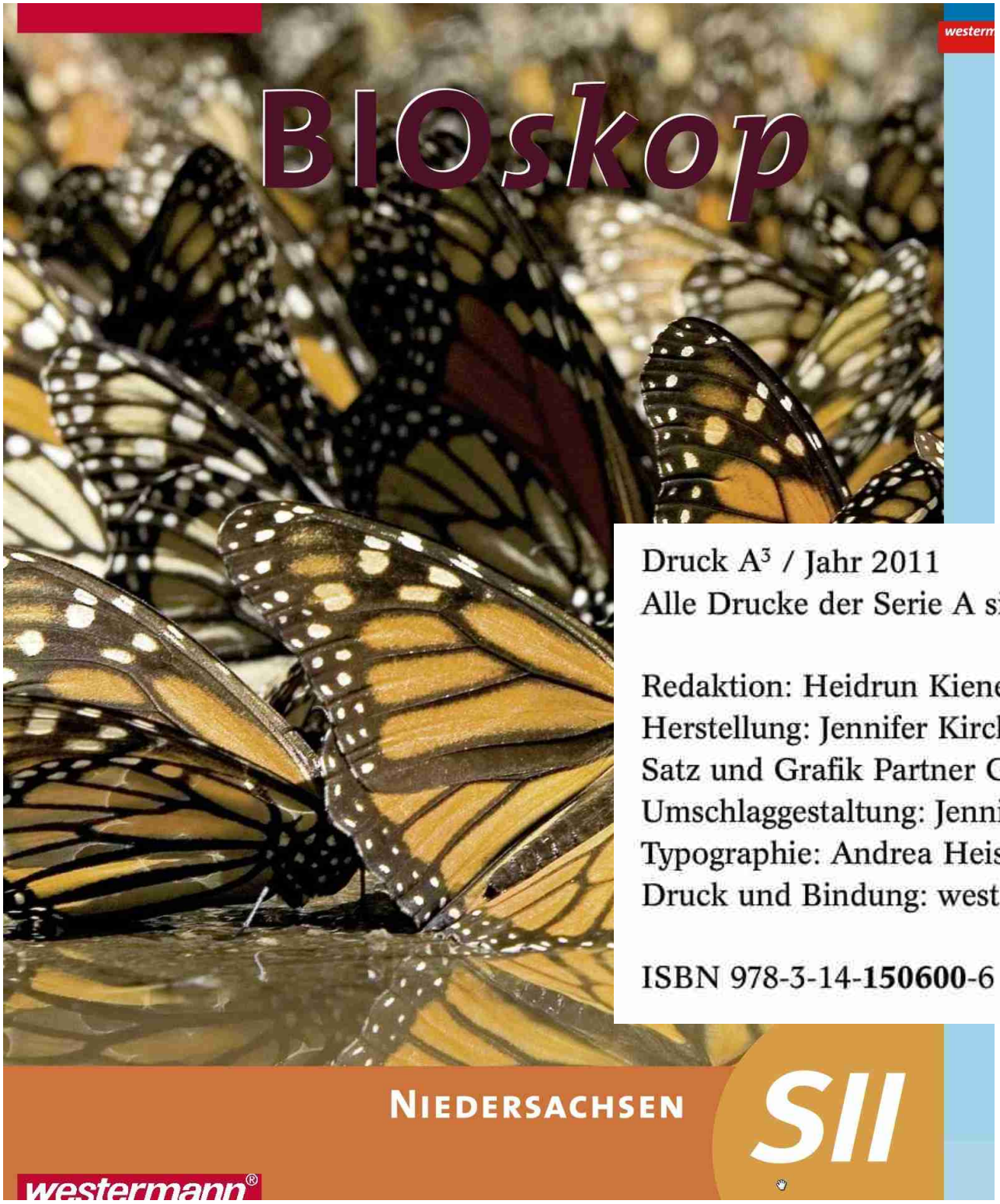
Korrelation und Kausalität CO2 und Temp

Folie M 2



Druck A³ / Jahr 2011
Alle Drucke der Serie A sind im Unterricht parallel verwendbar.

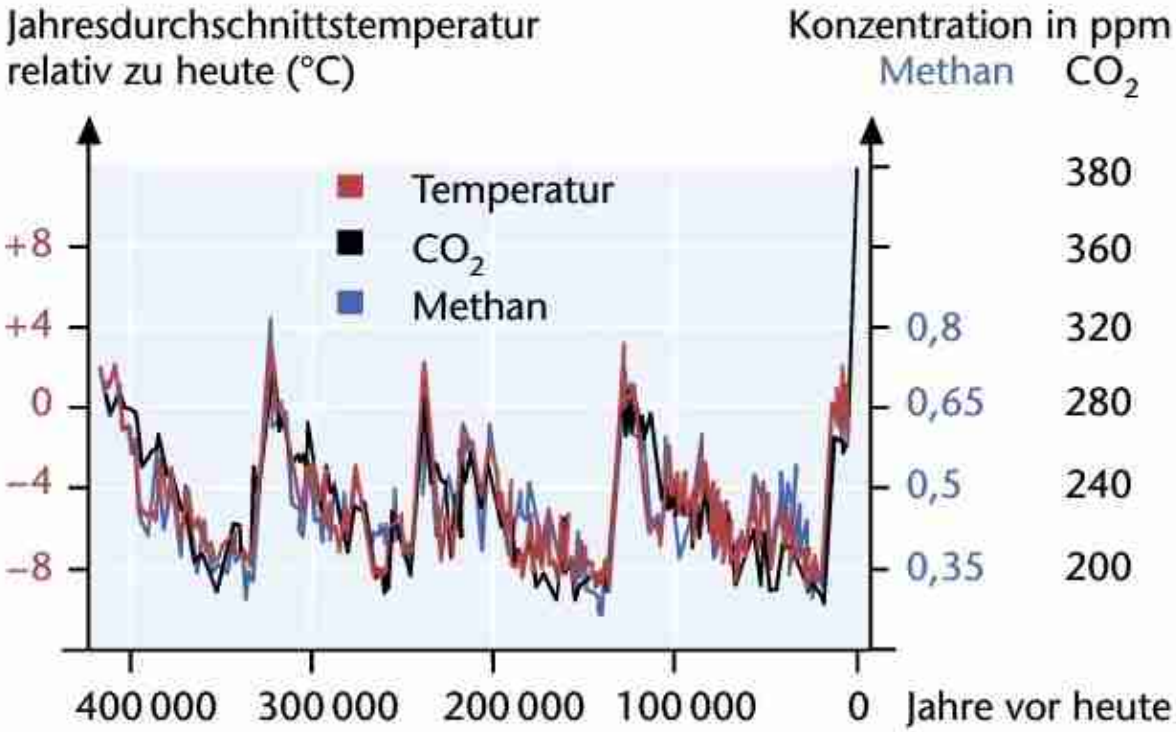
Redaktion: Heidrun Kiene
Herstellung: Jennifer Kirchhof
Satz und Grafik Partner GmbH, Meitingen
Umschlaggestaltung: Jennifer Kirchhof
Typographie: Andrea Heissenberg
Druck und Bindung: westermann druck GmbH, Braunschweig

ISBN 978-3-14-**150600**-6

Die CO_2-Konzentration in der Atmosphäre ist in den letzten 250 Jahren von 280 ppm auf 385 ppm stetig gestiegen und steigt auch weiterhin an (Abb. 3). Allerdings hat es in der Erdgeschichte schon immer Schwankungen im CO_2-Gehalt gegeben. Da der CO_2-Gehalt mit der Temperatur korreliert, gab es bei hohen CO_2-Werten relativ warme Zeiten, bei niedrigen Werten kalte Zeiten wie z. B. die Eiszeiten der letzten zwei Millionen Jahre. Ursache dafür sind u. a. regelmä-

Quelle: Bioskop SII, S. 168

2 Klimawandel in der Erdgeschichte und Ursachen.
Deuten Sie die Kurven in Abb. 3 und vergleichen Sie den heutigen Zustand mit dem der letzten 400 000 Jahre.



3 Temperaturschwankungen und Treibhausgas-Konzentrationen der letzten 400 000 Jahre

Quelle: Bioskop SII, S. 169

Lösungsvorschlag der Autoren:

b) Die Abbildung 3 zeigt eine Periodik in der Konzentration der Treibhausgase Kohlenstoffdioxid und Methan. Damit einher geht synchron die Veränderung der Temperatur. Eine Periode dauert etwa 100 000 Jahre,

wobei es jeweils zu einem starken Anstieg und danach zu einer allmählichen Abflachung kommt. Der letzte Anstieg unterscheidet sich von den vorhergehenden dadurch, dass die Konzentration von Kohlenstoffdioxid mehr als doppelt so hoch ansteigt als in den vergangenen Perioden. Eine größere Temperaturerhöhung ist damit zu erwarten.

Originalzitat

„***Deep ice tells long climate story***“

"Ice cores reveal the Earth's natural climate rhythm over the last 800,000 years. ***When carbon dioxide changed there was always an accompanying climate change.*** *Over the last 200 years human activity has increased carbon dioxide to well outside the natural range," explained Dr Wolff.*

Dr Eric Wolff from the
British Antarctic Survey (BAS)

4 September 2006

http://news.bbc.co.uk/2/hi/science/nature/5314592.stm

Übersetzung

„*Tiefes Eis erzählt eine lange Klimageschichte*“

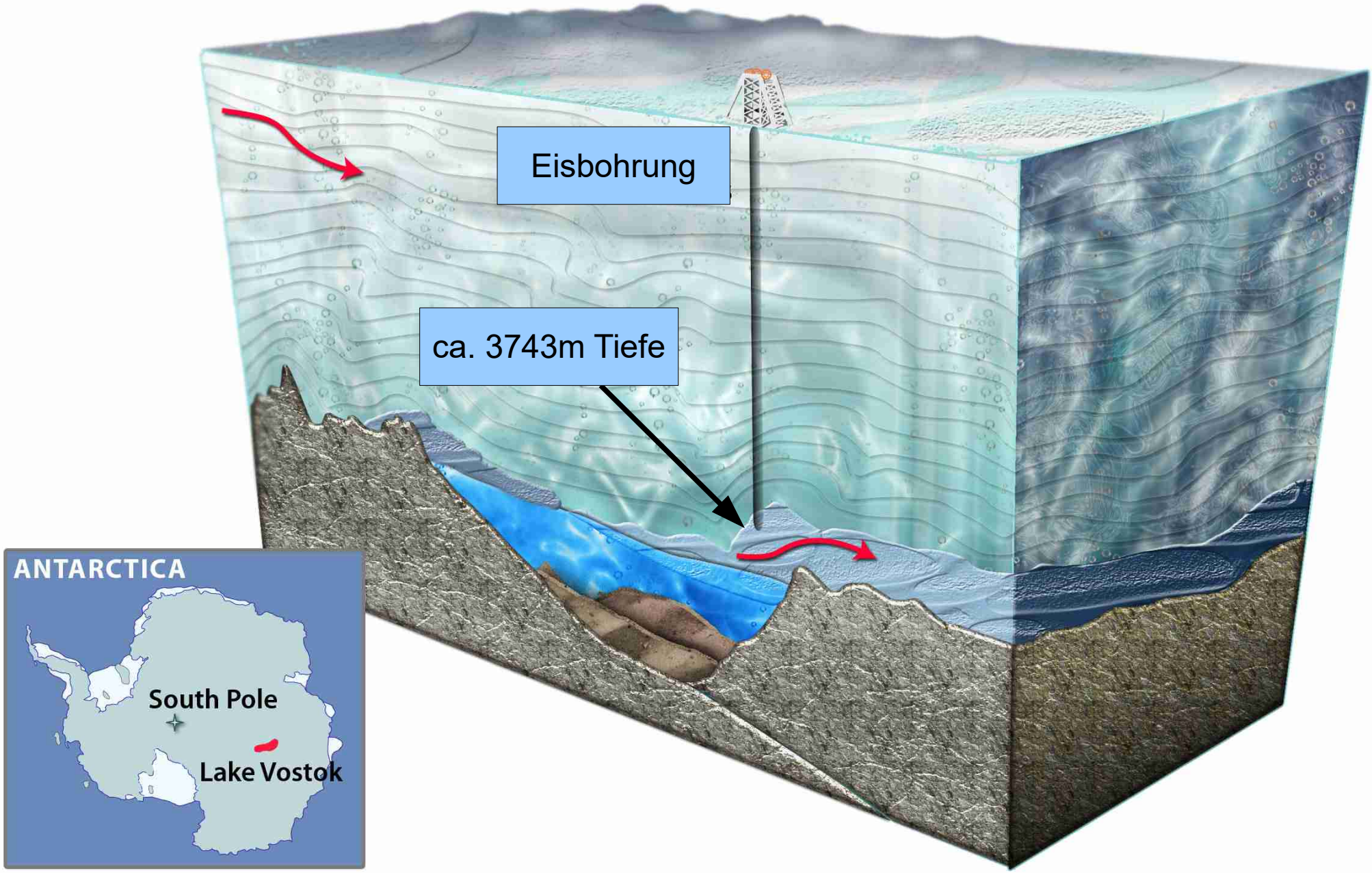
Eiskernbohrungen zeigen den natürlichen Klimarhythmus über die letzten 800.000 Jahre.
Wenn sich die CO_2-Konzentration änderte, dann gab es immer eine begleitende Klimaänderung **[Temperaturänderung]**.
In den letzten 200 Jahren hat menschliche Aktivität zu einer CO_2-Konzentrationszunahme geführt, die weit außerhalb der natürlichen Größenordnung liegt.

Dr Eric Wolff vom
„British Antarctic Survey“ (BAS)

4 September 2006

http://news.bbc.co.uk/2/hi/science/nature/5314592.stm

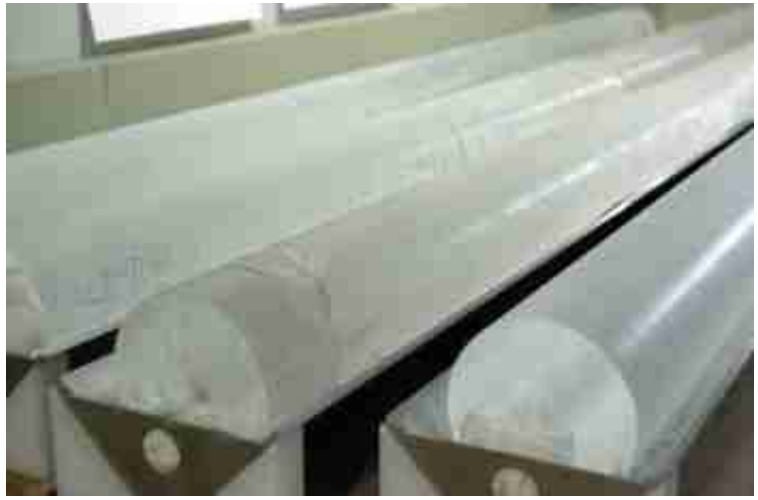
Eisbohrung in „Vostok“? Nie gehört!



Quelle: http://upload.wikimedia.org/wikipedia/commons/7/7a/Lake_Vostok_drill_2011.jpg

Fotos von der Bohrstelle

http://www.extremetech.com/extreme/160667-3500-species-discovered-in-lake-vostok-underneath-miles-of-ice-in-conditions-similar-to-jupiters-europa



http://www.camelclimatechange.org/view/article/179408/

http://www.sciencedaily.com/releases/2008/11/081117103653.htm

Ice Core Gateway

Vostok Ice Core

In January 1998, the collaborative ice-drilling project between Russia, the United States, and France at the Russian Vostok station in East Antarctica yielded the deepest ice core ever recovered, reaching a depth of 3,623 m (Petit et al. 1997, 1999). Preliminary data indicate the Vostok ice-core record extends through four climate cycles, with ice slightly older than 400 kyr (Petit et al. 1997, 1999).

Download Vostok Data

Some publication references for the data and research are:

Petit, J.R., J. Jouzel, D. Raynaud, N.I. Barkov, J.-M. Barnola, I. Basile, M. Benders, J. Chappellaz, M. Davis, G. Delayque, M. Delmotte, V.M. Kotlyakov, M. Legrand, V.Y. Lipenkov, C. Lorius, L. Pépin, C. Ritz, E. Saltzman, and M. Stievenard. 1999. Climate and atmospheric history of the past 420,000 years from the Vostok ice core, Antarctica. Nature 399: 429-436.

Petit, J.R., I. Basile, A. Leruyuet, D. Raynaud, C. Lorius, J. Jouzel, M. Stievenard, V.Y. Lipenkov, N.I. Barkov, B.B. Kudryashov, M. Davis, E. Saltzman, and V. Kotlyakov. 1997. Four climate cycles in Vostok ice core. Nature 387: 359-360.

Brook, E.J., Kurz, M.D., Curtice, J., and Cowburn, S., 2000, Accretion of Interplantary Dust in Polar Ice, Geophysical Research Letters, Vol. 27, No. 19, p. 3145.

C. Lorius, J. Jouzel, C. Ritz, L. Merlivat, N. I. Barkov, Y. S. Korotkevitch and V. M. Kotlyakov, A 150,000-year climatic record from Antarctic ice, Nature, 316, 1985, 591-596.

