NASA GISS Temperature Records Altered - Why?

by
Friedrich-Karl Ewert*)

1. Introduction

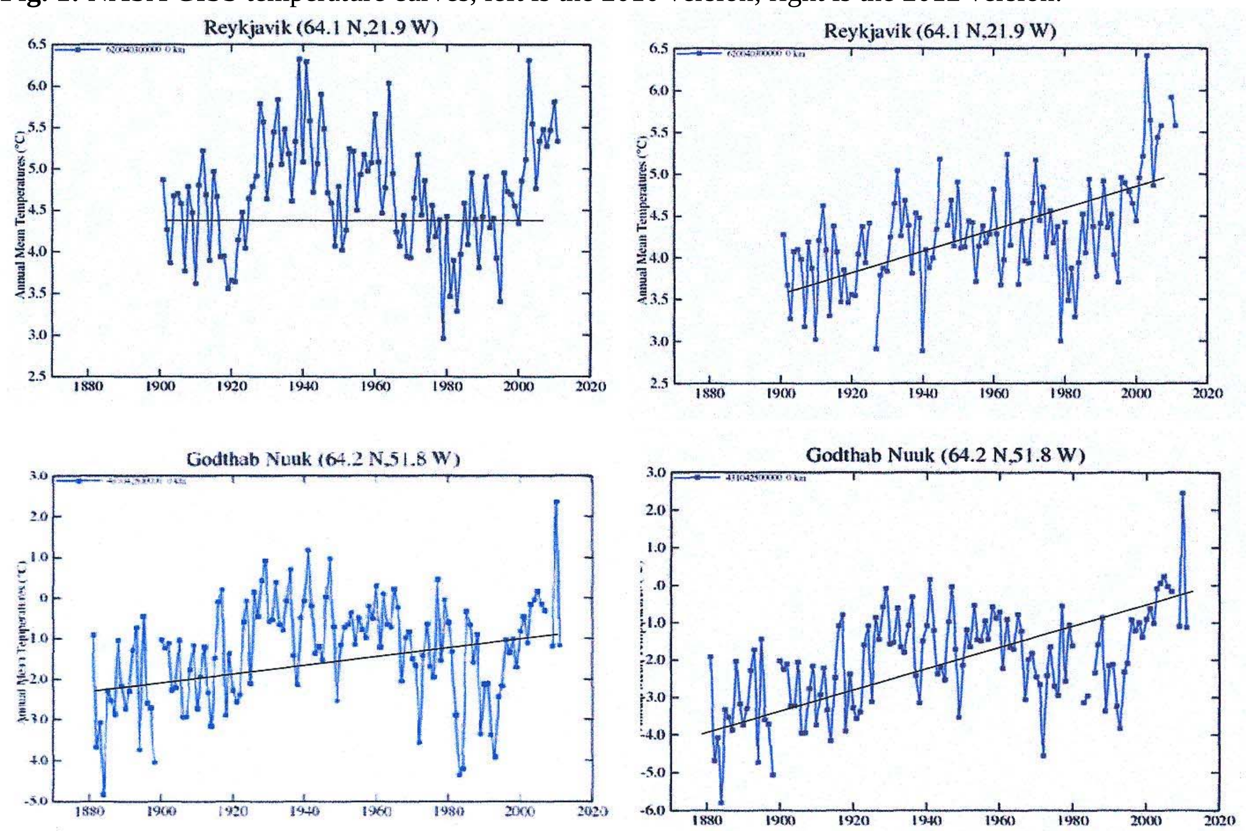
On January 26, 2012, a short report written by Steven Goddard dealing with the modification of temperature records was published in the German version at EIKE’s internet portal. By using the examples of Reykjavik (Iceland), Godthab Nuuk (Greenland) and all stations of the US, it was demonstrated that temperature curves were altered to produce the impression that the Arctic has been warming up since 1920.

The temperature records are made up of the monthly and yearly averages and the corresponding temperature curves. The temperature curves depict the temperature variations over time. The inclination of the trend line tells us whether the average temperature is flat, increasing, or decreasing. An inclined trend line yields a gradient given in °C/year, i.e. the yearly rate of temperature change.

Examples: Reykjavik and Godthab Nuuk

Fig. 1 compares the original temperature curves of the stations Reykjavik and Godthab Nuuk (left) from the year 2010 with those altered by NASA GISS in 2012 (right).

Fig. 1: NASA GISS temperature curves, left is the 2010 version; right is the 2012 version:



*) ewert.fk@t-online.de

The 2010 temperature curves reveal two distinct warming periods. The first one between 1920 and 1960 appears to be stronger than the second one beginning in 1980. The overall trend lines of the respective 2010 temperature curves indicate no warming for Reykjavik and slight warming for Godthab Nuuk. By contrast, in the 2012-temperature curves, the first 1920-1960 warming phase is noticeably reduced while the second warming remains approximately the same. This alteration serves to increase the positive inclination of the overall trend lines, which leaves the impression of stronger warming.

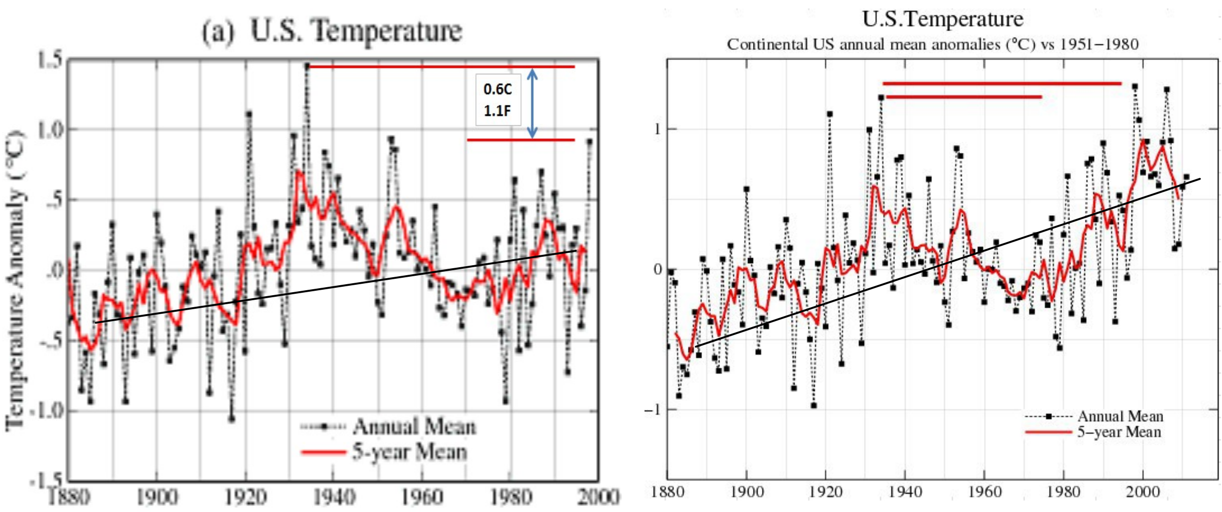
Example: USA

These newly altered Arctic region temperature records lead the observer to believe that the Arctic apparently became progressively warmer. However, this kind of alteration was not only applied to the Arctic. Steven Goddard also considered the overall temperature curve USHCN Version 1 of all 1221 stations in the USA introduced in 1990, published by James Hansen in 1999 as “USHCN v.1”, see Fig. 2

In Fig. 2 the left temperature curve very clearly shows the first warming phase of 1920 to 1940, which was then followed by cooling until, 1980 and then by the second warming period from 1980 to 1995. The first warming was stronger. The overall trend line shows a moderate inclination, indicating a rather small yearly warming.

The right temperature curve in Fig. 2 shows the opposite: the values of the first warming were lowered while those of the second one were adjusted upwards. The scale of the y-axis was modified as well, altogether producing a steeper overall trend line, i.e. a stronger warming. That alteration gives the appearance of a distinct warming for the entire USA.

Fig. 2: Alteration of temperature data for the entire USA, 1920-1960 values were reduced, 1980 values increased:

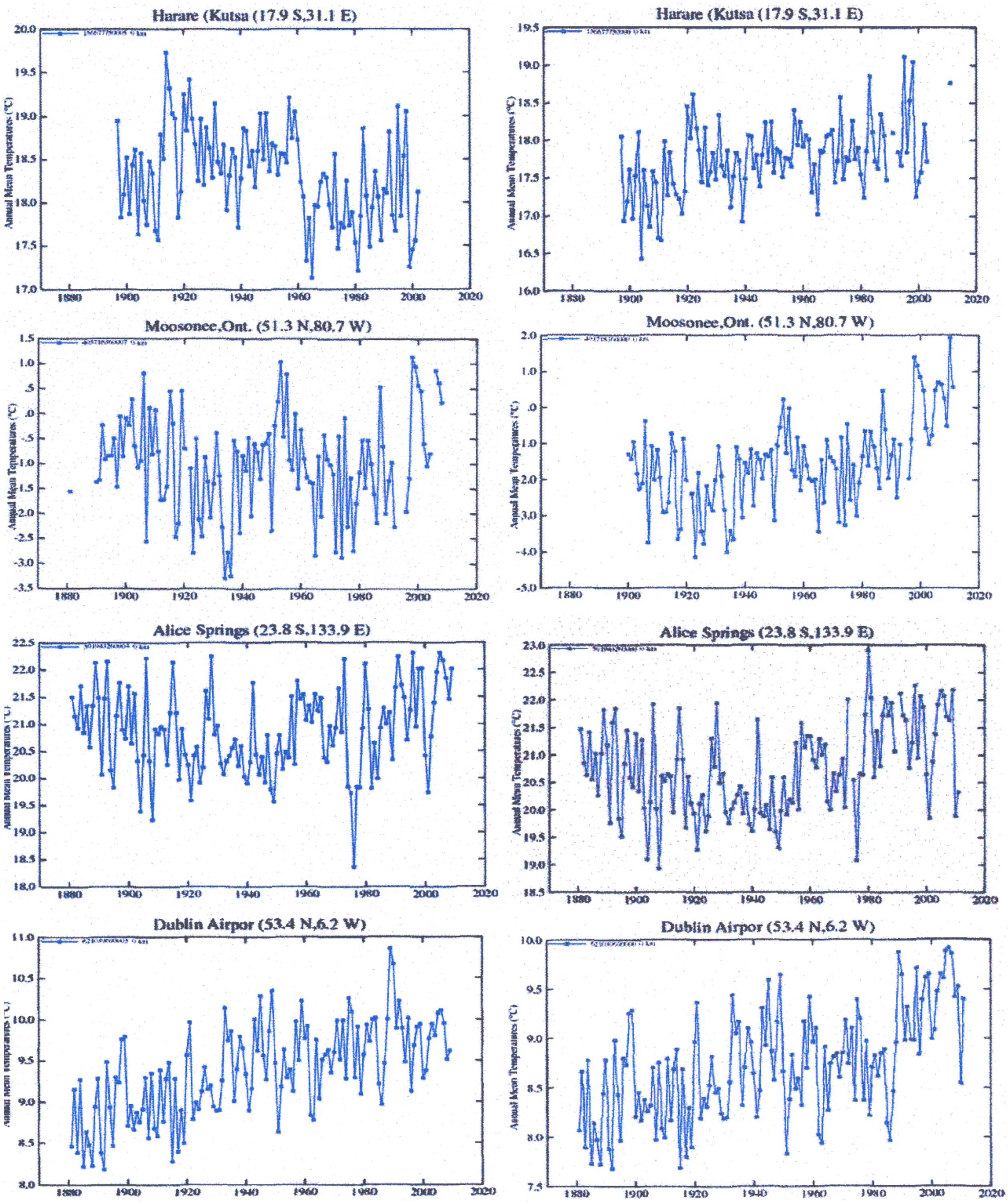


Further examples

It was necessary to check whether the examples of Reykjavik, Godthab Nuuk and USA were isolated events or if many (if not all) data series and curves had been altered. Therefore, four additional stations were evaluated and the temperature curves and trend lines from 2010 and 2012 datasets were carried out and are depicted in Fig. 3. Such comparisons are possible because the 2010 data series and diagrams had already been stored and, hence, are now available [1,2].

The temperatures curves of Harare and Moosonee illustrate quite massive alterations, already recognisable at first glance. However, the graphs of Alice Spring and Dublin need a closer inspection to detect their hidden alterations.

