Climate4you update April 2010

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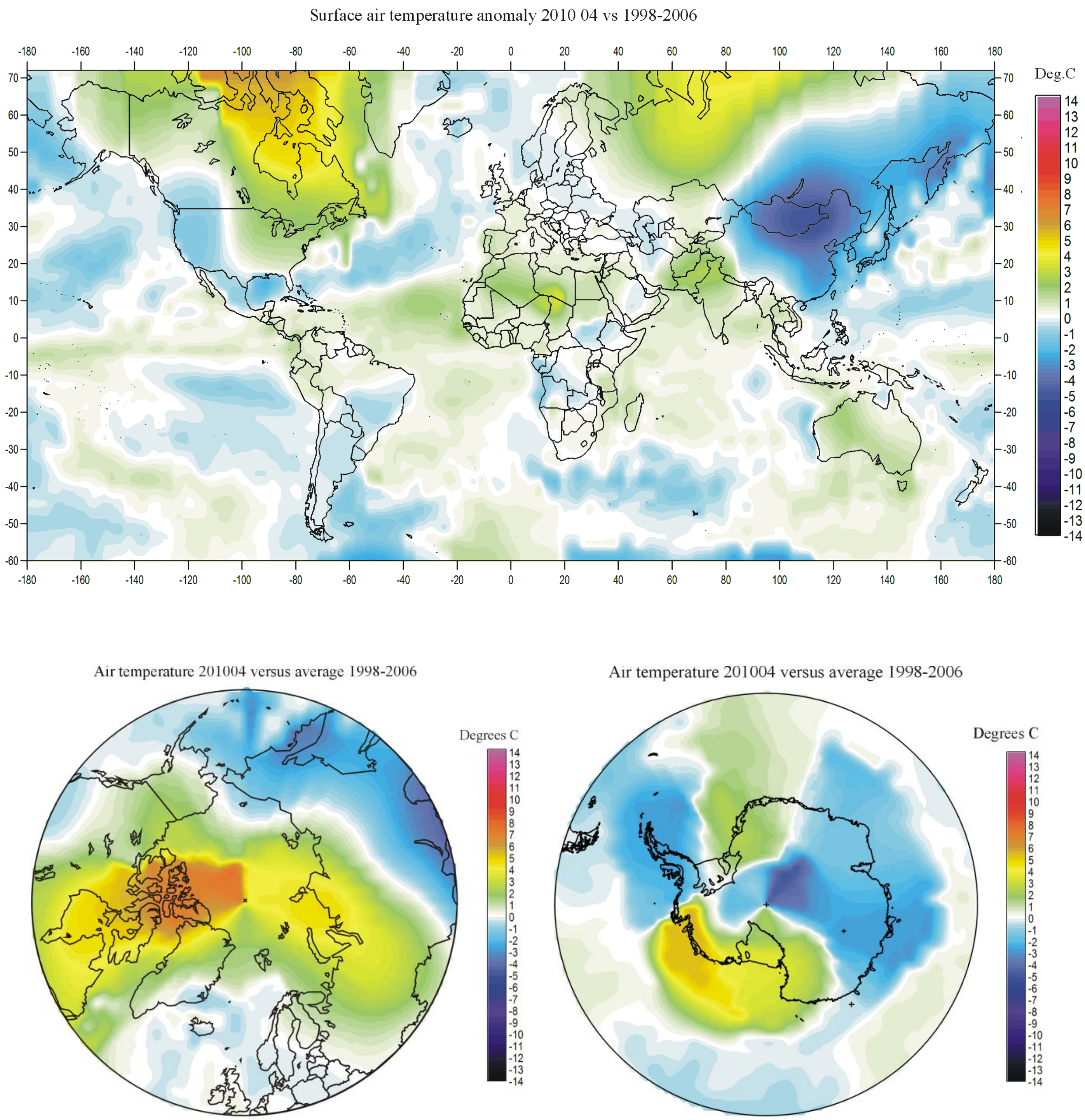
April 2010 global surface air temperature overview



April 2010 surface air temperature compared to the average for April 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 April 2010 global surface air temperature overview

This newsletter contains graphs showing a selection of key meteorological variables for April 2010. 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 37-month average, almost corresponding to three years.

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.

Global surface air temperatures April 2010 was again characterised by varied conditions in the Northern Hemisphere, ranging from cold to warm conditions. The Southern Hemisphere generally experienced smaller regional temperature contrasts than the Northern Hemisphere.

In the Northern Hemisphere relative cold areas extended across eastern Siberia, China, Japan and Mongolia. Relatively low temperatures also characterised eastern and northern Europe, the North Atlantic, Mexico, western USA, northern Pacific and southern Alaska. Relatively warm conditions characterised northern Siberia and Russia, as well as eastern and northern Canada. High pressure over Siberia brought cold and dry air masses to China, while at the same time advecting relatively warm air masses to Russia and parts of northern Siberia.

Conditions near Equator were influenced by the still ongoing, although now beginning to weaken, El Niño in the Pacific Ocean. Relatively high temperatures characterised most of the Equatorial regions, but especially Sahara and the North Atlantic west of Africa. The western Pacific was relatively cold. As these predominantly warm regions are located near the Equator, their total surface area is considerable, and the effect on the global average surface temperature therefore important.

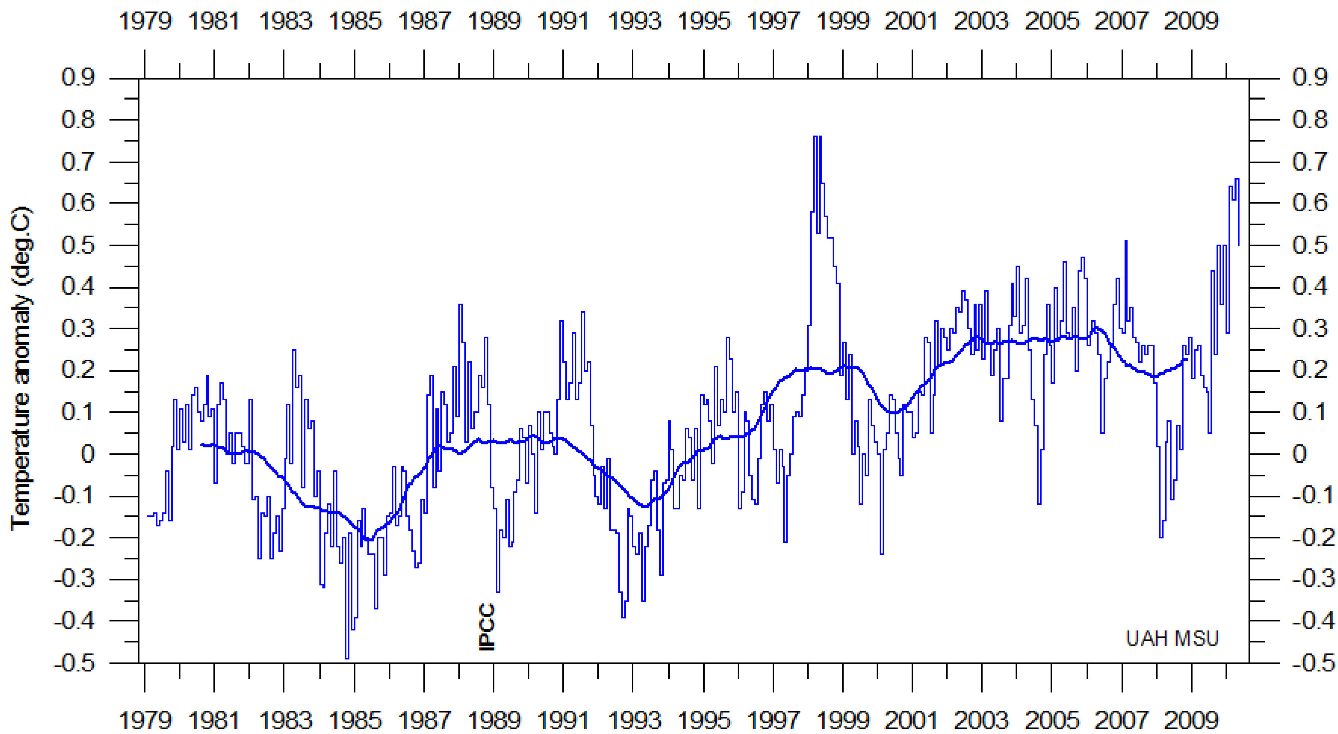
In the Southern Hemisphere most areas experienced temperature conditions near the 1998-2006 average. Most of South America experienced temperatures slightly below average, while Australia was somewhat above average.

In the Arctic, a band of relatively high temperatures extended from Canada over NW Greenland, the central Arctic Ocean, and into northern Russia and Siberia. As there are few observations from the central Arctic, GISS therefore attempts to cover part of the Arctic by interpolating from temperatures recorded at lower latitudes. The result of such interpolation across areas with few observation points always to some degree is problematic. For April 2010 some of the shortcomings of the GISS interpolation procedure become evident in the form of an apparent extreme temperature gradient in the vicinity of the North Pole. Clearly such a gradient across a uniform surface (the entire surface is covered by sea ice) in quite unrealistic.

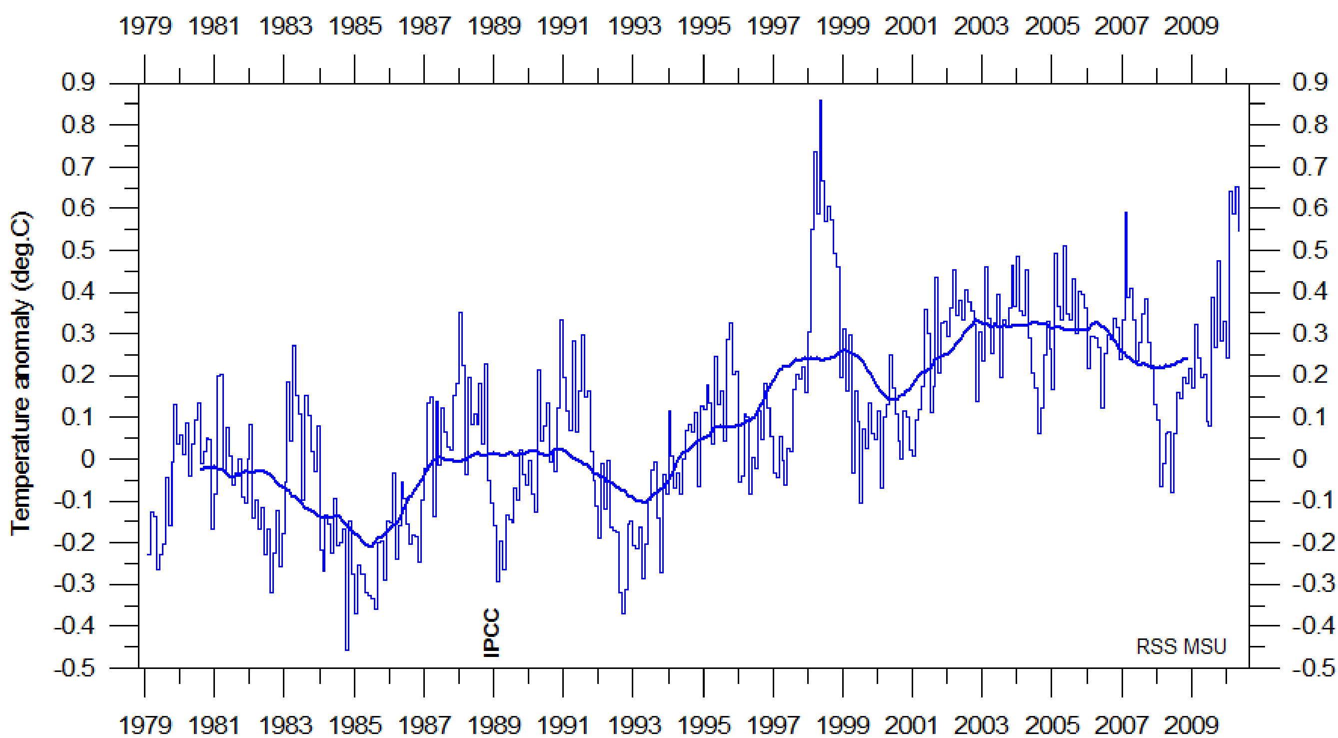
In the Antarctic relatively cold conditions characterised the major part of East Antarctica and the Peninsula, while especially parts of West Antarctica, the Ross Sea and western Queen Maud Land were relatively warm.