J. Jouzel, C. Lorius, J. R. Petit, C. Genthon, N. I. Barkov, V. M. Kotlyakov and V. M. Petrov, Vostok

vostok-1999-temp-co2-rohdaten.ods - LibreOffice Calc

Datei Bearbeiten Ansicht Einfügen Format Extras Daten Fenster Hilfe

Arial 10

A3 Alter des Eis

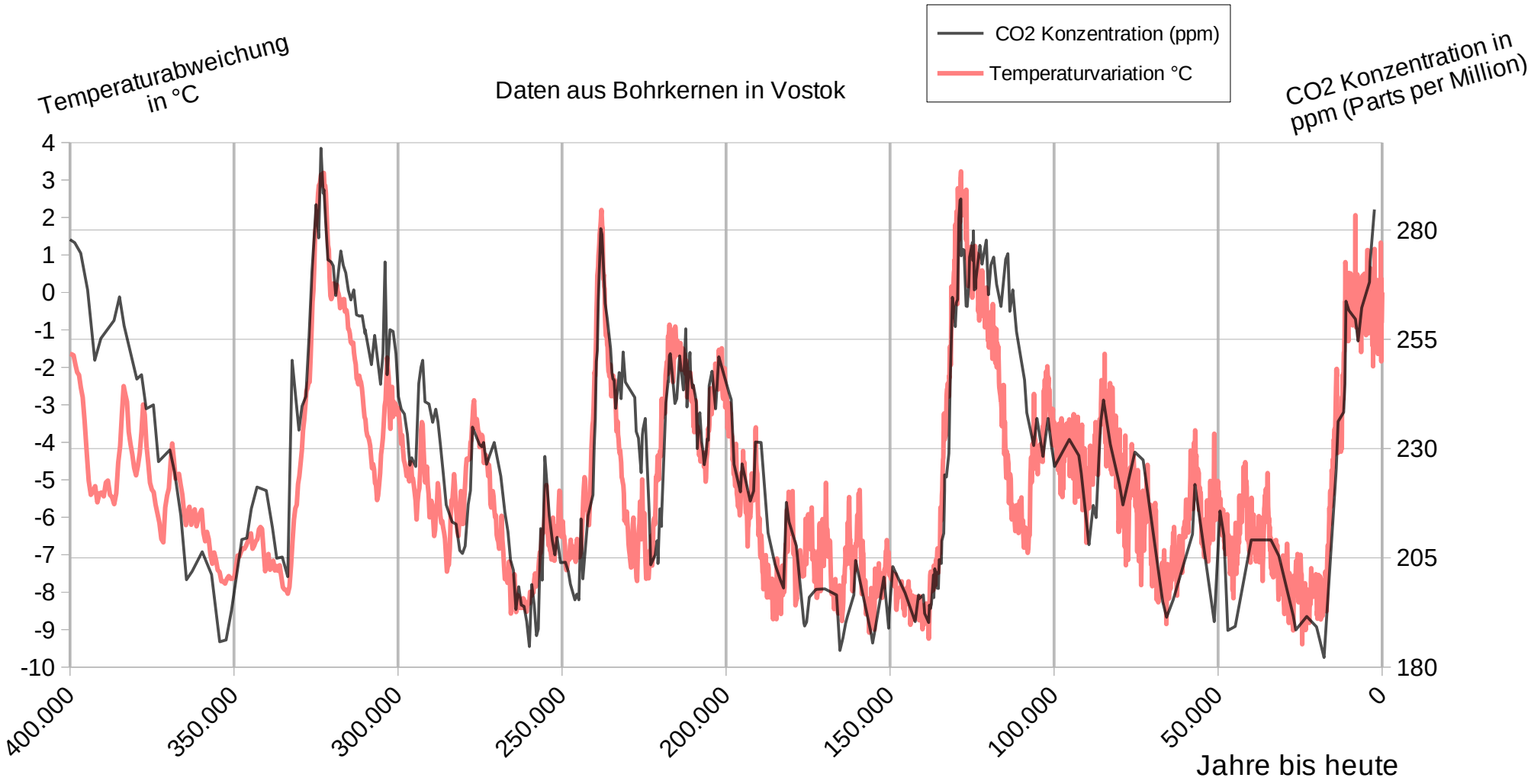
	A	B	C	D	E	F
3	Alter des Eis	Temperaturvariation				
4	Jahre ab Gegenwart (-)	°C		Mittleres Alter der Luft	CO2 Konzentration (ppm)	
5	0	0		2342	284,7	
6	17	0		3634	272,8	
7	35	0		3833	268,1	
8	53	0		6220	262,2	
9	72	0		7327	254,6	
10	91	0		8113	259,6	
11	110	0		10123	261,6	
12	129	0		11013	263,7	
13	149	-0.81		11326	244,8	
14	170	0.02		11719	238,3	
15	190	0.36		13405	236,2	
16	211	-0.95		13989	225,3	
17	234	-1.84		17695	182,2	
18	258	-1.09		19988	189,2	
19	281	-0.75		22977	191,6	
20	304	-0.22		26303	188,5	
21	327	-0.48		27062	191,7	
22	351	-0.75		31447	205,4	
23	375	0.23		33884	209,1	
24	397	1.33		39880	209,1	
25	420	0.35		44766	189,3	
26	444	0.18		47024	188,4	
27	469	-0.08		48229	210,1	
28	495	-1.08		49414	215,7	
29	523	-1.39		51174	190,4	
30	552	-1.61		57068	221,8	
31	581	-0.9		57799	210,4	
32	609	-0.6		63687	195,4	
33	637	-0.02		65701	191,4	
34	665	-0.18		66883	195	
35	695	-1.23		72849	227,4	
36	726	-1.54		75360	229,2	
37	757	-0.85		78995	217,1	
38	788	-0.1		80059	221,8	
39	817	-0.17		82858	231	

Tabelle1

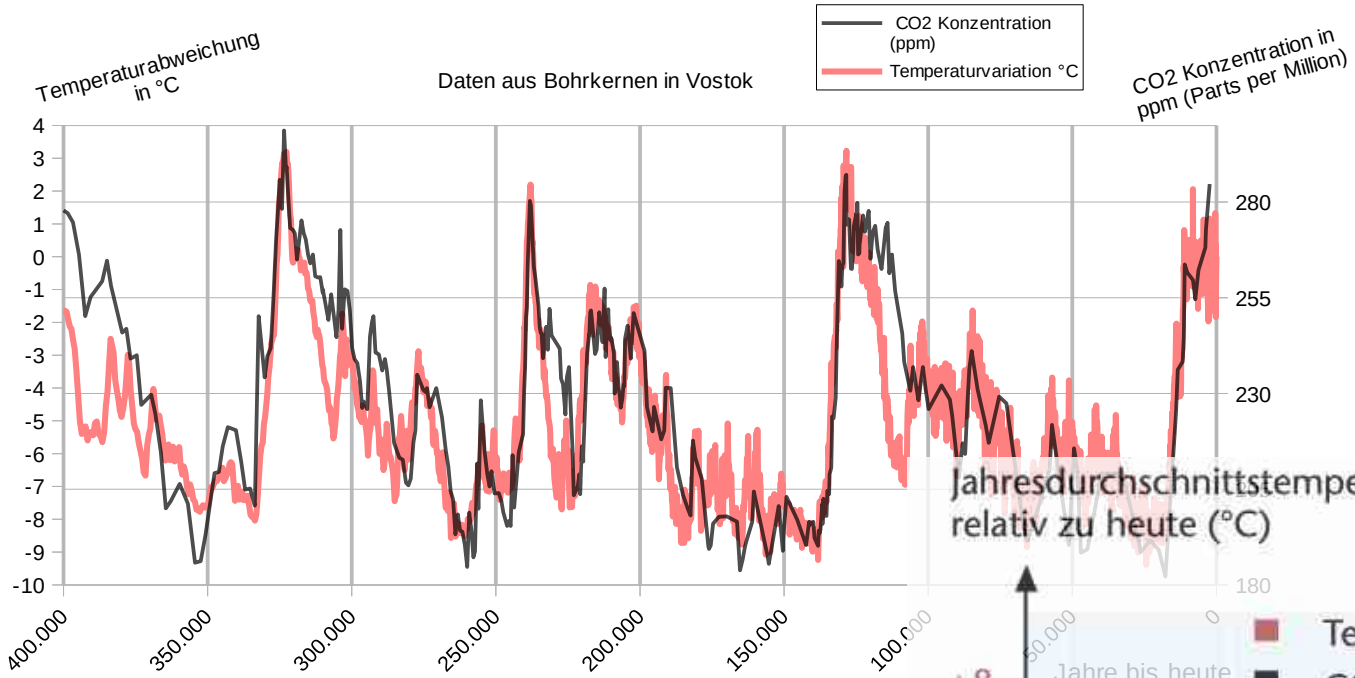
Suchen Groß-/Kleinschreibung

Tabelle 1 / 1 Standard Summe=0 80%

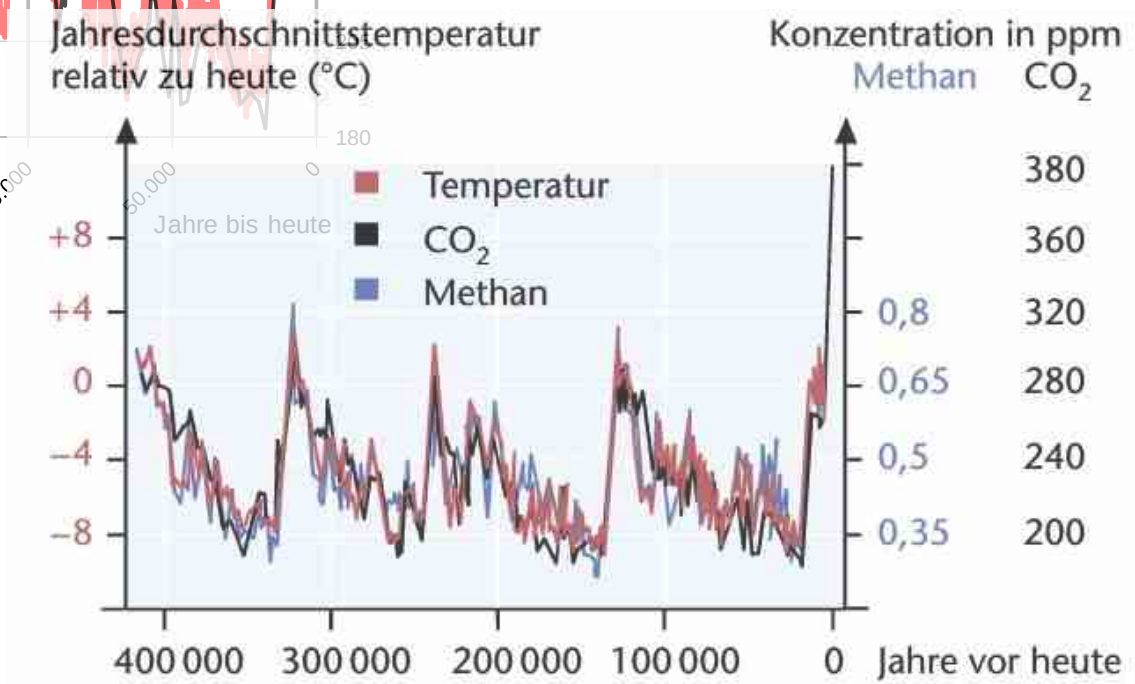
Vergleich der Temperaturabweichung und der CO_2 Konzentration



Vergleich der Temperaturabweichung und der CO_2 Konzentration



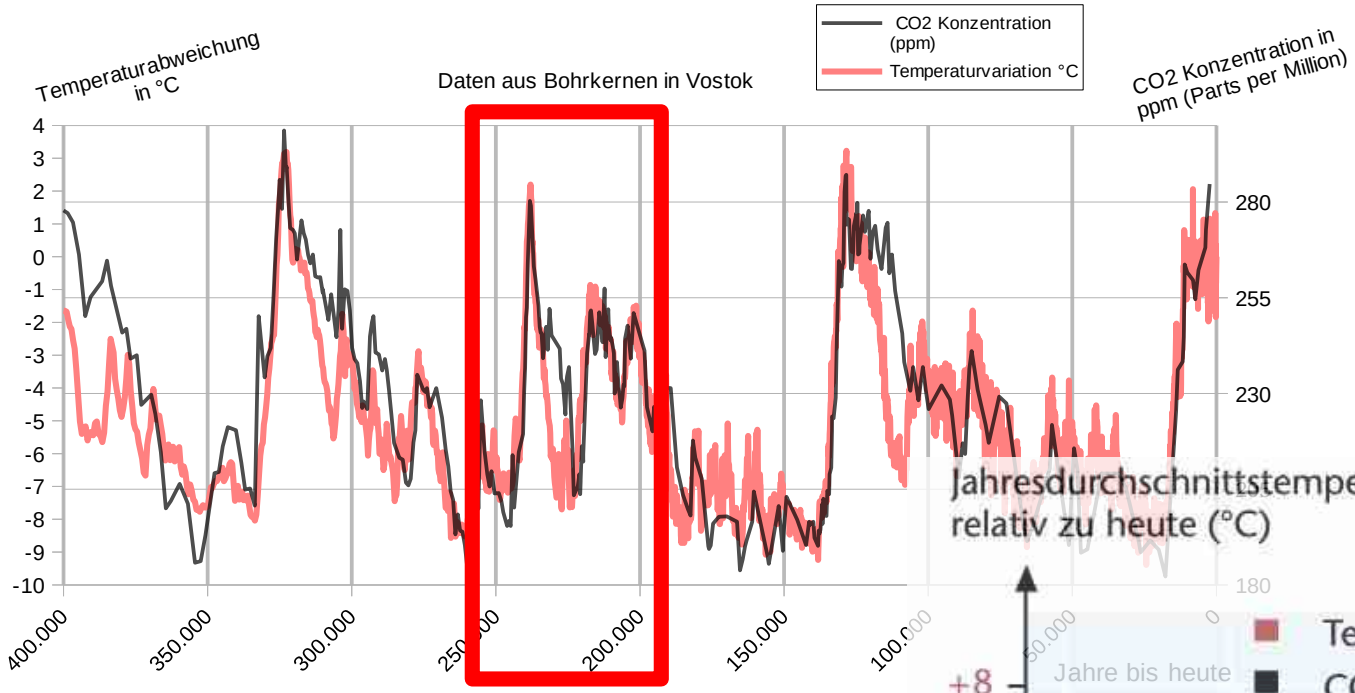
Quelle: Diagramm auf Basis des Datensatzes der Vostok-Eisbohrkerne

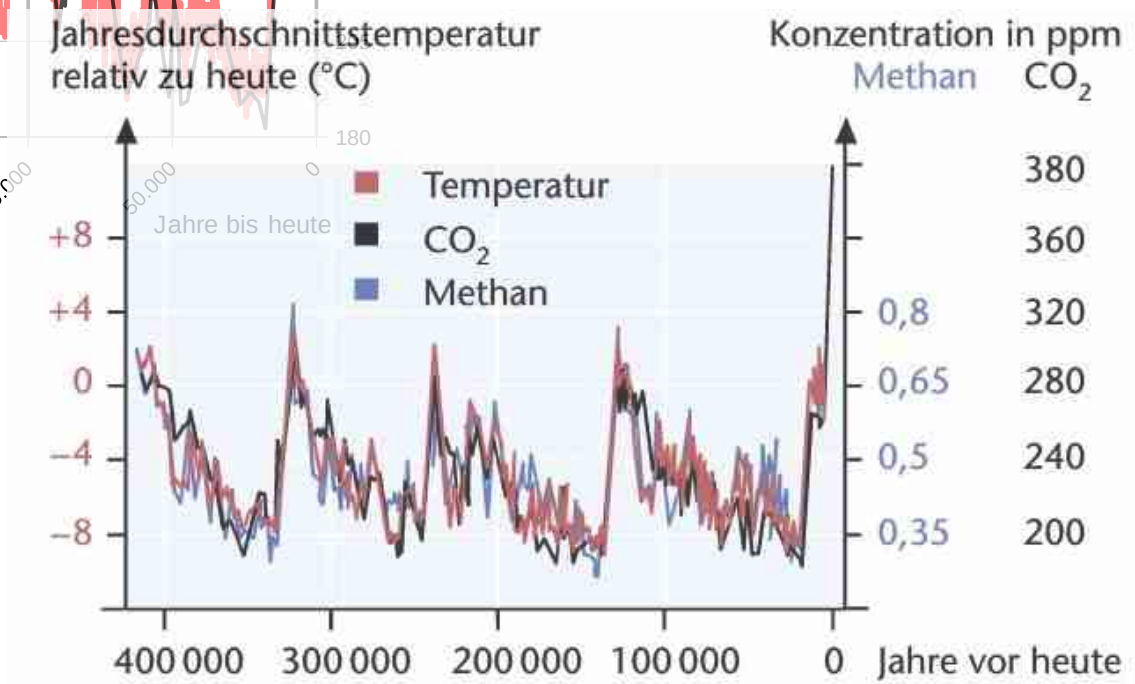


3 *Temperaturschwankungen und Treibhausgas-Konzentrationen der letzten 400 000 Jahre*

Quelle: Abbildung aus dem Bioskop SII, S. 169

Vergleich der Temperaturabweichung und der CO_2 Konzentration

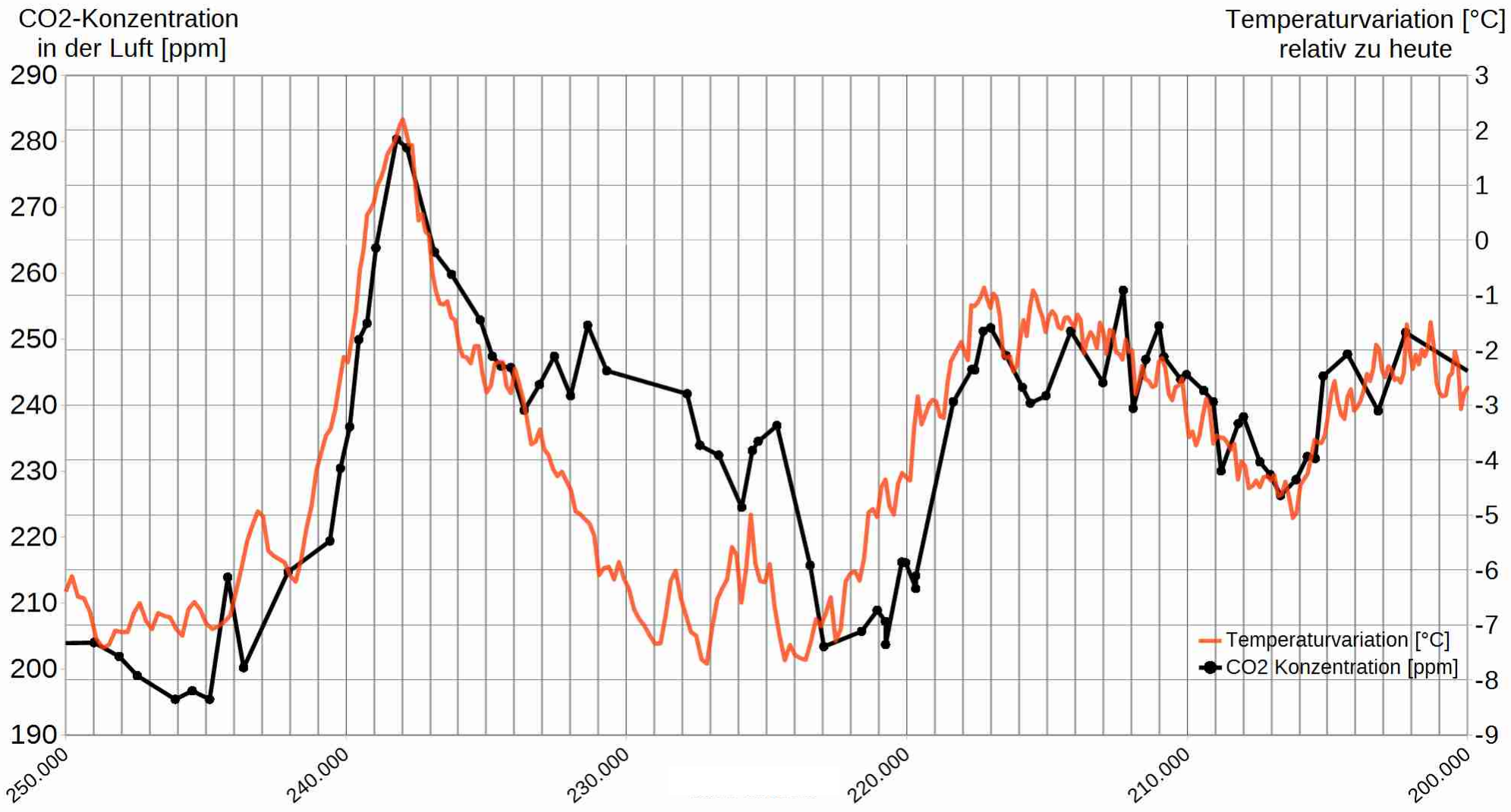




3 *Temperaturschwankungen und Treibhausgas-Konzentrationen der letzten 400 000 Jahre*

Vostok Eisbohrkern Daten

CO2- und Temperaturverlauf zwischen 250.000 und 200.000 vor unserer Zeit



Jahre vor heute

(Quelle: Diagramm auf Basis der Vostok Originaldaten.)

