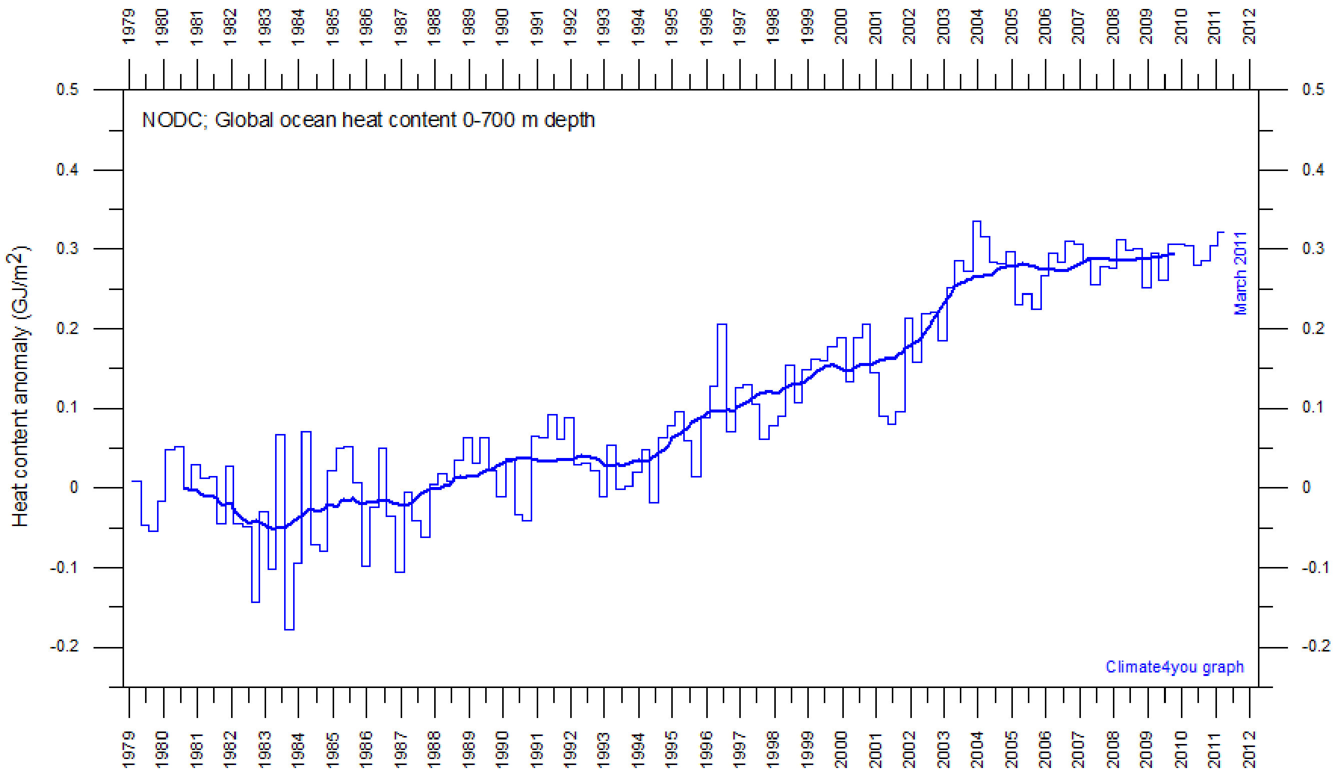


Global monthly average sea surface temperature since 1979 according to University of East Anglia's [Climatic Research Unit] ([CRU]), UK. Base period: 1961-1990. The thick line is the simple running 37 month average. Please note that this diagram is not updated beyond May 2011.

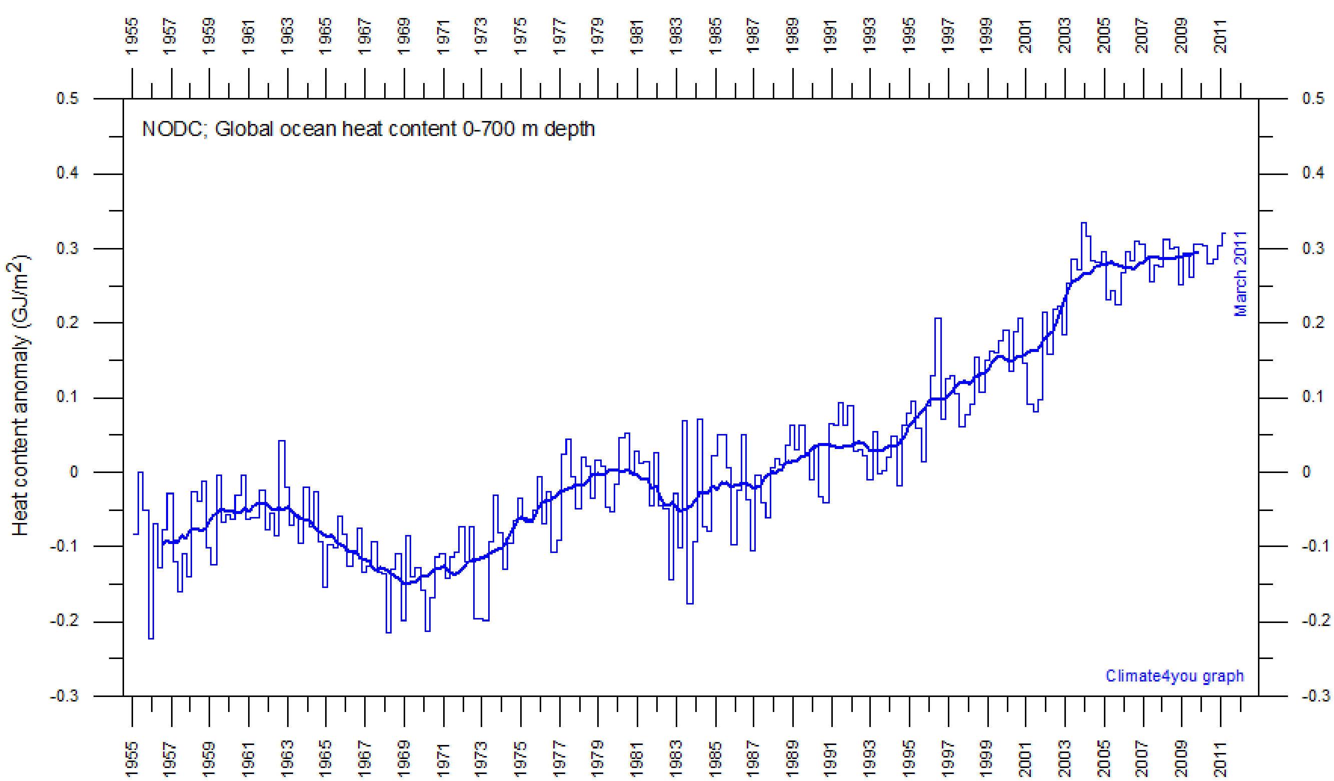


Global monthly average sea surface temperature since 1979 according to the [National Climatic Data Center](#) (NCDC), USA. Base period: 1901-2000. The thick line is the simple running 37 month average.