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

Lower troposphere temperature from satellites, updated to April 2010

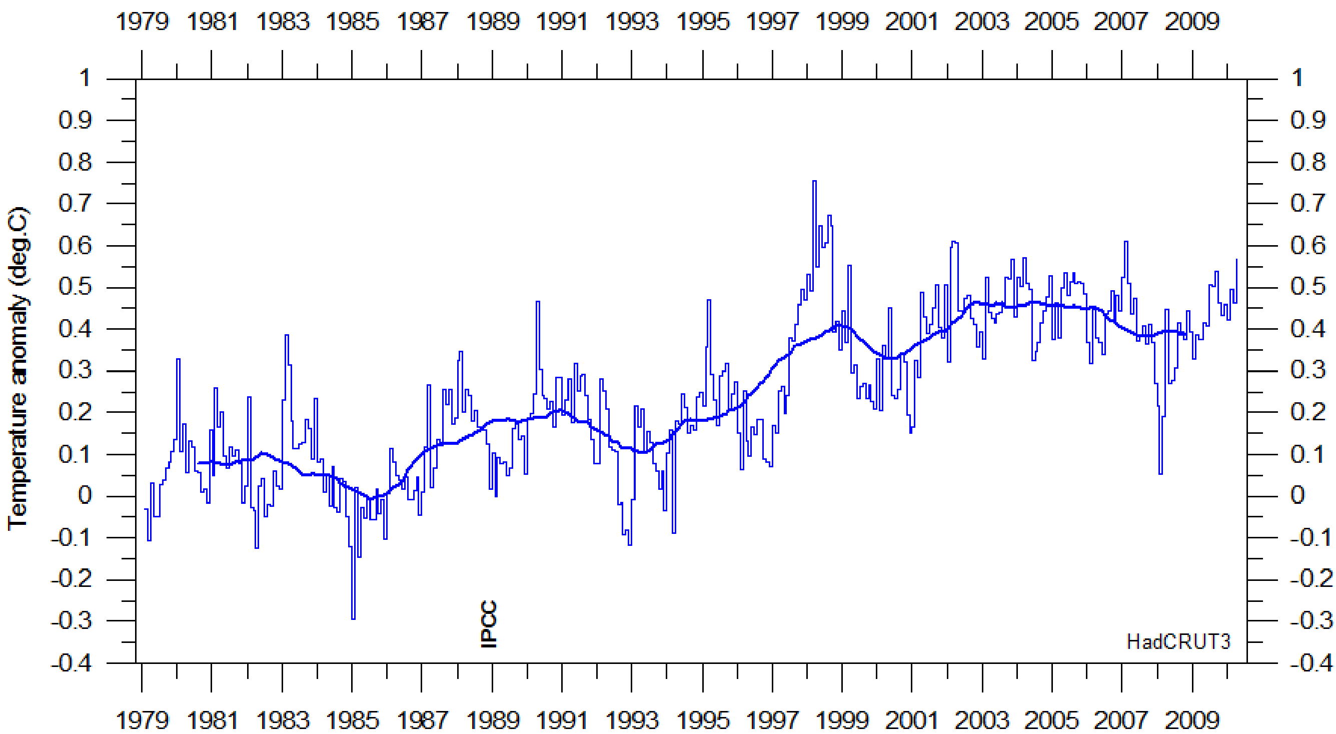


Global monthly average lower troposphere temperature (thin line) since 1979 according to [University of Alabama] at Huntsville, USA. The thick line is the simple running 37 month average.

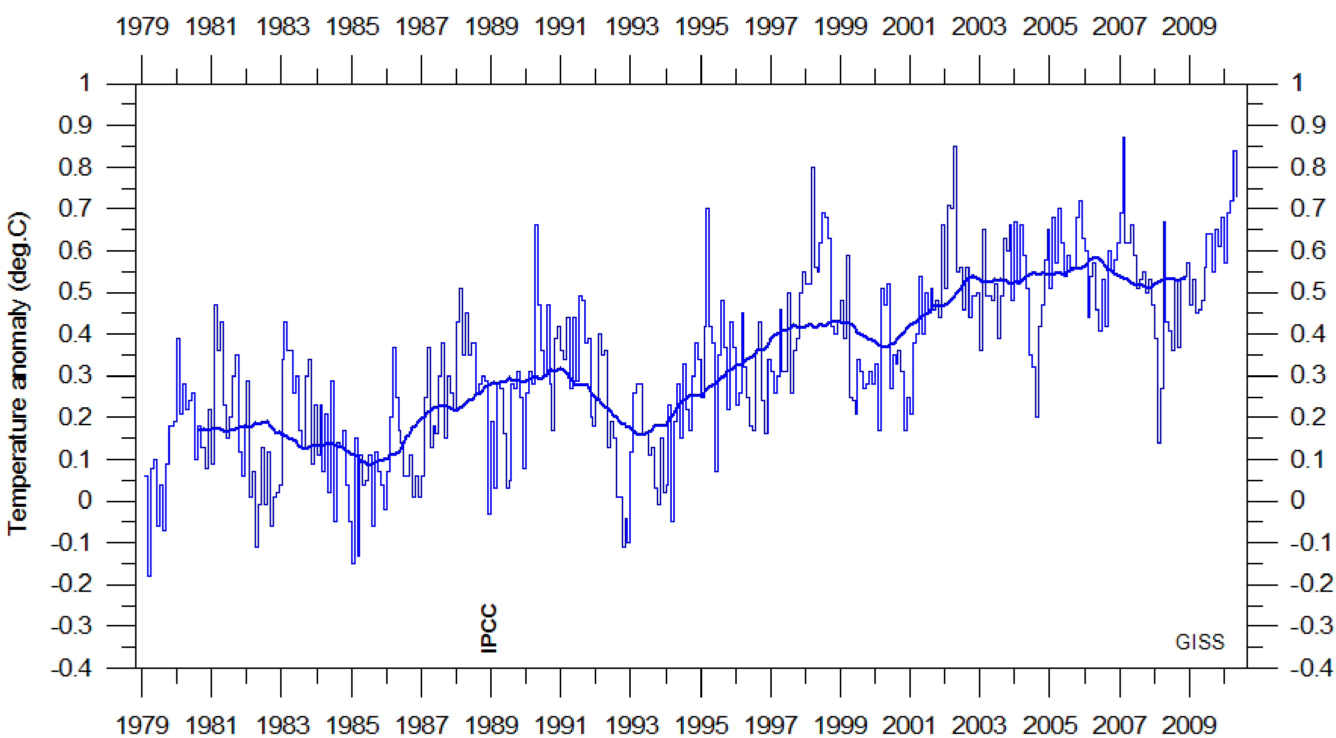


Global monthly average lower troposphere temperature (thin line) since 1979 according to according to Remote Sensing Systems (RSS), USA. The thick line is the simple running 37 month average.

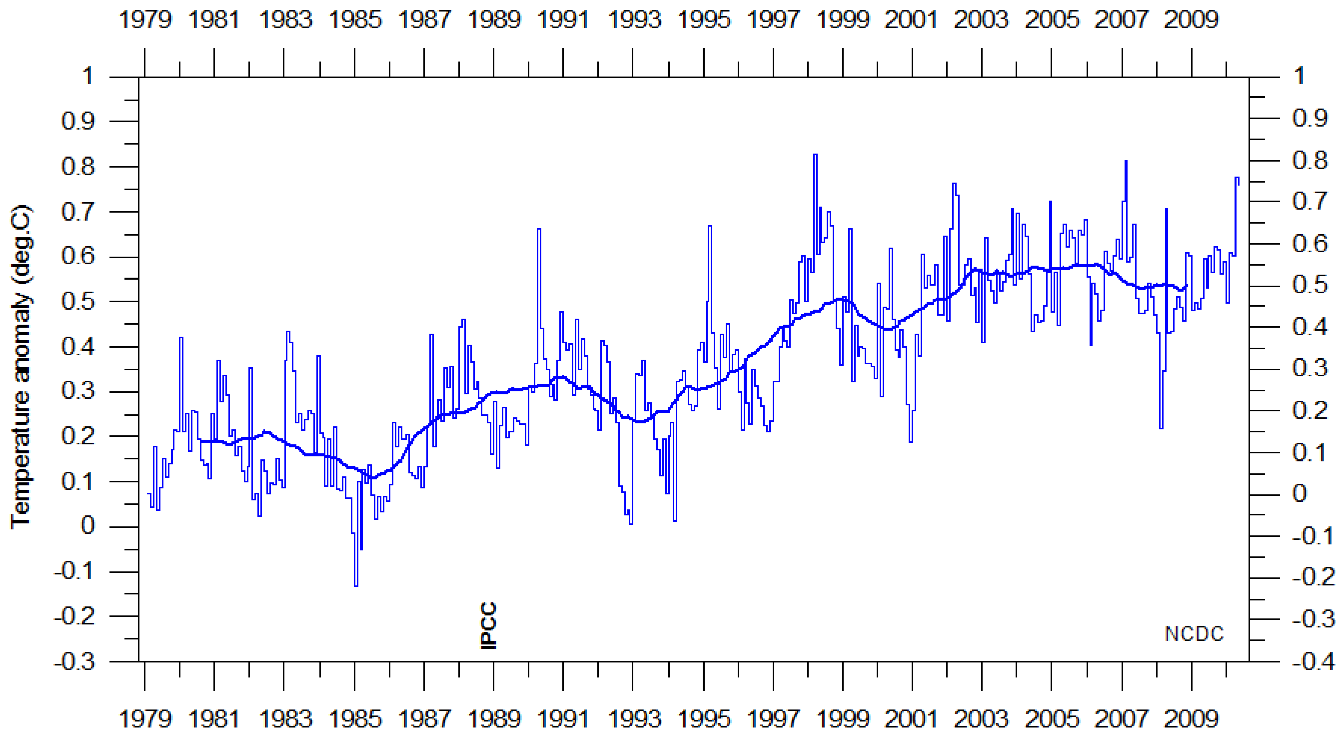
Global surface air temperature, updated to April 2010



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 this record has not yet been updated beyond March 2010.