Climate and atmospheric history of the past 420,000 years from the Vostok ice core, Antarctica

J. R. Petit*, J. Jouzel†, D. Raynaud*, N. I. Barkov‡, J.-M. Barnola*, I. Basile*, M. Bender§, J. Chappellaz*, M. Davis‖, G. Delaygue†, M. Delmotte*, V. M. Kotlyakov¶, M. Legrand*, V. Y. Lipenkov‡, C. Lorius*, L. Pépin*, C. Ritz*, E. Saltzman‖ & M. Stievenard†

* *Laboratoire de Glaciologie et Géophysique de l'Environnement, CNRS, BP96, 38402, Saint Martin d'Hères Cedex, France*
† *Laboratoire des Sciences du Climat et de l'Environnement (UMR CEA/CNRS 1572), L'Orme des Merisiers, Bât. 709, CEA Saclay, 91191 Gif-sur-Yvette Cedex, France*
‡ *Arctic and Antarctic Research Institute, Beringa Street 38, 199397, St Petersburg, Russia*
§ *Department of Geosciences, Princeton University, Princeton, New Jersey 08544-1003, USA*
‖ *Rosenstiel School of Marine and Atmospheric Science, University of Miami, 4600 Rickenbacker Causeway, Miami, Florida 33149, USA*
¶ *Institute of Geography, Staromonetny, per 29, 109017, Moscow, Russia*

The recent completion of drilling at Vostok station in East Antarctica has allowed the extension of the ice record of atmospheric composition and climate to the past four glacial–interglacial cycles. The succession of changes through each climate cycle and termination was similar, and atmospheric and climate properties oscillated between stable bounds. Interglacial periods differed in temporal evolution and duration. Atmospheric concentrations of carbon dioxide and methane correlate well with Antarctic air-temperature throughout the record. Present-day atmospheric burdens of these two important greenhouse gases seem to have been unprecedented during the past 420,000 years.

Petit et al. in Nature 1999

Uncertainty in the phasing comes mainly from the sampling frequency and the ubiquitous uncertainty in gas-age/ice-age differences (which are well over ±1 kyr during glaciations and terminations). In a recent paper, Fischer *et al.*[44] present a CO_2 record, from Vostok core, spanning the past three glacial terminations. They conclude that CO_2 concentration increases lagged Antarctic warmings by 600 ± 400 years. However, considering the large gas-age/ice-age uncertainty (1,000 years, or even more if we consider the accumulation-rate uncertainty), we feel that it is premature to infer the sign of the phase relationship between CO_2 and temperature at the start of terminations. We also note that their discussion relates to early deglacial changes, not the entire transitions.

Petit et al. in Nature 1999

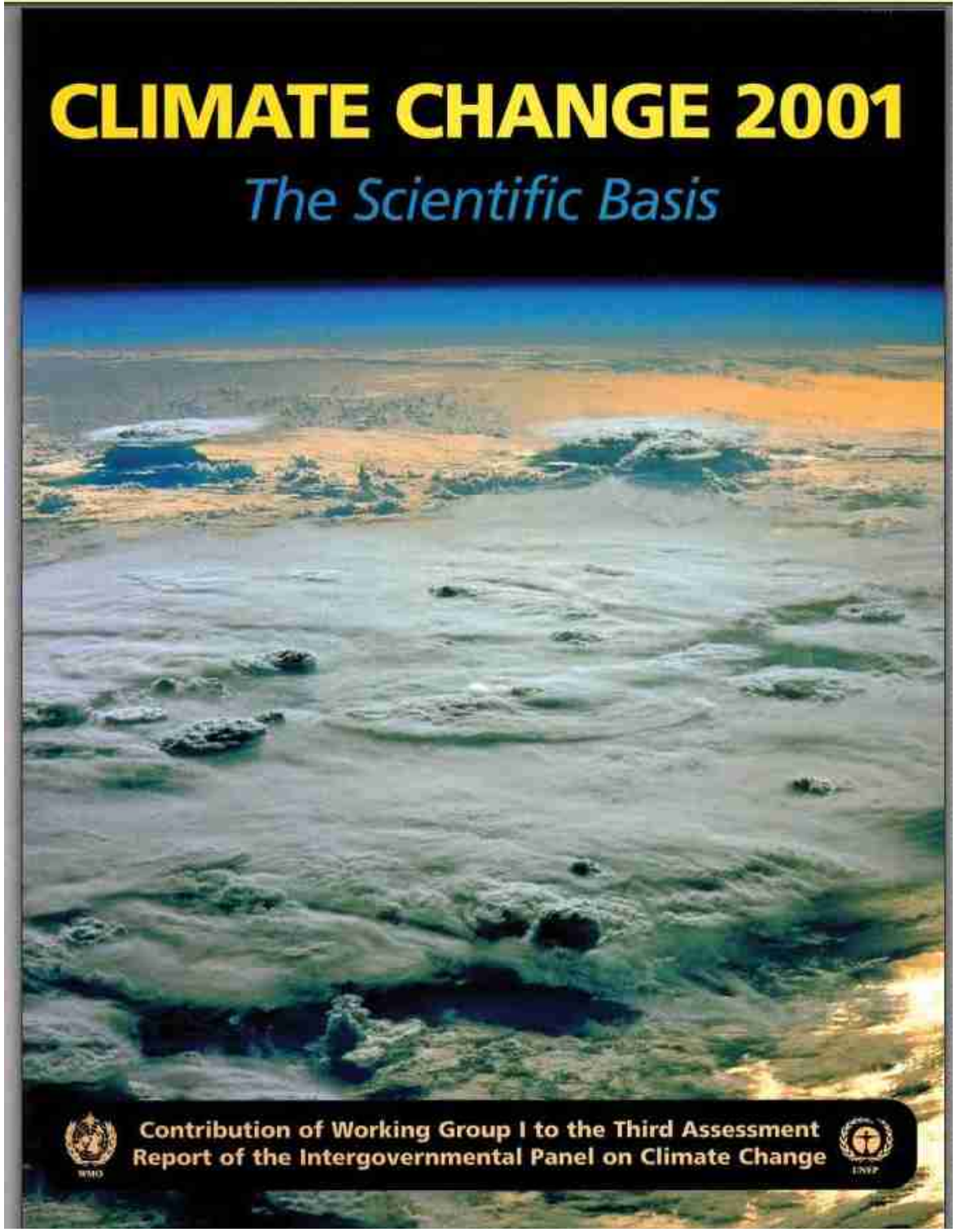
REPORTS

Ice Core Records of Atmospheric CO_2 Around the Last Three Glacial Terminations

Hubertus Fischer, Martin Wahlen, Jesse Smith,
Derek Mastroianni, Bruce Deck

Air trapped in bubbles in polar ice cores constitutes an archive for the reconstruction of the global carbon cycle and the relation between greenhouse gases and climate in the past. High-resolution records from Antarctic ice cores show that carbon dioxide concentrations increased by 80 to 100 parts per million by volume 600 ± 400 years after the warming of the last three deglaciations. Despite strongly decreasing temperatures, high carbon dioxide concentrations can be sustained for thousands of years during glaciations; the size of this phase lag is probably connected to the duration of the preceding warm period, which controls the change in land ice coverage and the buildup of the terrestrial biosphere.

Quelle: Fischer et al, Science 12.03.1999



Quelle:AR3 IPCC Report, 2001, S.137

https://www.ipcc.ch/site/assets/uploads/2018/03/WGI_TAR_full_report.pdf

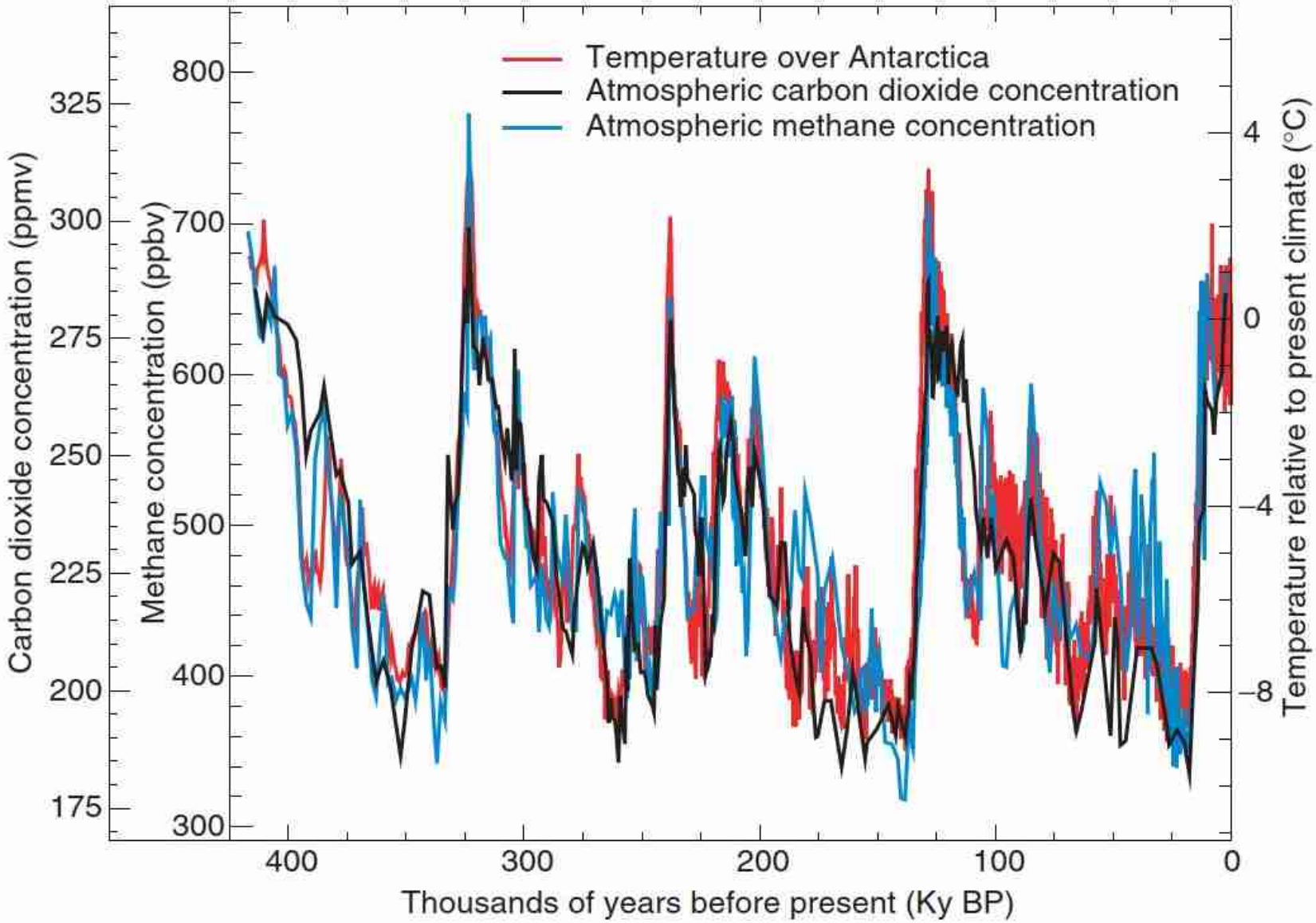
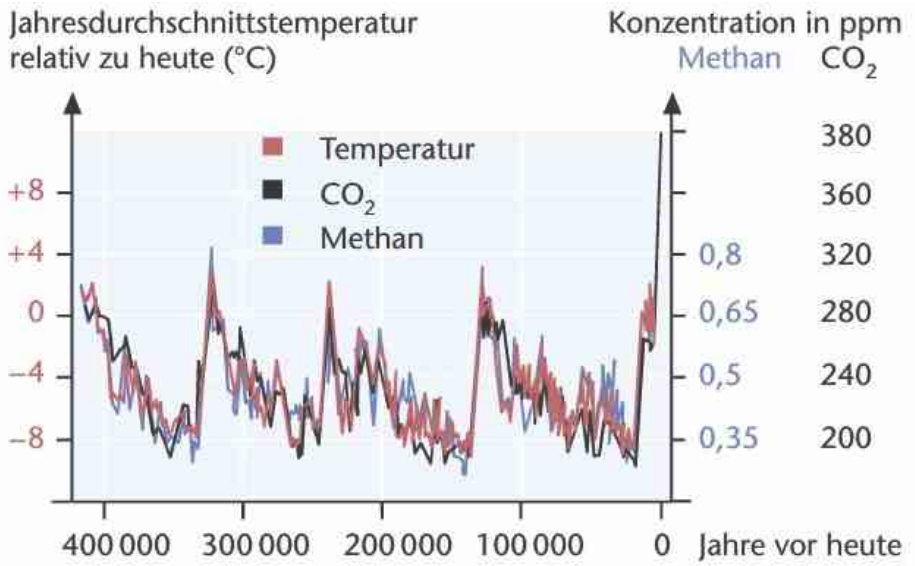


Figure 2.22: Variations of temperature, methane, and atmospheric carbon dioxide concentrations derived from air trapped within ice cores from Antarctica (adapted from Sowers and Bender, 1995; Blunier *et al.*, 1997; Fischer *et al.*, 1999; Petit *et al.*, 1999).

Quelle:AR3 IPCC Report, 2001, S.137

Vergeich IPCC Report AR3 von 2001 und Bioskop



3 *Temperaturschwankungen und Treibhausgas-Konzentrationen der letzten 400 000 Jahre*

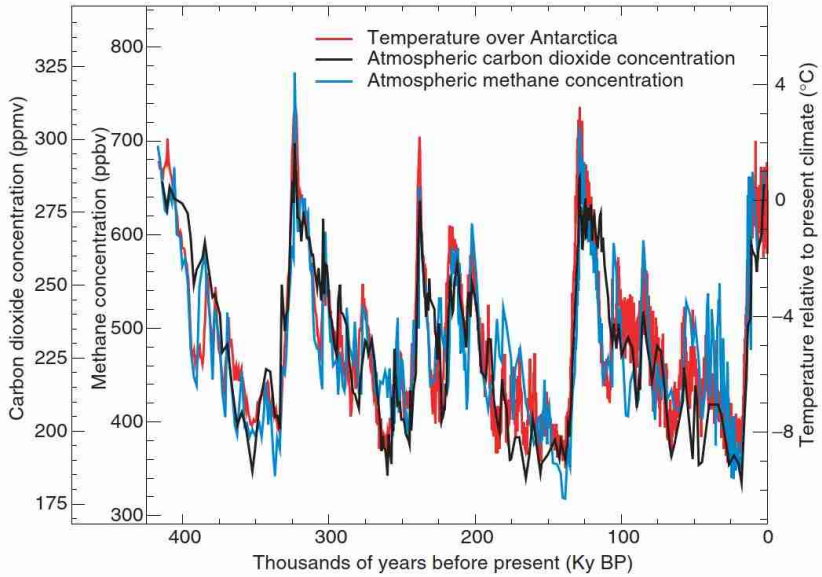
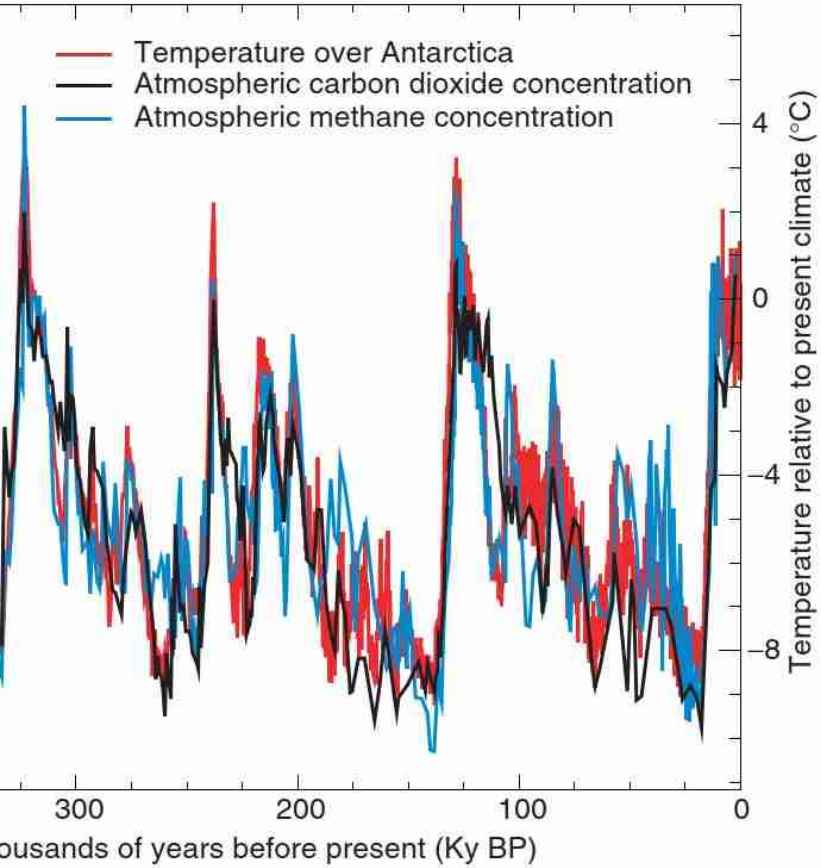


Figure 2.22: Variations of temperature, methane, and atmospheric carbon dioxide concentrations derived from air trapped within ice cores from Antarctica (adapted from Sowers and Bender, 1995; Blunier *et al.*, 1997; Fischer *et al.*, 1999; Petit *et al.*, 1999).