Global ocean heat content, updated to March 2011

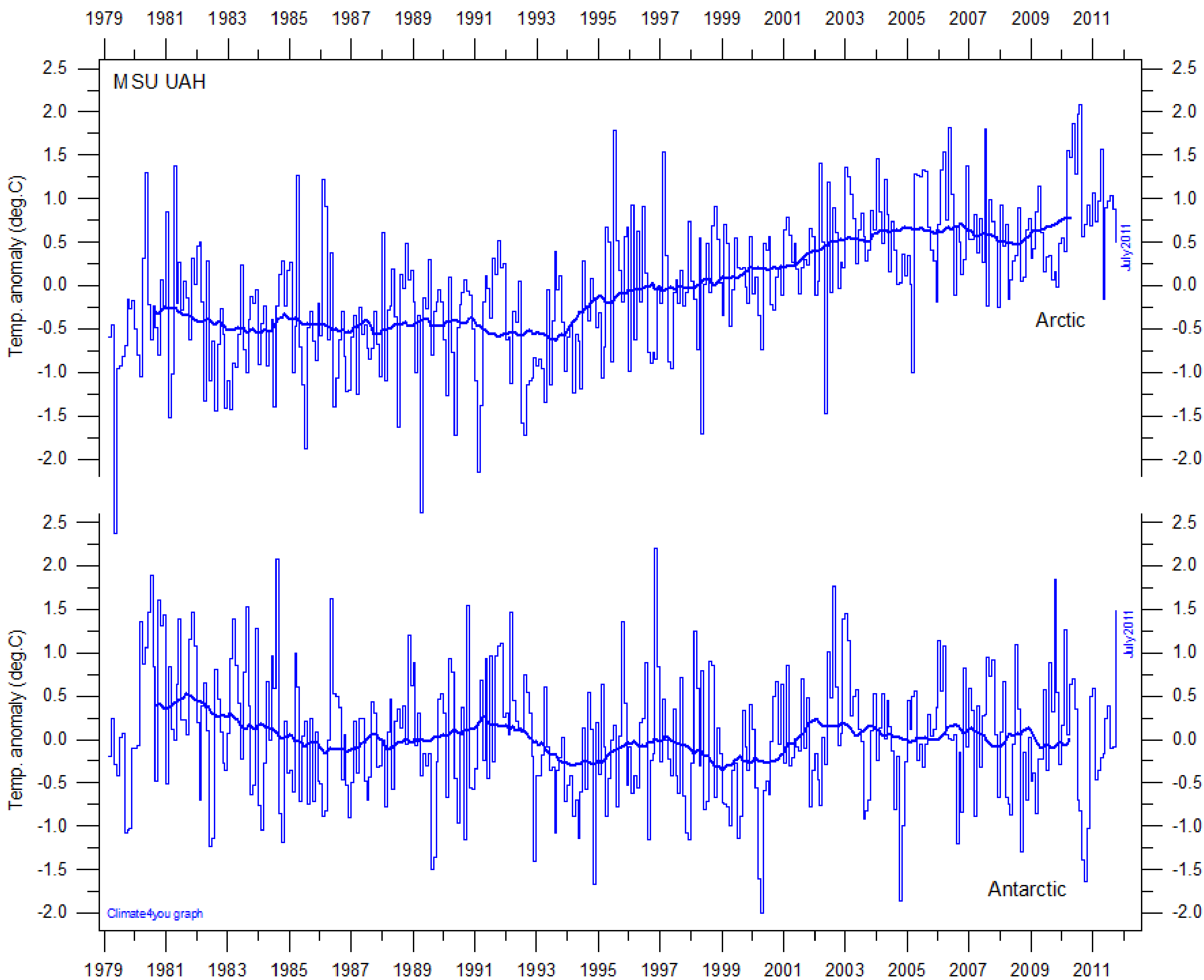


Global monthly heat content anomaly (GJ/m2) in the uppermost 700 m of the oceans since January 1979. Data source: National Oceanographic Data Center(NODC).



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).

Arctic and Antarctic lower troposphere temperature, updated to July 2011



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). 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 May 2011

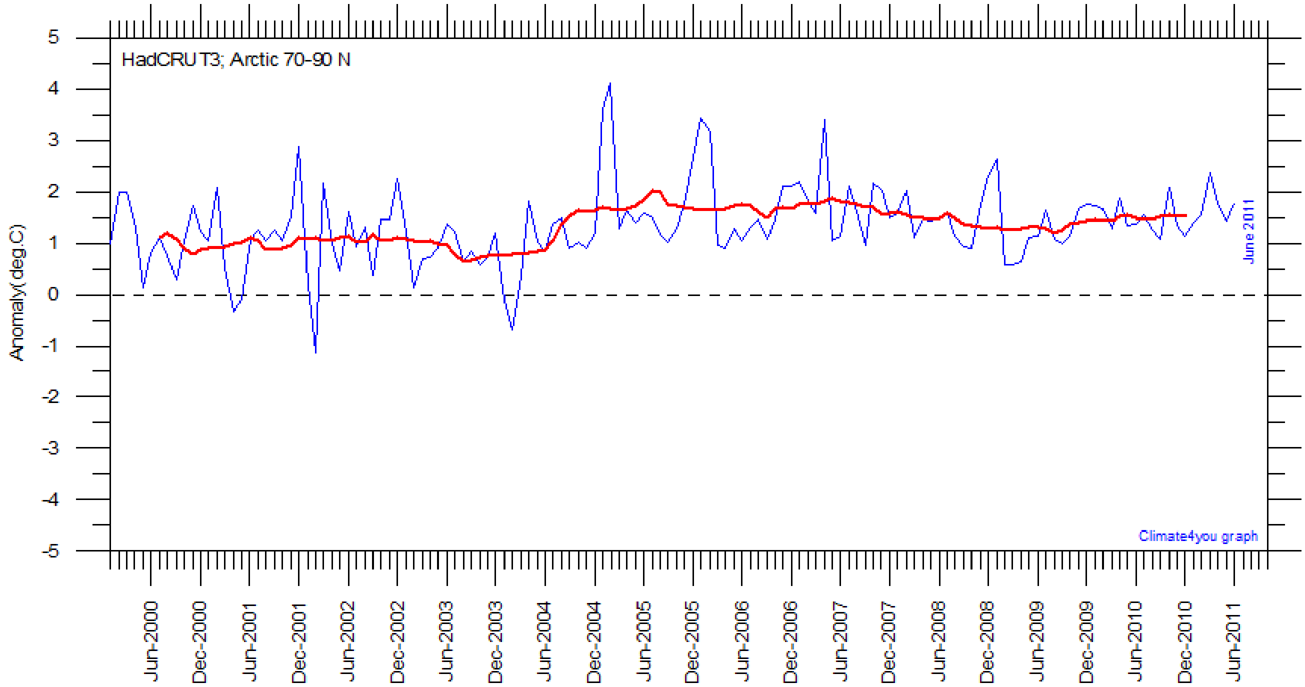


Diagram showing Arctic monthly surface air temperature anomaly 70-90°N since January 2000, in relation to the WMO reference "normal" period 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. Data provided by the Hadley Centre for Climate Prediction and Research and the University of East Anglia's [Climatic Research Unit](CRU) ([CRU]), UK.

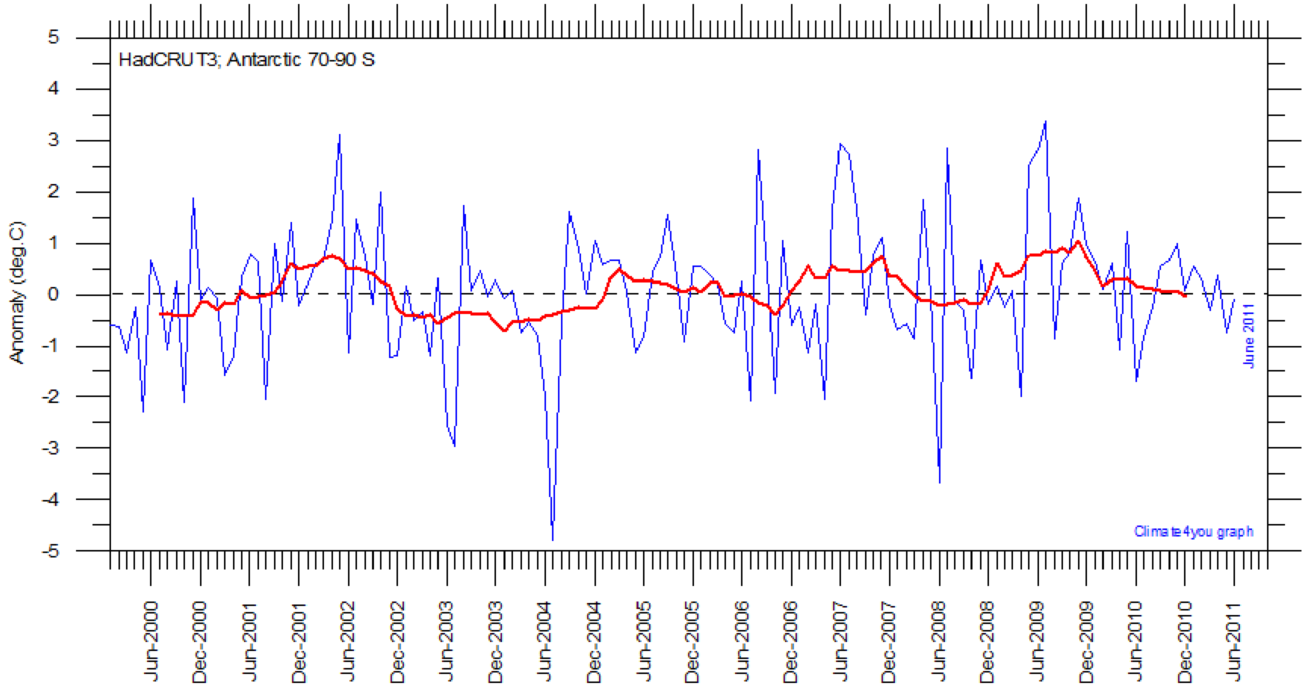


Diagram showing Antarctic monthly surface air temperature anomaly 70-90°S since January 2000, in relation to the WMO reference "normal" period 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. Data provided by the Hadley Centre for Climate Prediction and Research and the University of East Anglia's Climatic Research Unit (CRU), UK.