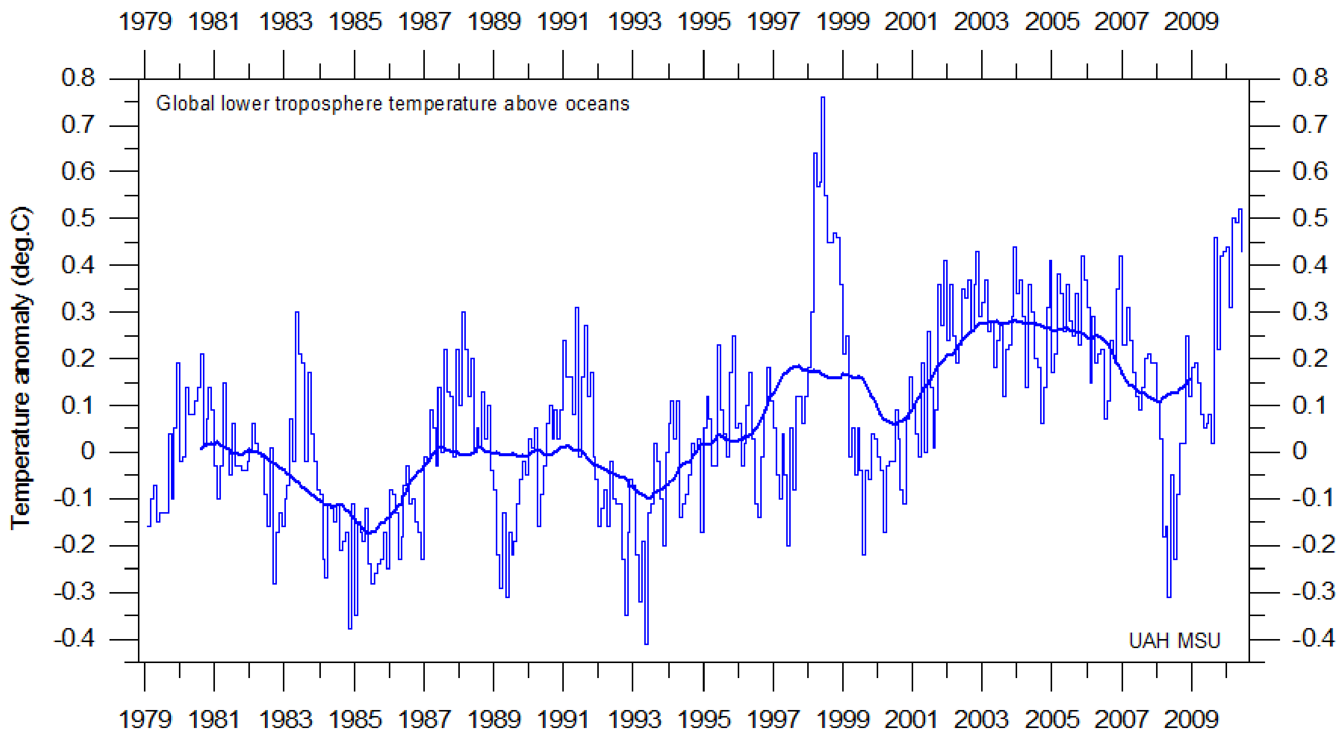
Global monthly average surface air temperature (thin line) since 1979 according to according to the [Goddard Institute for Space Studies](#) (GISS), at Columbia University, New York City, USA. The thick line is the simple running 37 month average.



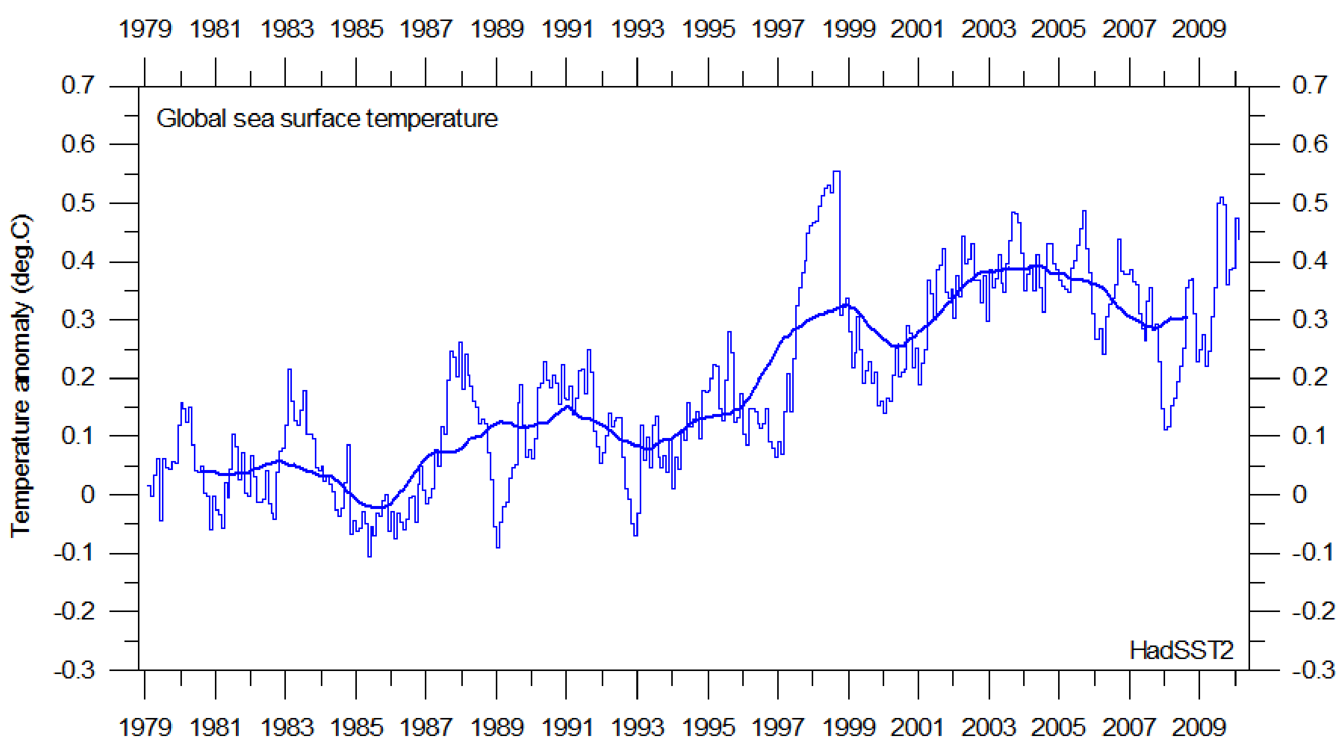
Global monthly average surface air temperature since 1979 according to according to the [National Climatic Data Center](#) (NCDC), USA. The thick line is the simple running 37 month average.

Some readers have noted that several of the above data series display changes when one compare with previous issues of this newsletter, not only for the most recent months, but actually for most of months included in the data series. The interested reader may find more on this lack of temporal stability on [www.climate4you](#) (go to: Global Temperature and then Temporal Stability).

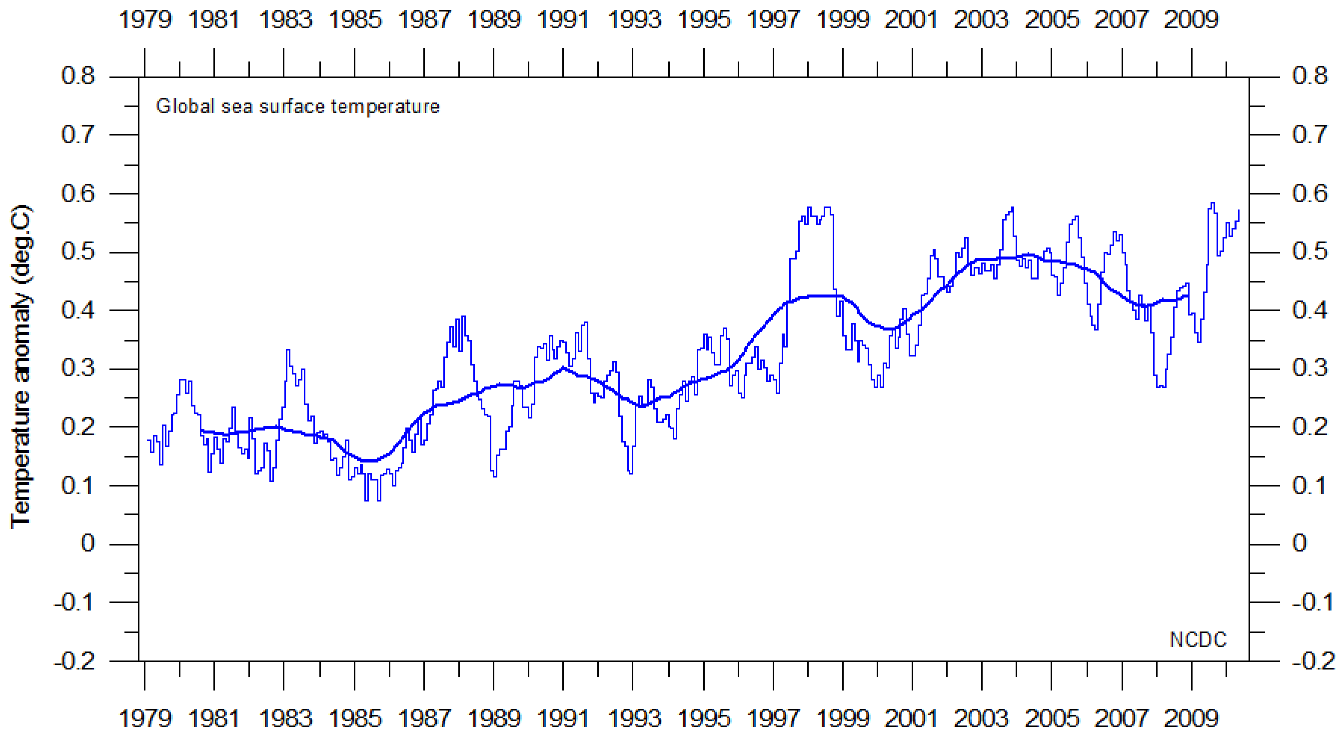
Global sea surface temperature, updated to April 2010



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.

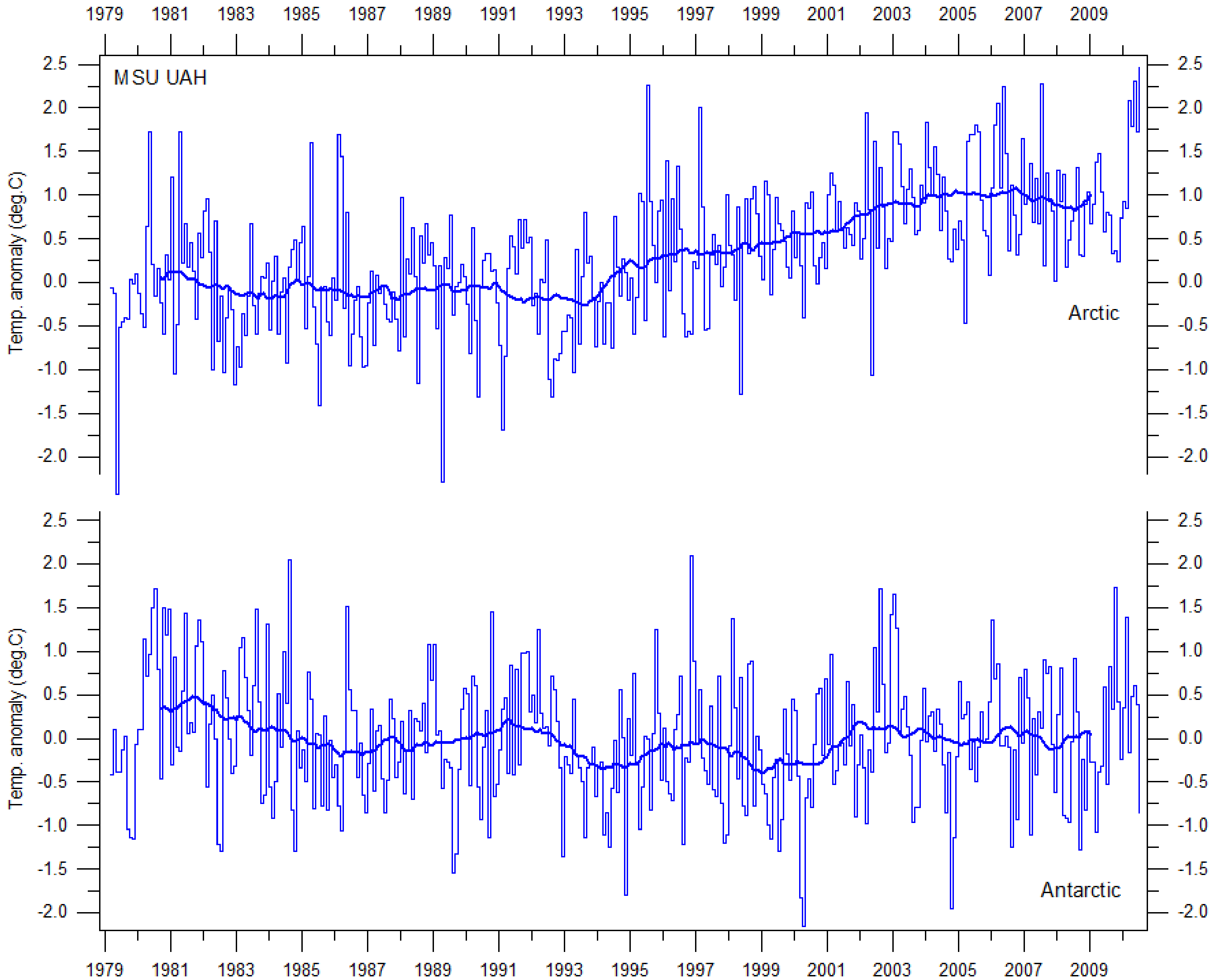


Global monthly average sea surface temperature since 1979 according to University of East Anglia's [Climatic Research Unit](#) ([CRU](#)), UK. Base period: 1961-1990. The thick line is the simple running 37 month average. Please note that this data series has not yet been updated beyond March 2010.