Quelle: Abbildung aus dem Bioskop SII, S. 169

Quelle:AR3 IPCC Report, 2001, S.137

https://www.ipcc.ch/site/assets/uploads/2018/03/WGI_TAR_full_report.pdf



of temperature, methane, and atmospheric
rations derived from air trapped within ice
adapted from Sowers and Bender, 1995;
scher *et al.*, 1999; Petit *et al.*, 1999).

core in central East Antarctica. The strong relationship between CO_2 and CH_4 and Antarctic climate documented over the last climatic cycle has been remarkably confirmed over four climatic cycles, spanning about 420 ky (Figure 2.22). Present day levels of these two important greenhouse gases appear unprecedented during this entire interval (Petit *et al.*, 1999; and Figure 2.22). From a detailed study of the last three glacial terminations in the Vostok ice core, Fischer *et al.* (1999) conclude that CO_2 increases started 600 ± 400 years after the Antarctic warming. However, considering the large uncertainty in the ages of the CO_2 and ice (1,000 years or more if we consider the ice accumulation rate uncertainty), Petit *et al.* (1999) felt it premature to ascertain the sign of the phase relationship between CO_2 and Antarctic temperature at the initiation of the terminations. In any event, CO_2 changes parallel Antarctic temperature changes during deglaciations (Sowers and Bender, 1995; Blunier *et al.*, 1997; Petit *et al.*, 1999). This is consistent with a significant contribution of these greenhouse gases to the glacial-interglacial changes by amplifying the initial orbital forcing (Petit *et al.*, 1999).

We also now have a better knowledge of climate variability over the last few climatic cycles as illustrated by selected palaeo-

Quelle:AR3 IPCC Report, 2001, S.137

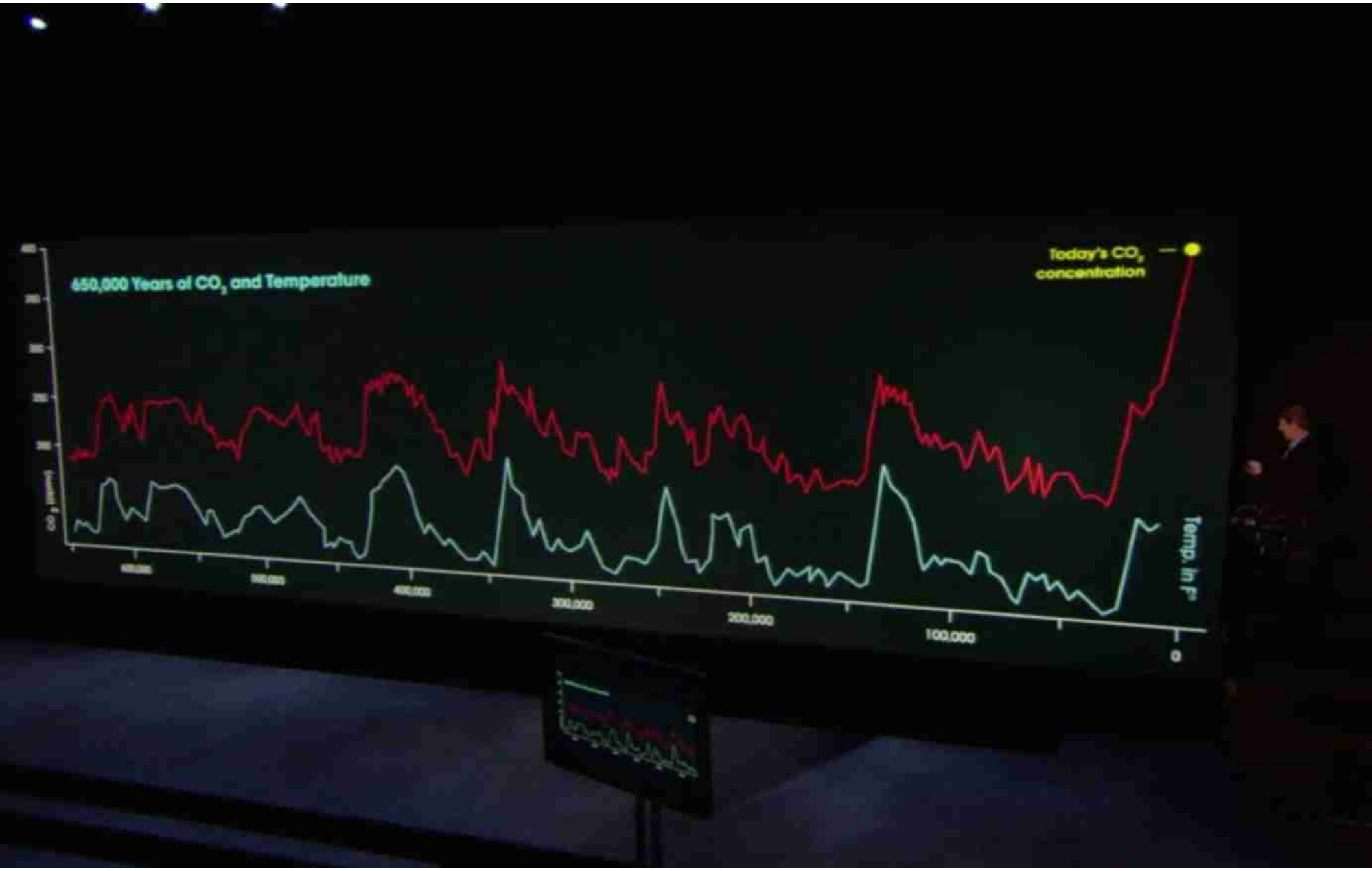
https://www.ipcc.ch/site/assets/uploads/2018/03/WGI_TAR_full_report.pdf

Box 6.2: What Caused the Low Atmospheric Carbon Dioxide Concentrations During Glacial Times?

Ice core records show that atmospheric CO_2 varied in the range of 180 to 300 ppm over the glacial-interglacial cycles of the last 650 kyr (Figure 6.3; Petit et al., 1999; Siegenthaler et al., 2005a). The quantitative and mechanistic explanation of these CO_2 variations remains one of the major unsolved questions in climate research. Processes in the atmosphere, in the ocean, in marine sediments and on land, and the dynamics of sea ice and ice sheets must be considered. A number of hypotheses for the low glacial CO_2 concentrations have emerged over the past 20 years, and a rich body of literature is available (Webb et al., 1997; Broecker and Henderson, 1998; Archer et al., 2000; Sigman and Boyle, 2000; Kohfeld et al., 2005). Many processes have been identified that could potentially regulate atmospheric CO_2 on glacial-interglacial time scales. However, the existing proxy data with which to test hypotheses are relatively scarce, uncertain, and their interpretation is partly conflicting.

Most explanations propose changes in oceanic processes as the cause for low glacial CO_2 concentrations. The ocean is by far the largest of the relatively fast-exchanging (<1 kyr) carbon reservoirs, and terrestrial changes cannot explain the low glacial values because terrestrial storage was also low at the Last Glacial Maximum (see Section 6.4.1). On glacial-interglacial time scales, atmospheric CO_2 is mainly governed by the interplay between ocean circulation, marine biological activity, ocean-sediment interactions, seawater carbonate chemistry and air-sea exchange. Upon dissolution in seawater, CO_2 maintains an acid/base equilibrium with bicarbonate and carbonate ions that depends on the acid-titrating capacity of seawater (i.e., alkalinity). Atmospheric CO_2 would be higher if the ocean lacked biological activity. CO_2 is more soluble in colder than in warmer waters; therefore, changes in surface and deep ocean temperature have the potential to alter atmospheric CO_2. Most hypotheses focus on the Southern Ocean, where large volume-fractions of the cold deep-water masses of the world ocean are currently formed, and large amounts of biological nutrients (phosphate and nitrate) upwelling to the surface remain unused. A strong argument for the importance of SH processes is the co-evolution

AR4 Climate Change 2007 - The Physical Science Basis, Chapter 6 „Paleoclimate“ S. 446


650,000 Years of CO_2 and Temperature
Today's CO_2 concentration
Temp. in F°
500,000
400,000
300,000
200,000
100,000
0

Eine unbequeme Wahrheit

Eine unbequeme Wahrheit (*An Inconvenient Truth*) ist ein Dokumentarfilm von Davis Guggenheim mit dem ehemaligen US-Vizepräsidenten und Präsidentschaftskandidaten Al Gore über die globale Erwärmung. Nach den Ereignissen der Präsidentschaftswahl im Jahr 2000 widmete sich Al Gore noch stärker dem Kampf gegen die globale Erwärmung. Der Film zeigt Mitschnitte seiner in vielen Städten vorgestellten Präsentationen, in denen er seine Sicht auf wissenschaftliche und politische Aspekte der globalen Erwärmung vermittelt.

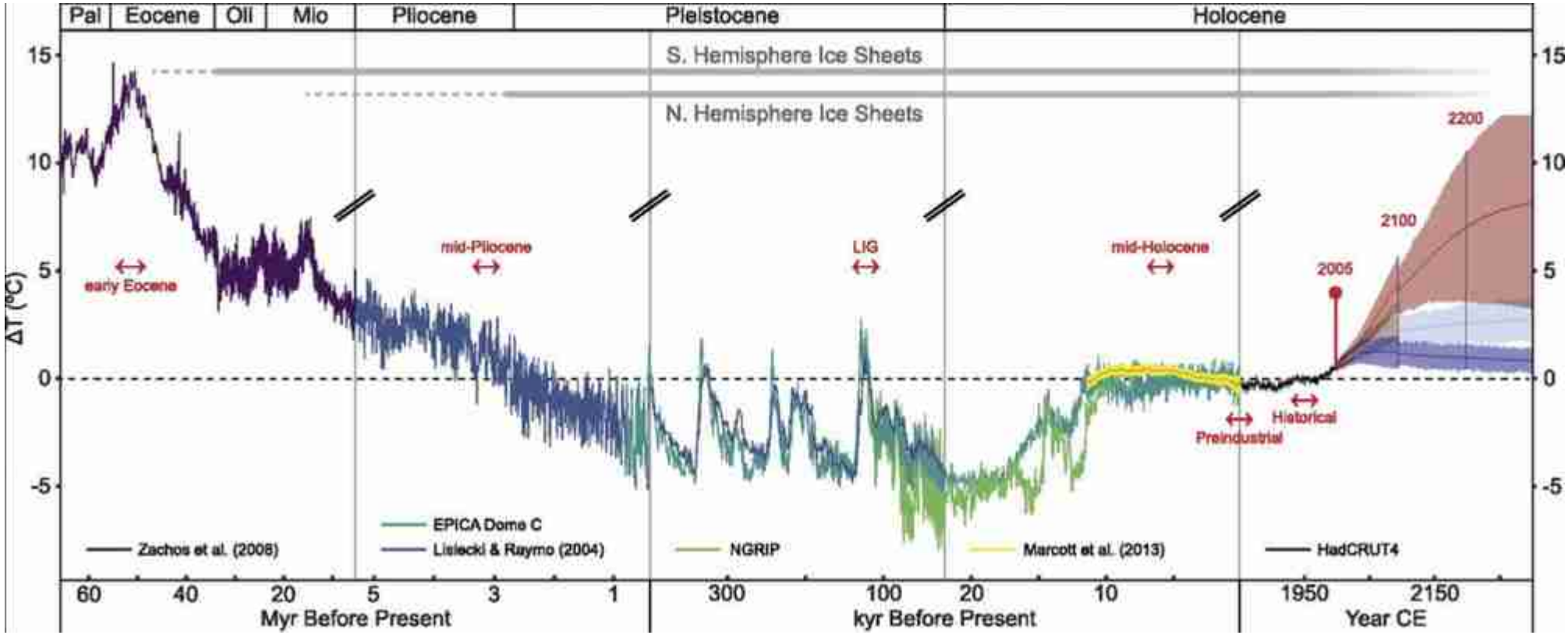
Der Film hatte seine Premiere auf dem Sundance Film Festival 2006. Er erhielt als erster Film seit zehn Jahren einen Special-Humanitas-Preis für seine besonders gelungene Botschaft an die Menschheit. Außerdem gewann der Film die Oscars 2007 für den besten Dokumentarfilm und für den besten Song (*I Need to Wake Up* von Melissa Etheridge). Er galt schon vor der Verleihung im Februar 2007 als Favorit.[2]

Am 19. Januar 2017 wurde im Rahmen der neu eingerichteten „Klima-Sektion“

Film	
Deutscher Titel Originaltitel	Eine unbequeme Wahrheit An Inconvenient Truth
Produktionsland	USA
Originalsprache	Englisch
Erscheinungsjahr	2006
Länge	100 Minuten
Altersfreigabe	FSK keine Altersbeschränkung JMK 0[1]
Stab	
Regie	Davis Guggenheim

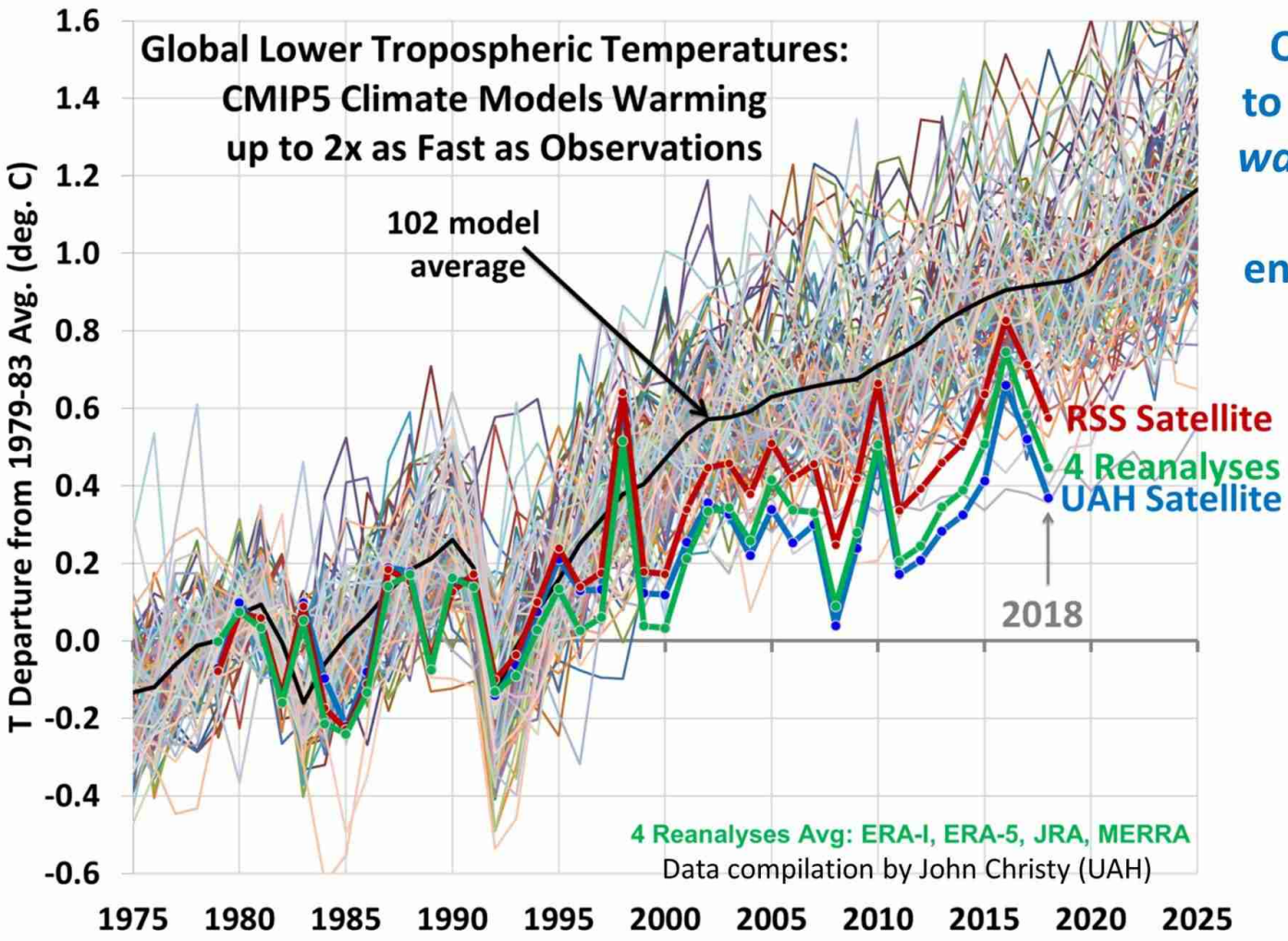
Paläoklima

Paläoklima der Erde



https://i.redd.it/dcrlnr10f0a41.png

Ähnliche Abbildung auf
https://de.wikipedia.org/wiki/Klimawandel



Observations continue to show *considerably less warming* than the climate models upon which energy policies are based.