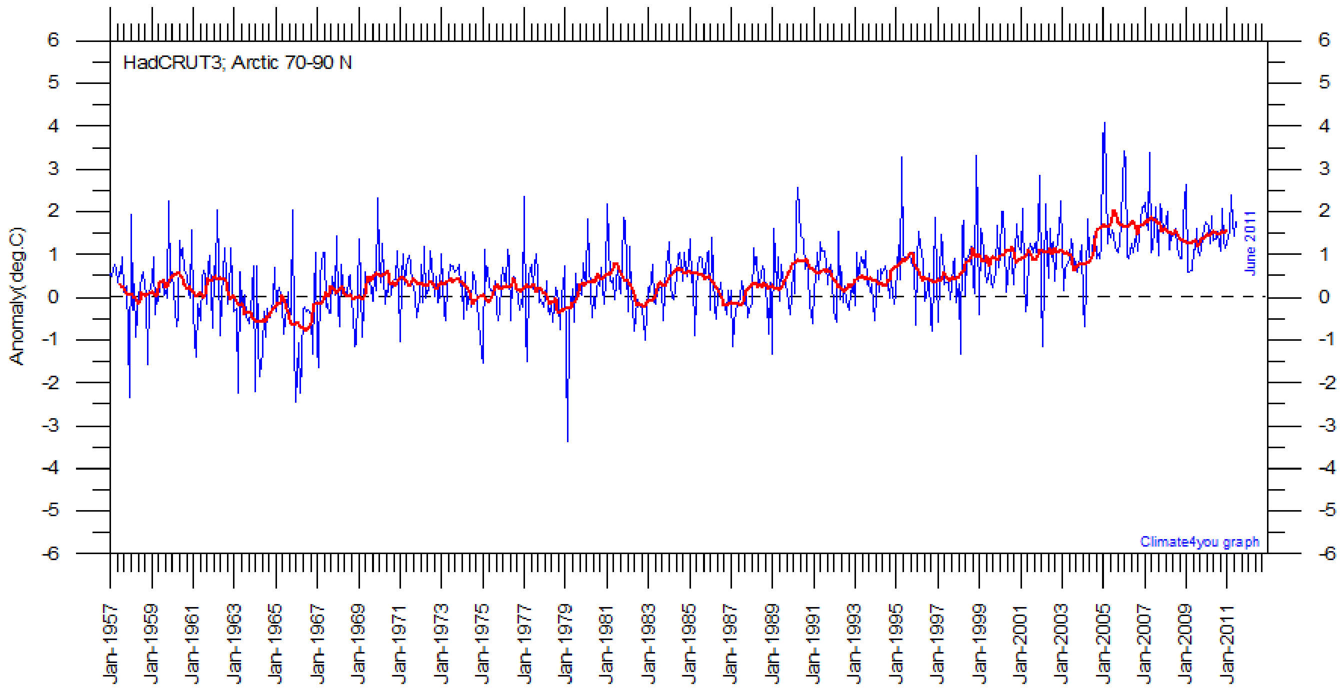


Diagram showing Arctic monthly surface air temperature anomaly 70-90°N since January 1957, in relation to the WMO reference "normal" period 1961-1990. The year 1957 has been chosen as starting year, to ensure easy comparison with the maximum length of the realistic Antarctic temperature record shown below. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. Data provided by the Hadley Centre for Climate Prediction and Research and the University of East Anglia's Climatic Research Unit (CRU), UK.

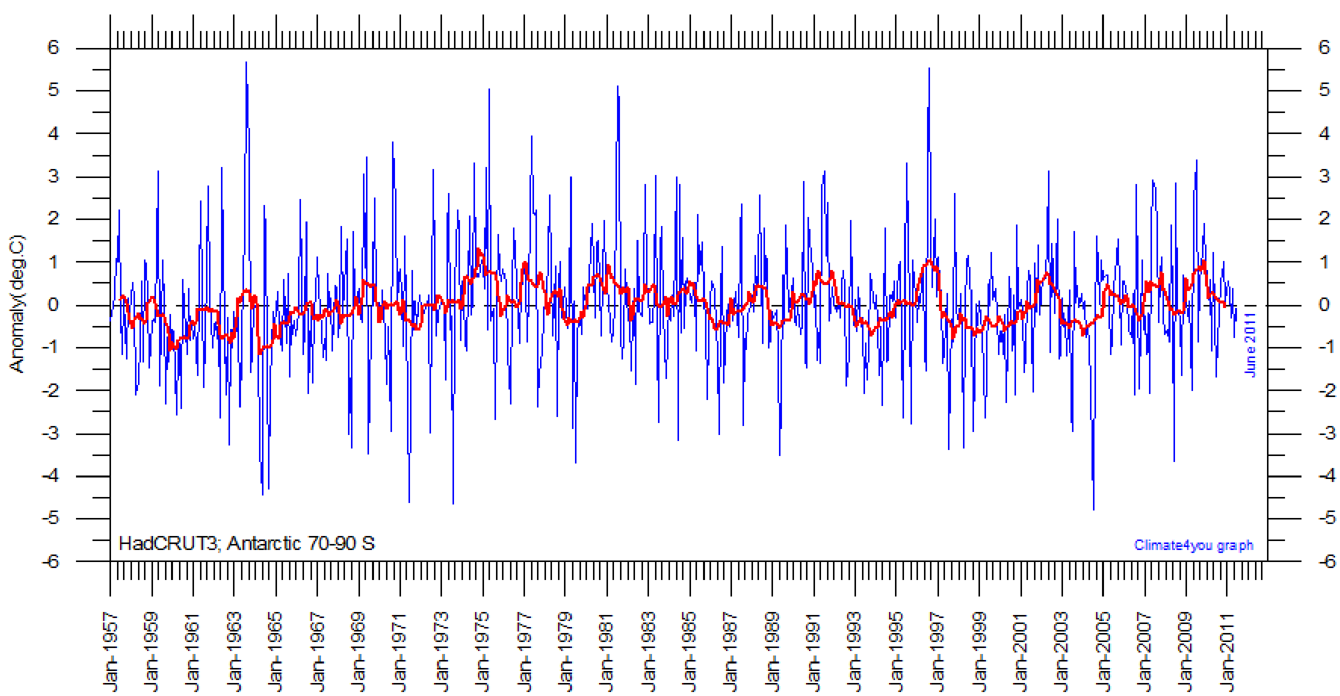


Diagram showing Antarctic monthly surface air temperature anomaly 70-90°S since January 1957, in relation to the WMO reference "normal" period 1961-1990. The year 1957 was an international geophysical year, and several meteorological stations were established in the Antarctic because of this. Before 1957, the meteorological coverage of the Antarctic continent is poor. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. Data provided by the Hadley Centre for Climate Prediction and Research and the University of East Anglia's Climatic Research Unit (CRU), UK.

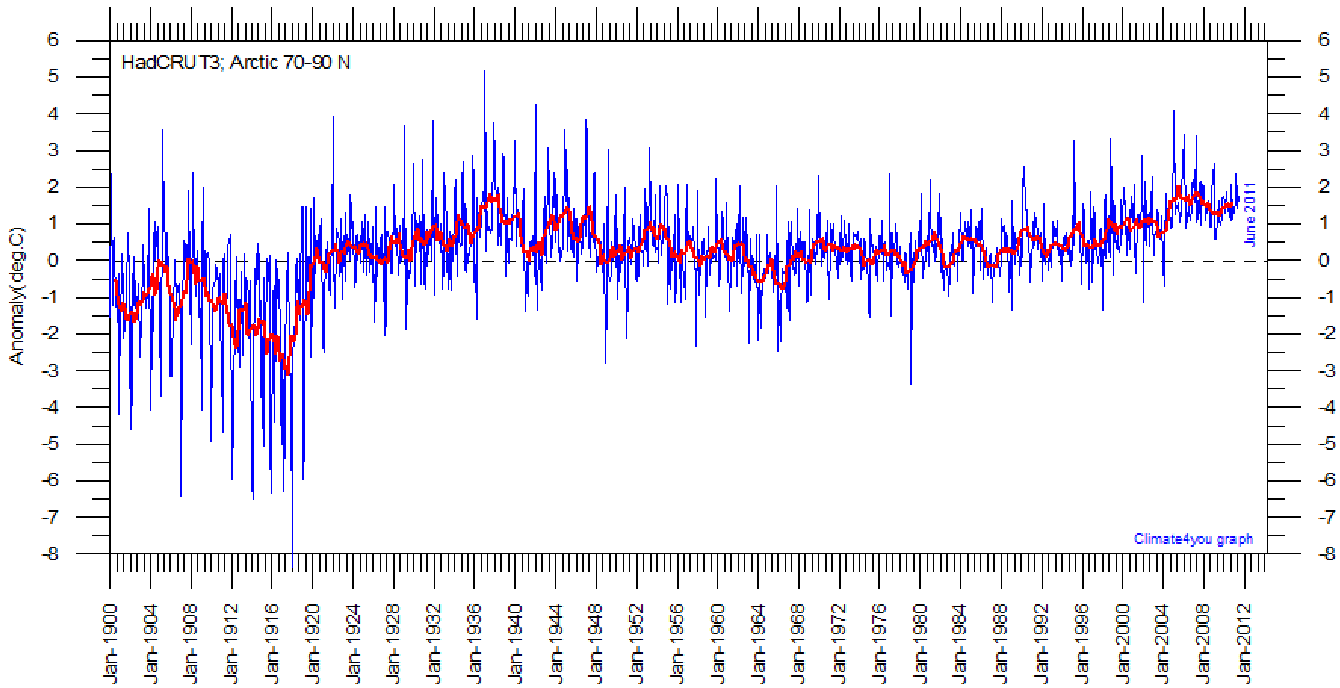


Diagram showing Arctic monthly surface air temperature anomaly 70-90°N since January 1900, in relation to the WMO reference "normal" period 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. In general, the range of monthly temperature variations decreases throughout the first 30-50 years of the record, reflecting the increasing number of meteorological stations north of 70°N over time. Especially 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. Because of the relatively small number of stations before 1930, details in the early part of the Arctic temperature record should not be over interpreted. The rapid Arctic warming around 1920 is, however, clearly visible, and is also documented by other sources of information. The period since 2000 is warm, about as warm as the period 1930-1940. Data provided by the Hadley Centre for Climate Prediction and Research and the University of East Anglia's Climatic Research Unit (CRU), UK