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.

Arctic and Antarctic lower troposphere temperature, updated to April 2010



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 March 2010

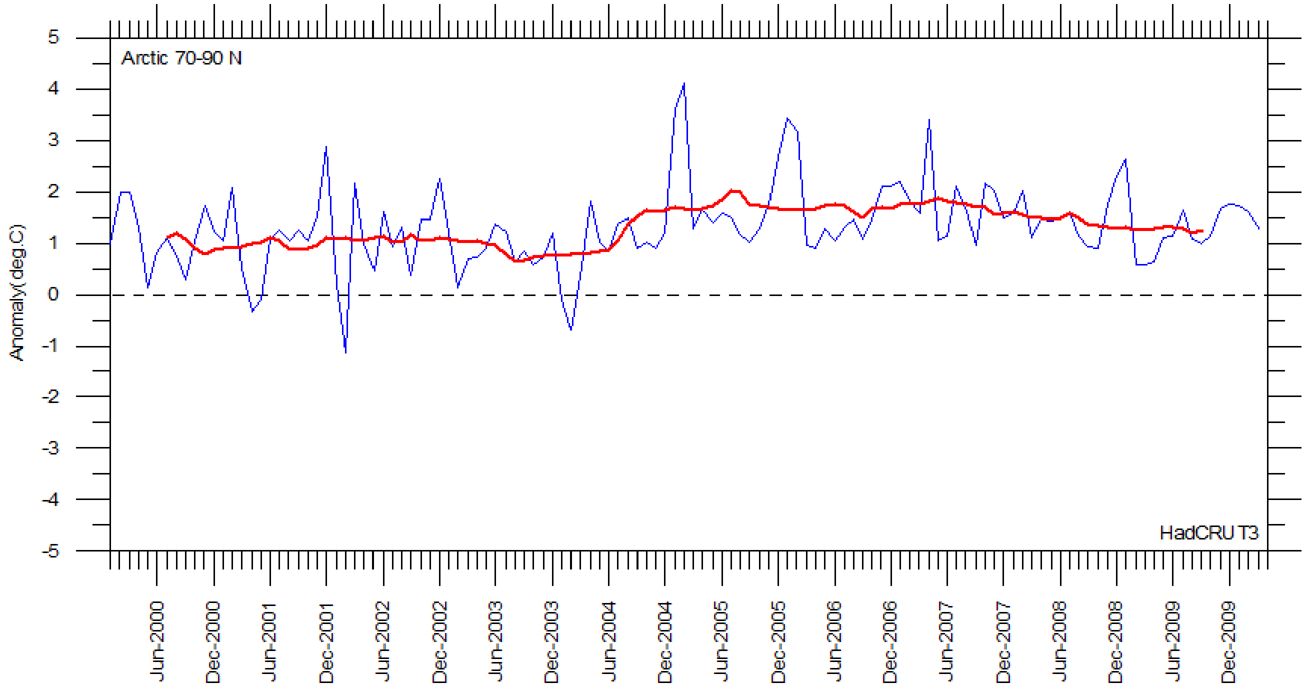


Diagram showing Arctic monthly surface air temperature anomaly 70-90°N since January 2000, in relation to the WMO reference "normal" period 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. Data provided by the Hadley Centre for Climate Prediction and Research and the University of East Anglia's [Climatic Research Unit](CRU) ([CRU]), UK. Please note that this data series has not yet been updated beyond March 2010.

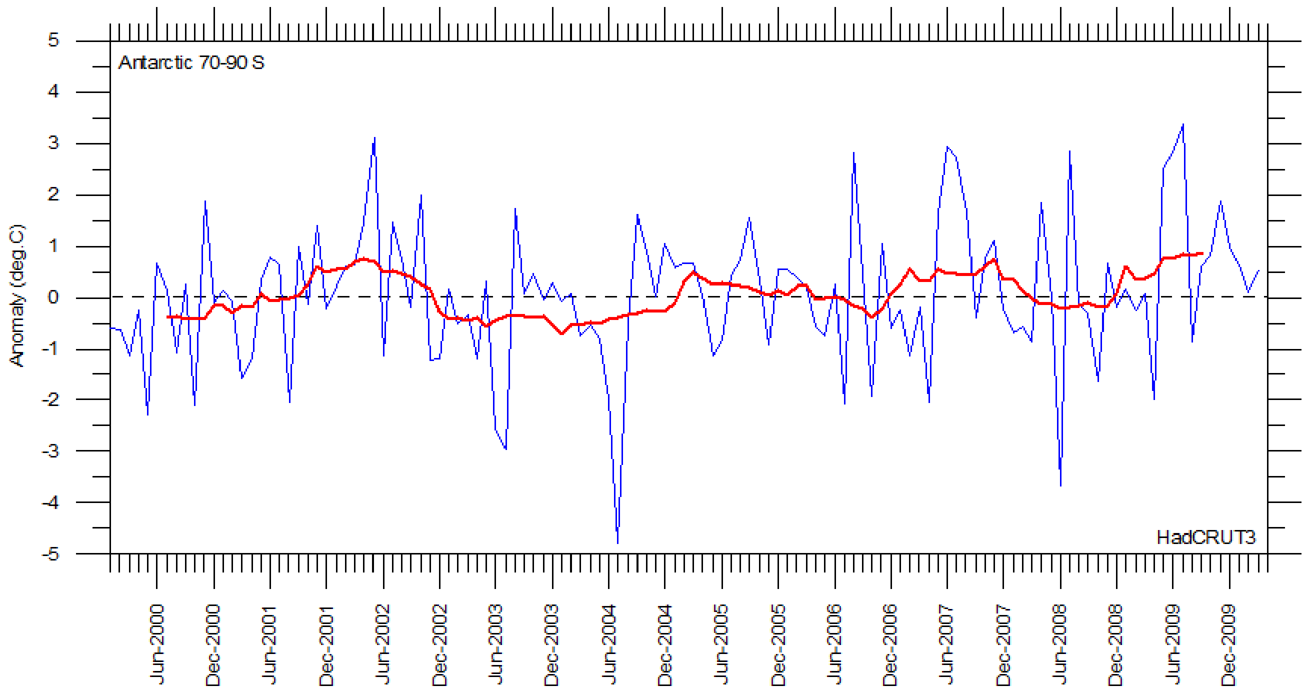


Diagram showing Antarctic monthly surface air temperature anomaly 70-90°S since January 2000, in relation to the WMO reference "normal" period 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. Data provided by the Hadley Centre for Climate Prediction and Research and the University of East Anglia's Climatic Research Unit (CRU), UK. Please note that this data series has not yet been updated beyond March 2010.

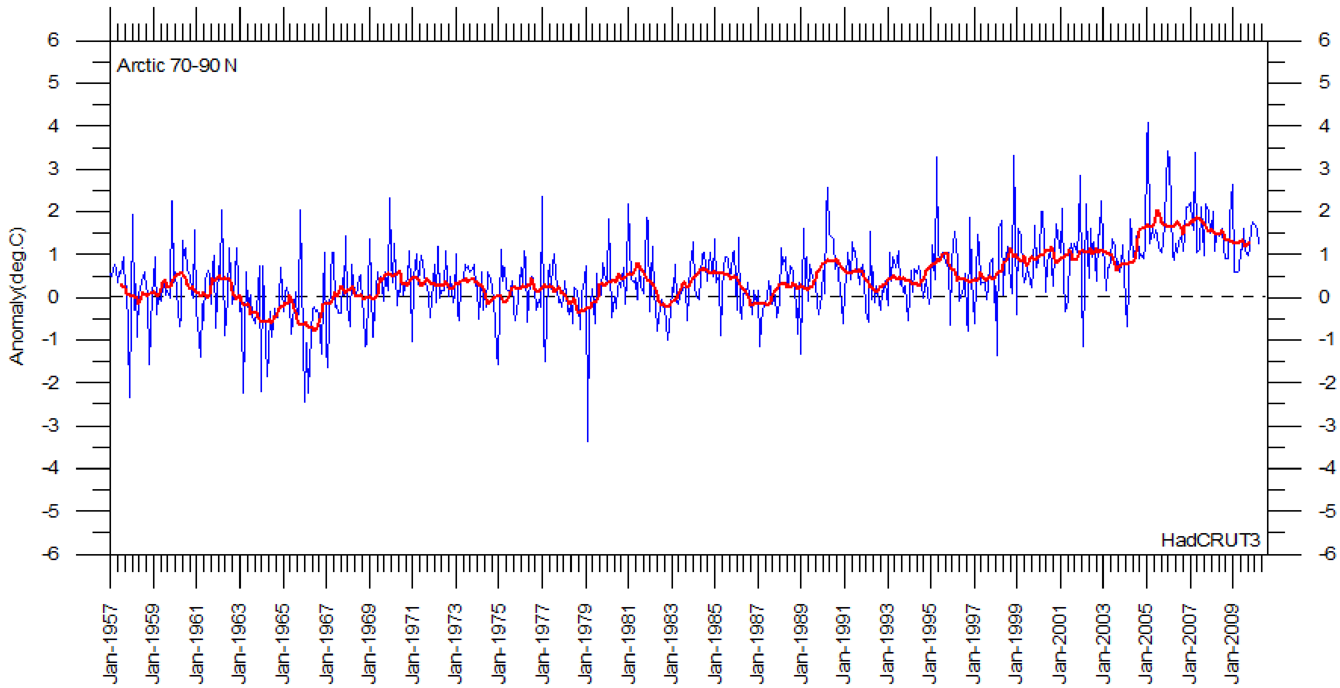


Diagram showing Arctic monthly surface air temperature anomaly 70-90°N since January 1957, in relation to the WMO reference "normal" period 1961-1990. The year 1957 has been chosen as starting year, to ensure easy comparison with the maximum length of the realistic Antarctic temperature record shown 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. Please note that this data series has not yet been updated beyond March 2010.