Quelle: Präsentation, Prof. Fritz Vahrenholt

NASA GISS Daten

Europäisches Institut für Klima und Energie

5. Internationale Konferenz

30.11.+1.12.2012

München

NASA-GISS-Temperaturdaten wurden geändert – warum ?

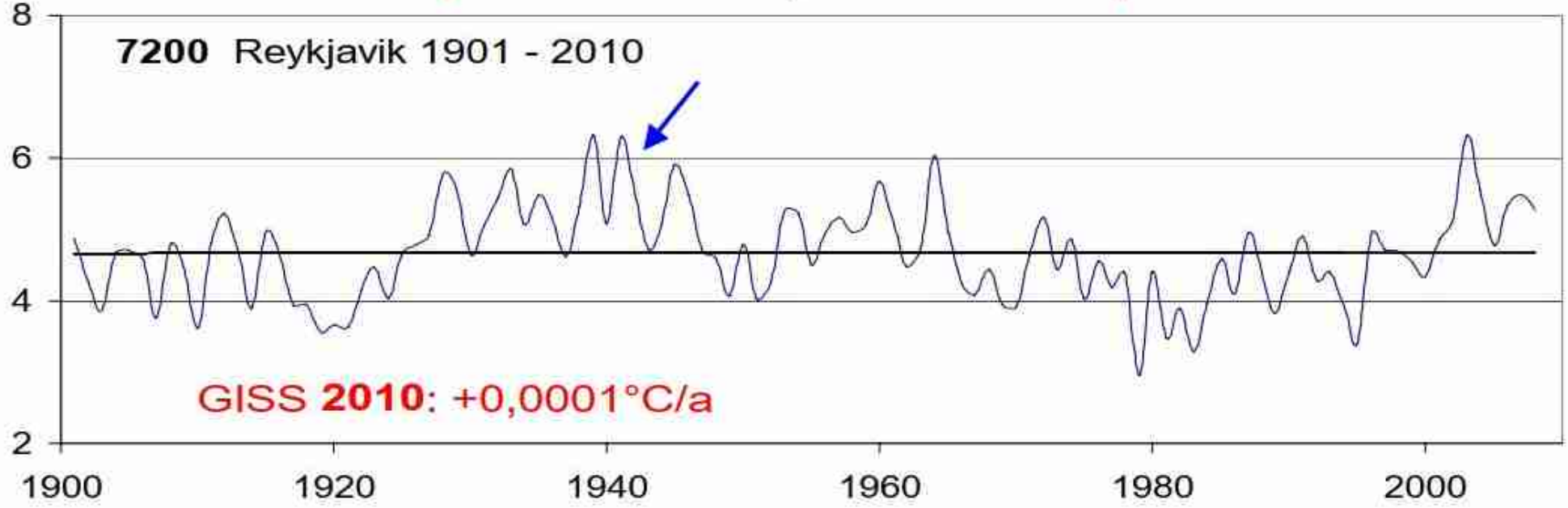
Vortrag von

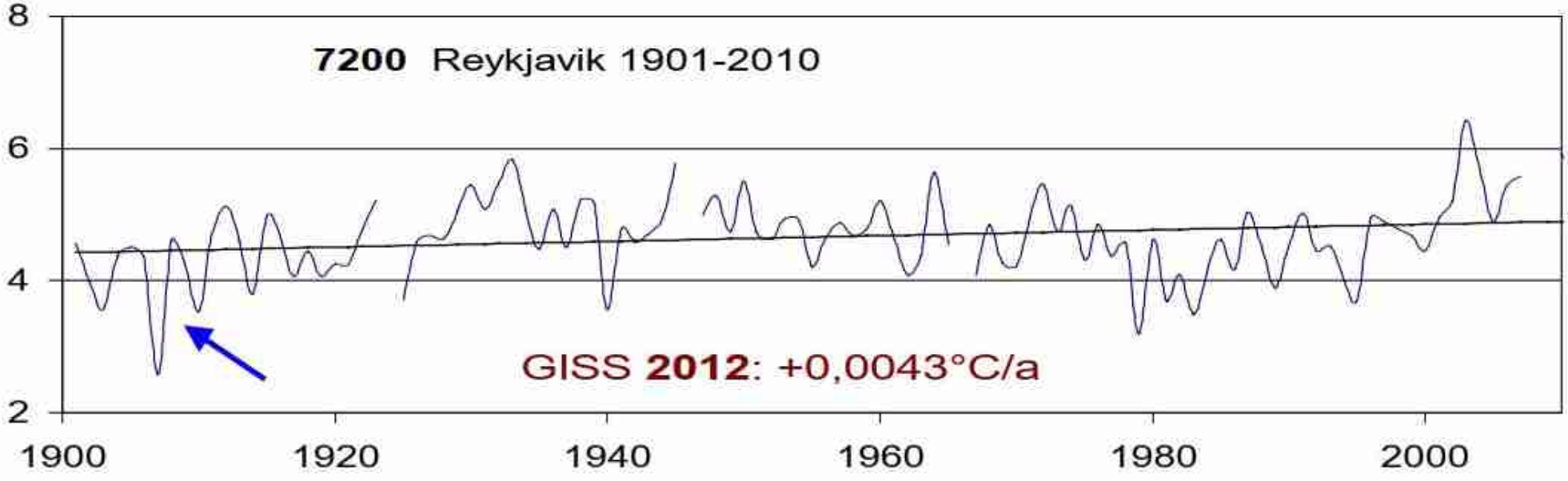
Friedrich-Karl Ewert

*) ewert.fk@t-online.de

Reykjavik

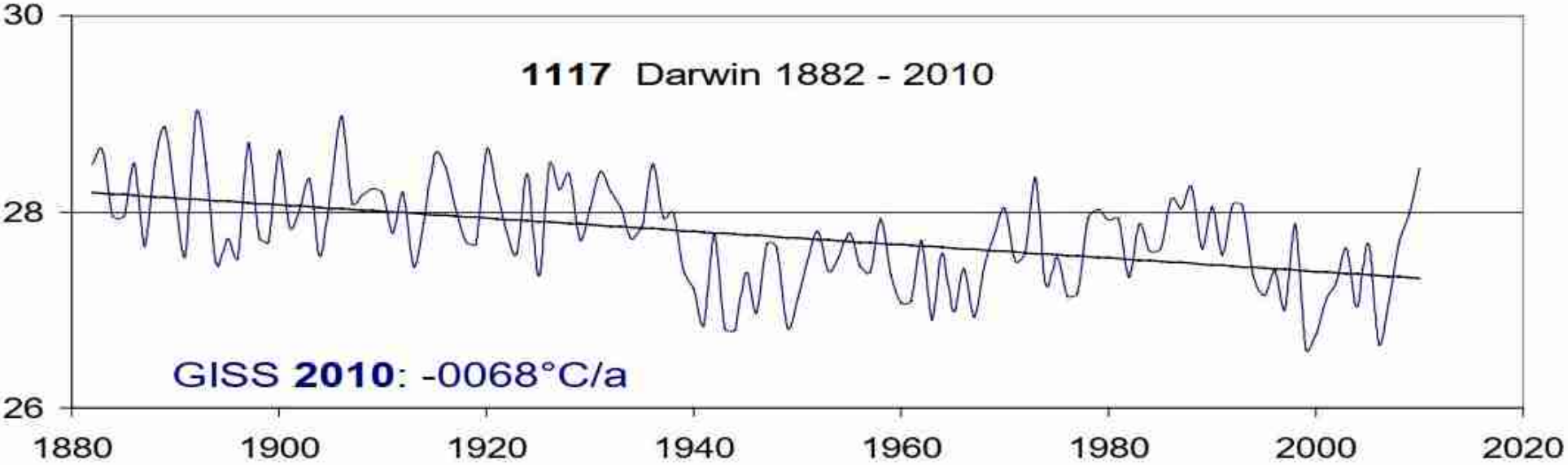
2010: +0,0001°C/a ; 2012: +0,0043°C/a

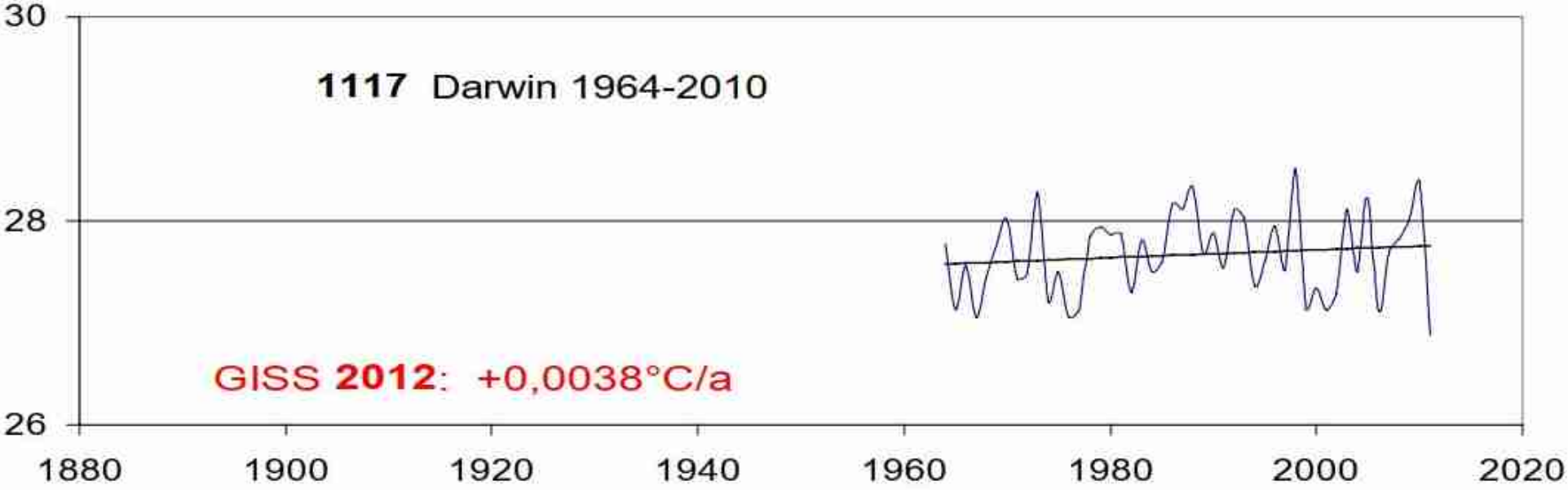




Darwin

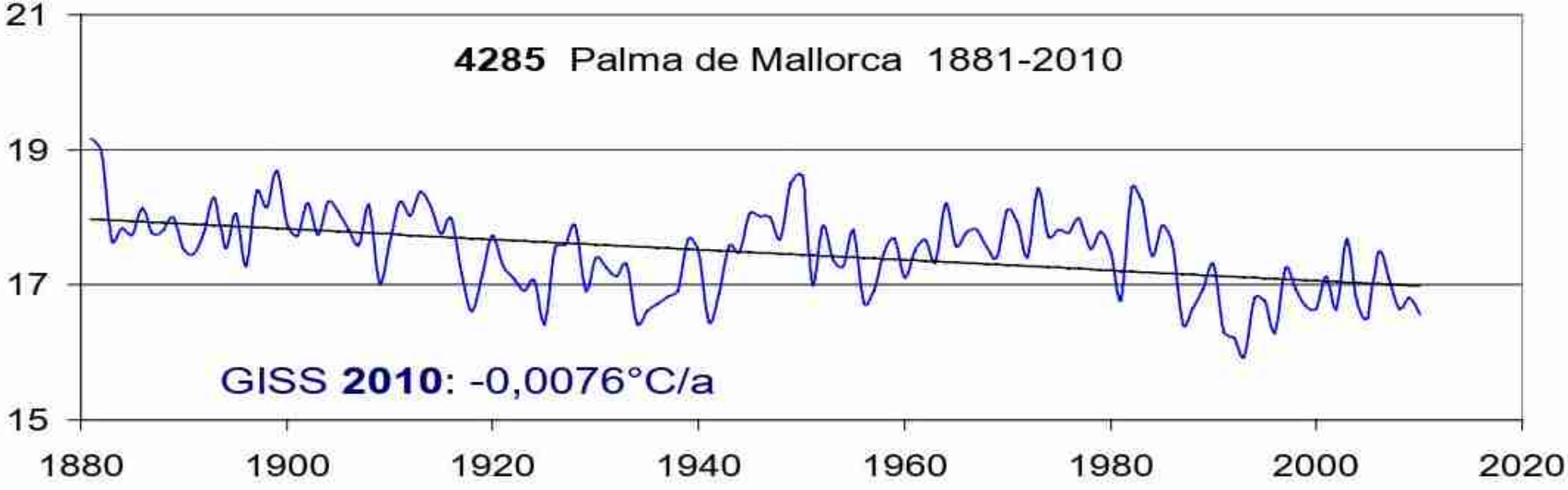
2010: -0,0068°C/a; 2012: +0,0038°C/a

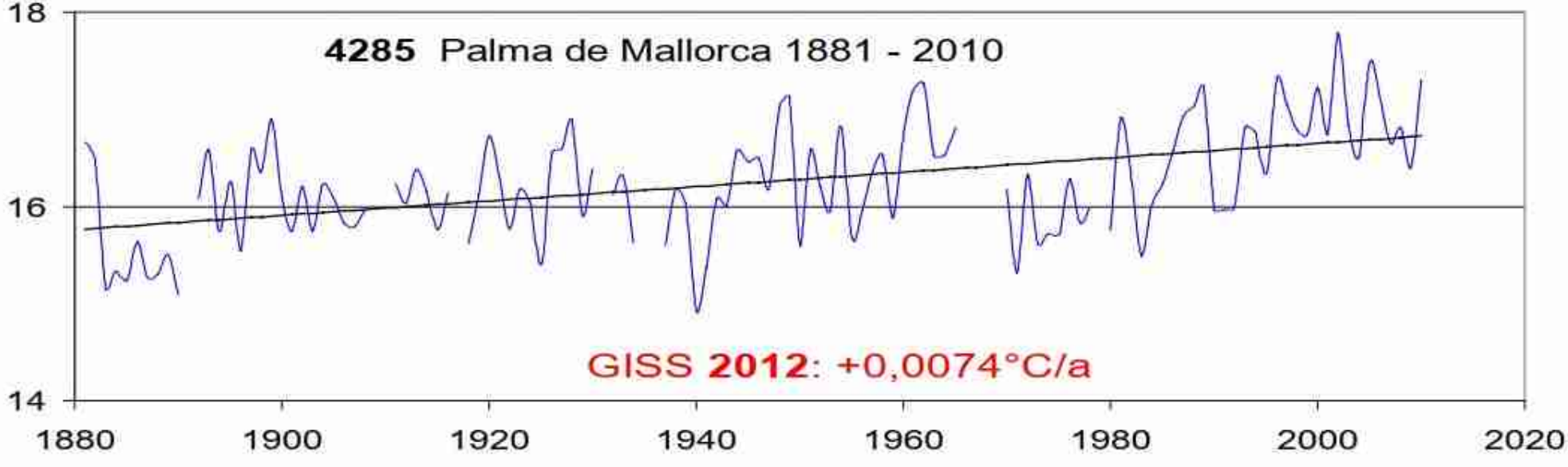




Palma de Mallorca

2010: -0,0076°C/a; 2012: +0,0074°C/a



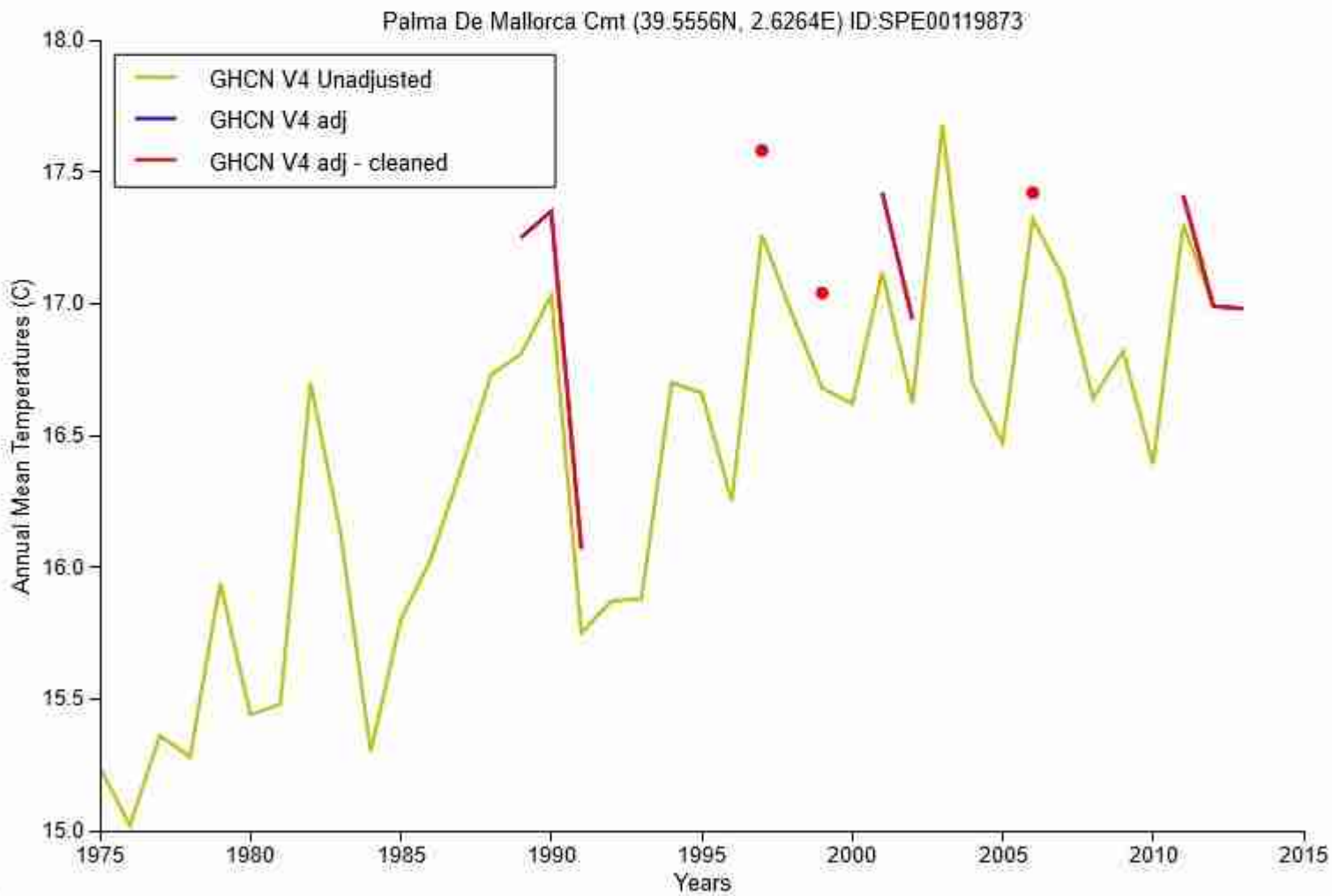


National Aeronautics and Space Administration
Goddard Institute for Space Studies