Fig. 3: Further examples of altered temperature data, comparison of 2010 (left) and 2012 (right):



The examples from four continents shown in Figures 1 – 3 would suggest that GISS alterations probably apply to a considerable part of all stations worldwide. To confirm or to disprove that suspicion, the data from 120 stations were analysed. Table 1 is a list of these randomly selected stations. Due to time constraints, the analysis had to be limited to this comparatively small number. The result cannot represent all stations managed by NASA GISS, of course, but it is certainly sufficient to discern the intentions behind the alterations.

Table 1: Randomly selected stations for analysing NASA GISS temperature data changes:

No.	ID	Station	Begin	No.	ID	Station	Begin	No.	ID	Station	Begin
1	4094	Afyon	1881	41	162	Esquel Aero	1931	81	3561	Perry	1901
2	855	Alice springs	1881	42	92	Faraday	1944	82	571	Perth Airport	1945
3	2307	Allahabad	1881	43	3184	GGainesville	1897	83	582	Pilar Observ	1931
4	5113	Almaty	1881	44	5660	Geneve	1881	84	6224	Poltava	1886
5	7237	Angmagssalik	1895	45	7201	Godthab Nuuk	1881	85	2072	Port Sudan	1906
6	3809	Anna 1E	1896	46	6986	Goteborg	1951	86	6618	Poznan	1951
7	975	Antananarivo	1889	47	4634	Gothenburg	1896	87	3089	Prescott	1899
8	4605	Aomori	1886	48	997	Harare Kutsa	1897	88	484	PudahueL	1881
9	2412	Arcadia	1899	49	2995	Haskell	1895	89	186	Puerto Montt	1951
10	824	Acunción Aero	1893	50	7082	Helsinki	1951	90	128	Punta Arenas	1888
11	3917	Athinai Observ	1895	51	4500	Holdrege	1902	91	3516	Quingdao	1898
12	284	Auckland Air	1881	52	143	Invercargill	1950	92	5007	Racine	1897
13	4274	Austin	1895	53	3869	Isparta	1949	93	7200	Reykjavik	1901
14	1786	Bangalore	1951	54	7143	Jakutsk	1883	94	5827	Saentis	1883
15	193	Bariloche Aero	1931	55	2788	Jerusalem	1881	95	3214	Saint Johns	1909
16	120	Base Orcadas	1903	56	7205	Kajaani	1950	96	2471	Saint Leo	1895
17	6825	Belfast	1881	57	698	Kimberley	1897	97	3999	Salisbury ML	1907
18	5307	Bethlehem	1895	58	6982	Kodiak	1882	98	3459	Salisbury NC	1895
19	7270	Bodo Vi	1881	59	4404	Krasovodsk	1883	99	201	San Antonio Ob	1931
20	2591	Boerne	1904	60	4308	Larissa	1900	100	589	San Juan Aero	1931
21	751	Brisbane Eagle	1950	61	181	Launceston Air	1939	101	494	San Luis Aero	1931
22	5332	Bucuresti	1881	62	249	Laverton Aero	1944	102	303	Santa Rosa Aero	1941
23	1021	Cairns Airport	1906	63	3878	Lexington	1895	103	6508	Saratov	1887
24	355	Canberry Airport	1939	64	2680	LLano	1906	104	5579	Sibiu	1881
25	3364	CAPE HATTERAS	1895	65	861	Longreach	1949	105	437	Sydney Airport	1939
26	443	Capetown	1881	66	3482	Luqa	1881	106	2453	Tampa	1890
27	2200	Casa Blanca	1895	67	245	Mar del Plata	1931	107	218	Temuco	1951
28	557	Ceduna Airport	1942	68	5125	Marseille	1881	108	2806	Thomasville	1897
29	3319	Chattanooga / L	1881	69	3413	Meeker 4W	1895	109	7144	Thorshavn	1881
30	157	Christchurch	1905	70	422	Mildura Air	1947	110	1613	Trincomalee	1881
31	6564	Cita	1891	71	4001	Mina	1896	111	3750	Trinidad	1900
32	148	Comodoro Riva	1931	72	6733	Minusinsk	1885	112	3382	Tullahoma	1896
33	1117	Darwin	1881	73	4048	Moab	1895	113	6552	Valentia Obse	1881
34	313	Dolores Aero	1931	74	6471	MOOSONEE	1881	114	5550	Vancouver 4ene	1896
35	4195	Dover	1895	75	255	Mt Gambier AI	1942	115	6823	Vilnius	1881
36	2829	Dublin 2se	1897	76	213	New Plymouth	1951	116	6978	Visby Air	1951
37	6714	Dublin Air NEU	1881	77	7360	Ostrov Vize	1951	117	359	Wagga iAirport	1943
38	5761	Duluth Int	1904	78	4285	Palma de Mall	1881	118	1037	Willis Island	1939
39	653	Durban Louis	1885	79	577	Parana Aero	1931	119	4407	Wray	1896
40	6437	Erfurt	1952	80	334	Pehuajo	1951	120	6449	Wroclaw	1881

The subject of the analysis is the evaluation of the annual temperature mean values published at the NASA GISS Internet portal in March 2010 and March 2012, respectively. Hereinafter they are designated as “2010-data” and “2012-data”. Their records and corresponding temperature curves are compared to each other in order to find out whether the data were retroactively altered between 2010 and 2012. The evaluated data start in 1881, or sometime later, and always end in 2010, regardless of whether they were downloaded in March 2012, or later in August, September or December of 2012.

2. Applied modification methods

A tabular comparison has been used to examine the changes between the annual mean values considered for 2010-data and 2012-data. In March 2012, the 2012-data were compared to the 2010-data for the stations Reykjavik, Palma de Majorca, and Darwin. This first comparison was extended for Palma de Majorca and Darwin in August and December 2012 when it was detected that further alterations had occurred during the course of the year. It is very likely that changes were carried out even more often.

The annual mean values provided by NASA GISS begin around 1880, thus their observation time covers about 130 years. This is by far too short a period to really recognize temperature developments with proper care. The latter thousand years only saw changes between the Medieval Climate Optimum and the Little Ice Age, followed by a re-warming that is still on-going. In assessing climate development, this has to be taken into consideration. This is possible to some extent because long-term temperature records are indeed available. The oldest one known is from Central England, where several stations began recording already in 1659. A little later Berlin began in 1701, and De Bilt in 1708, and followed by Prague, Vienna, and Hohenpeissenberg beginning in 1773, 1775 and 1781 respectively. Although NASA GISS manages all of them, it only uses their data from 1880 onwards. Using the earlier data is essential in understanding the development of the climate. Without considering the early data, it is not possible to reach the correct conclusions.

2.1 Reykjavik

The example of Reykjavik has been selected for this evaluation because at the outset Steven Goddard’s report mentioned its temperature curves.

In Table 2, the annual mean values (metANN) offered by NASA GISS in March 2010 and in March 2012 respectively are compared to each other. Negative differences (blue) indicate that the 2012-values had been reduced, i.e. made smaller than the 2010-values; positive differences (light brown) indicate the opposite, i.e. the 2012-values had been made larger than the 2010-values.

By reducing the 2012-values in the early section of the temperature series, reducing the peak values in the middle section, and by increasing the values in the end section, a stronger positive inclination of the overall trend line is yielded. Here the first 1920-1960 warming phase is decreased while the second phase is enhanced. The result: the new overall temperature curve depicts a stronger warming. While the 2010-data for the 20th century temperature readings revealed a warming of 0.001°C/a[*)], the new, altered 2012-data show a warming of 0.0043°C/a[*)] (Fig. 4a/4b). In order to conceal the transitions between the decreasing and increasing sections, individual values were even deleted, thus leaving gaps which originally did not exist.

[*)] Hereinafter the yearly average temperatures are given in **°C/a** (**a =** annum = year)

It was conceivable that also the 2010-values had already been modified. In order to check this possibility, a temperature curve was generated using the annual mean values available in the German wetterzentrale.de (WZ Data). Their data had been downloaded for an earlier study in November 2008. Fig. 4a shows that the graph is nearly identical with the one obtained from the NASA GISS 2010-data. The first warming phase 1930-1965 is particularly apparent. Here and there occur slight deviations because single adjustments were probably applied. Nevertheless, since warming and cooling phases are shown to be more or less the same, it is assumed that they represent the same state.

Table 2: Reykjavik – differences between the annual mean temperatures offered by NASA GISS in March 2010 and March 2012 respectively.

-0,04 Lowering the data | 0.13 Lifting the data | Gaps to conceal modifications

Year	metANN 2010	2012	Diff.	Year	metANN 2010	2012	Diff.	Year	metANN 2010	2012	Diff.	Year	metANN 2010	2012	Diff.
1901	4.87	4.57	-0.30	1929	5.57	5.05	-0.52	1957	5.17	4.88	-0.29	1985	4.59	4.63	0.04
1902	4.27	3.97	-0.30	1930	4.64	5.45	0.81	1958	4.97	4.68	-0.29	1986	4.09	4.16	0.07
1903	3.87	3.57	-0.30	1931	5.05	5.08	0.03	1959	5.08	4.78	-0.30	1987	4.96	5.04	0.08
1904	4.67	4.38	-0.29	1932	5.45	5.45	0.00	1960	5.67	5.22	-0.45	1988	4.39	4.48	0.09
1905	4.70	4.50	-0.20	1933	5.84	5.84	0.00	1961	5.08	4.68	-0.40	1989	3.82	3.88	0.06
1906	4.58	4.38	-0.20	1934	5.06	5.06	0.00	1962	4.47	4.08	-0.39	1990	4.42	4.51	0.09
1907	3.77	2.58	-1.19	1935	5.48	4.48	-1.00	1963	4.77	4.38	-0.39	1991	4.91	5.02	0.11
1908	4.79	4.59	-0.20	1936	5.18	5.08	-0.10	1964	6.04	5.64	-0.40	1992	4.29	4.46	0.17
1909	4.47	4.28	-0.19	1937	4.61	4.51	-0.10	1965	4.95	4.55	-0.40	1993	4.40	4.52	0.12
1910	3.62	3.53	-0.09	1938	5.33	5.23	-0.10	1966	4.24			1994	3.92	4.03	0.11
1911	4.81	4.71	-0.10	1939	6.32	5.18	-1.14	1967	4.08	4.08	0.00	1995	3.40	3.70	0.30
1912	5.22	5.13	-0.09	1940	5.08	3.56	-1.52	1968	4.44	4.84	0.40	1996	4.95	4.96	0.01
1913	4.69	4.59	-0.10	1941	6.29	4.79	-1.50	1969	3.95	4.27	0.32	1997	4.72	4.89	0.17
1914	3.90	3.80	-0.10	1942	5.58	4.58	-1.00	1970	3.93	4.23	0.30	1998	4.69	4.79	0.10
1915	4.97	4.98	0.01	1943	4.72	4.70	-0.02	1971	4.65	4.95	0.30	1999	4.55	4.68	0.13
1916	4.67	4.67	0.00	1944	5.07	4.94	-0.13	1972	5.17	5.47	0.30	2000	4.34	4.44	0.10
1917	3.94	4.07	0.13	1945	5.91	5.78	-0.13	1973	4.44	4.74	0.30	2001	4.86	4.96	0.10
1918	3.95	4.45	0.50	1946	5.49			1974	4.86	5.14	0.28	2002	5.12	5.22	0.10
1919	3.56	4.06	0.50	1947	4.72	4.99	0.27	1975	4.02	4.31	0.29	2003	6.32	6.42	0.10
1920	3.66	4.26	0.60	1948	4.59	5.29	0.70	1976	4.56	4.86	0.30	2004	5.55	5.65	0.10
1921	3.64	4.24	0.60	1949	4.07	4.74	0.67	1977	4.18	4.38	0.20	2005	4.77	4.87	0.10
1922	4.14	4.74	0.60	1950	4.79	5.51	0.72	1978	4.38	4.57	0.19	2006	5.34	5.44	0.10
1923	4.47	5.21	0.74	1951	4.03	4.72	0.69	1979	2.96	3.20	0.24	2007	5.48	5.58	0.10
1924	4.04			1952	4.27	4.63	0.36	1980	4.42	4.63	0.21	2008	5.28		
1925	4.64	3.71	-0.93	1953	5.25	4.93	-0.32	1981	3.47	3.69	0.22	2009	5.47		
1926	4.79	4.59	-0.20	1954	5.22	4.92	-0.30	1982	3.90	4.09	0.19	2010	5.82	5.92	0.10
1927	4.92	4.68	-0.24	1955	4.50	4.21	-0.29	1983	3.29	3.49	0.20	2011		5.58	5.58
1928	5.79	4.64	-1.15	1956	4.93	4.63	-0.30	1984	3.97	4.14	0.17				

Fig. 4a: Reykjavik – NASA GISS 2010-data match reasonably well with the WZ data: The warming and cooling phases concur and are in harmony with the general temperature development.