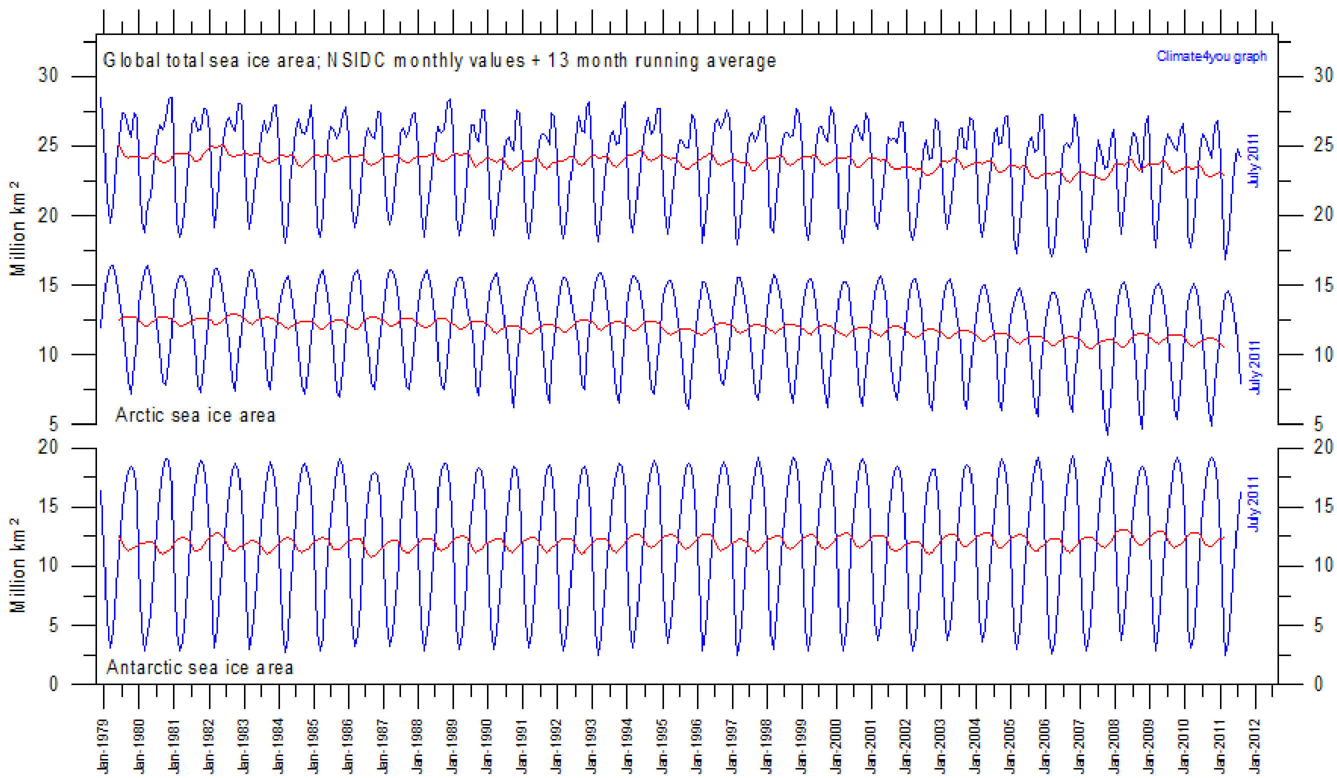
In general, the Arctic temperature record appears to be less variable than the Antarctic record, presumably at least partly due to the higher number of meteorological stations north of 70°N, compared to the number of stations south of 70°S.

As data coverage is sparse in the Polar Regions, the procedure of Gillet et al. 2008 has been followed, giving equal weight to data in each 5°x5° grid cell when calculating means, with no weighting by the surface areas of the individual grid dells.

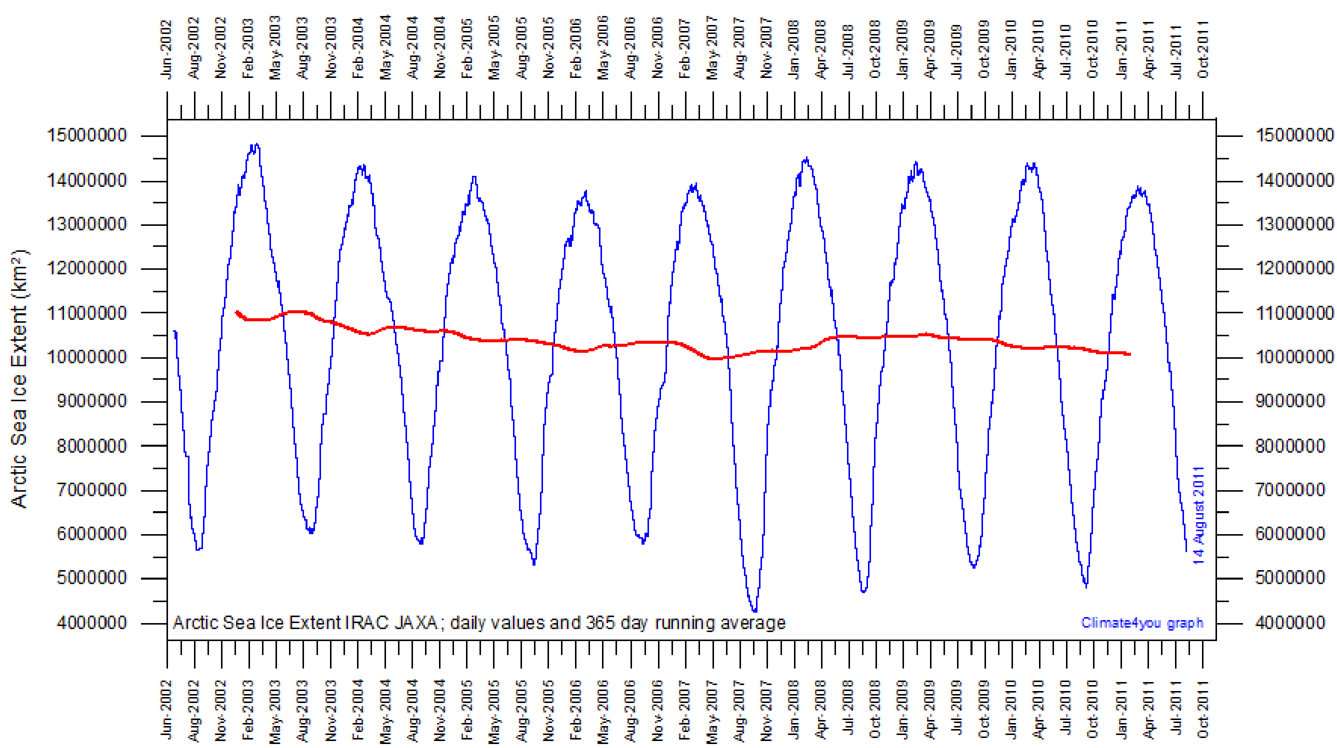
Literature:

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.

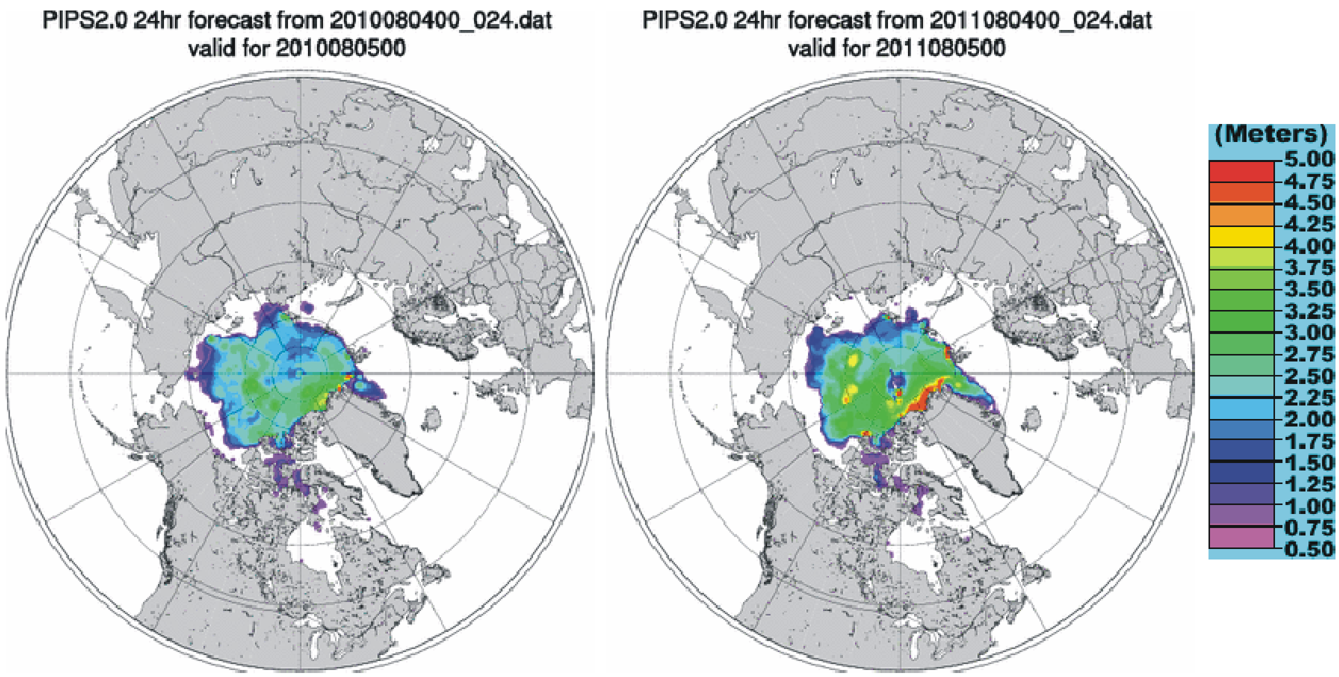
[Arctic and Antarctic sea ice, updated to July 2011](#)