Goddard Space Flight Center
Sciences and Exploration Directorate
Earth Sciences Division

GISS Surface Temperature Analysis (v4)

Station Data: Palma De Mallorca Cmt (39.5556N, 2.6264E)



https://data.giss.nasa.gov/gistemp/station_data_v4_globe/

https://data.giss.nasa.gov/cgi-bin/gistemp/stdata_show_v4.cgi?id=SPE00119873&ds=15&dt=1

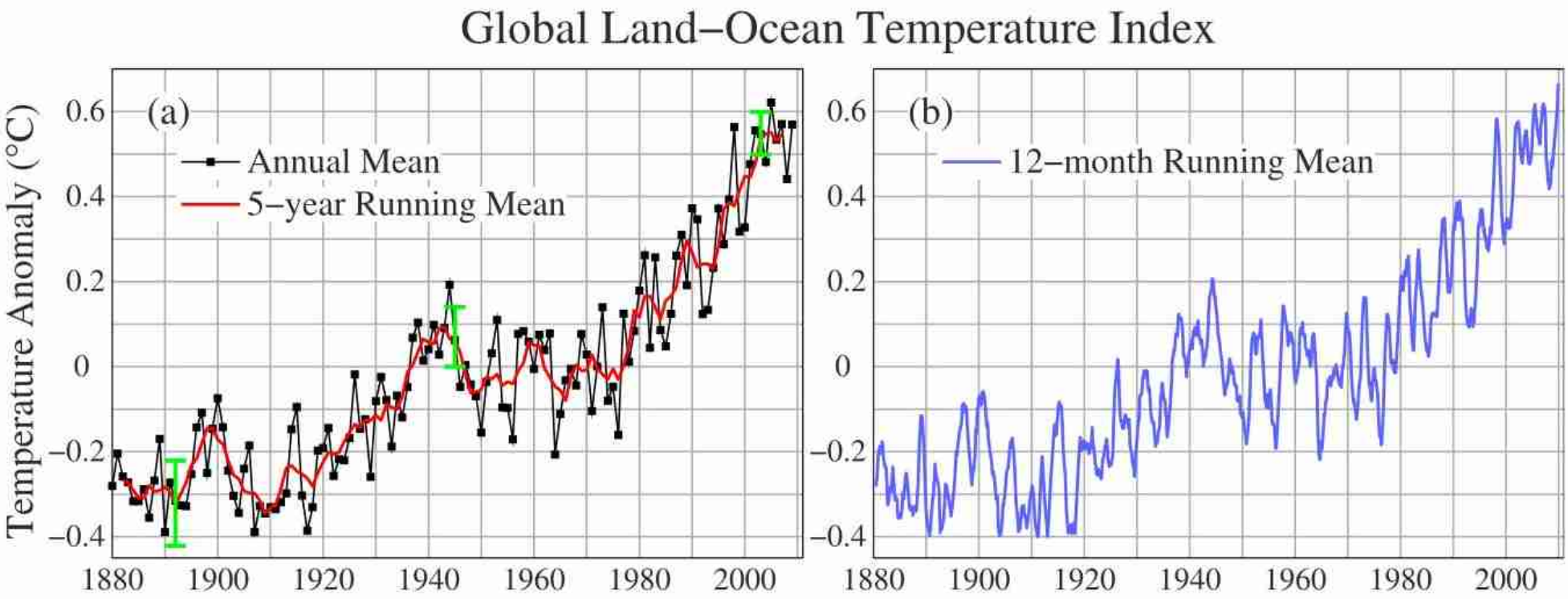


Figure 9. Global surface temperature anomalies relative to 1951–1980 mean for (a) annual and 5 year running means through 2009 and (b) 12 month running mean using data through June 2010. Green bars are 2σ error estimate, as discussed in section 7.

https://pubs.giss.nasa.gov/docs/2010/2010_Hansen_ha00510u.pdf

Quellen zum Thema der veränderten NASA-GISS Daten:

https://eike-klima-energie.eu/2015/11/24/manipulierte-temperatur-daten-erderwaermung-was-wurde-gemessen-und-wie-wurde-ausgewertet/

https://www.achgut.com/artikel/sind_die_klimadaten_manipuliert

Folgerungen

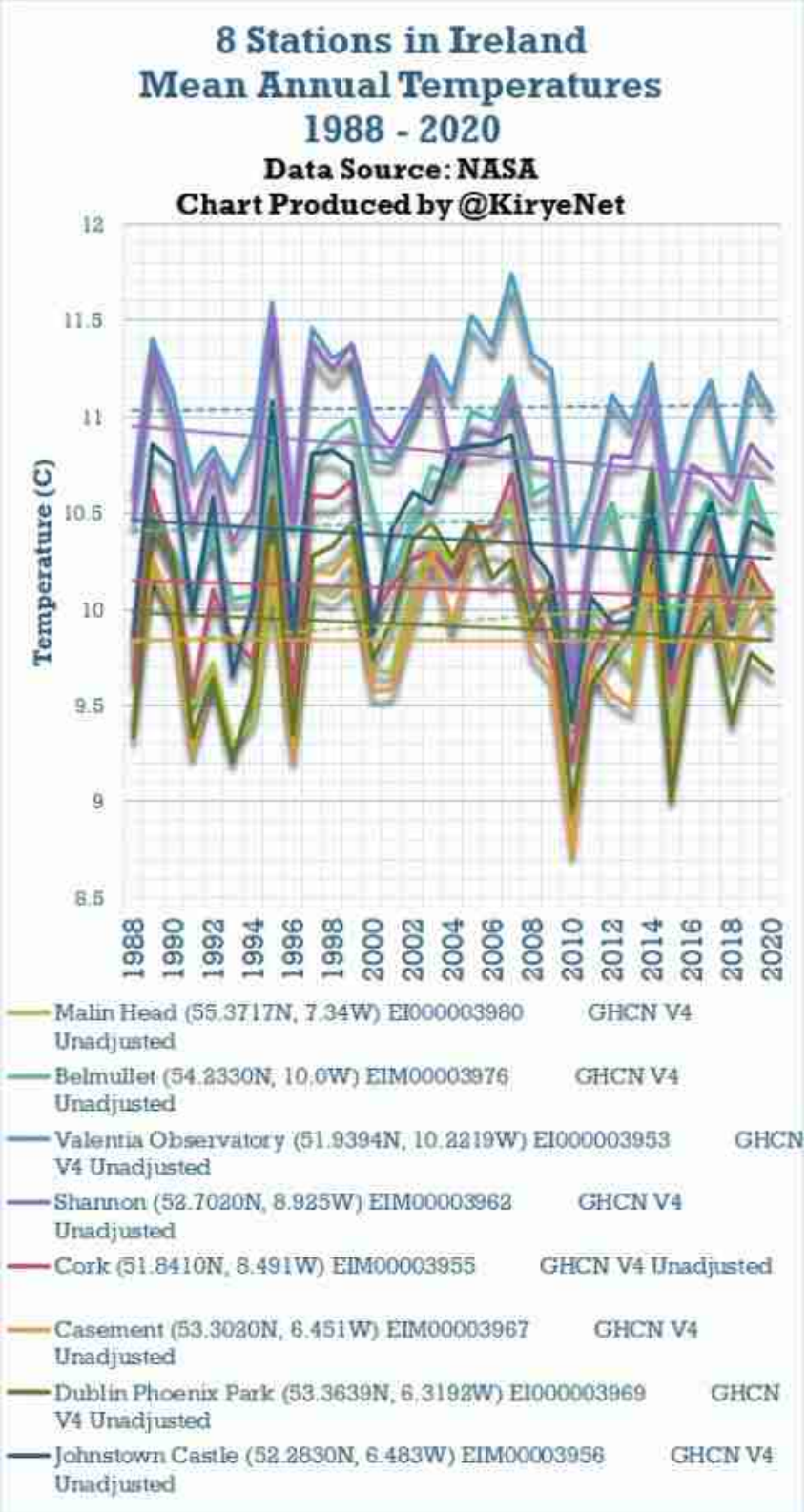
Änderungen offensichtlich in den meisten Stationen, vermutlich in allen.

Zwei Drittel der Änderungen erzielten eine stärkere und fortschreitende Erwärmung

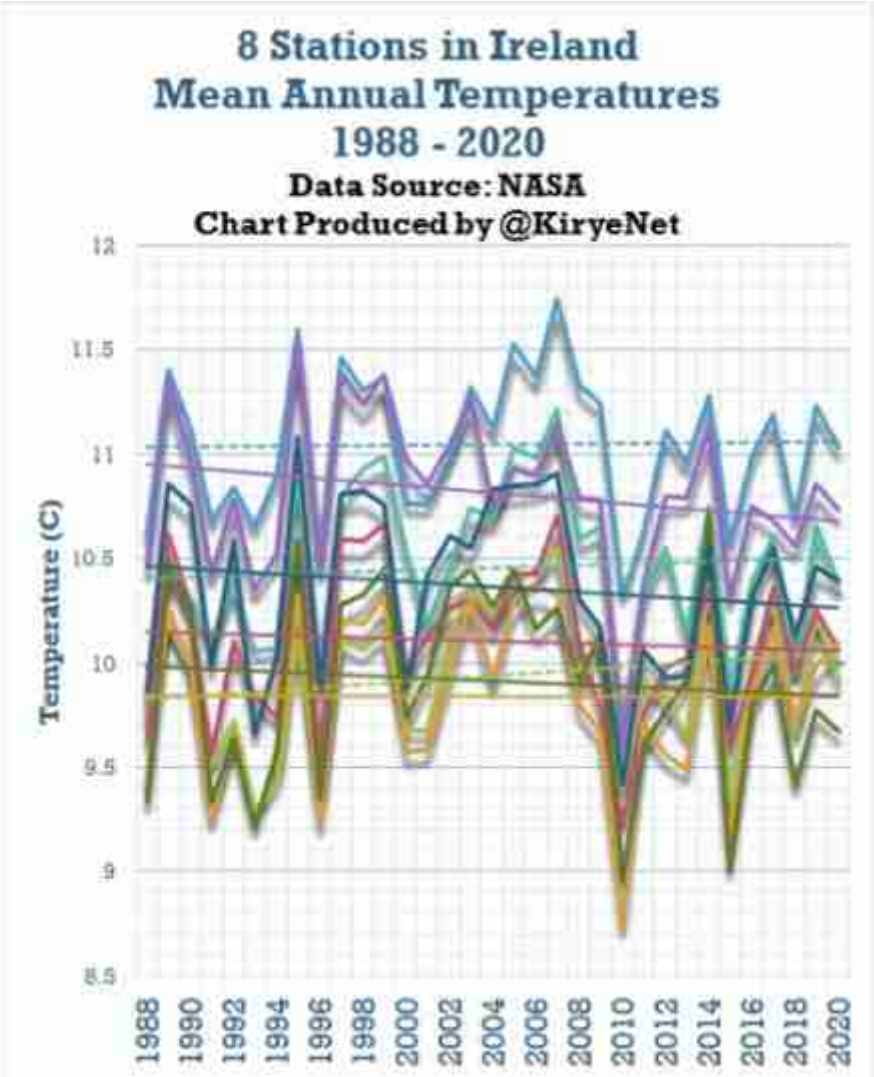
Ein Drittel verstärkt die Abkühlung – um eine Homogenisierung vorzutäuschen ?

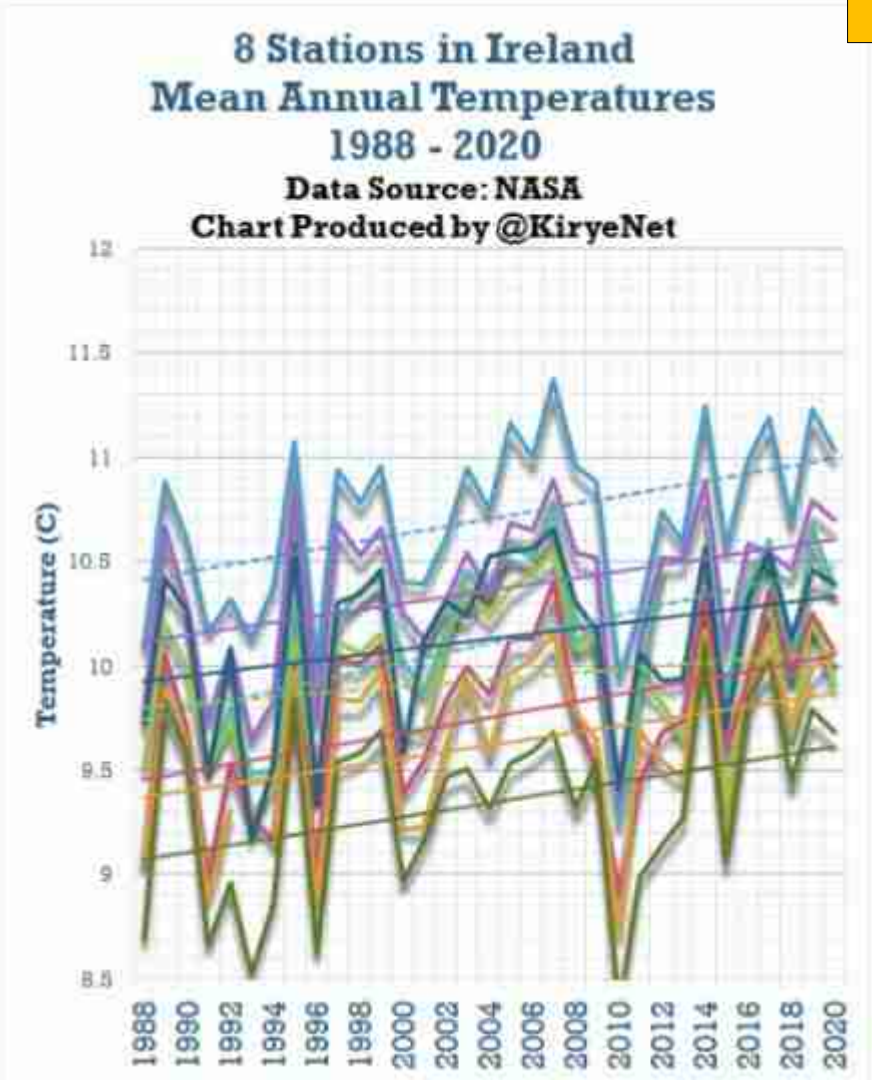
Die Methoden werden angepasst: Absenkung der Mittelwerte in den frühen Phasen bzw. zwischen 1920 und 1960, Anstieg in den späten Phasen und löschen von störenden Übergängen.

Quelle: Prof. Ewert



https://notrickszone.com/2021/08/24/adjusting-to-warm-nasa-data-alterations-change-cooling-to-warming-in-ireland-greece/





https://data.giss.nasa.gov/gistemp/station_data_v4_globe/

Nationale Luft- und Raumfahrtbehörde
Goddard Institute for Space Studies

Goddard Space Flight Center
Direktion Wissenschaft und Forschung
Abteilung Erdwissenschaften

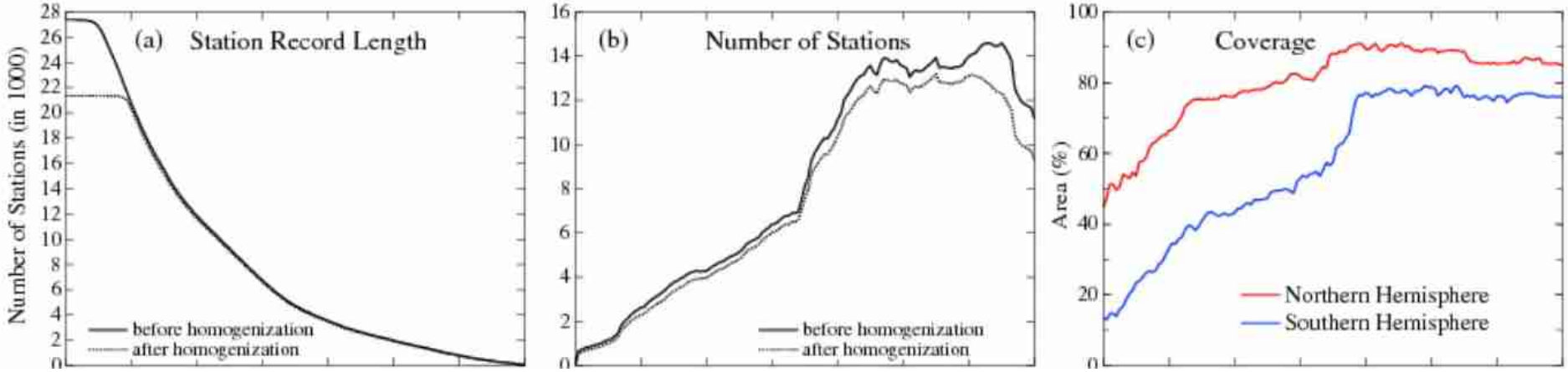
GISS-Oberflächentemperaturanalyse (v4)

Stationsdaten

In unserer Analyse können wir nur Stationen mit einigermaßen langen, konsistent gemessenen Zeitaufzeichnungen verwenden. Dies ist eine Teilmenge der vollständigen Senderliste . Diese Teilmenge der Stationsliste, die zu den Endprodukten beiträgt, kann sich mit jeder Aktualisierung geringfügig ändern, da die Anzahl der Stationen, die aufgrund der Kürze ihrer Temperaturaufzeichnungen ausfallen, abnehmen kann, wenn neue Daten hinzugefügt werden. Beachten Sie, dass im Rahmen der Homogenisierung alle Stationen mit Daten von weniger als 20 Jahren verworfen werden (siehe Teil (a) der folgenden Abbildung).