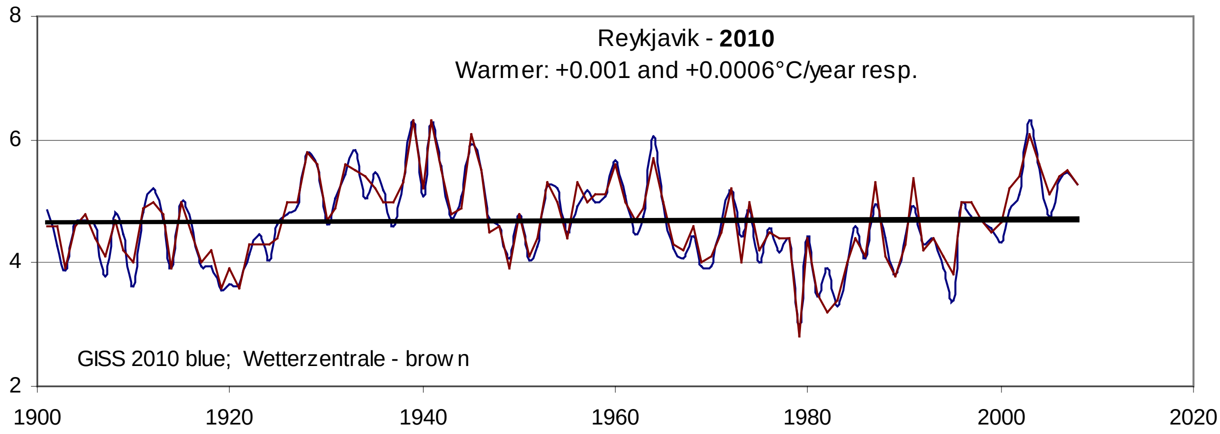
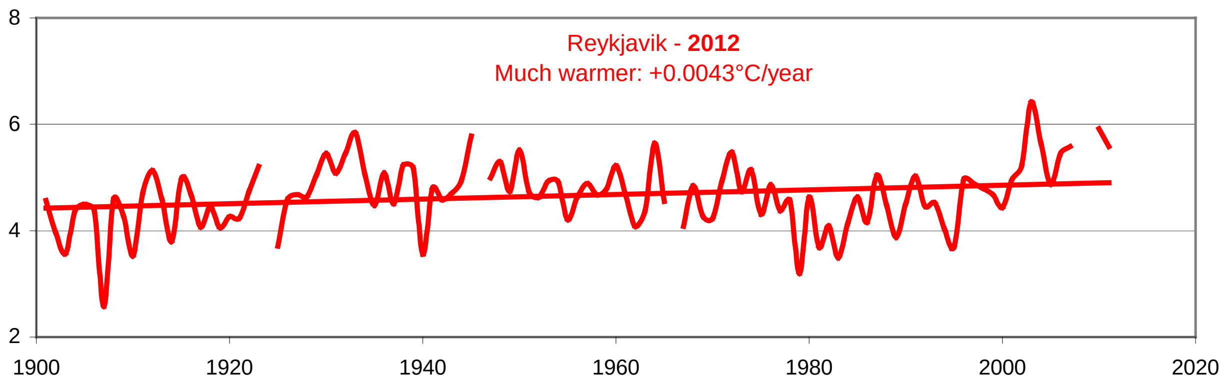


Fig. 4b: Reducing the 1900 to 1960 values and raising the values of the end section of the temperature series generate stronger warming.



2.2 Palma de Majorca

Palma de Majorca was selected because the 2010-data indicated this station had registered cooling (–0.0076°C/a) over the 20th century, which the 2012-data simply inverted in order to show a warming (+0.0074°C/a). In order to find out the method applied to achieve this peculiar alteration, the 2010-data and 2012-data were compared (as was done with Reykjavik) to determine their differences. In the early section of the data series, beginning in 1881, the annual mean temperature values were reduced considerably, by 2.5°C/a. The reductions gradually decreased over time and resulted in changing the original cooling into a warming.

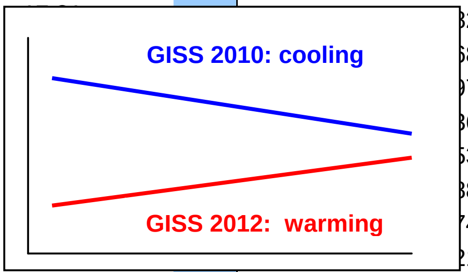
Table 3 lists the data and exposes the method. The digressive reduction seen in the differences ends up producing mirror-image temperature curves: 2010-cooling is mirrored by the new 2012-warming. Singular peak values were individually adjusted and early values were adjusted upwards only a few times. And also here the deletion of data caused gaps that hid transitions. Today nobody can see or remember that the annual temperature between 1881 and 1914 was about 2.5°C cooler. Figures 5a and 5b illustrate the alterations.

If persons in 2010 had wanted to know the temperature development at Palma de Majorca, the NASA GISS-data would have told them that a cooling of 0.0076°C/a had taken place between 1881 and 2010. But if the same persons had wanted to know the temperature development from the same source two years later, they would have learned that it had become warmer: 0.0074°C/a. And that's hardly the end of the story. In 2012, the data were adjusted upwards again by August, and once again by December, as Figures 5c and 5d confirm.

Table 3: Palma de Majorca - annual mean values provided by NASA GISS in March 2010 and March 2012, and their differences.

-0.04 Lowering the data | 0.13 Lifting the data | Gaps to hide adjustments

Year	metANN 2010	metANN 2012	Diff.	Year	metANN 2010	metANN 2012	Diff.	Year	metANN 2010	metANN 2012	Diff.	Year	metANN 2010	metANN 2012	Diff.
1881	19.16	16.66	-2.50	1914	18.16	16.16	-2.00	1947	18.00	16.18	-1.82	1980	17.49	15.75	-1.74
1882	19.00	16.50	-2.50	1915	17.76	15.76	-2.00	1948	17.68	17.03	-0.65	1981	16.78	16.91	0.13
1883	17.66	15.16	-2.50	1916	17.98	16.14	-1.84	1949	18.52	17.12	-1.40	1982	18.43	16.34	-2.09
1884	17.83	15.33	-2.50	1917	17.19			1950	18.62	15.60	-3.02	1983	18.25	15.49	-2.76
1885	17.74	15.24	-2.50	1918	16.62	15.62	-1.00	1951	17.00	16.57	-0.43	1984	17.42	16.00	-1.42
1886	18.14	15.64	-2.50	1919	17.12	16.12	-1.00	1952	17.88	16.21	-1.67	1985	17.88	16.24	-1.64
1887	17.76	15.26	-2.50	1920	17.73	16.73	-1.00	1953	17.38	15.96	-1.42	1986	17.62	16.57	-1.05
1888	17.80	15.30	-2.50	1921							-0.45	1987	16.42	16.93	0.51
1889	18.00	15.50	-2.50	1922							-2.12	1988	16.66	17.03	0.37
1890	17.54	15.09	-2.45	1923							-0.76	1989	16.94	17.23	0.29
1891	17.45			1924							-0.55	1990	17.31	15.97	-1.34
1892	17.78	16.08	-1.70	1925							-0.95	1991	16.30	15.97	-0.33
1893	18.28	16.58	-1.70	1926							-1.80	1992	16.22	15.99	-0.23
1894	17.55	15.74	-1.81	1927							-0.37	1993	15.93	16.81	0.88
1895	18.06	16.26	-1.80	1928							-0.29	1994	16.81	16.77	-0.04
1896	17.28	15.54	-1.74	1929	16.91	15.91	-1.00	1962	17.67	17.27	-0.40	1995	16.77	16.34	-0.43
1897	18.38	16.58	-1.80	1930	17.39	16.39	-1.00	1963	17.34	16.53	-0.81	1996	16.29	17.32	1.03
1898	18.15	16.35	-1.80	1931	17.26			1964	18.21	16.53	-1.68	1997	17.25	17.05	-0.20
1899	18.70	16.90	-1.80	1932	17.12	16.12	-1.00	1965	17.58	16.81	-0.77	1998	16.95	16.79	-0.16
1900	17.89	16.09	-1.80	1933	17.31	16.31	-1.00	1966	17.78			1999	16.69	16.74	0.05
1901	17.73	15.74	-1.99	1934	16.43	15.63	-0.80	1967	17.82			2000	16.65	17.23	0.58
1902	18.21	16.21	-2.00	1935	16.62			1968	17.57			2001	17.13	16.75	-0.38
1903	17.74	15.74	-2.00	1936	16.72			1969	17.41			2002	16.65	17.79	1.14
1904	18.23	16.23	-2.00	1937	16.82	15.60	-1.22	1970	18.11	16.18	-1.93	2003	17.69	16.83	-0.86
1905	18.07	16.07	-2.00	1938	16.92	16.18	-0.74	1971	17.93	15.31	-2.62	2004	16.73	16.51	-0.22
1906	17.82	15.82	-2.00	1939	17.68	16.03	-1.65	1972	17.41	16.33	-1.08	2005	16.51	17.49	0.98
1907	17.59	15.79	-1.80	1940	17.52	14.93	-2.59	1973	18.43	15.61	-2.82	2006	17.49	17.10	-0.39
1908	18.18	15.97	-2.21	1941	16.44	15.38	-1.06	1974	17.71	15.72	-1.99	2007	17.10	16.65	-0.45
1909	17.02			1942	16.87	16.08	-0.79	1975	17.82	15.72	-2.10	2008	16.65	16.81	0.16
1910	17.62			1943	17.58	16.01	-1.57	1976	17.78	16.28	-1.50	2009	16.81	16.40	-0.41
1911	18.23	16.23	-2.00	1944	17.49	16.57	-0.92	1977	17.98	15.83	-2.15	2010	16.57	17.31	0.74
1912	18.03	16.03	-2.00	1945	18.06	16.46	-1.60	1978	17.53	15.99	-1.54				
1913	18.38	16.38	-2.00	1946	18.02	16.50	-1.52	1979	17.79						



The original data and the subsequently altered data, yield the following gradients:

- Cooling, GISS data 1881 – 2010, evaluated in March 2010: -0.0076°C/a
- Warming, GISS data 1881 – 2010, evaluated in March 2012: +0.0074°C/a:
- Warming, GISS data 1881 – 2010, evaluated in August 2012: +0.0051°C/a
- Warming, GISS data 1881 – 2010, evaluated in December 2012: +0.0102°C/a

Fig. 5a: Palma de Majorca, 2010 data shows cooling since 1881.

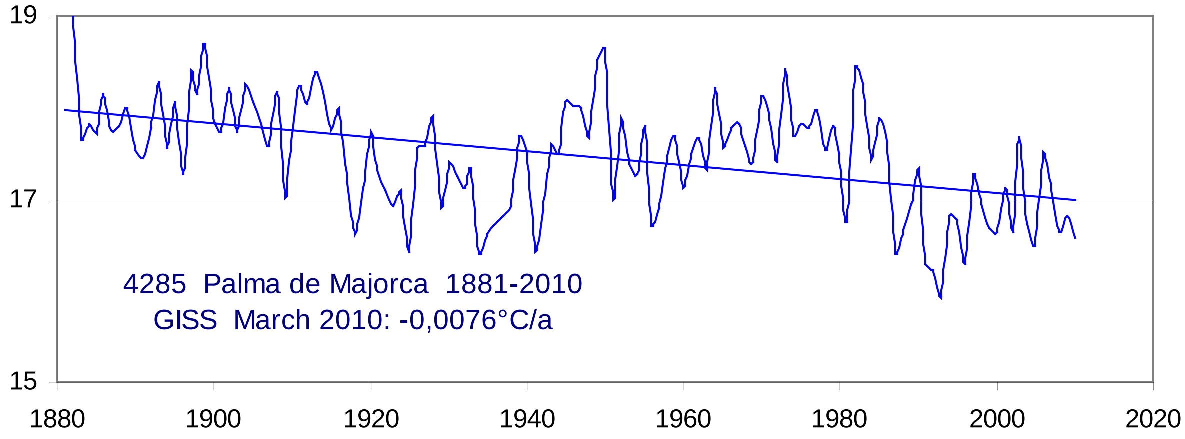


Fig. 5b: Palma de Majorca, an inversion changes the cooling into warming.