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

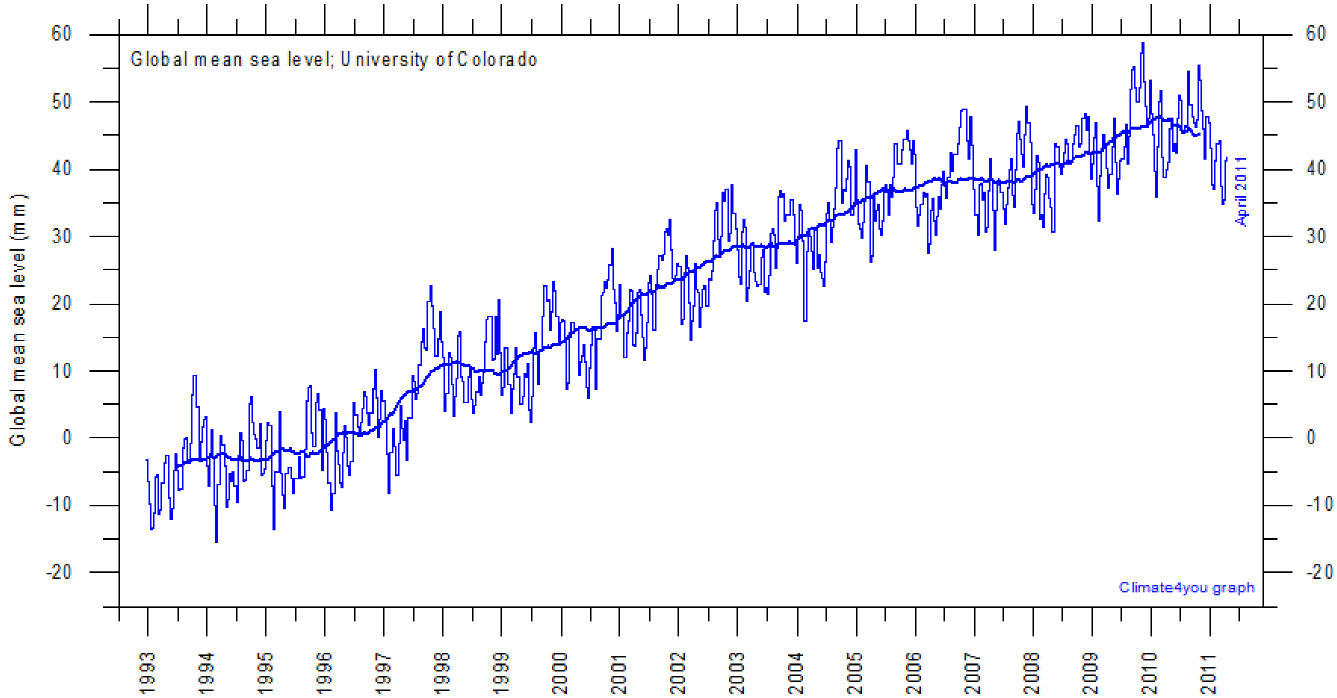


Graph showing daily Arctic sea ice extent since June 2002, to August 14,2011, by courtesy of [Japan Aerospace Exploration Agency](#) (JAXA).

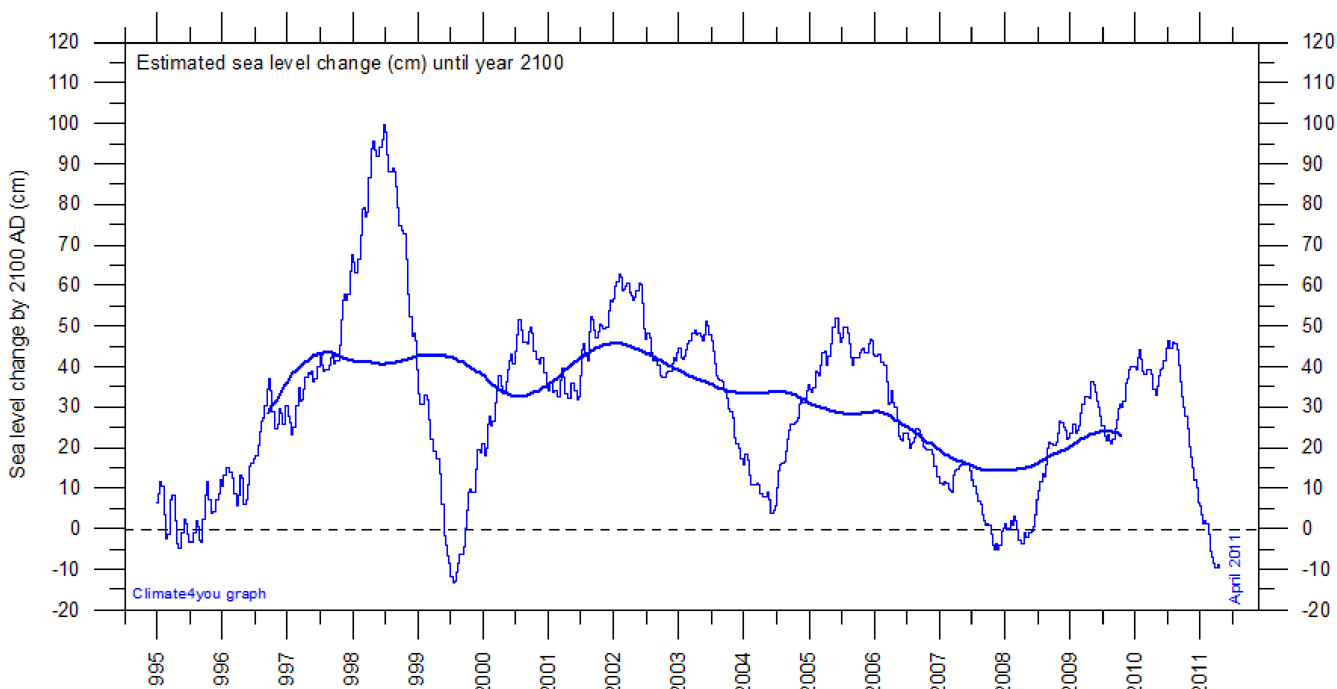


Northern hemisphere sea ice thickness on 5 August 2010 (left) and 2011 (right), according to the Naval Oceanographic Office (NAVO). Thickness values are calculated by the Polar Ice Prediction System (PIPS 2.0), based on the Special Sensor Microwave Image (SSM/I) to initialize the calculation. Thickness scale (m) is shown to the right.