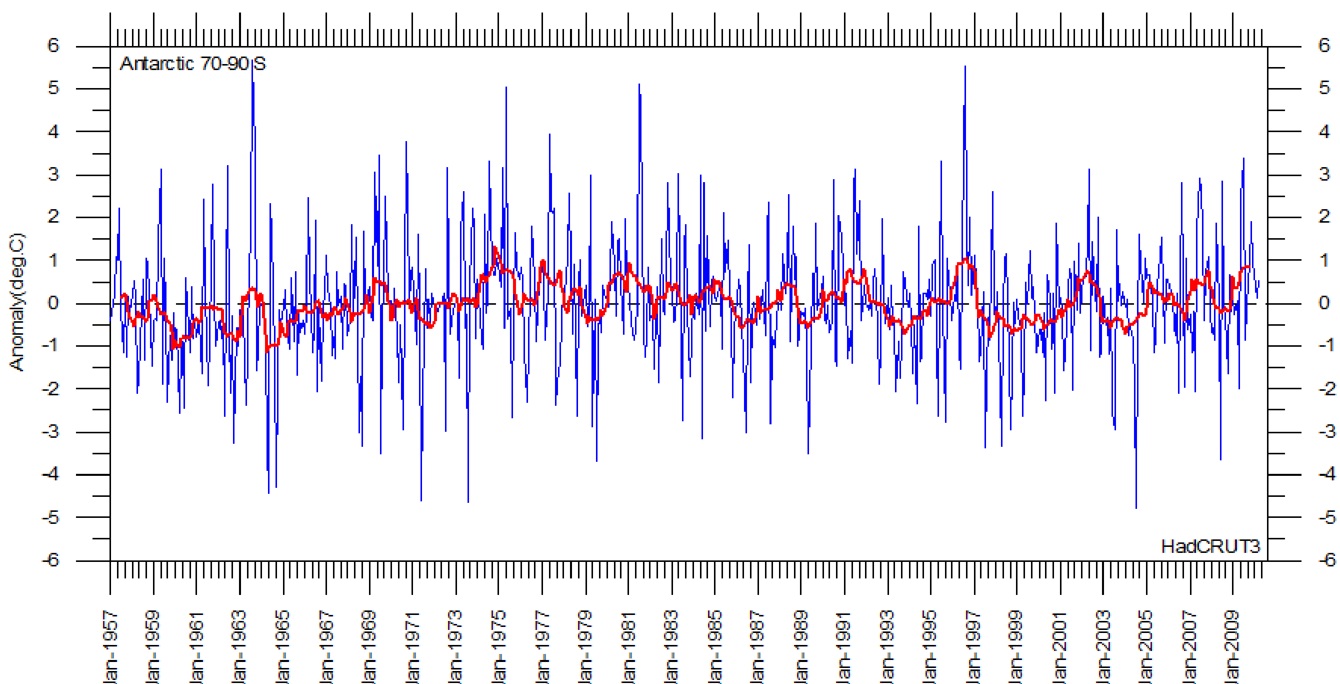


Diagram showing Antarctic monthly surface air temperature anomaly 70-90°S since January 1957, in relation to the WMO reference "normal" period 1961-1990. The year 1957 was an international geophysical year, and several meteorological stations were established in the Antarctic because of this. Before 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. Please note that this data series has not yet been updated beyond March 2010.

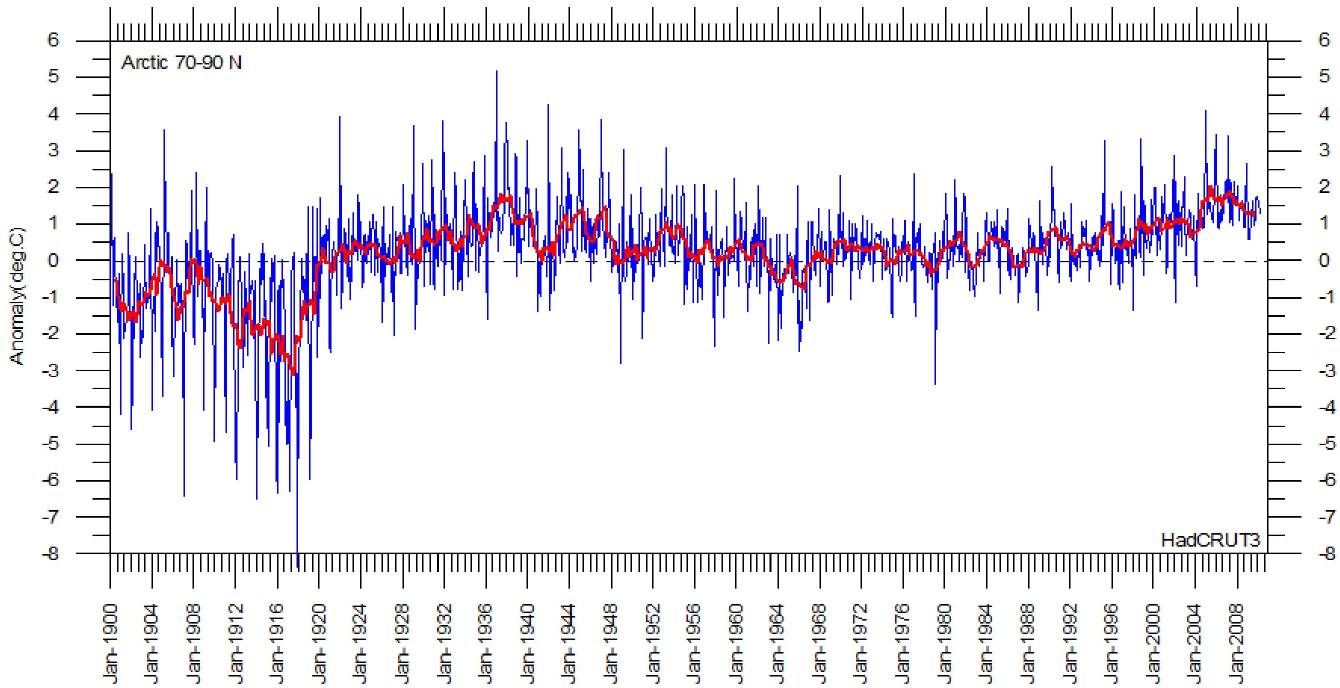


Diagram showing Arctic monthly surface air temperature anomaly 70-90°N since January 1900, in relation to the WMO reference "normal" period 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. In general, the range of monthly 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. Please note that this data series has not yet been updated beyond March 2010.

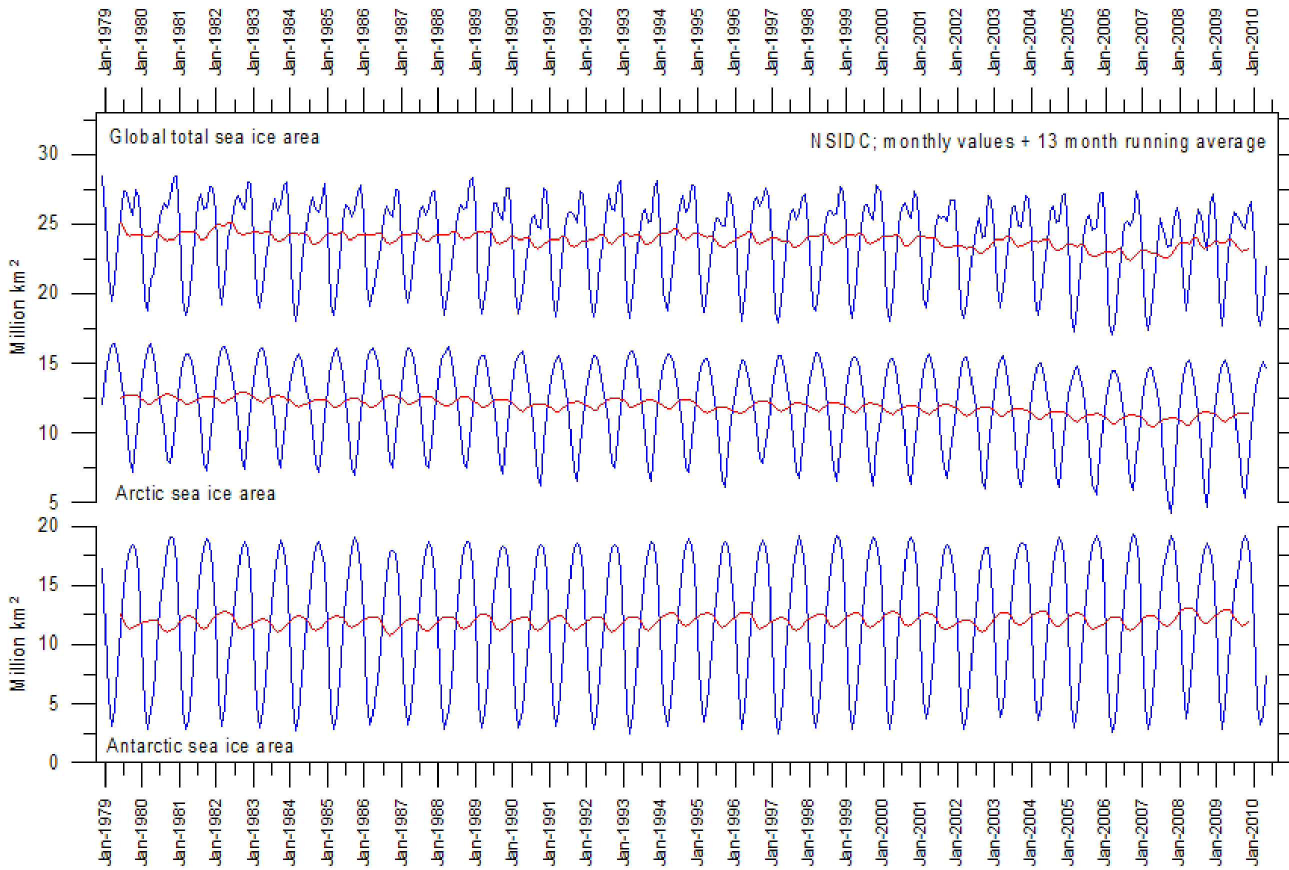
In general, the Arctic temperature record appears to be less variable than the contemporary Antarctic record, presumably at least partly due to the higher number of meteorological stations north of 70°N, compared to the number of stations south of 70°S.

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 areas of the grid dells.

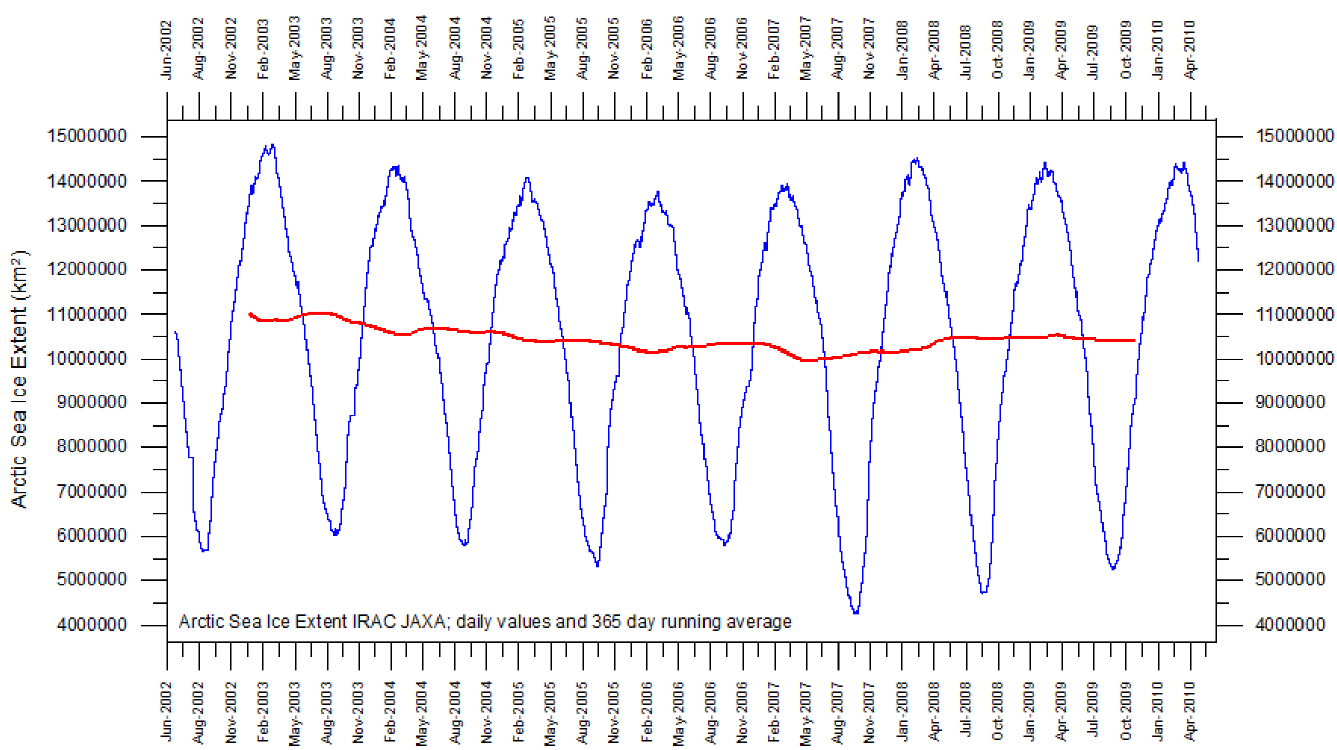
Litterature:

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 April 2010

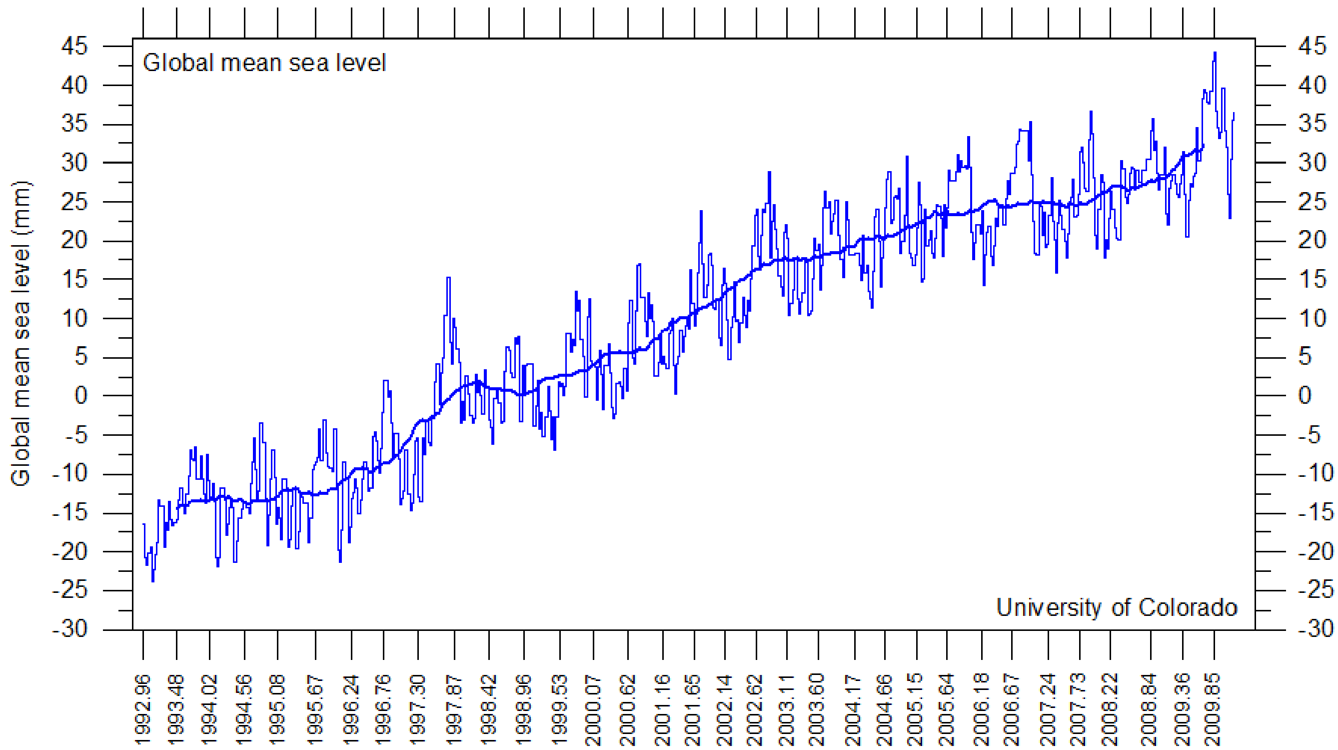


Graphs showing monthly Antarctic, Arctic and global sea ice extent since November 1978, according to the National Snow and Ice data Center (NSIDC).

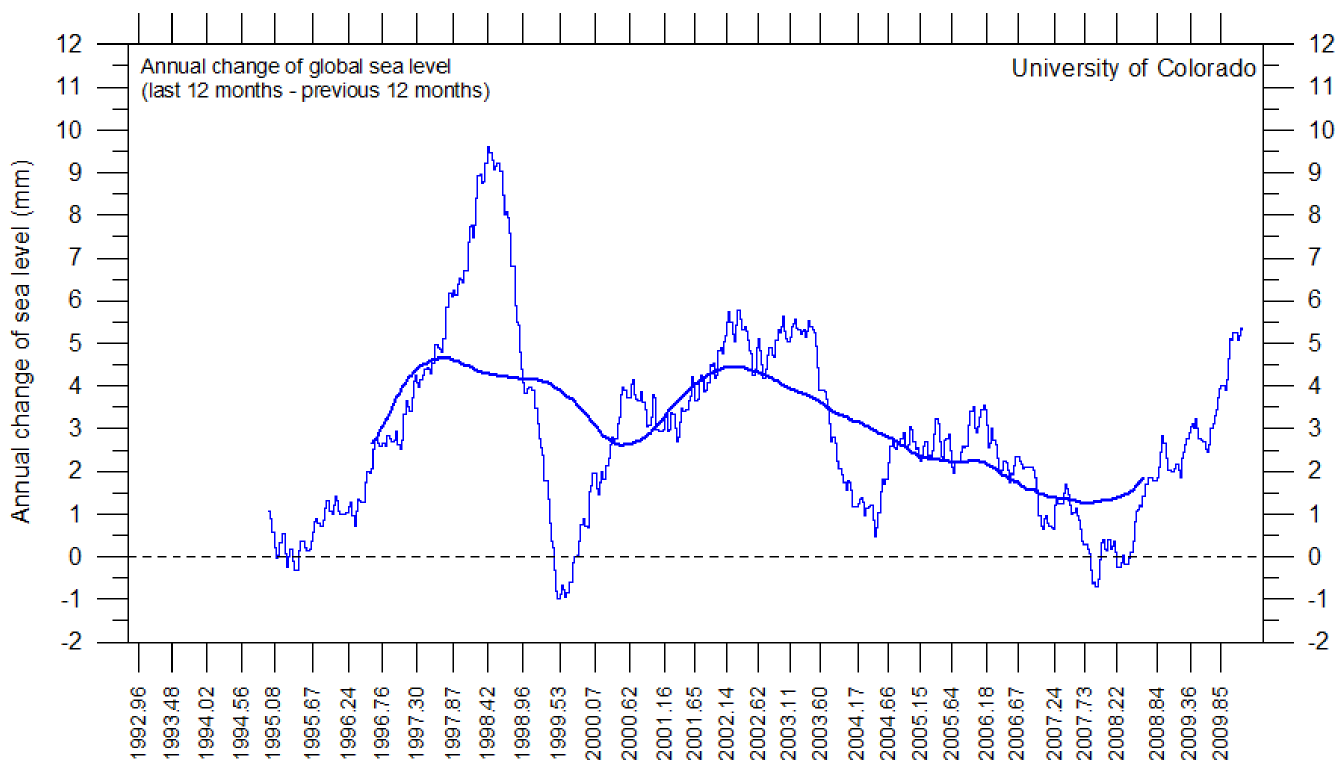


Graph showing daily Arctic sea ice extent since June 2002, to 12/05 2010, by courtesy of Japan Aerospace Exploration Agency (JAXA).