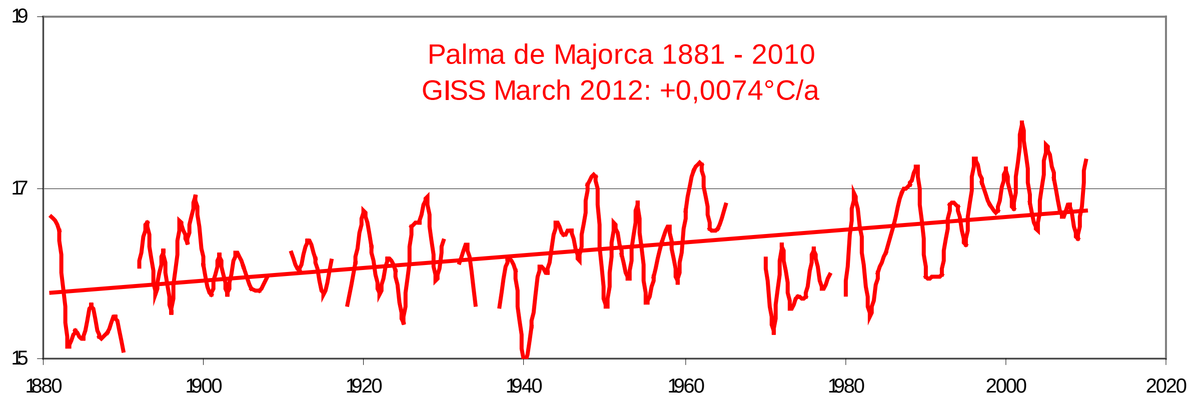


Fig. 5c: Palma de Majorca - adjusting upwards the early 20th century values reduces warming.

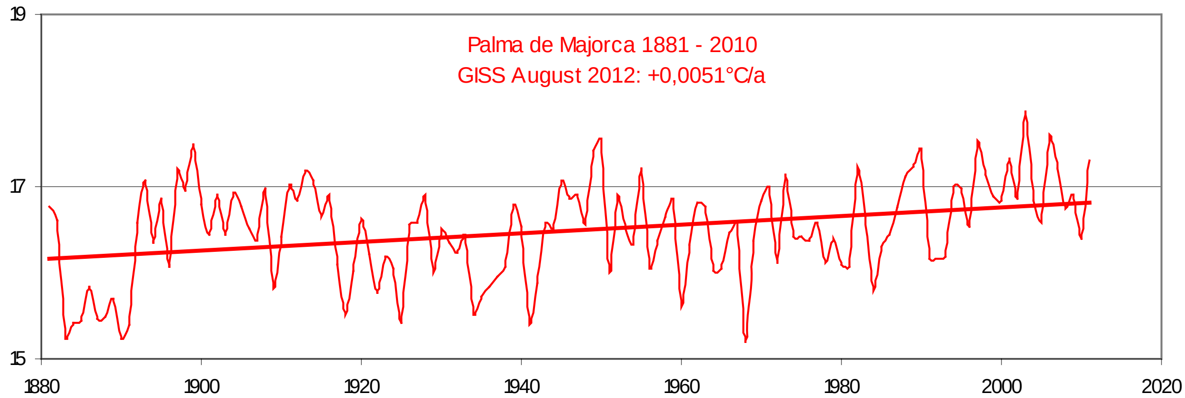
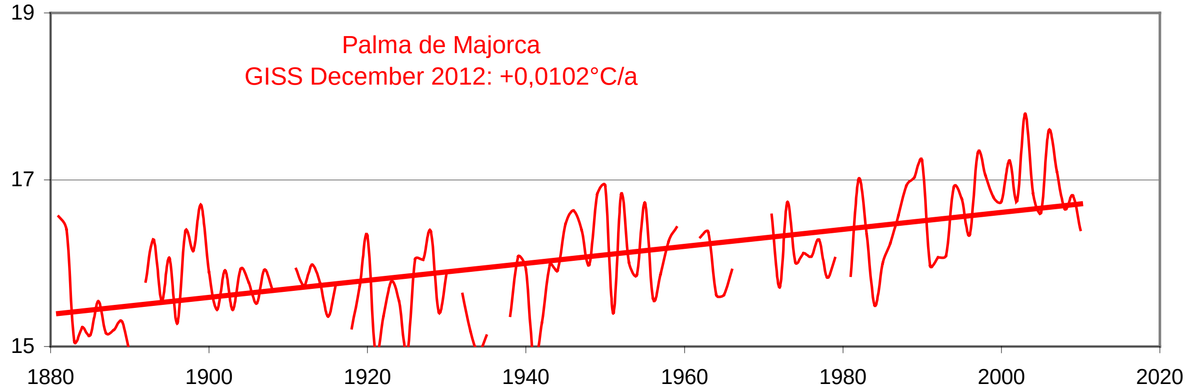


Fig. 5d: Palma de Majorca- lowering the early and middle values boosts the warming.



Summarizing: The cooling recorded over 130 years since 1881 was retroactively converted into a warming of similar magnitude in March 2012, and then scaled back a bit in August 2012, before being doubled by December 2012. Further modifications in between were possibly made, but have not been checked.

In February 2013, AE*Met*, the local service of the Spanish government, kindly made the original data available which lead to a completely different assessment to be dealt with in Chapter 5.

2.3 Darwin

Darwin is an interesting example because the station as a whole has recorded a cooling since 1882, although it includes a slight warming phase from 1964 to 1990. In March, 2012, NASA GISS rolled out the temperature curve shown in Fig. 6, informing the public that warming had been registered. Suddenly the monthly and annual mean values from 1882 to 1964 disappeared. The altered 2012 data series began in 1964, with excerpts thereof shown in Table 4a. Both the data and the temperature curve are surprising because the climate community knows that temperature recording actually began in 1882.

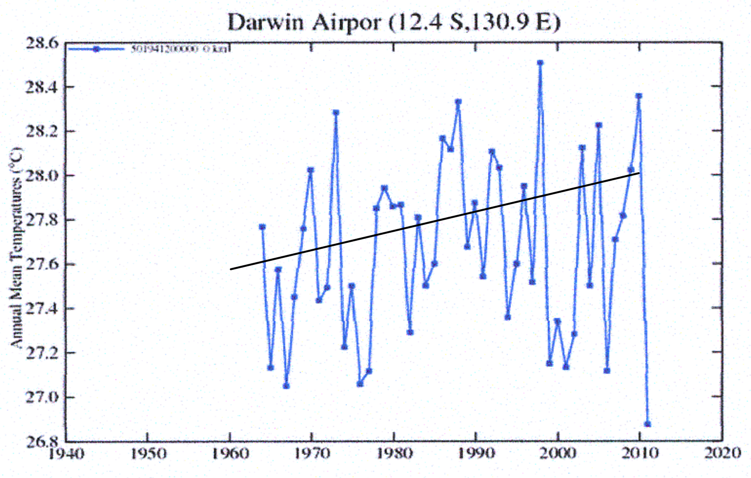


Fig. 6: Darwin temperature curve based on annual mean values since 1964, brought out by NASA GISS in March 2012.

(http://data.giss.**nasa**.gov/gistemp/Station_data)

Table 4a: Darwin – monthly and annual mean values 1964-1976 (extract from 1964 –2010) evaluated in March, 2012.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	D-J-F	M-A-M	J-J-A	S-O-N	metANN
1963	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	999.9	29.1	999.9	999.9	999.9	999.9	999.90
1964	28.5	29.7	27.9	28.4	27.1	24.6	25.3	26.1	28.7	29.5	28.3	28.5	29.1	27.8	25.3	28.8	27.77
1965	28.2	28.5	26.8	27.7	27.2	25.4	22.5	24.9	27.4	28.7	29.8	28.3	28.4	27.2	24.3	28.6	27.13
1966	28.4	28.3	28.2	28.9	26.8	25.9	24.6	26.1	28.0	28.2	29.2	28.4	28.3	28.0	25.5	28.5	27.57
1967	27.9	26.6	27.7	28.3	26.7	23.3	24.0	25.3	27.0	29.5	29.9	29.8	27.6	27.6	24.2	28.8	27.05
1968	28.0	26.8	28.2	28.4	26.3	25.4	24.4	25.7	27.7	29.2	29.5	29.4	28.2	27.6	25.2	28.8	27.45
1969	28.6	27.5	28.5	28.4	27.7	25.1	26.0	26.4	27.3	28.3	29.9	29.5	28.5	28.2	25.8	28.5	27.76
1970	29.4	28.7	29.0	28.6	27.6	26.7	24.3	25.4	28.3	29.2	29.6	29.0	29.2	28.4	25.5	29.0	28.02
1971	28.8	28.1	27.6	27.6	25.9	23.7	24.2	26.5	28.7	29.8	29.3	28.4	28.6	27.0	24.8	29.3	27.43
1972	28.8	28.1	27.9	28.2	26.0	25.2	24.4	26.5	27.7	29.2	29.5	29.3	28.4	27.4	25.4	28.8	27.49
1973	28.7	29.1	28.1	28.7	28.1	26.8	25.7	27.4	28.7	29.8	29.0	28.6	29.0	28.3	26.6	29.2	28.28
1974	27.1	28.0	27.2	28.4	26.6	23.9	24.6	26.1	28.4	28.9	28.9	27.5	27.9	27.4	24.9	28.7	27.23
1975	28.5	27.5	27.6	27.9	27.2	25.0	26.2	26.7	28.7	28.7	28.5	28.5	27.8	27.6	26.0	28.6	27.50
1976	27.3	27.0	26.9	28.5	26.3	24.7	24.5	24.9	27.0	29.1	30.0	29.8	27.6	27.2	24.7	28.7	27.06

Table 4b below lists the 2010 and 2012 data and clears up the discrepancies. In fact, the annual mean values published by NASA GISS in 2010 confirm that temperature recording truly began in 1882. The respective temperature curve shown in Fig. 7a indicates cooling of -0.0068°C/a. Two years later, in 2012, all annual mean values between 1882 and 1964 were simply left out in order to make use of the slight warming phase from 1964 to 1990. An additional lowering of values between 1969 and 1985 and boosting the values between 1986 and 2009 yield a more inclined trend line, thus producing a warming of +0.0038°C/a (Fig. 7b).

When writing up this report, it was noticed that data were modified again in September 2012, also for Darwin. The last issue of December 2012 reactivated part of the previously ignored data, and now begin in 1897 instead of the original 1882. The values in the earlier section of the temperature series were adjusted downwards heavily so that the temperature curve no longer indicates cooling. The new altered curve now shows a strong warming of 0.0104°C/a as shown in Fig. 7c.

Fig. 7a: Darwin – overall cooling registered since 1882:

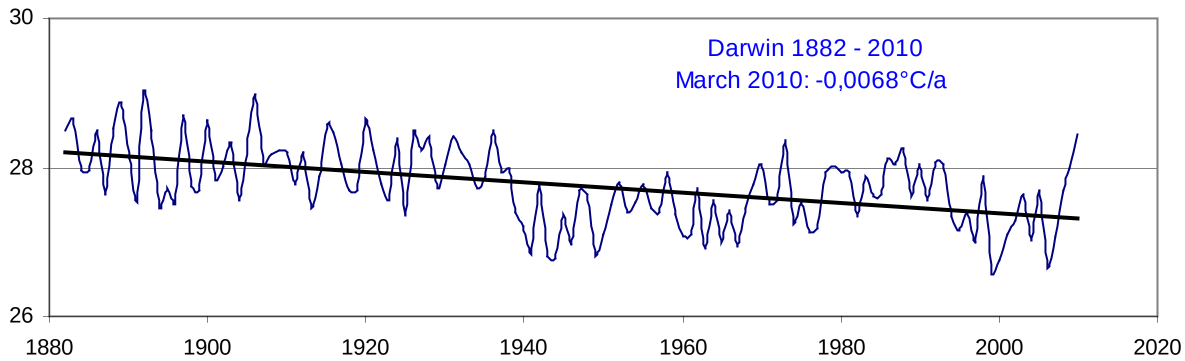


Fig. 7b: Darwin – leaving out the 1882 - 1963 data and adjusting the 1986 –2009 values upwards yield stronger warming:

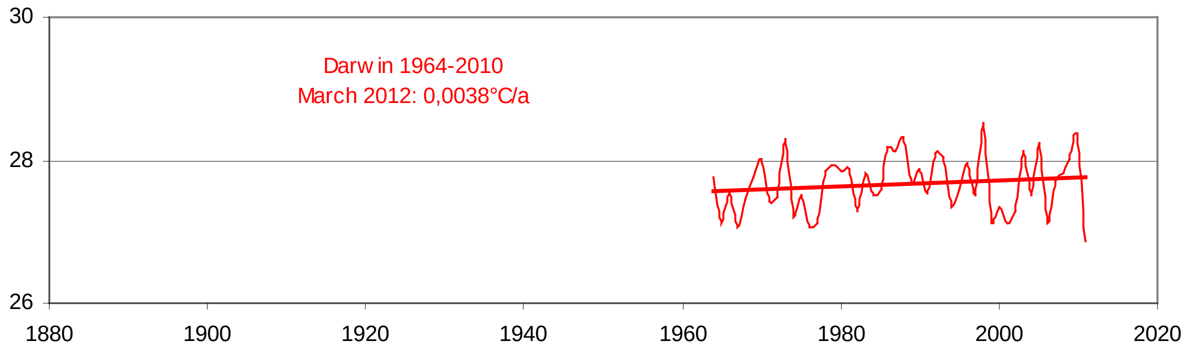
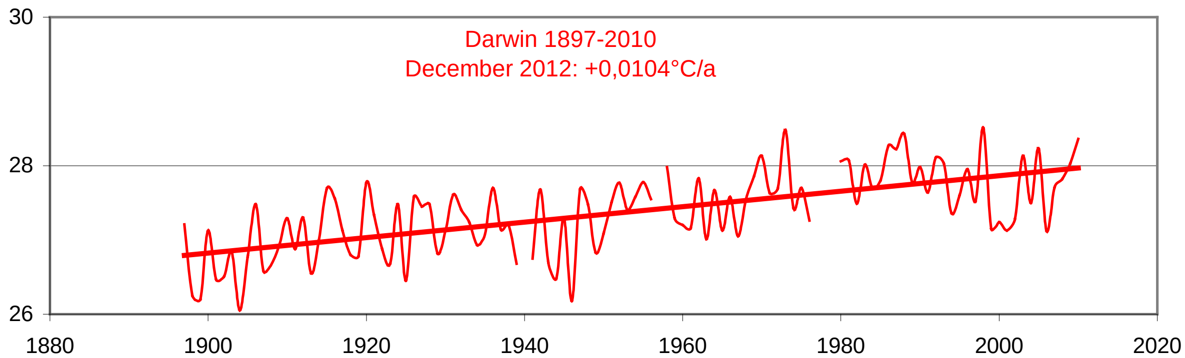


Fig. 7c: Darwin – disregarded data reactivated beginning in 1897 with massive downward adjustment transforms the original cooling trend into a warming trend:



The method applied to convert cooling into warming is the same as the one discussed for Palma de Majorca. Table 5 shows the comparison of the March 2010 data and the December 2012 data, and their respective differences. The check of the December 2012 data was carried out purely by chance and thus it is possible that even further modifications have been made since.

Table 4b: Darwin – the difference between annual mean values of March 2010 and March 2012: 2010-data are complete, 2012-data begin in 1964 due to the deletion of the 1882-1963 data:

-0,04	Lowerng data	0.13	Lifting data		Data deleted

Year	metANN 2010	2012	Diff.	Year	metANN 2010	2012	Diff.	Year	metANN 2010	2012	Diff.	Year	metANN 2010	2012	Diff.
1882	28.49			1915	28.59			1948	27.63			1981	27.93	27.87	-0.06
1883	28.63			1916	28.46			1949	26.82			1982	27.33	27.29	-0.04
1884	27.96			1917	28.03			1950	27.10			1983	27.88	27.81	-0.07
1885	27.96			1918	27.70			1951	27.51			1984	27.60	27.50	-0.10
1886	28.50			1919	27.68			1952	27.80			1985	27.63	27.60	-0.03
1887	27.65			1920	28.63			1953	27.40			1986	28.13	28.17	0.04
1888	28.52			1921	28.23			1954	27.53			1987	28.03	28.12	0.09
1889	28.86			1922	27.78			1955	27.78			1988	28.26	28.33	0.07
1890	28.13			1923	27.58			1956	27.45			1989	27.62	27.68	0.06
1891	27.56			1924	28.38			1957	27.39			1990	28.05	27.88	-0.17
1892	29.01			1925	27.35			1958	27.93			1991	27.56	27.54	-0.02
1893	28.49			1926	28.48			1959	27.36			1992	28.08	28.11	0.03
1894	27.47			1927	28.23			1960	27.07			1993	28.05	28.03	-0.02
1895	27.73			1928	28.38			1961	27.09			1994	27.35	27.36	0.01
1896	27.53			1929	27.72			1962	27.71			1995	27.15	27.60	0.45
1897	28.71			1930	28.03			1963	26.90			1996	27.40	27.95	0.55
1898	27.75			1931	28.41			1964	27.57	27.77	0.20	1997	27.00	27.52	0.52
1899	27.70			1932	28.21			1965	26.98	27.13	0.15	1998	27.88	28.51	0.63
1900	28.63			1933	28.04			1966	27.43	27.57	0.14	1999	26.60	27.15	0.55
1901	27.84			1934	27.73			1967	26.93	27.05	0.12	2000	26.74	27.34	0.60
1902	28.01			1935	27.87			1968	27.45	27.45	0.00	2001	27.10	27.13	0.03
1903	28.33			1936	28.50			1969	27.77	27.76	-0.01	2002	27.28	27.28	0.00
1904	27.55			1937	27.94			1970	28.03	28.02	-0.01	2003	27.63	28.12	0.49
1905	28.28			1938	28.00			1971	27.49	27.43	-0.06	2004	27.03	27.50	0.47
1906	28.98			1939	27.40			1972	27.57	27.49	-0.08	2005	27.68	28.23	0.55
1907	28.08			1940	27.21			1973	28.35	28.28	-0.07	2006	26.66	27.12	0.46
1908	28.17			1941	26.85			1974	27.26	27.23	-0.03	2007	27.08	27.71	0.63
1909	28.24			1942	27.78			1975	27.53	27.50	-0.03	2008	27.69	27.82	0.13
1910	28.19			1943	26.81			1976	27.14	27.06	-0.08	2009	27.98	28.02	0.04
1911	27.78			1944	26.79			1977	27.18	27.12	-0.06	2010	28.45	28.36	-0.09
1912	28.20			1945	27.38			1978	27.94	27.85	-0.09	2011		26.88	
1913	27.45			1946	26.96			1979	28.02	27.94	-0.08				
1914	27.89			1947	27.68			1980	27.92	27.86	-0.06				

Table 5: Differences between March 2010 and December 2012 annual mean values (excerpt):

-0.04	Lowering of data	0.13	Lifting of data		Gaps to hide transitions		same

Year	metANN 2010	2012	Diff.	Year	metANN 2010	2012	Diff.	Year	metANN 2010	2012	Diff.
1897	28.71	27.21	-1.50	1933	28.04	27.24	-0.80	1972	27.57	27.69	0.12
1898	27.75	26.25	-1.50	1934	27.73	26.93	-0.80	1973	28.35	28.48	0.13
1899	27.70	26.2	-1.50	1935	27.87	27.07	-0.80	1974	27.26	27.43	0.17
1900	28.63	27.13	-1.50	1936	28.50	27.7	-0.80	1975	27.53	27.7	0.17
1901	27.84	26.47	-1.37	1937	27.94	27.14	-0.80	1976	27.14	27.26	0.12
1902	28.01	26.51	-1.50	1938	28.00	27.2	-0.80	1977	27.18		
1931	28.41	27.61	-0.80	1970	28.03	28.13	0.10	2009	28.03	27.98	-0.05
1932	28.21	27.41	-0.80	1971	27.49	27.63	0.14	2010	28.36	28.45	0.09

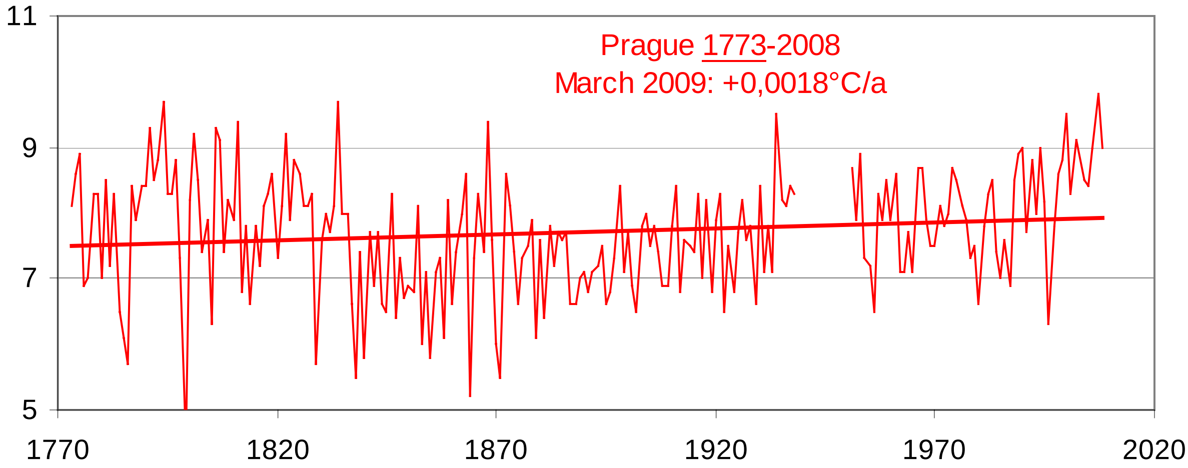
Summary: The data sets evaluated in March 2010, March 2012 and December 2012 show that the original cooling was successively converted into warming follows:

- Cooling, GISS data 1881 – 2010, evaluated in March 2010: -0.0068°C/a
- Warming, GISS data 1964 – 2010, evaluated in March 2012: +0.0038°C/a
- Warming, GISS data 1897 – 2010, evaluated in December 2012: +0.0104°C/a

2.4 Prague

In Prague regular temperature recording began in 1773. But it was suspended between 1939 and 1950 because of World War II. The data used to generate the temperature curve in Fig. 8a were evaluated in 2009 using www.wetterzentrale.de. The overall gradient of 0.0018°C/a yields a modest increase of 0.45°C for the 235 years between 1773 and 2008. If you take the Urban Heat Island effect (UHI) due to building and industry into account, the natural part of the slight warming is virtually insignificant.

Fig. 8a: Prague – temperature curve generated from the original annual mean values beginning in 1773



The NASA GISS data available in March 2010 yielded the temperature curve shown in Fig. 8b. At first glance it indicates a cooling of 0.0106°C/a. This cooling, however, is likely not realistic and probably more the result of a new installation after the war at a location that is 2 m lower in elevation. But much more important for the assessment is the fact that the data between 1773 and 1881 were left out. The evaluation of the December 2012 data shows that the data continued to be left out and so the temperature curve produced a new gradient of 0.0081°C/a (Fig. 8c). This is less than before in March 2010, however now four times the rate of warming of the total data set since 1773.

Being curious of whether the alterations continued, the station was again called up in January 2013 – with a ‘positive’ result as Fig. 8d certifies: By deleting the data between 1881 and 1945 the shorter temperature curve produces a more inclined trend line yielding a gradient of 0.0203°C/a, about eleven times the rate obtained at the outset.