Global sea level, updated to April 2011

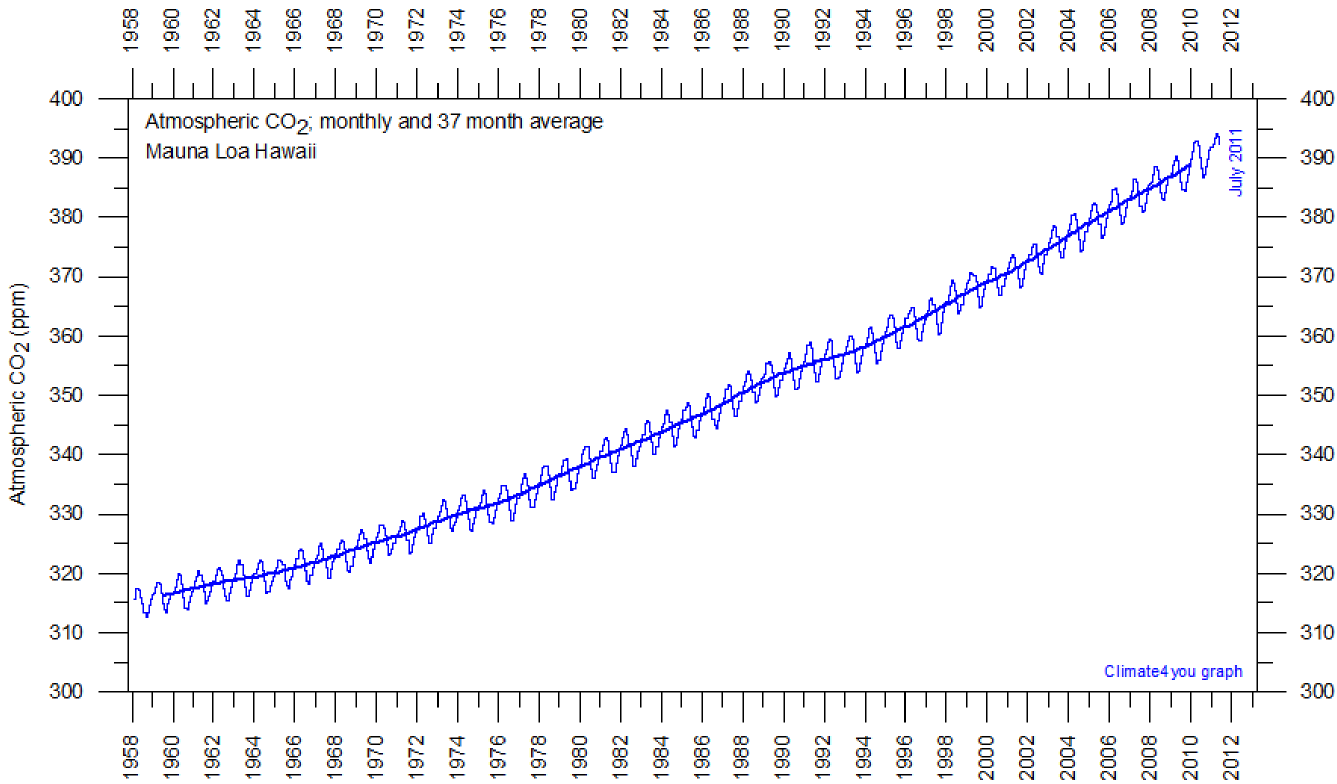


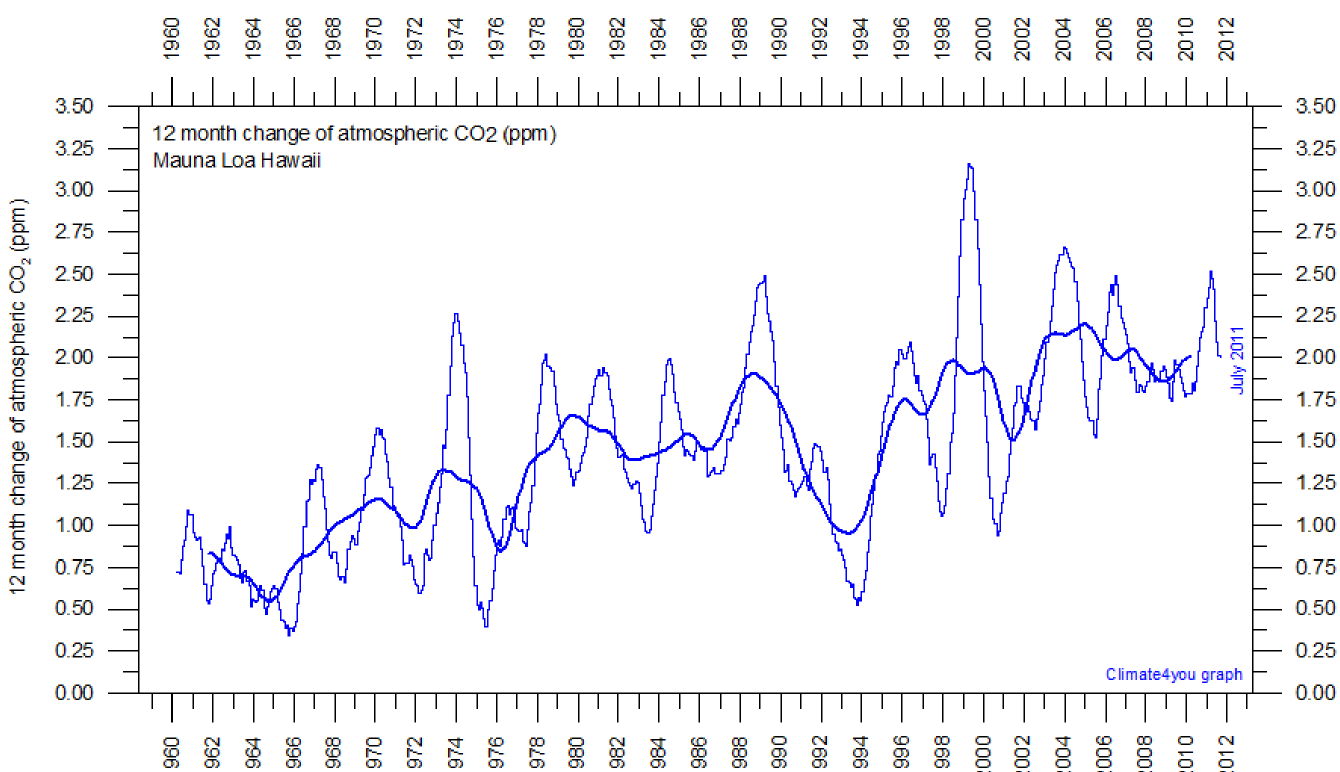
Globa lmonthly sea level since late 1992 according to the Colorado Center for Astrodynamics Research at University of Colorado at Boulder, USA. The thick line is the simple running 37 observation average, nearly corresponding to a running 3 yr average.



Forecasted change of global sea level until year 2100, based on simple extrapolation of measurements dome 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. The present empirical forecast of sea level change until 2100 is 20-25 cm (end point of thick line).

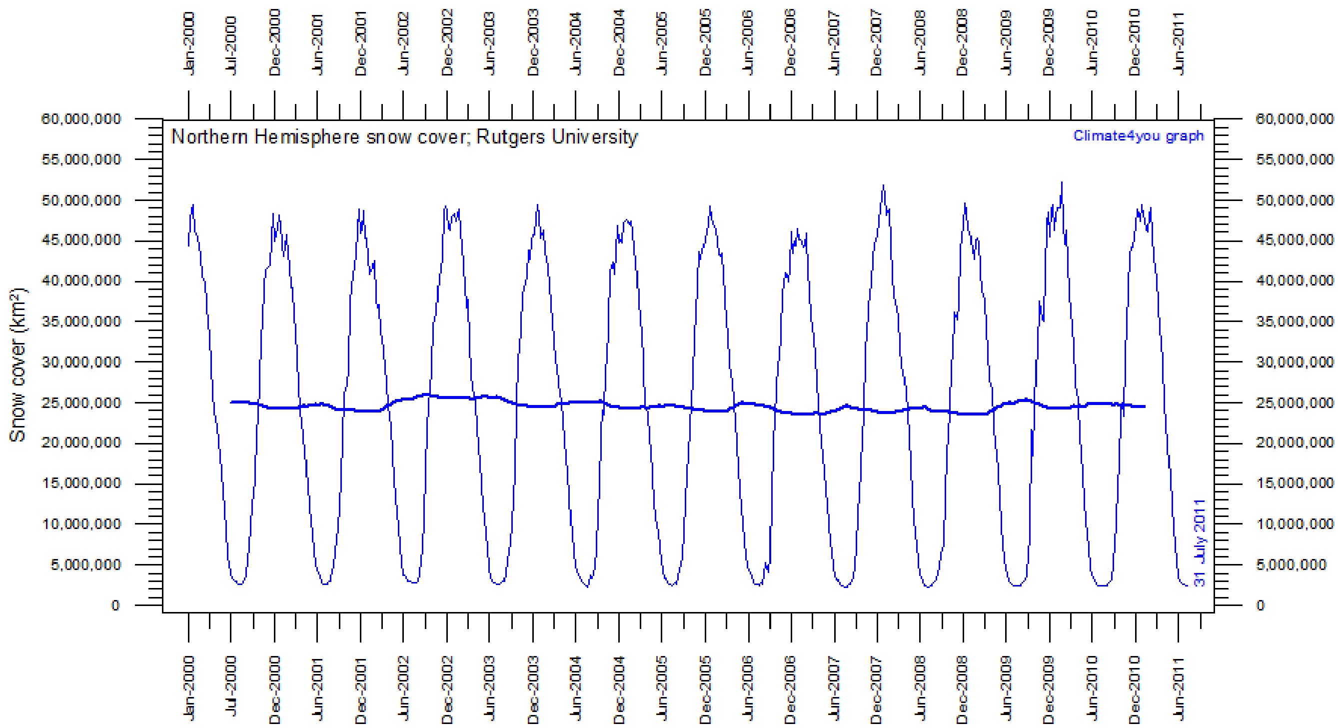
Atmospheric CO_2, updated to July 2011



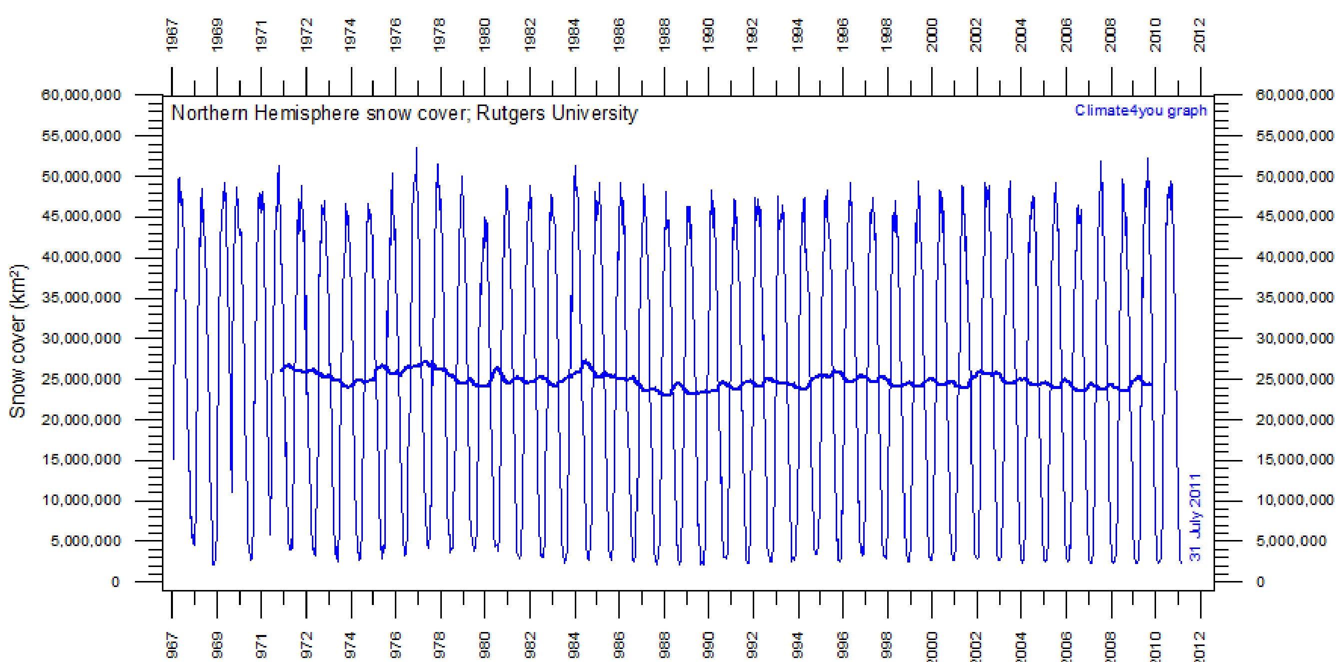


Monthly amount of atmospheric CO_2 (above) and annual growth rate (below; average last 12 months minus average preceding 12 months) of atmospheric CO_2 since 1959, according to data provided by the Mauna Loa Observatory, Hawaii, USA. The thick line is the simple running 37 observation average, nearly corresponding to a running 3 yr average.