Die folgenden Zahlen zeigen

a. die Anzahl der Stationen mit einer Satzlänge von mindestens N Jahren in Abhängigkeit von N ,
b. die Anzahl der Meldestationen als Funktion der Zeit,
c. der prozentuale Anteil der hemisphärischen Fläche im Umkreis von 1200 km um eine Meldestation.



https://data.giss.nasa.gov/gistemp/station_data_v4_globe/

Sie können alle GISS homogenisierten Stationsdaten auch als herunterladen komprimierte Textdatei .

Stationsdaten herunterladen

Die verfügbaren Stationen sind unten auf dem Globus markiert. Sie können die Art der Datensätze auswählen (unbereinigt, NCEI-bereinigt, gereinigt, homogenisiert); Sie können die markierten Sender auch auf diejenigen beschränken, deren Aufzeichnungen am oder vor dem Monat beginnen im Feld „Von“ eingegeben wurden und deren Datensätze am oder nach dem im Feld „Bis“ eingegebenen Monat enden. Eine Zählung der passende Stationen zur Verfügung gestellt (nach Klick auf „Aktualisieren“). Wenn die Felder Von/Bis leer sind, sind alle Stationen des ausgewählten Typs markiert.

(Automatische Übersetzung durch Google)

https://data.giss.nasa.gov/gistemp/station_data_v4_globe/

Prognose mit FFT möglich

Clim. Past, 9, 447–452, 2013
www.clim-past.net/9/447/2013/
doi:10.5194/cp-9-447-2013

Climate of the Past
Open Access

Multi-periodic climate dynamics: spectral analysis of long-term instrumental and proxy temperature records

H.-J. Lüdecke[1,*], A. Hempelmann[2], and C. O. Weiss[3,*]

[1]HTW, University of Applied Sciences, Saarbrücken, Germany
[2]University of Hamburg, Hamburg Observatory, Hamburg, Germany
[3]Physikalisch-Technische Bundesanstalt, Braunschweig, Germany
[*]retired

Correspondence to: H.-J. Lüdecke (moluedecke@t-online.de)

Received: 16 August 2012 – Published in Clim. Past Discuss.: 12 September 2012
Revised: 20 January 2013 – Accepted: 4 February 2013 – Published: 22 February 2013

https://cp.copernicus.org/articles/9/447/2013/cp-9-447-2013.pdf

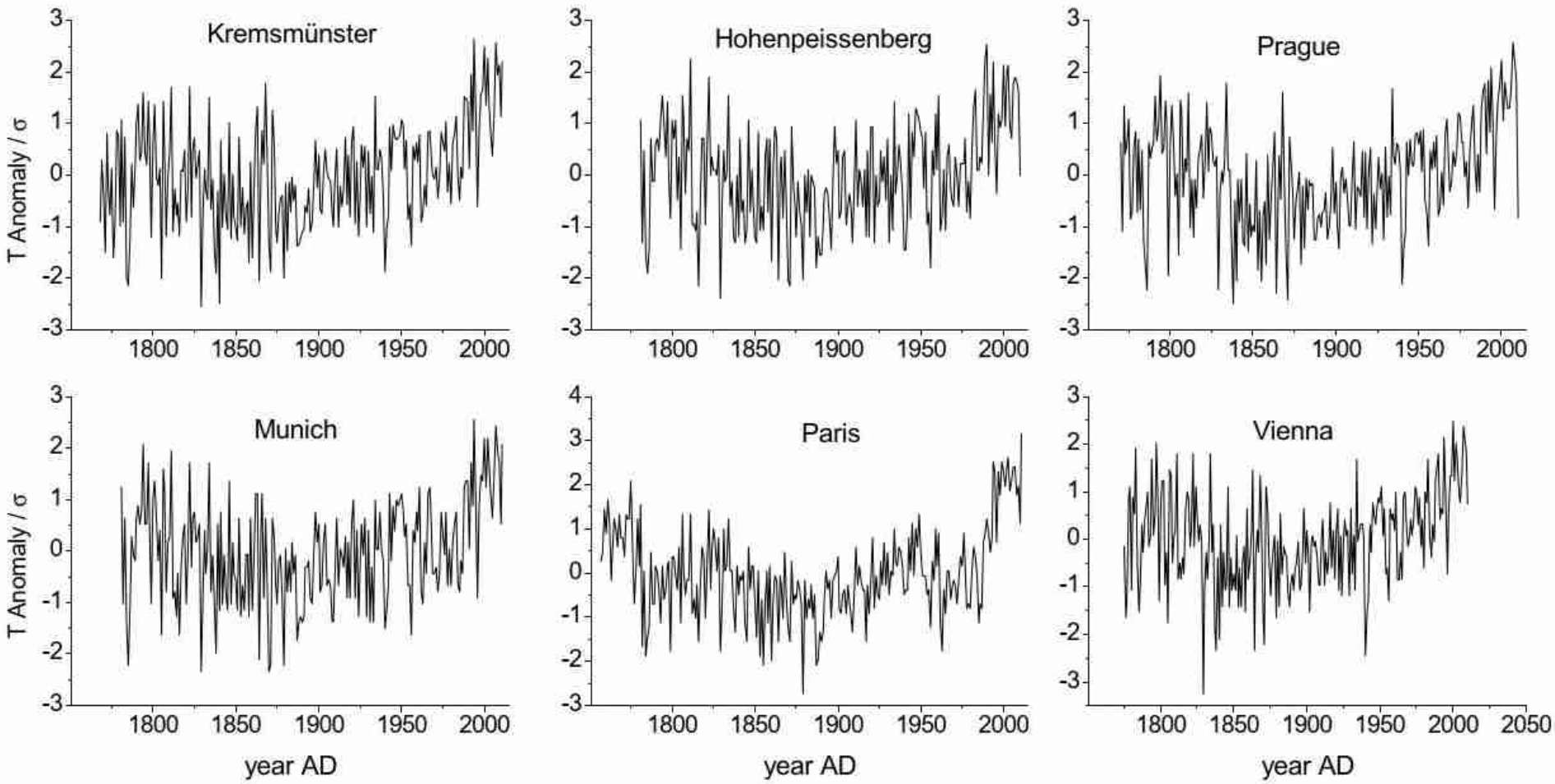


Fig. 1. Long-term temperature records from six central European stations.

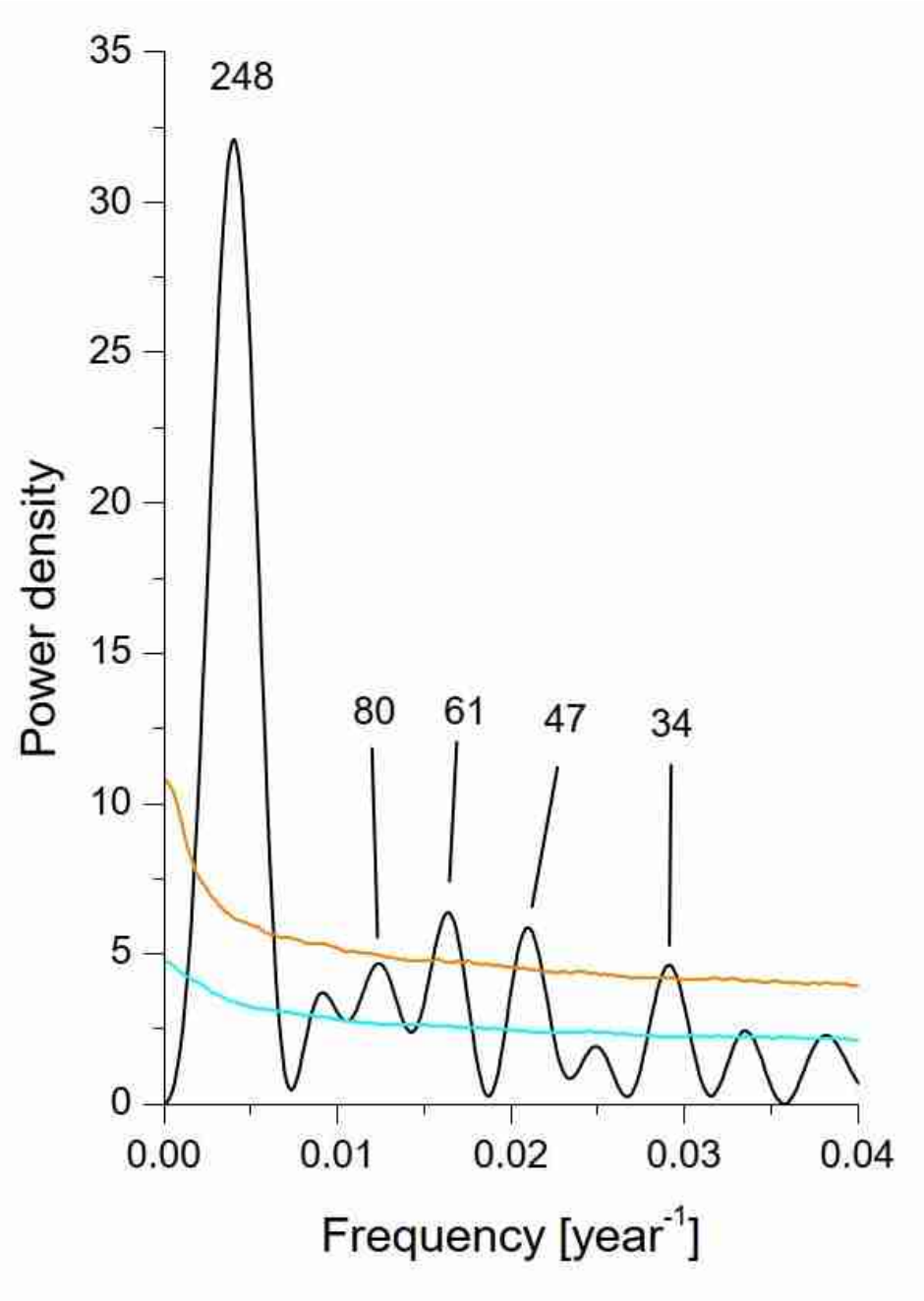


Fig. 3. Left panel: DFT of M6 (average from six central European instrumental time series). […]

In both DFT analyses the records were padded with zeros. The upper confidence curve (brown) is for 95 %, the lower (cyan) for 90 % against background noise, each of those established by 10 000 Monte Carlo runs. The most relevant peaks are indicated by their period length.

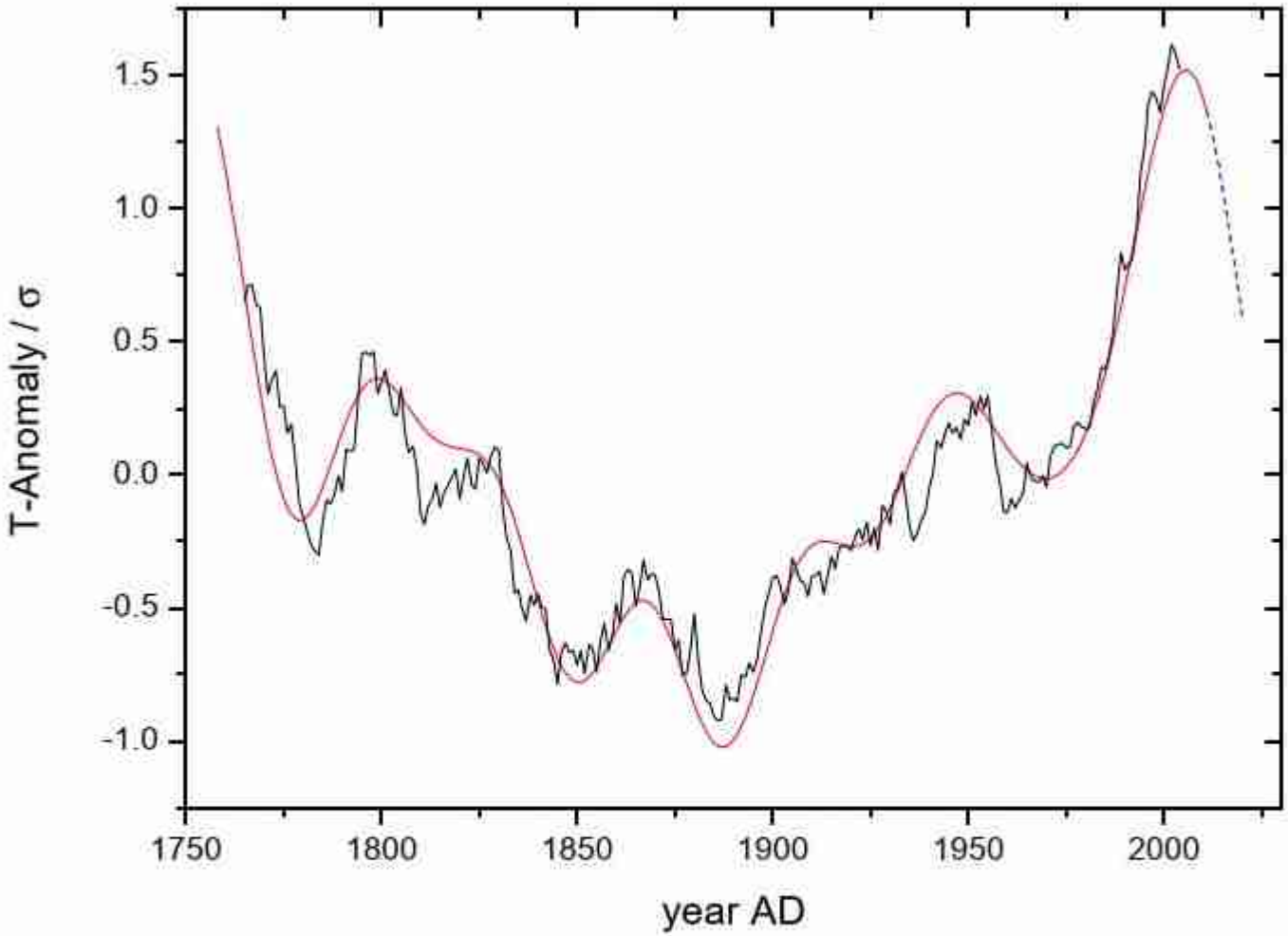


Fig. 6. (color online) 15 yr running average record SM6 (black); reconstruction RM6 according to Eqs. (1), (3) and (4) (red); projection of future NH temperatures mainly due to the ~65-yr periodicity (dashed blue).

Cook et al. Konsensstudie

Folie M 48

OPEN ACCESS
IOP PUBLISHING
ENVIRONMENTAL RESEARCH LETTERS
Environ. Res. Lett. **8** (2013) 024024 (7pp)
doi:10.1088/1748-9326/8/2/024024

Quantifying the consensus on anthropogenic global warming in the scientific literature

John Cook[1,2,3], Dana Nuccitelli[2,4], Sarah A Green[5], Mark Richardson[6], Bärbel Winkler[2], Rob Painting[2], Robert Way[7], Peter Jacobs[8] and Andrew Skuce[2,9]

[1] Global Change Institute, University of Queensland, Australia
[2] Skeptical Science, Brisbane, Queensland, Australia
[3] School of Psychology, University of Western Australia, Australia
[4] Tetra Tech, Incorporated, McClellan, CA, USA
[5] Department of Chemistry, Michigan Technological University, USA
[6] Department of Meteorology, University of Reading, UK
[7] Department of Geography, Memorial University of Newfoundland, Canada
[8] Department of Environmental Science and Policy, George Mason University, USA
[9] Salt Spring Consulting Ltd, Salt Spring Island, BC, Canada

E-mail: j.cook3@uq.edu.au

Received 18 January 2013
Accepted for publication 22 April 2013
Published 15 May 2013
Online at stacks.iop.org/ERL/8/024024

Abstract
We analyze the evolution of the scientific consensus on anthropogenic global warming (AGW) in the peer-reviewed scientific literature, examining 11 944 climate abstracts from 1991–2011 matching the topics 'global climate change' or 'global warming'. We find that 66.4% of abstracts expressed no position on AGW, 32.6% endorsed AGW, 0.7% rejected AGW and 0.3% were uncertain about the cause of global warming. Among abstracts expressing a position on AGW, 97.1% endorsed the consensus position that humans are causing global warming. In a second phase of this study, we invited authors to rate their own papers. Compared to abstract ratings, a smaller percentage of self-rated papers expressed no position on AGW (35.5%). Among self-rated papers expressing a position on AGW, 97.2% endorsed the consensus. For both abstract ratings and authors' self-ratings, the percentage of endorsements among papers expressing a position on AGW marginally increased over time. Our analysis indicates that the number of papers rejecting the consensus on AGW is a vanishingly small proportion of the published research.