Summary: The original data set and the subsequent modifications yielded the following gradients:

- Warming, WZ data 1773 – 2008, evaluated in March 2009: +0.0018°C/a
- Cooling, GISS data 1881 – 2008, evaluated in March 2010: -0.0106°C/a
- Warming, GISS data 1881 – 2010, evaluated in December 2012: +0.0081°C/a
- Warming, GISS data 1949 – 2010, evaluated in January 2013: +0.0203°C/a

Fig. 8b: Prague – leaving out the 1773-1880 values and adjusting the 1881-1949 values upwards yields a cooling trend

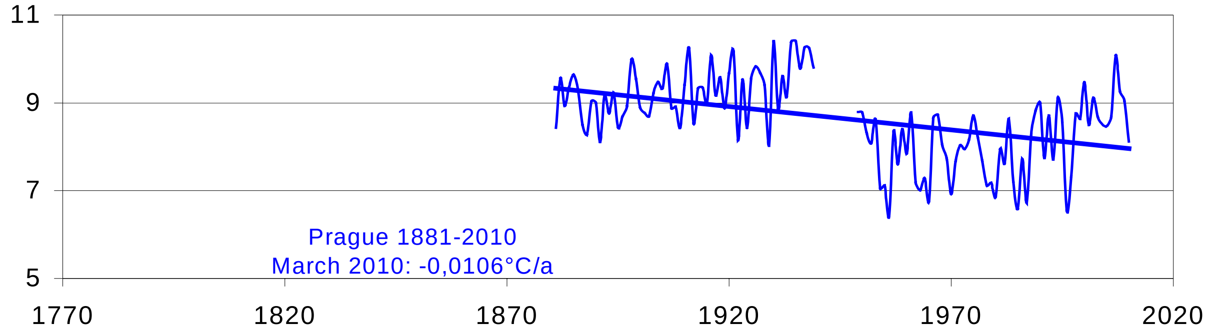


Fig. 8c: Prague – values until 1880 remain left out, lowering the 1881-1949 values yields a warming trend

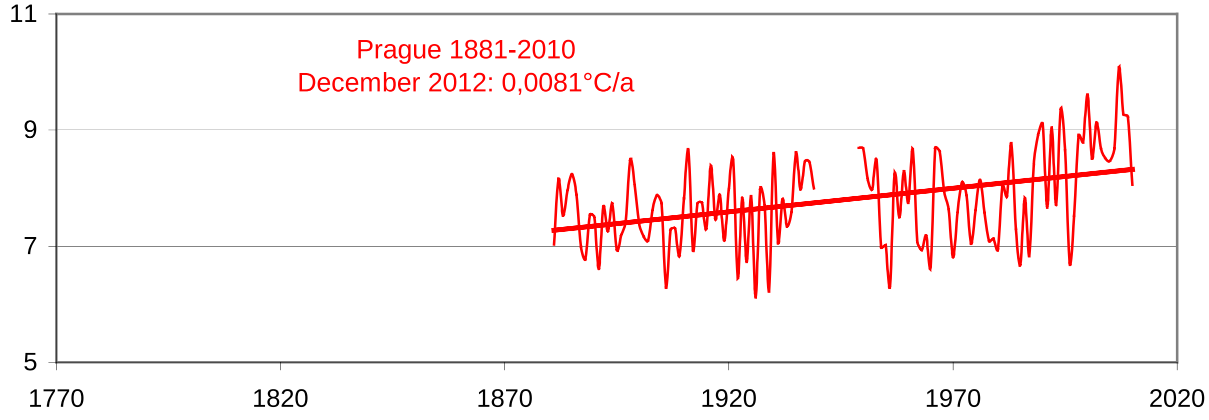
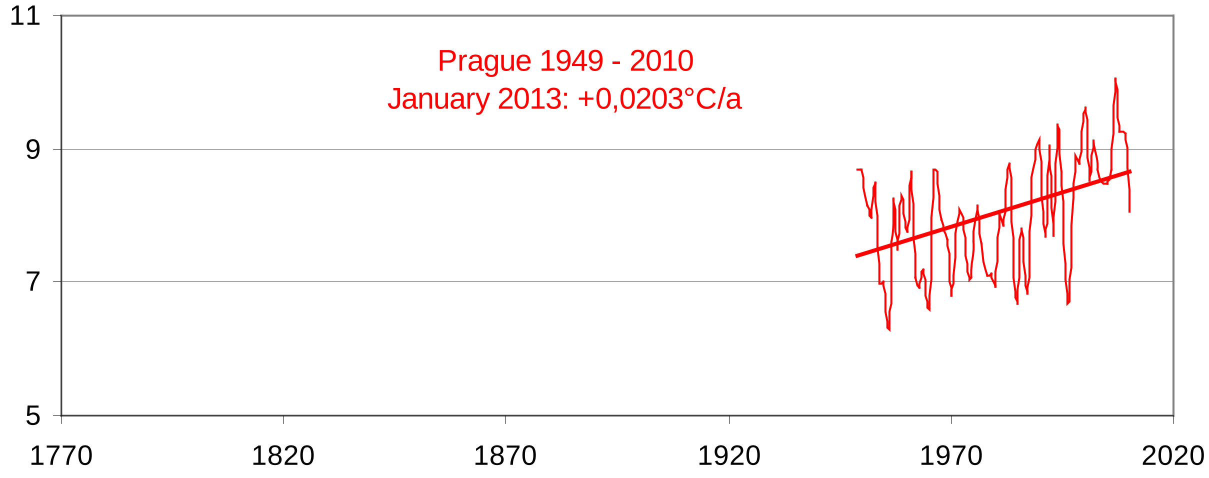


Fig. 8d: Prague – values until 1949 remain left out, yielding an even stronger warming trend



2.5 Vienna

Recording temperatures in Vienna began in 1775. The complete data set, also coming from wetter-zentrale.de, was evaluated in March, 2009. It yielded the temperature curve shown in Fig. 9a which has a trend of +0.003°C/a.

Vienna is suitable for demonstrating the relevance of the urban heat island effect (UHI), which was significant during the latter decades of the 20th century. This becomes obvious if the temperature curve is drawn only for the period of 1775-1980, where the trend decreases to –0.0002°C/a, i.e. without UHI a slight cooling is all that remains (Fig. 9b).

Fig. 9a: Vienna – temperature curve generated from the original data set beginning in 1775:

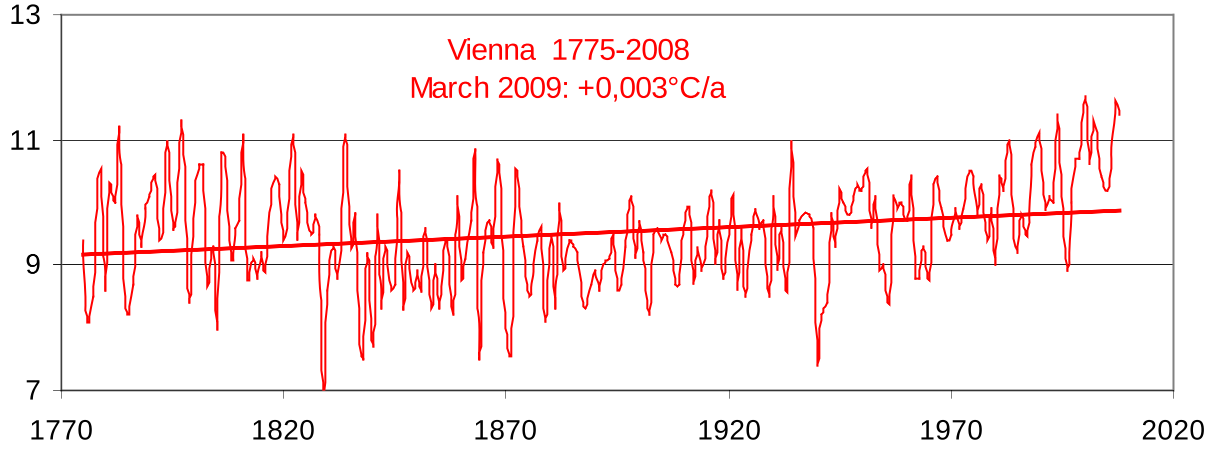
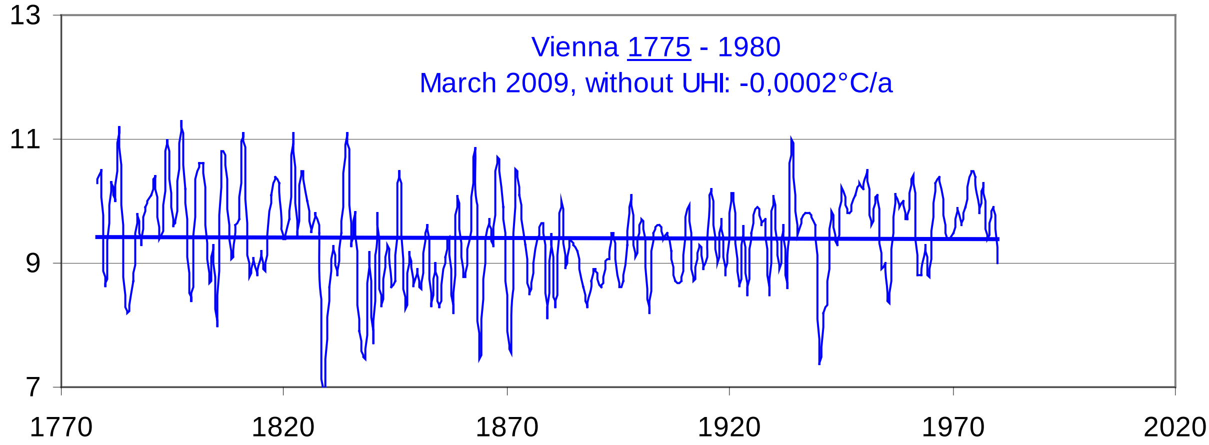
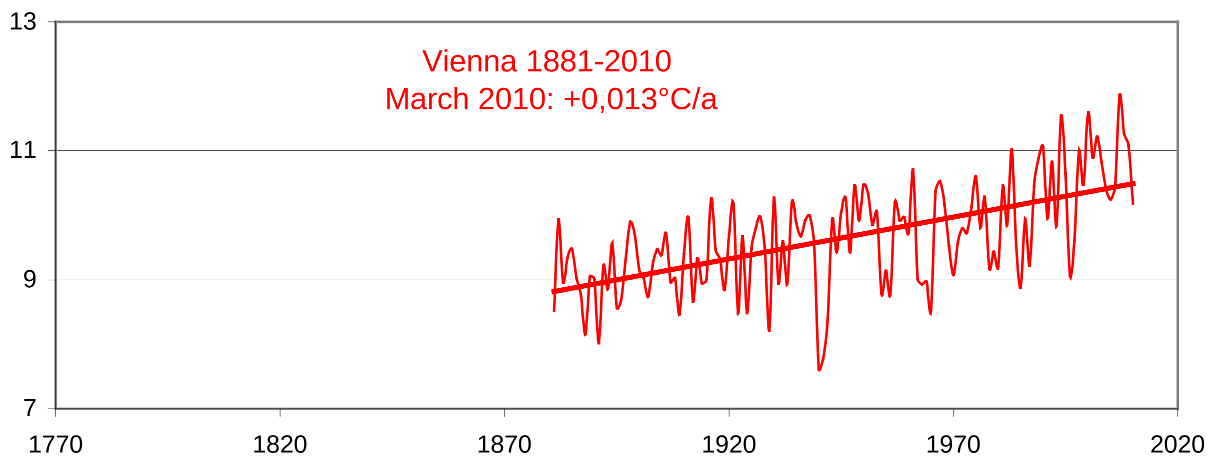


Fig. 9b: Vienna – as before, but without the 1980 - 2008 section to illustrate UHI.



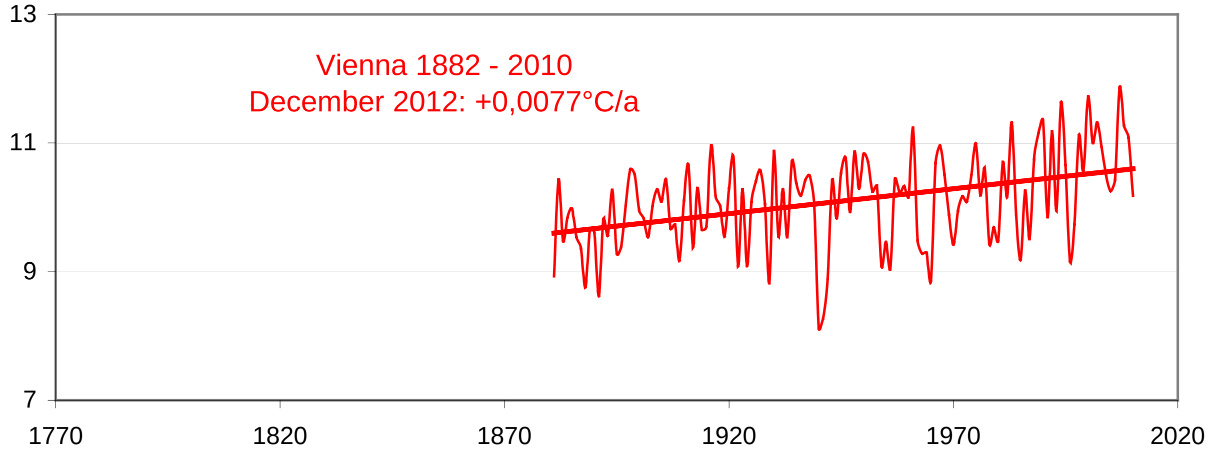
The data set provided by NASA GISS in March 2010 begins at 1881, i.e. without the data from 1775 until 1880. In addition, the annual mean values of both the early and middle sections were lowered. Compared to the original temperature curve this altogether leads to a stronger inclined temperature curve, thus a larger gradient – i.e. 0.013°C/a instead of 0.003°C/a (Fig. 9c).