Northern Hemisphere weekly snow cover, updated to late July 2011

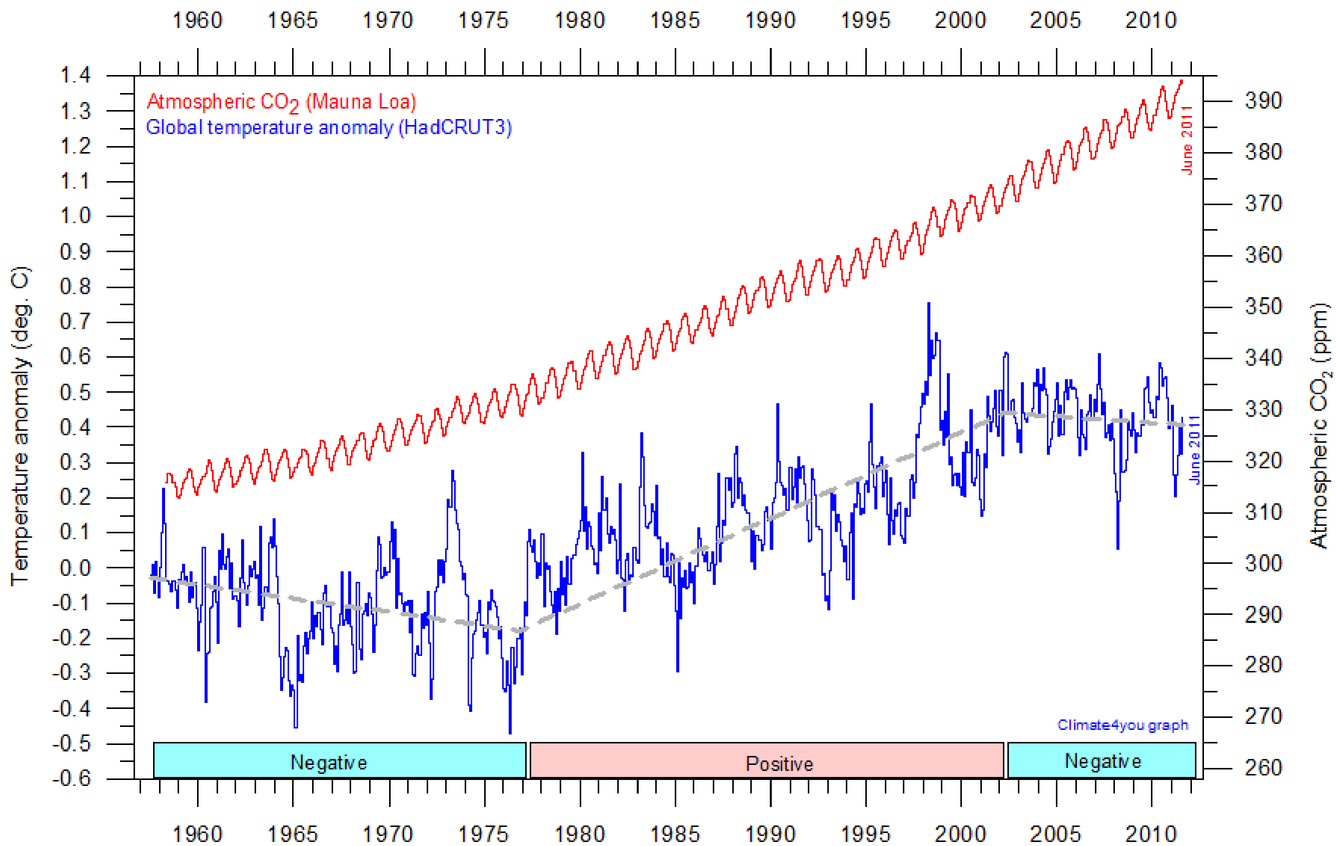


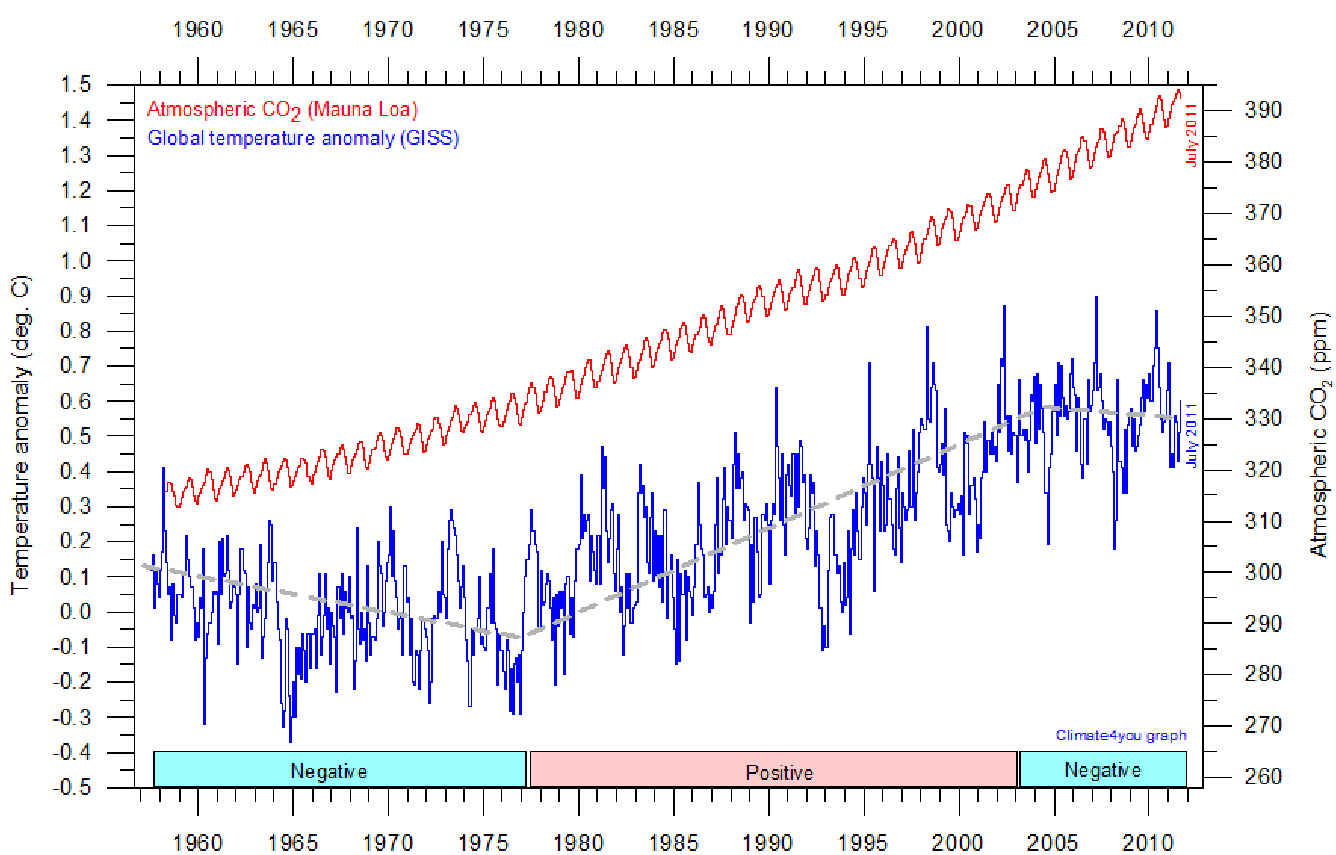
Northern hemisphere weekly snow cover since January 2000 according to Rutgers University Global Snow Laboratory. The thin line is the weekly data, and the thick line is the running 53 week average (approximately 1 year).