Global sea level, updated to April 2010

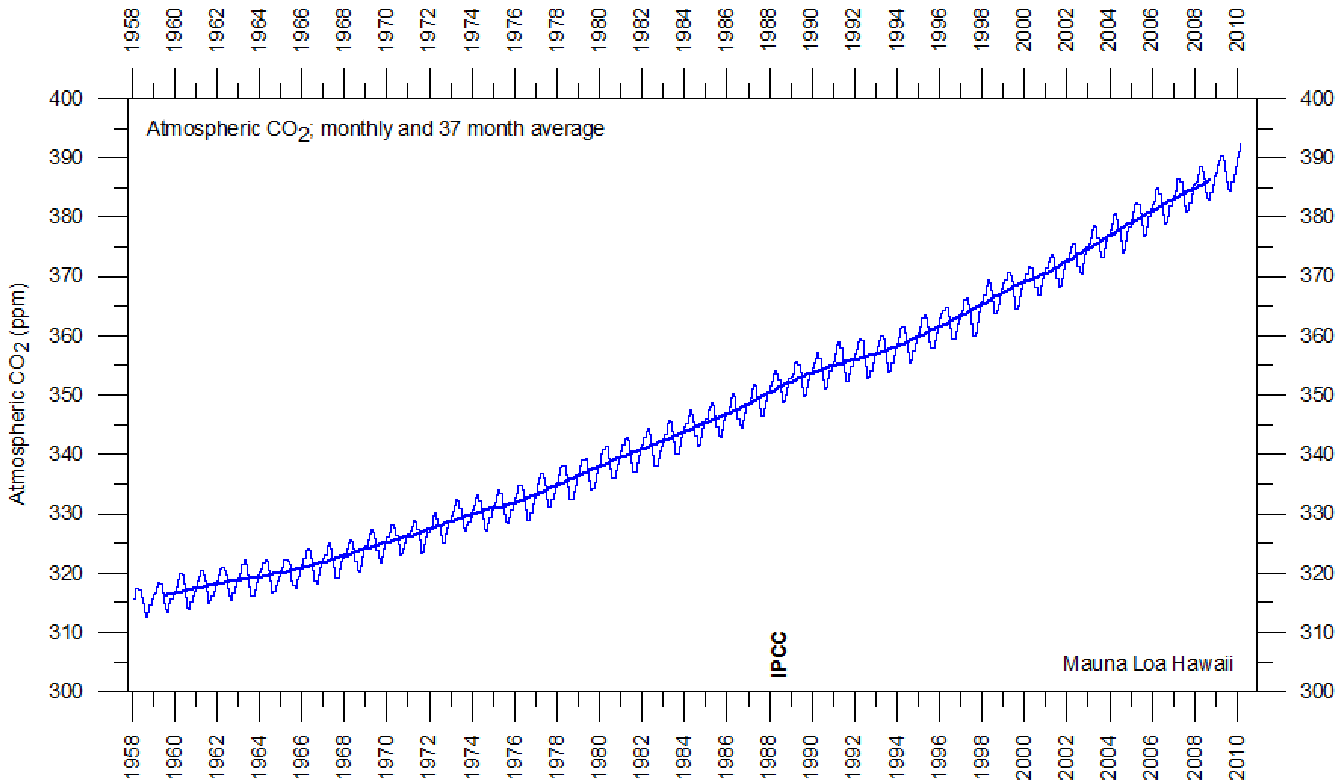


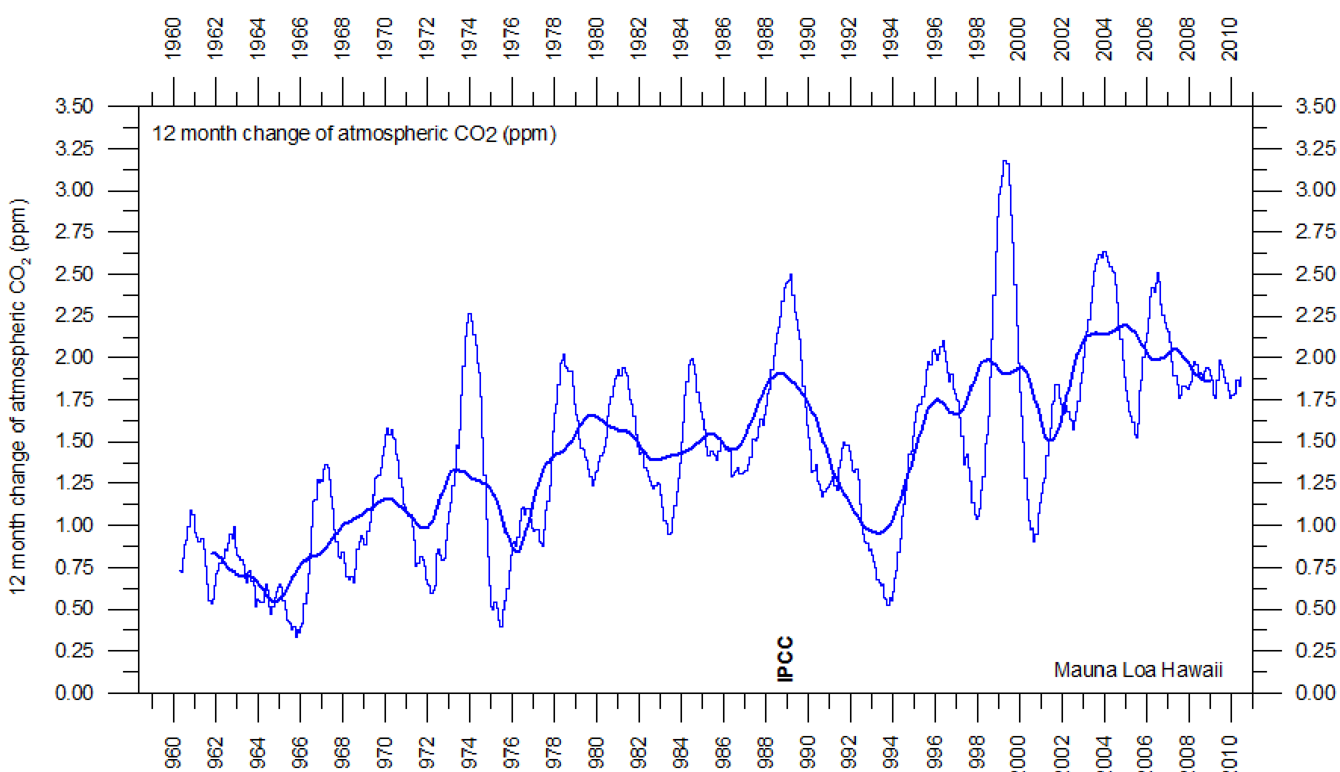
Globa lmonthly sea level since late 1992 according to the Colorado Center for Astrodynamics Research at [University of Colorado at Boulder](), USA. The thick line is the simple running 37 observation average, nearly corresponding to a running 3 yr average.



Annual change of global 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 3 yr average.

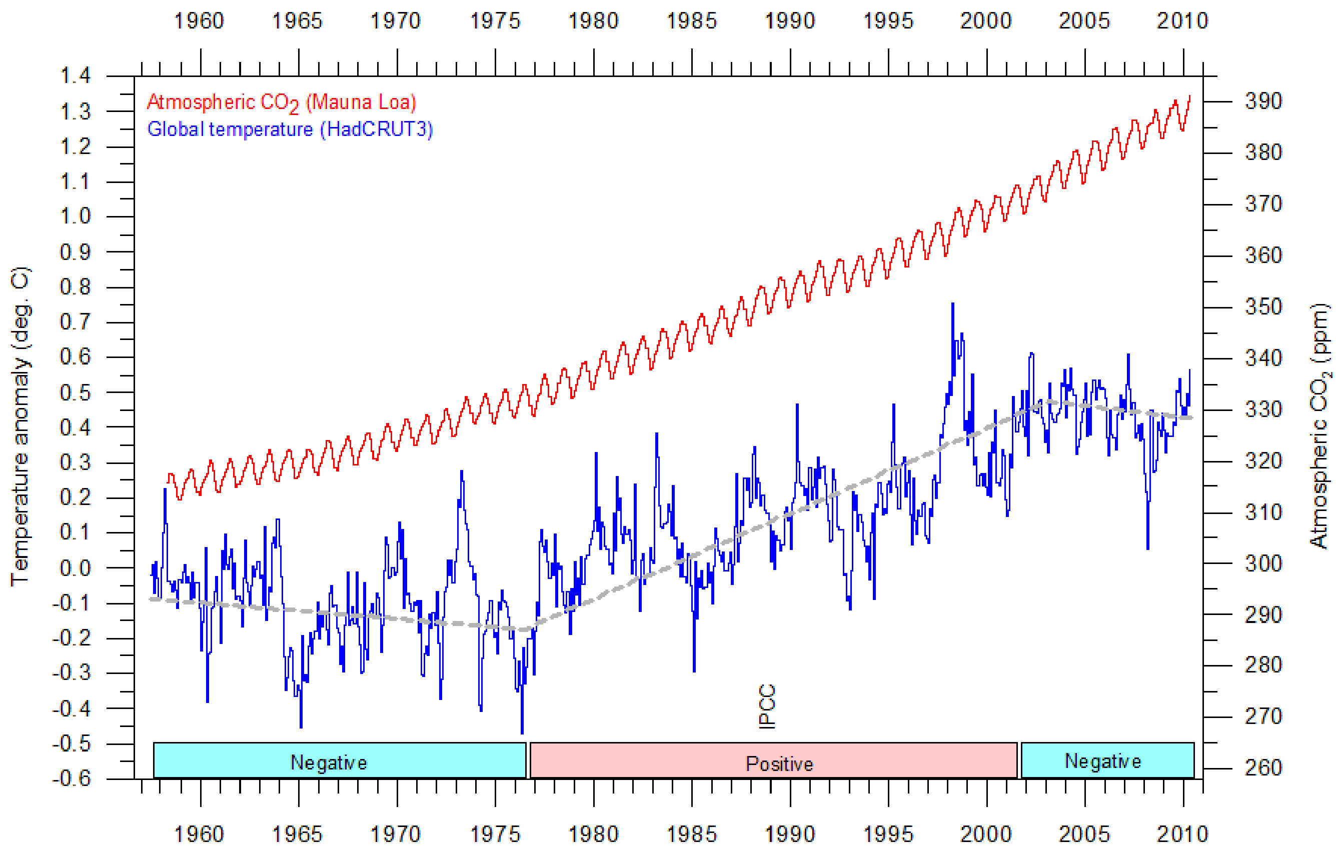
Atmospheric CO_2, updated to April 2010





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.

Global surface air temperature and atmospheric CO_2, updated to March 2010



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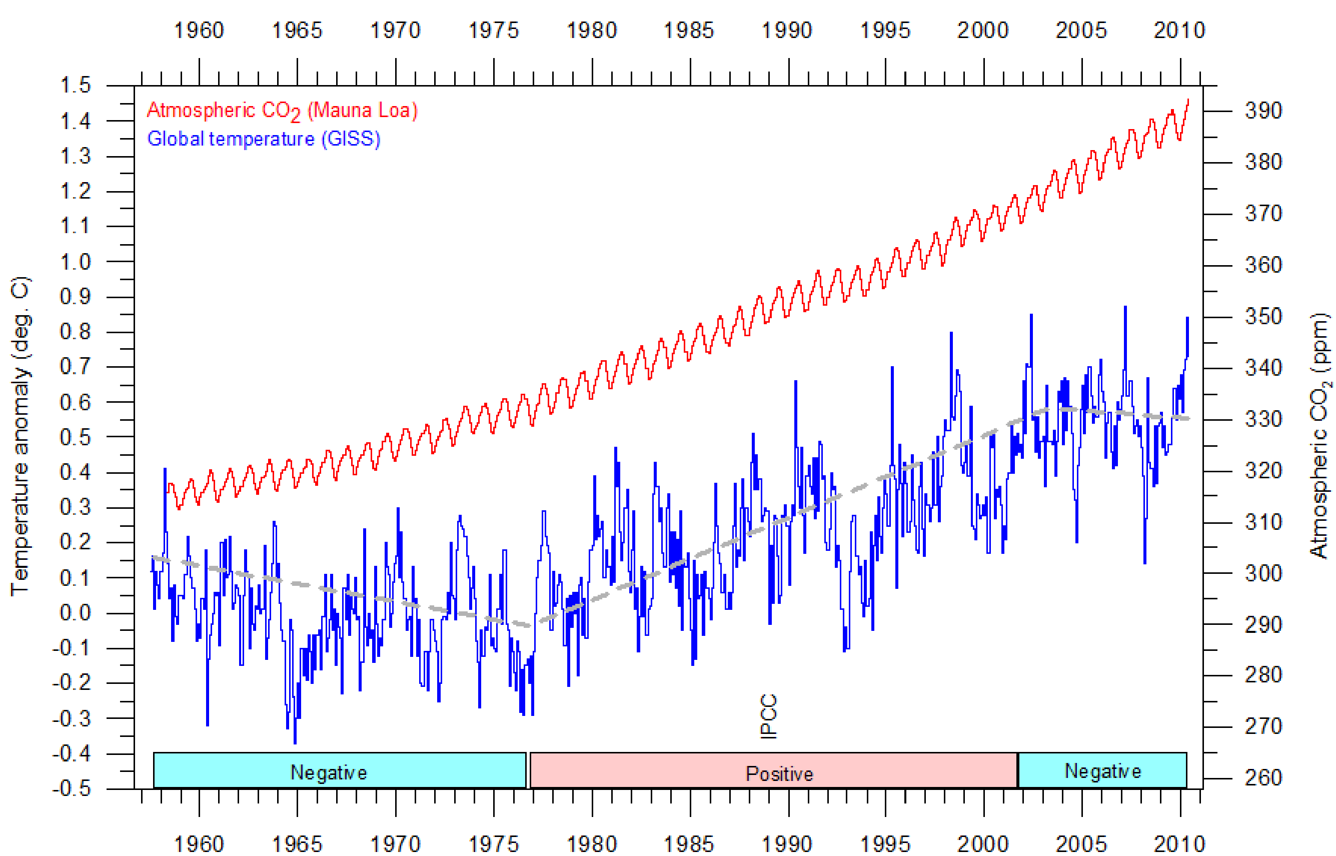
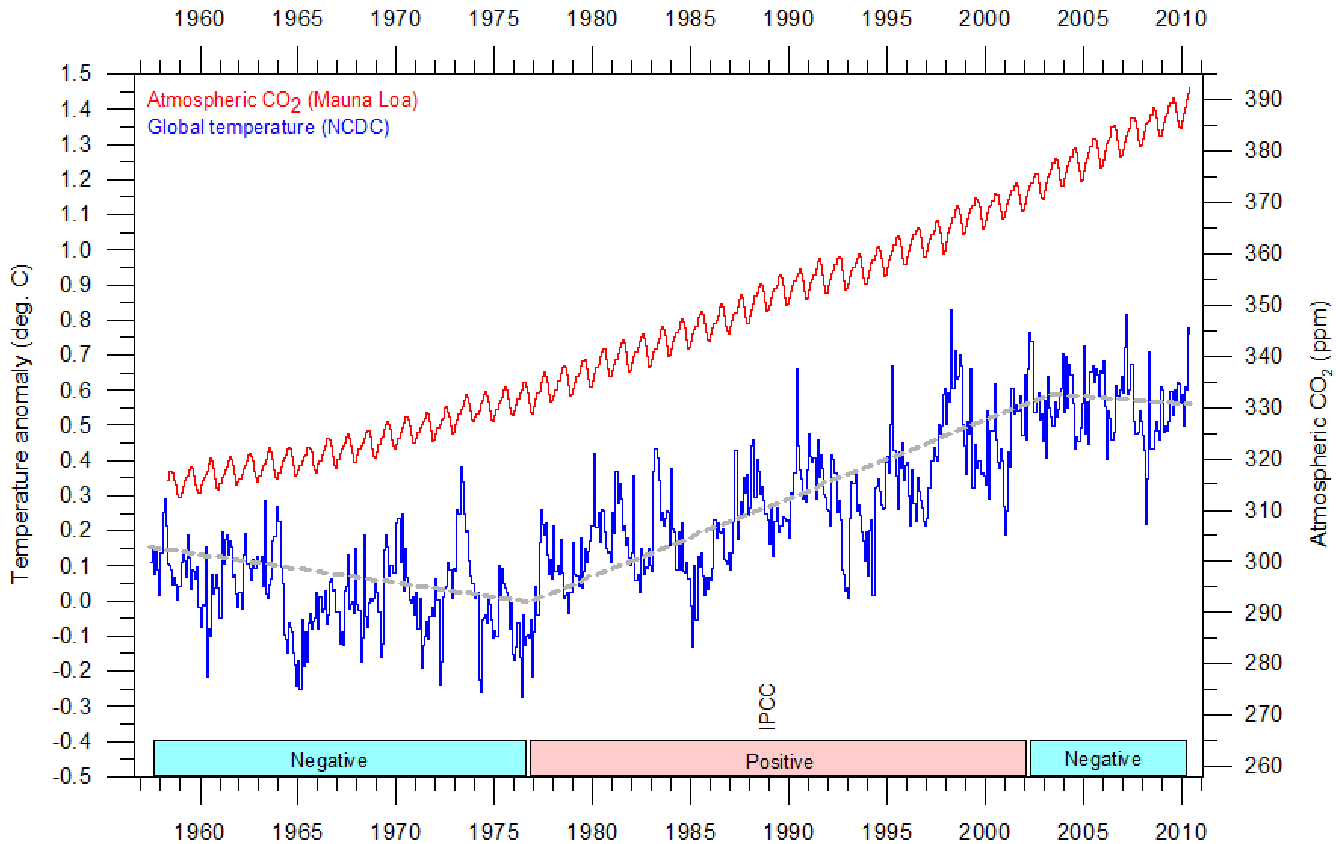