Fig. 9c: Vienna – leaving out the 1775-1880 values, adjusting both the early and middle years downwards in order to produce the appearance of stronger warming:



It is not known if further alterations took place up to December 2012 when the last one was discovered purely by chance. The alteration in December reduced the preceding warming a little: 0.0077°C/a instead of 0.013°C/a (Fig. 9d). This was achieved by adjusting the values of the early years upwards. Nevertheless, compared to the original warming, it purports an even higher one.

Fig. 9d: Vienna – leaving out of 1775-1880 values and adjusting upwards the early years values reduces warming:



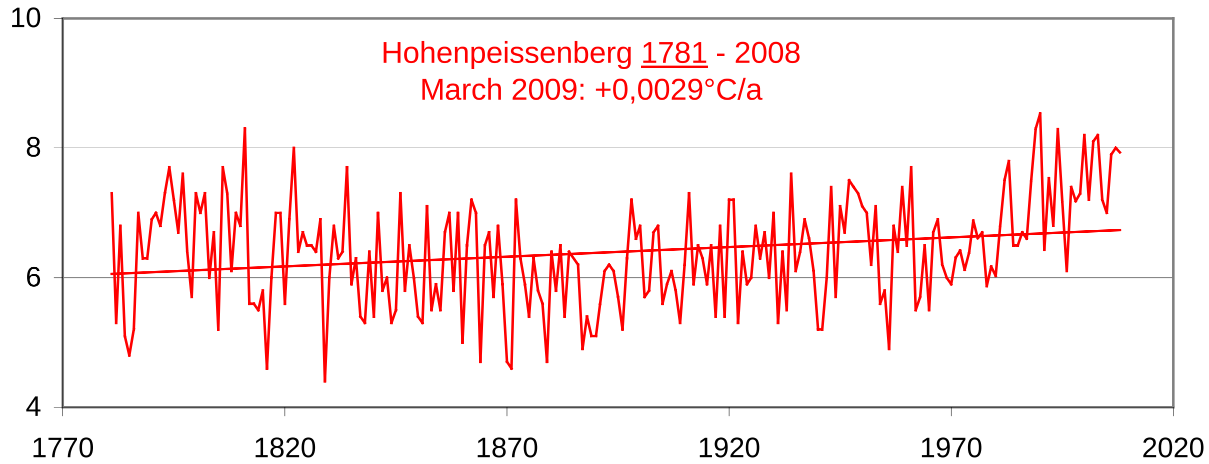
Summary: The original data set and the subsequent modifications yielded the following trends:

- Warming, WZ data 1775 – 2010, evaluated in March 2009: +0.003°C/a
- Warming, GISS data 1881 – 2010, evaluated in March 2010: +0.013°C/a
- Warming, GISS data 1881 – 2010, evaluated in December 2012: +0.0077°C/a

2.6 Hohenpeissenberg

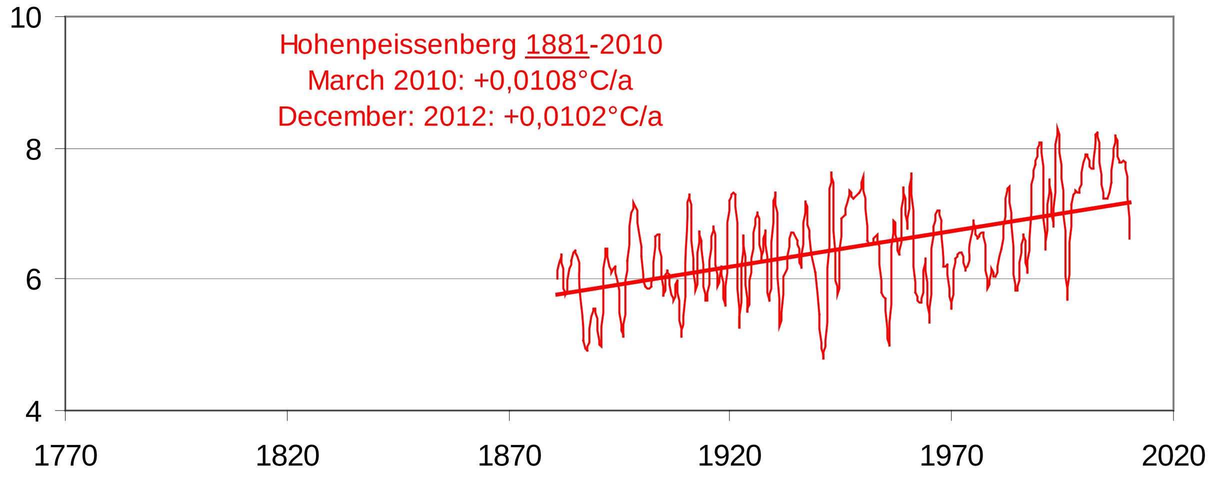
The Hohenpreissenberg station began recording temperatures in 1781. The original data downloaded from wetterzentrale.de were evaluated in March 2009. The rising trend line of the temperature curve indicates warming at a rate of 0.0029°C/a (Fig. 10a).

Fig. 10a: Hohenpeissenberg – temperature curve generated from the original data set beginning in 1781:



The data set offered by NASA-GISS in 2010 begins in 1881, i.e. the data from 1781 to 1881 were left out. The 1881- 2010 data thus produced a stronger inclination of the trend line, yielding a gradient of 0.0108°C/a. Afterwards the data remained almost unchanged because in December 2012 they had almost the same gradient of 0.0102°C/a, as shown in Fig. 10b. Leaving out the data of 1781-1881 yields a stronger warming.

-Fig. 10b: Hohenpeissenberg – leaving out the data 1781-1880 yields stronger warming:



Summary: The original data set and the subsequent alterations yielded the following gradients:

- Warming, WZ data 1781 – 2009, evaluated in March 2009: +0.0029°C/a
- Warming, GISS data 1881 – 2010, evaluated in March 2010: +0.0108°C/a
- Warming, GISS data 1881 – 2010, evaluated in December 2012: +0.0102°C/a

2.7 Conclusions concerning the methodology

Reykjavik, Palma de Majorca, and Darwin illustrate how different methods were applied to alter short-term temperature records beginning in 1881, aimed at producing the impression of a substantial and progressive warming. This was achieved by:

- Lowering the values of the early years of the series,
- Reducing the individual values of higher temperatures occurring during the warming phase from 1930 to 1960,
- Raising individual values of the warming phase from 1980 to 1995,
- Suppressing the recent cooling phase, which began around 1995,
- Changing the scale of the coordinates in accordance with the method selected,
- With short-term temperature series, leaving out the early decades,
- With long-term temperature series, leaving out the first centuries.

The long-term temperature series of Prague, Vienna and Hohenpeissenberg demonstrate that leaving out considerable early parts of the data sets is particularly consequential because they often cover more than hundred years that include the warming phase from 1770 to 1830. Although it took place before industrialization and anthropogenic emissions of CO_2, the warming during that early phase was stronger compared to that of the 20th century. This needs to be considered when assessing long term climate developments.

3. Results of the analysis

The analysis of NASA GISS data from 120 selected stations examines the…

- specific annual mean temperatures, temperature curves, trend lines and gradients,
- differences between the gradients of 2010 and 2012,
- classification of groups characterising the different types of modification,
- determination of their early, middle and end sections,
- repeated alterations, and
- reason of these alterations.

3.1 Specific annual mean values and gradients

3.1.1 Alterations made to enhance the warming

For a complete detailed analysis to determine all the alterations, all annual mean values of both 2010 and March 2012 data sets had to be compared to each other. One set from 1880 to 2010 comprises 130 individual values, and therefore the procedure is rather time-consuming. Fortunately it is sufficient to compare only one of the three specific types of annual mean values a) from the early section of the data series, b) from the middle section, and c) from the end section. Table 6 presents these specific annual mean values for 20 stations, selected randomly from the 120 stations analysed herein. Table 6 lists also the gradients obtained for the trend lines of the temperature curves derived from the 2010 and 2012 data, and compares them.

Table 6: Specific mean values from the early, middle, and end sections of the datasets and yielded gradients from the 2010 and 2012 NASA GISS-datasets

Legend:		NASA GISS-data of March 2010						NASA GISS-data of March 2012					
	Warming	Data available		Annual mean values metANN			**Gradient 2010**	Data available		Annual mean values metANN			**Gradient 2012**
	Cooling												
ID	Station	from	to	**Early**	**Middle**	**End**	(°C/a)	from	to	**Early**	**Middle**	**End**	(°C/a)
5113	Almaty	1881	2010	8.31	8.98	10.67	0.0241	1916	2010	8.5	8.50	10.7	0.0239
4605	Aomori	1886	2010	10.08	10.16	10.98	0.0029	1937	2010	9.5	10.57	11.1	0.0107
284	Auckland Air	1881	1992	15.40	15.60	14.70	0.0034	1952	1992	14.95	14.77	15.7	0.0046
751	Brisbane Eagle	1950	2010	20.33	20.33	20.67	-0.0045	1951	2010	19.8	19.72	20.7	0.0187
5332	Bucuresti	1881	2010	9.17	12.21	10.95	0.0062	1881	2010	8.7	10.71	10.9	0.0072
443	Capetown	1881	2010	16.68	17.04	17.25	-0.0025	1932	2010	15.3	16.33	17.3	0.0109
2200	Casa Blanca	1895	2010	22.22	24.65	21.49	-0.0040	1952	1990	24.6	24.60	25.1	0.0126
157	Christchurch	1905	2010	10.33	11.48	11.84	0.0035	1951	2010	10.4	10.47	11.8	0.0108
653	Durban Louis	1885	2010	21.37	20.76	20.78	-0.1400	1948	2009	19.9	21.07	20.75	0.0088
143	Invercargill	1950	2009	10.63	10.63	9.91	-0.0002	1950	2009	9.7	9.77	9.9	0.0107
3869	Isparta	1949	2010	10.51	11.67	13.91	0.0061	1949	2010	10.6	11.77	13.9	0.0132
2788	Jerusalem	1881	1995	17.2	16.22	15.89	-0.0047	1881	1995	16.1	14.86	17.7	0.0097
698	Kimberley	1897	2010	18.00	18.13	18.00	0.0061	1956	2010	17.2	17.23	17.3	0.0185
4404	Krasovodsk	1883	2010	14.76	15.25	16.41	-0.0063	1924	2010	15.1	14.50	16.41	0.0119
5125	Marseille	1881	2010	14.71	14.68	14.94	0.0099	1934	2010	13.5	14.88	14.8	0.0191
7360	Ostrov Vize	1951	2010	13.59	-13.59	10.17	0.0240	1951	2010	-13.7	-12.17	-10.3	0.0172
4285	Palma de Mall	1881	2010	19.16	18.62	16.57	-0.0076	1881	2010	16.8	17.53	16.4	0.0049
484	Pudahuel	1881	2010	13.54	14.07	14.14	0.0050	1924	2010	13.6	13.77	14.2	0.0113
2471	Saint Leo	1895	2010	22.22	22.88	21.49	0.0053	1895	2010	21.2	21.97	20.9	0.0011
1613	Trincomalee	1881	2006	28.25	27.99	28.88	0.0039	1881	2010	27.45	28.27	28.87	0.0068

The adjusting downwards or upwards of these specific values alters the temperature curves and corresponding trend lines and gradients. Where lowering or raising the values are to be applied depends on the purpose of the alteration. In Tables 7 to 9, the 2010 and 2012 values are arranged in pairs so that they can be compared. Table 8 compares the annual mean values of the first section of the data set, Tables 9 and 10 compare the values of the middle and end sections of the data set.

A rather small part of the data sets offered by NASA GISS in 2010 began between 1930 and 1950, while the majority already began between 1881and 1905. Approximately half of these long sequences were shortened by deleting early sections. This is clear to see because the data available in 2012 starts several decades later – the first years are marked in red in Table 6. The effect of dropping these data will be illustrated by examples.

The early, middle and end sections of the datasets are compared to each other and their differences are listed in tables. Temperature curves of suitable stations illustrate the effect of the changes.