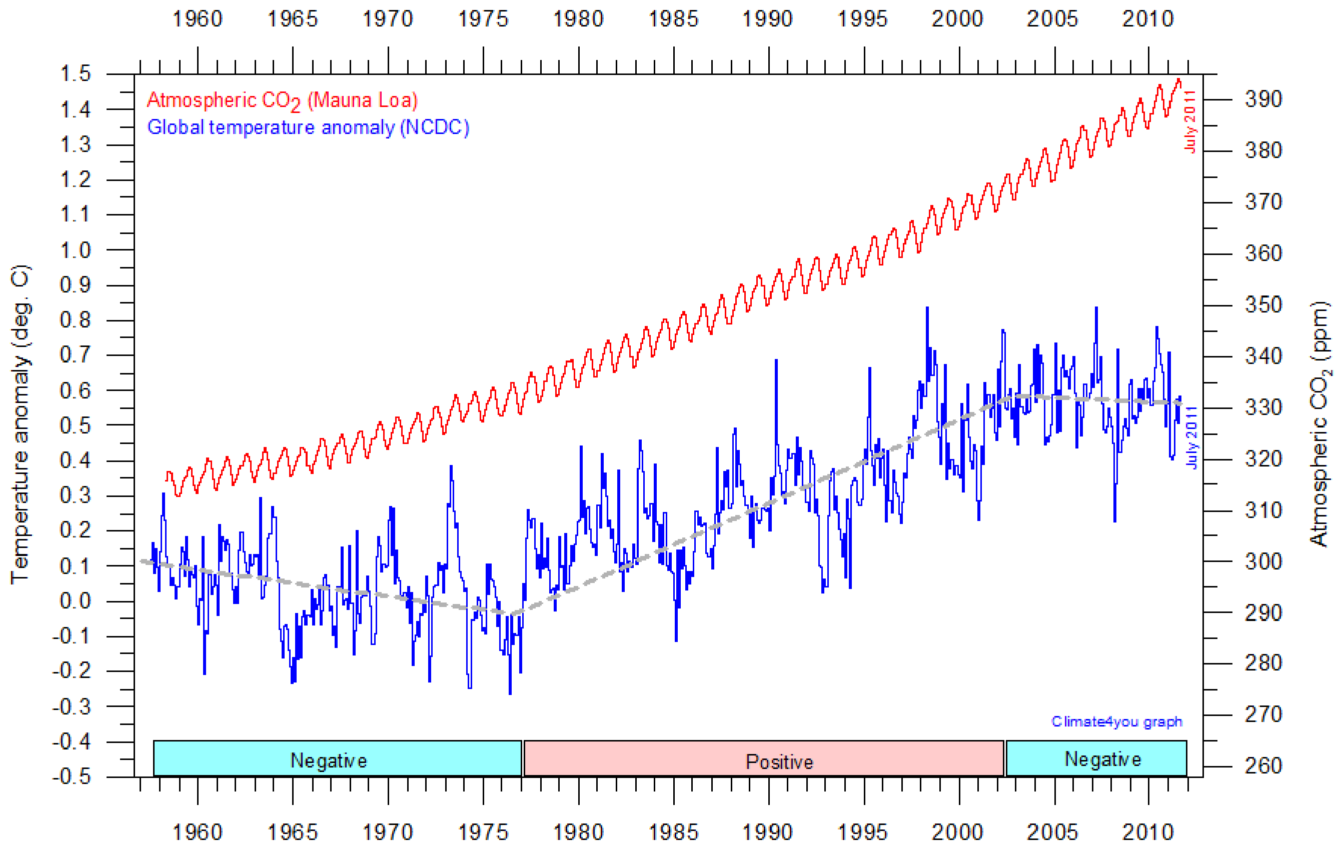


Northern hemisphere weekly snow cover since October 1966 according to Rutgers University Global Snow Laboratory. The thin line is the weekly data, and the thick line is the running 53 week average (approximately 1 year). The running average is not calculated before 1971 because of some data irregularities in this early period.

Global surface air temperature and atmospheric CO_2, updated to July 2011







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 modern 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 HadCRUT3 record is only updated to June 2011.

Most climate models assume the greenhouse gas carbon dioxide CO_2 to influence significantly upon global temperature. Thus, it is relevant to compare the different global 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, clouds, volcanic, etc.) may well override the potential influence of CO_2 on short time scales such as just a few years.

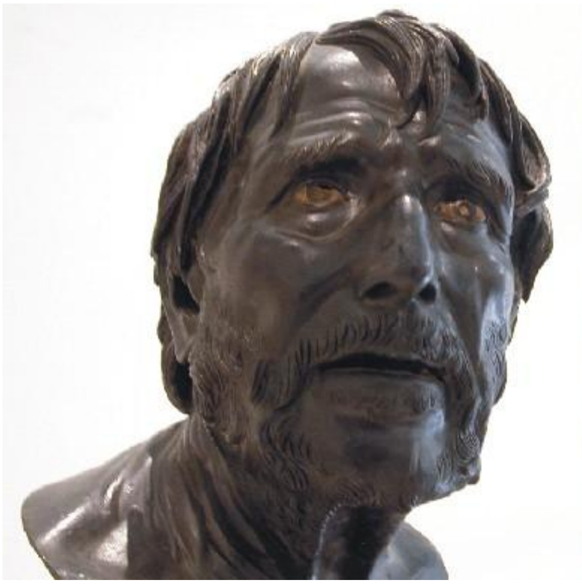
It is of cause equally inappropriate to present new meteorological record values, whether daily, monthly or annual, as support for the hypothesis ascribing high importance of atmospheric CO_2 for global temperatures. Any such short-period meteorological record value may well be the result of other phenomena than atmospheric CO_2.

What exactly defines the critical length of a relevant time period to consider for evaluating the alleged high importance of CO_2 remains elusive, and is still a topic for debate. The critical period length must, however, be inversely proportional to the importance of CO_2 on the global temperature, including feedback effects, such as assumed by most climate models. So if the net effect of CO_2 is strong, the length of the critical period is short, and vice versa.

After about 10 years of global temperature increase following global cooling 1940-1978, IPCC was established in 1988. Presumably, several scientists interested in climate then felt intuitively that their empirical and theoretical understanding of climate dynamics was sufficient to conclude about the high importance of CO_2 for global temperature. However, 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, public support for the hypothesis would have been difficult to obtain. Adopting this approach as to critical time length, the varying relation (positive or negative) between global temperature and atmospheric CO_2 has been indicated in the lower panels of the three diagrams above.

Climate and history; one example among many

750-650 BC: Hesiod’s Works and Days; early examples of meteorological advice



Ancient bronze bust (now conjectured to be imaginative) of the ancient Greek poet Hesiod (left). An image from a 1539 AD printing of Works and Days (right).

The ancient Greek poet Hesiod presumably lived somewhere between 750 and 650 BC. Hesiod and Homer are generally considered the earliest Greek poets whose work has survived until today, and for that reason they are often paired. In the fourth-century BC Alcidamas' Mouseion they were even brought together in an imagined poetic agon, the Contest of Homer and Hesiod. However, scholars disagree about who lived first, and today it is generally accepted that Homer was the first of these two poets. Much of the summary below is adopted from different sources in Wikepedia and from Rasmussen 2010, from where much additional information is available.

Hesiod's writings represent a major source on Greek mythology, farming techniques, early economic thought, archaic Greek astronomy and ancient time-keeping. Hesiod's works are seen from the view of the small independent farmer, while Homer's view is from nobility. Even with these differences, they share some beliefs regarding work ethic, justice, and consideration of material items. Hesiod was in favour of the rule of law and the dispensation of justice to provide stability and order within society. He spoke out against corrupt methods of wealth acquisition and denounced robbery.

Hesiod’s major work *Works and Days*, a poem of some 800 verses, revolves around two general truths: 1) labour is the universal lot of Man, but 2) he who is willing to work will get by. Scholars have interpreted this work against a contemporary background of agrarian crisis in mainland Greece, during the relatively cold period between the Minoan and the Roman warm periods. This crisis, however, inspired a wave of documented colonisations in search of new land. Works and Days is one of the earliest known musings on economic thought, and at its centre, it is a farmer’s almanac in which Hesiod instructs his brother Perses in the agricultural arts.

In Works and Days Hesiod draws attention to the movement of celestial objects such as the Sun and stars, stating that knowledge on this may be useful for weather forecasting. Among other phenomena, Works and Days contains the earliest recorded mention of the star Sirius, the brightest star seen from Earth (the Greek word for Sirius, is Σείριος, meaning "glowing" or "scorcher"). Hesiod uses a matter-of-fact style, without stating any cause-and-effect, and without associating the celestial objects with any kind of divinity.

Works and Days provides weather advice for both farmers and sailors, and examples of this are given below (translation by Hugh G. Evelyn-White 1914)

Meteorological advice for farmers

(ll. 383-404, extract) When the Pleiades, daughters of Atlas, are rising, begin your harvest, and your ploughing when they are going to set. Forty nights and days they are hidden and appear again as the year moves round, when first you sharpen your sickle. This is the law of the plains, and of those who live near the sea, and who inhabit rich country, the glens and dingles far from the tossing sea, -- strip to sow and strip to plough and strip to reap, if you wish to get in all Demeter's fruits in due season, and that each kind may grow in its season…..

(ll. 414-447, extract) When the piercing power and sultry heat of the sun abate, and almighty Zeus sends the autumn rains, and men's flesh comes to feel far easier, -- for then the star Sirius passes over the heads of men, who are born to misery, only a little while by day and takes greater share of night, -- then, when it showers its leaves to the ground and stops sprouting, the wood you cut with your axe is least liable to worm. Then remember to hew your timber: it is the season for that work…..

Meteorological advice for sailors

(ll. 618-640, extract) But if desire for uncomfortable sea-faring seize you; when the Pleiades plunge into the misty sea to escape Orion's rude strength, then truly gales of all kinds rage. Then keep ships no longer on the sparkling sea, but bethink you to till the land as I bid you. Haul up your ship upon the land and pack it closely with stones all round to keep off the power of the winds which blow damply, and draw out the bilge-plug so that the rain of heaven may not rot it. Put away all the tackle and fittings in your house, and stow the wings of the sea-going ship neatly, and hang up the well-shaped rudder over the smoke. You yourself wait until the season for sailing is come, and then haul your swift ship down to the sea and stow a convenient cargo in it, so that you may bring home profit….

(ll. 663-677, extract) Fifty days after the solstice), when the season of wearisome heat is come to an end, is the right time for me to go sailing. Then you will not wreck your ship, nor will the sea destroy the sailors, unless Poseidon the Earth-Shaker be set upon it, or Zeus, the king of the deathless gods, wish to slay them; for the issues of good and evil alike are with them. At that time the winds are steady, and the sea is harmless. Then trust in the winds without care, and haul your swift ship down to the sea and put all the freight no board; but make all haste you can to return home again and do not wait till the time of the new wine and autumn rain and oncoming storms with the fierce gales of Notus who accompanies the heavy autumn rain of Zeus and stirs up the sea and makes the deep dangerous.

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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

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