Keywords: scientific consensus, anthropogenic global warming, peer-review, global climate change, Intergovernmental Panel on Climate Change

S Online supplementary data available from stacks.iop.org/ERL/8/024024/mmedia

Nr.	Kategorie	Anteil Nominal	Anteil relativ in % (von Gesamtstichprobe, Summe= 11944)
1	Explicitly endorses and quantifies AGW as 50+%	64	0,54 %
2	Explicitly endorses but does not quantify or minimise	922	7,72 %
3	Implicitly endorses AGW without minimising it	2910	24,36 %
4	No Position	7970	66,73 %
5	Implicitly minimizes/rejects AGW	54	0,45 %
6	Explicitly minimizes/rejects AGW but does not quantify	15	0,13 %
7	Explicitly minimizes/rejects AGW as less than 50%	9	0,08 %

Nr.	Kategorie	Anteil Nom	
1	Explicitly endorses and quantifies AGW as 50+%	64	0,54 %
2	Explicitly endorses but does not quantify or minimise	922	7,72 %
3	Implicitly endorses AGW without minimising it	2910	24,36 %
4	No Position	7970	66,73 %
5	Implicitly minimizes/rejects AGW	54	0,45 %
6	Explicitly minimizes/rejects AGW but does not quantify	15	0,13 %
7	Explicitly minimizes/rejects AGW as less than 50%	9	0,08 %

http://markus-fiedler.de/2020/01/02/die-97-einigkeit-unter-wissenschaftlern-die-es-nie-gegeben-hat/

Handbuch zum **Klimakonsens**

Warum der wissenschaftliche Konsens zum Klimawandel wichtig ist

- John Cook
- Sander van der Linden
- Edward Maibach
- Stephan Lewandowsky

https://skepticalscience.com/docs/Consensus_Handbook_German_A4.pdf

„97% der Klimaforscher haben aus der Beweislage geschlossen, dass der Mensch **den** aktuellen Klimawandel verursacht.“

Cook, J., van der Linden, S., Maibach, E., & Lewandowsky, S. (2018). The Consensus Handbook. DOI:10.13021/G8MM6P. Seite 1. Hervorhebung durch den Autor.

Verfügbar unter
http://www.climatechangecommunication.org/all/consensus-handbook/

https://skepticalscience.com/docs/Consensus_Handbook_German_A4.pdf

„Den aktuellen Stand des wissenschaftlichen Konsenses (97%) zu vermitteln, erhöht nicht nur den wahrgenommenen Konsens. Es steigert auch die Akzeptanz der Tatsache, dass **die globale Erwärmung real und menschengemacht ist** und ein ernsthaftes Problem darstellt.“

Cook, J., van der Linden, S., Maibach, E., & Lewandowsky, S. (2018). The Consensus Handbook. DOI:10.13021/G8MM6P. Seite 18. Hervorhebung durch den Autor.

Verfügbar unter http://www.climatechangecommunication.org/all/consensus-handbook/

Deutsche Übersetzung: Bärbel Winkler, Timo Lubitz, Thomas Traill

https://skepticalscience.com/docs/Consensus_Handbook_German_A4.pdf

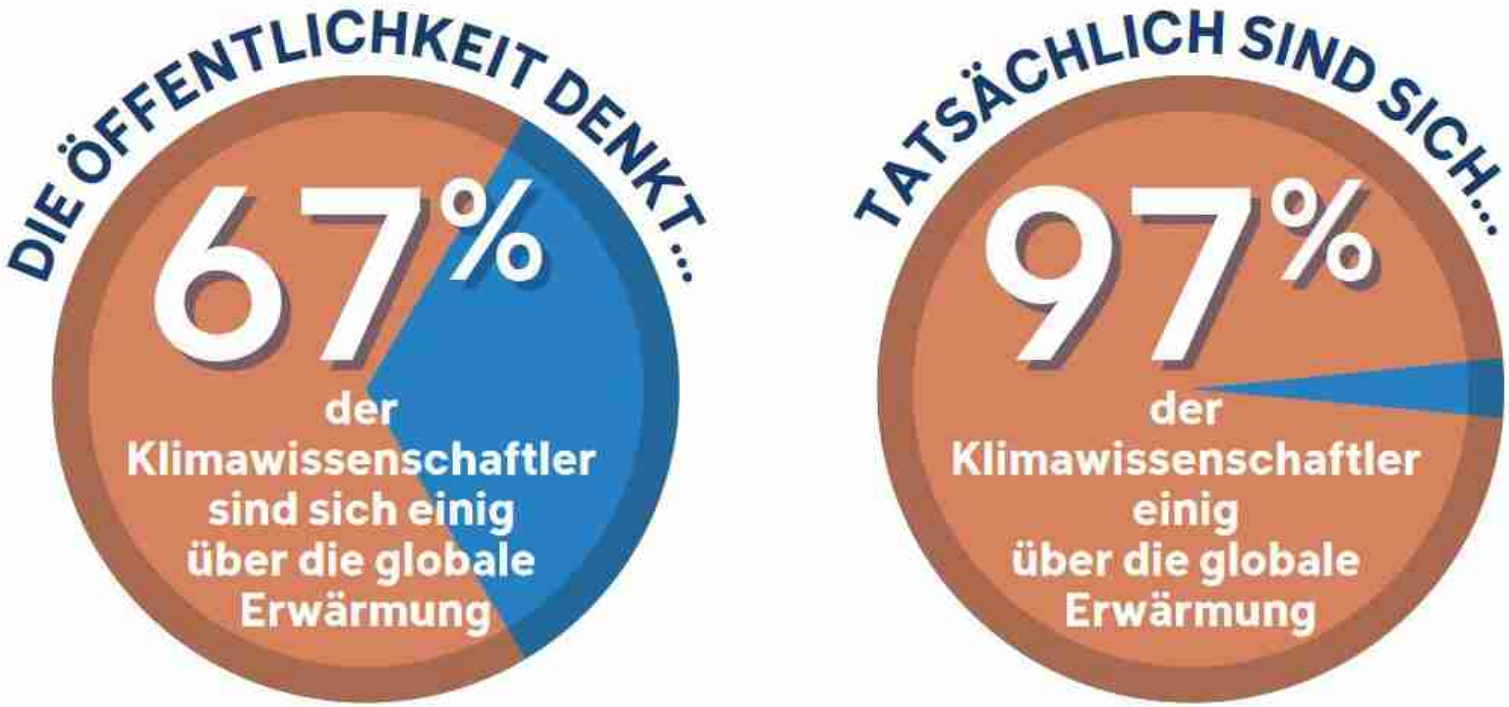


Abbildung 3: Die Konsenslücke[8,9].

Cook, J., van der Linden, S., Maibach, E., & Lewandowsky, S. (2018). The Consensus Handbook. DOI:10.13021/G8MM6P. Seite 4.

Verfügbar unter http://www.climatechangecommunication.org/all/consensus-handbook/

Deutsche Übersetzung: Bärbel Winkler, Timo Lubitz, Thomas Traill

https://skepticalscience.com/docs/Consensus_Handbook_German_A4.pdf

Chemische CO2 Messung E.G. Beck

180 YEARS OF ATMOSPHERIC CO_2 GAS ANALYSIS BY CHEMICAL METHODS

by

Ernst-Georg Beck

Reprinted from

ENERGY & ENVIRONMENT

VOLUME 18 No. 2 2007

260 *Energy & Environment* · Vol. 18, No. 2, 2007

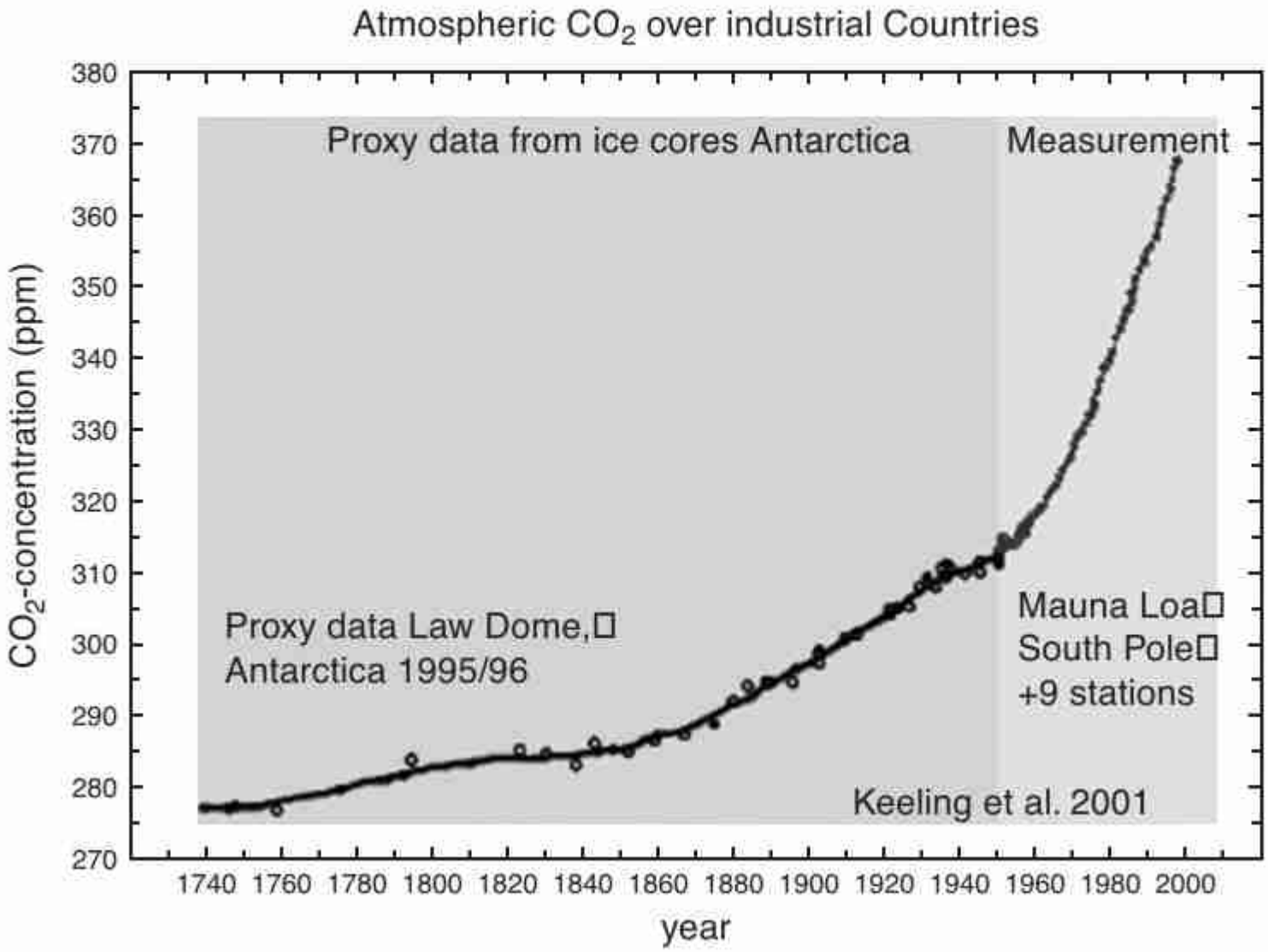


Table 2: Series of CO_2 measurements since 1855 lasting more than a year using the titrimetric Pettenkofer process

	Year	Author	Locality	Amount of determinations
1	Since 1855	v. Pettenkofer [46]	Munich (D)	Many
2	1856 (6 month)[1]	v. Gilm[1] [50]	Innsbruck[1] (AUS)	19
3	1863–1864	Schulze[2] [51]	Rostock, (D)	426
4	1864/65	Smith [52]	London, Manchester, Scotland (GB)	246
5	1868–1871	Schulze[2] [51]	Rostock, (D)	1600
6	1872–1873	Reiset [53]	Dieppe, France (Northsea) (F)	92
7	1873	Truchot [54]	Clermont Ferrand (F)	60
8	1874–875	Farsky[2] [55]	Tabor, Böhmen, (Cz)	295
9	1874–1875	Hässelbarth[2] [56]	Dahme (D)	347
10	1879–1880	Reiset [31]	Dieppe (F)	118
11	1883	Spring [57][2]	Liege (B)	266
12	1886–1887	Uffelmann [58]	Rostock (D)	420
13	1889–1891	Petermann [59]	Gembloux (B)	525
14	1897–1898	Letts&Blake [14]	near Belfast (IRL)	64
15	1898–1901	Brown& Escombe [60]	Kew Garden England (GB)	92
16	1917–1918	A. Krogh [61, 62]	Kopenhagen (DK)	Many
17	1920–1926	Lundegardh [35]	in southern Sweden (Kattegat) (S)	>3000
18	1928	Krogh/Rehberg [62]	Kopenhagen (DK)	Many
19	1932–1935	Buch [32]	Northern atlantic ocean/ Finland (FIN)	176
20	1936–1939	Duerst [37]	at Bern (Switzerland) (CH)	>1000
21	1941–1943	Misra [39]	Poona, India (IND)	> 250
22	1950	Effenberger [17]	Hamburg (D)	>40
23	1954	Chapman et al. [63]	Ames (IOWA, USA)	>100
24	1957	Steinhauser [64]	Vienna (AUS)	>500
25	1955–1960	Fonselius et al. [65] Bischof [66]	Scandinavia	>3400

[1]v. Gilm: similar process as Pettenkofer, first calibrated.
[2]identical variant of Pettenkofer process, sampling by tube through opening in window.

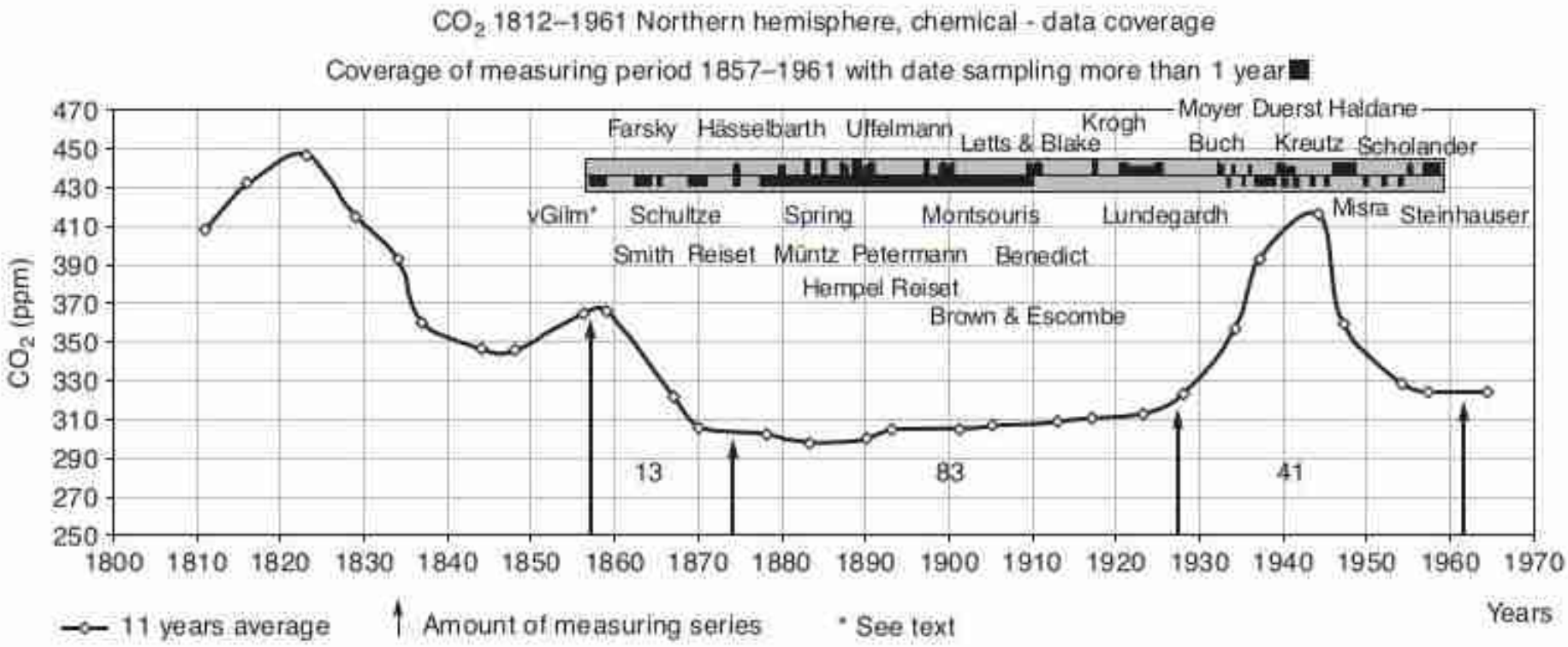


Figure 11: Local CO_2 concentration for the northern hemisphere, determined through chemical analysis between 1812 and 1861. Data plotted as an 11 year average. Data coverage and important scientists indicated in dark grey/black. The curve delineates three major maxima in CO_2 content, though the one situated around 1820 must be treated as provisional only. Data series used: time window 1857–1873: 13 yearly averages, 83 until 1927 and up to 1961 41 data records (eleven interpolated).

comparative measurements with the other techniques (see table 3).

The volumetric apparatuses used before Haldane [70] and Benedict/Sonden/Petterson (e.g. 1900; [15, 44]), including gas analysers used by the French authors Regnault, Müntz, Tissander and earlier authors were **open systems** which lacked efficient control of reaction temperature (see Schuftan 1933, [43,]). So their data were less reliable. Most French authors such as Müntz, Tissander and Reiset (Pettenkofer process) used sulphuric acid for drying air (or releasing CO_2, Müntz [28, 29, 30]) before determination of CO_2 content. Because of the absorption of a considerable fraction of CO_2 in the sulphuric acid, their values are too low (Bunsen absorption coefficient H_2SO_4 at 25°C = 0,96; H_2O at 25°C = 0,759; [72]). These systematic errors were known since 1848, Hlasiwetz [73] 1856 and Spring [57] 1885 determined these absorption losses to 7–10% or about 20 ppm.

Neither Callendar or Keeling nor the IPCC commented on these systematic errors resulting in too low values. In fact, Reiset and Müntz were singled out for special praise by Keeling and IPCC as the source of the best available data of that time. [22, 23, 25, 26, 27, 74] However, because of the deficiencies results determined using these methods have not been incorporated in the present study.

https://wattsupwiththat.com/2014/08/05/co2-data-might-fit-the-ipcc-hypothesis-but-it-doesnt-fit-reality/

Saturday, August 28, 2021

Watts Up With That?

The world's most viewed site on global warming and climate change

ABOUT EVERYTHINGCLIMATE REFERENCE PAGES SUBMIT STORY SEND NEWS TIP

Home / 2014 / August / 5 / CO2 data might fit the IPCC hypothesis, but it doesn't fit reality

CARBON DIOXIDE IPCC

CO2 data might fit the IPCC hypothesis, but it doesn't fit reality

7 years ago Anthony Watts

https://wattsupwiththat.com/2014/08/05/co2-data-might-fit-the-ipcc-hypothesis-but-it-doesnt-fit-reality/