Diagrams showing HadCRUT3, GISS, and NCDC monthly global surface air temperature estimates (blue) and the monthly atmospheric CO_2 content (red) according to the [Mauna Loa Observatory](), Hawaii. The Mauna Loa data series begins in March 1958, and 1958 has therefore been chosen as starting year for 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 has not been updated beyond March 2010.

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, etc.) may well override the potential influence of CO_2 on short time scales such as just a few years.

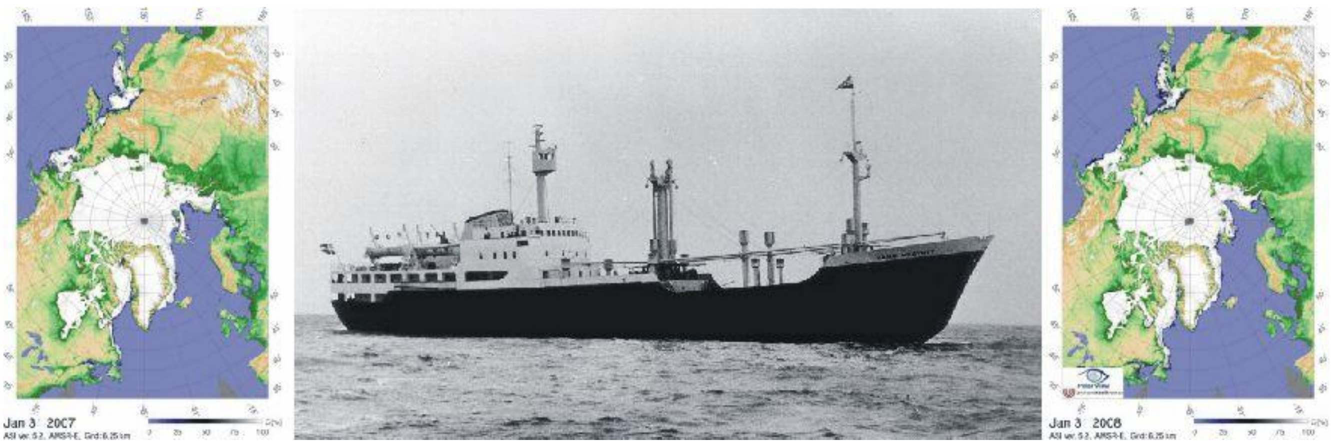
It is of cause equally inappropriate to present new meteorological record values, whether daily, monthly or annual, as support for the hypothesis ascribing high importance of atmospheric CO_2 for global temperatures. Any such short-period meteorological record value may well be the result of other phenomena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

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

1959: Danish ship Hans Hedtoft is lost on her maiden voyage



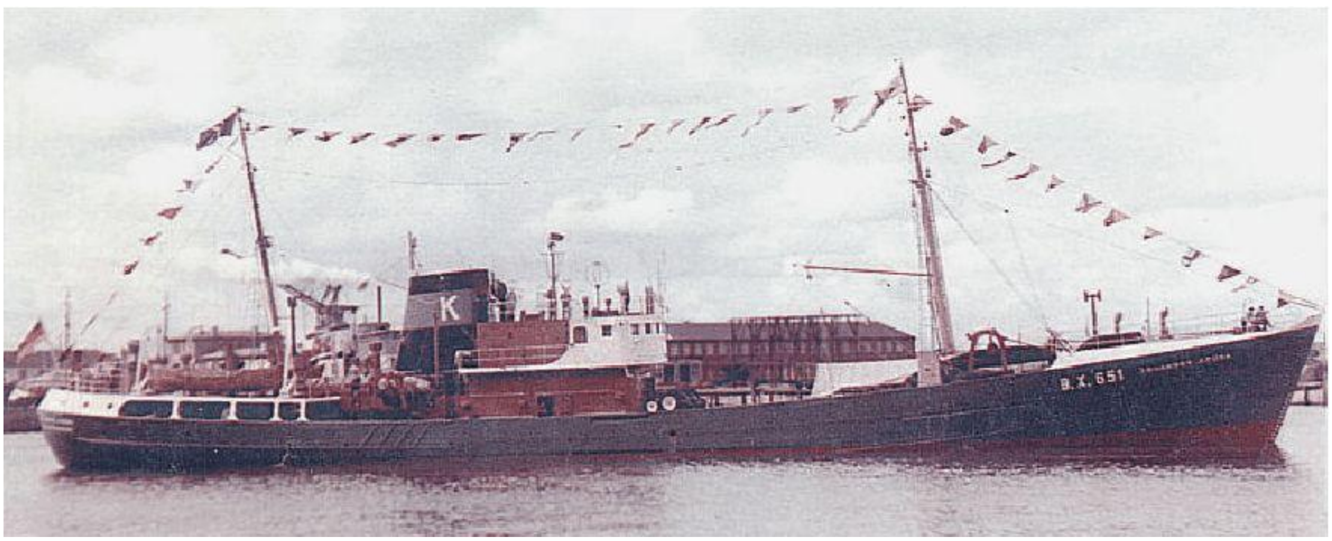
Northern hemisphere sea ice 31 January 2007 (left; map from University of Bremen). MS Hans Hedtoft (2,857 brt) before setting out on her maiden voyage to Greenland (centre). Northern hemisphere sea ice 31 January 2008 (right; map from University of Bremen). The two sea ice maps show the interannual variation of sea ice in modern time.

On January 30, 1959 the new Danish combined freighter-passenger liner "Hans Hedtoft" was lost en route from Julianehåb, Greenland, to Copenhagen, Denmark. Besides the 40 crew members, there were 55 passengers aboard Hans Hedtoft; none of the 95 persons survived. Hans Hedtoft was on its maiden voyage and was said to be "unsinkable" due to its very strong design, much like what was said about the Titanic in 1912.

The Hans Hedtoft was a diesel-engine 2,857-ton ship specially designed for the Danish government to handle winter storms and sea ice in the North Atlantic Ocean near the southern tip of Greenland. She had a double steel bottom, an armoured bow and stern, and was divided into seven watertight compartments. She carried the most modern instrumentation, from radar to gyro, from Decca Navigator to radio-equipped life rafts. In addition, she was under command of the highly experienced Captain P. L. Rasmussen (age 58), who after the sea trials declared: "This ship means a revolution in Arctic navigation."

On 7 January 1959 the Hans Hedtoft left Copenhagen on her maiden voyage to Greenland. She arrived uneventfully at Nuuk (Godthåb), capital of Greenland, and put to sea again bound for Copenhagen, Denmark, sailing down the west coast of Greenland. The return journey began on 29 January hr. 21:15, local time, when Hans Hedtoft left Qaqortoq (Julianehåb) in SW Greenland. On board were 95 persons, including six children and Augo Lynge, one of Greenland's two Representatives in the Danish Parliament. Rounding Cape Farewell, the southernmost tip of Greenland on 30 January 1959, the Hans Hedtoft was hit by a storm with high seas, freezing temperatures, snow, and bad visibility. Following the warm period in Greenland 1925-1947, temperatures were again declining in the Greenland region, and sea ice and icebergs was again spreading further south than usual in previous years. At 11:54 next morning Hans Hedtoft radioed an SOS: "Collision with iceberg". Less than an hour later came the message that the engine room was filling fast from a serious leak in the riveted steel hull. At 15:36 came another message from the Hedtoft: "Slowly sinking and in need of immediate assistance". At 17:41 the last message from Hans Hedtoft was received: "We are slowly sinking". At 18:06 the beginning of "SOS" was heard, but the transmission was interrupted and no further communication was received from Hans Hedtoft.

A West German ocean-going trawler, the Johannes Krüss (see photo below), and the U.S. Coast Guard cutter Campbell both were in the area near Hans Hedtoft and immediately turned toward Hans Hedtoft's position after the initial distress call. However, due to the high sea, floating ice, dwindling daylight and generally bad visibility they were unable to reach the position provided by Hans Hedtoft before she sank later that afternoon. Presumably Johannes Krüss (commanded by Kapitän Albert Sierck) after a gallant and dangerous voyage at high speed in the ice-filled stormy waters actually made it to the position of Hans Hedtoft only few minutes after her sinking. However, she was unable to find any survivors under these exceptionally difficult conditions. The only item ever recovered from Hans Hedtoft was a life belt that was washed ashore on the coast of Iceland, 9 months after the ship was lost.



The German 60.4 m long ocean-going trawler Johannes Krüss in 1956, setting out for sea trials before her maiden voyage.

Eight years later, in early March 1967, the Johannes Krüss was itself lost in the same waters as Hans Hedtoft. The ship simply disappeared with its crew of 22, after last being having radio contact on 28 February, about 450 km east of Cape Farewell, Greenlands southern tip. At that time the wind strength was 10 on the Beaufort scale, and the air temperature -22^{o}C. Most likely the loss of Johannes Krüss was caused by a collision with an iceberg or an ice floe, or perhaps rapid icing leading to capsizing; something sudden which prevented even a single distress call from the ship. In 1967 the cooling beginning around 1945 was even more pronounced, and sea ice conditions in the North Atlantic known to be more difficult than in 1959.

References:

Rockwell, T. 2002. *I de bedste hænder. Historien om M/S Hans Hedtofts forlis.* Aschenhoug, Copenhagen, Denmark, 253 pp. ISBN 87-11-16284-8.

All above diagrams with supplementary information, including links to data sources, are available on www.climate4you.com

Yours sincerely, Ole Humlum (Ole.Humlum@geo.uio.no)

18 May 2010.