Alteration of the annual mean values from the beginning of the data sets

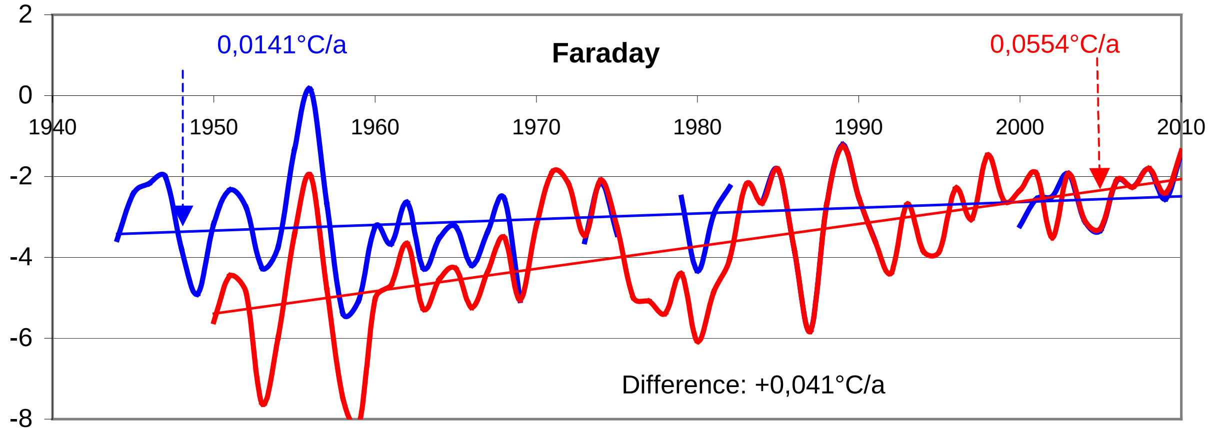
In Table 7 the (light-brown cells) show positive differences between the early values, meaning the 2012-data are greater than the 2010-data, and thus indicate that the early sections of the temperature curves had been adjusted upwards. Negative differences show that 2012-data were smaller than the 2010-data, and thus indicate that the temperature curve was adjusted downwards in the early part of the temperature dataset (blue cells). The latter applies for 15 of the 20 stations that were selected randomly.

Table 7: Annual mean values starting at the beginning of the data sets, from March 2010 and March 2012, and the respective differences:

	warmer in 2012	Comparison between values from beginning of data sets						
	cooler in 2012	Data		metANN	Data		metANN	
ID	Station	from	to	**2010**	from	to	**2012**	**Difference**
5113	Almaty	1881	2010	8.31	1916	2010	8.5	0.190
4605	Aomori	1886	2010	10.08	1886	2010	9.5	-0.580
284	Auckland Air	1881	1992	15.40	1952	1992	14.95	-0.450
751	Brisbane Eagle	1950	2010	20.33	1951	2010	19.8	-0.530
5332	Bucuresti	1881	2010	9.17	1881	2010	8.7	-0.470
443	Capetown	1881	2010	16.68	1932	2010	15.3	-1.380
2200	Casa Blanca	1895	2010	22.22	1952	1990	24.6	2.380
157	Christchurch	1905	2010	10.33	1951	2010	10.4	0.070
653	Durban Louis	1885	2010	21.37	1948	2009	19.9	-1.470
143	Invercargill	1950	2009	10.63	1950	2009	9.7	-0.930
3869	Isparta	1949	2010	10.51	1949	2010	10.6	0.090
2788	Jerusalem	1881	1995	17.2	1881	1995	16.1	-1.100
698	Kimberley	1897	2010	18.00	1956	2010	17.2	-0.800
4404	Krasovodsk	1883	2010	14.76	1924	2010	15.1	0.340
5125	Marseille	1881	2010	14.71	1934	2010	13.5	-1.210
7360	Ostrov Vize	1951	2010	13.59	1951	2010	-13.7	-27.290
4285	Palma de Mall	1881	2010	19.16	1881	2010	16.66	-2.500
484	Pudahuel	1881	2010	13.54	1924	2010	13.6	0.060
2471	Saint Leo	1895	2010	22.22	1895	2010	21.2	-1.020
1613	Trincomalee	1881	2006	28.25	1881	2010	27.45	-0.800

The larger portion of curves (15 of 20), where the early values were lowered, shows that this method was applied quite often. Adjusting downwards the early parts of the temperature curve increases the gradient of the trend line, which yields a stronger warming trend. The superimposed temperature curves for 1944-2010 and 1950-2010 in Fig. 11 demonstrate the Faraday station as an example. The gradient of the original temperature curve (blue) is only 0.0141°C/a, but adjusting the temperature values downward in the early part of the dataset increases the gradient to 0.0554°C/a, thus yielding a difference of 0.0413°C/a.

Fig. 11: Methods of modification – lowering of initial values enhances warming, example Faraday:



Alteration of the annual mean values within the middle section of the data sets

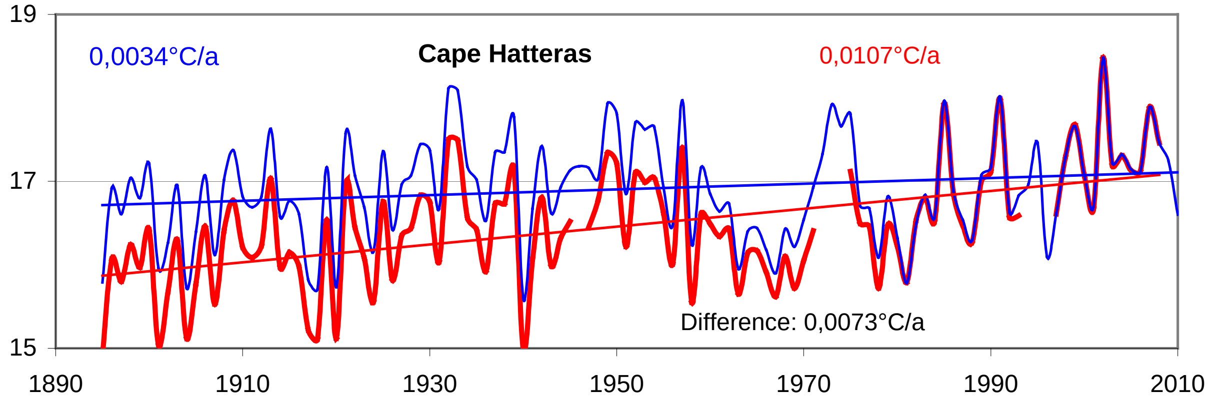
Table 8 compares the annual mean values of the middle section, mostly for the year 1950. Negative differences appear in 14 of the 20 data sets, i.e. the 2012-data were lowered, which also yields stronger warming.

Table 8: Annual mean values from the middle section of the datasets of both March 2010 and March 2012 and their respective differences:

	warmer in 2012	Comparison between values from the middle of the data sets						
	cooler in 2012	Data		metANN	Data		metANN	
ID	Station	from	to	**2010**	from	to	**2012**	**Difference**
5113	Almaty	1881	2010	8.98	1916	2010	8.50	-0.480
4605	Aomori	1886	2010	10.16	1886	2010	10.57	0.410
284	Auckland Air	1881	1992	15.60	1952	1992	14.77	-0.830
751	Brisbane Eagle	1950	2010	20.33	1951	2010	19.72	-0.610
5332	Bucuresti	1881	2010	12.21	1881	2010	10.71	-1.500
443	Capetown	1881	2010	17.04	1932	2010	16.33	-0.710
2200	Casa Blanca	1895	2010	24.65	1952	1990	24.60	-0.050
157	Christchurch	1905	2010	11.48	1951	2010	10.47	-1.010
653	Durban Louis	1885	2010	20.76	1948	2009	21.07	0.310
143	Invercargill	1950	2009	10.63	1950	2009	9.77	-0.860
3869	Isparta	1949	2010	11.67	1949	2010	11.77	0.100
2788	Jerusalem	1881	1995	16.22	1881	1995	14.86	-1.360
698	Kimberley	1897	2010	18.13	1956	2010	17.23	-0.900
4404	Krasovodsk	1883	2010	15.25	1924	2010	14.50	-0.750
5125	Marseille	1881	2010	14.68	1934	2010	14.88	0.200
7360	Ostrov Vize	1951	2010	-13.59	1951	2010	-12.17	1.420
4285	Palma de Mall	1881	2010	18.62	1881	2010	17.53	-1.090
484	Pudahuel	1881	2010	14.07	1924	2010	13.77	-0.300
2471	Saint Leo	1895	2010	22.88	1895	2010	21.97	-0.910
1613	Trincomalee	1881	2006	27.99	1881	2010	28.27	0.280

The temperature curves and gradients of the Cape Hatteras station serve as an illustrative example (Fig. 12). The blue temperature curve of the 2010-data yields a gradient of 0.0034°C/a, but the gradient of the red temperature curve based on the 2012-data amounts to 0.0107°C/a, which is an increase of 0.0073°C/a. This is caused by adjusting the values of both the early and the middle parts of the temperature series downwards.

Fig. 12: Methods of modification – adjusting downwards the early and middle values of the data sets enhances warming, example Cape Hatteras



Modification of the annual mean values of the final section of the data sets

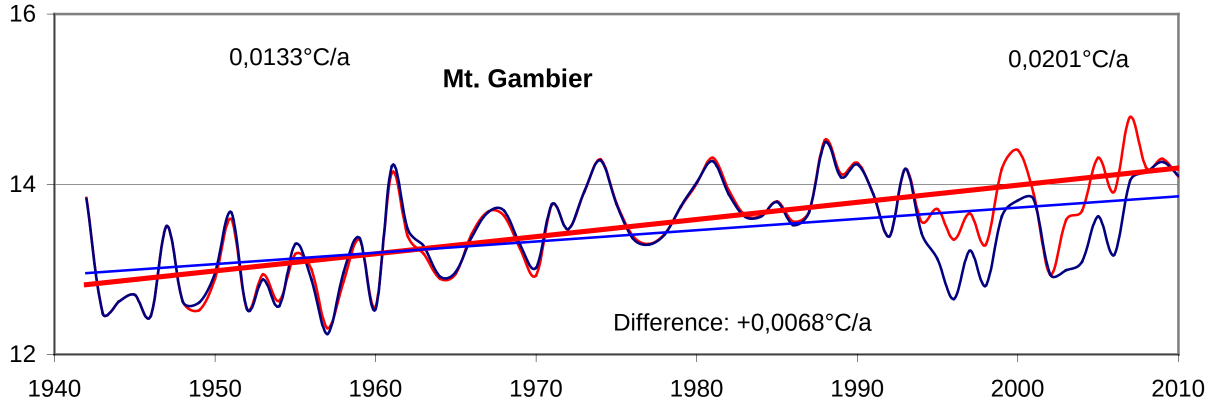
The portion of temperature curves altered by increasing the annual mean values of the final section of the data sets in order to achieve a stronger warming trend is relatively small – 8 stations out of the 20 stations analysed (Table 9).

Table 9: Annual mean values from the final section of the data sets taken from March 2010 and March 2012 and their respective differences:

(orange)	*warmer in 2012*	Comparison between values from the end of the data sets						
(blue)	*cooler in 2012*	Data		metANN	Data		metANN	
ID	Station	from	to	**2010**	from	to	**2012**	**Difference**
5113	Almaty	1881	2010	10.67	1916	2010	10.7	0.030
4605	Aomori	1886	2010	10.98	1886	2010	11.1	0.120
284	Auckland Air	1881	1992	14.70	1952	1992	15.7	1.020
751	Brisbane Eagle	1950	2010	20.67	1951	2010	20.7	0.030
5332	Bucuresti	1881	2010	10.95	1881	2010	10.9	-0.050
443	Capetown	1881	2010	17.25	1932	2010	17.3	0.050
2200	Casa Blanca	1895	2010	21.49	1952	1990	25.1	3.650
157	Christchurch	1905	2010	11.84	1951	2010	11.8	-0.040
653	Durban Louis	1885	2010	20.78	1948	2009	20.75	-0.030
143	Invercargill	1950	2009	9.91	1950	2009	9.9	-0.010
3869	Isparta	1949	2010	13.91	1949	2010	13.9	-0.010
2788	Jerusalem	1881	1995	15.89	1881	1995	17.7	1.810
698	Kimberley	1897	2010	18.00	1956	2010	17.3	-0.700
4404	Krasovodsk	1883	2010	16.41	1924	2010	16.41	0.000
5125	Marseille	1881	2010	14.94	1934	2010	14.8	-0.140
7360	Ostrov Vize	1951	2010	-10.17	1951	2010	-10.3	-0.130
4285	Palma de Mall	1881	2010	16.57	1881	2010	17.31	0.740
484	Pudahuel	1881	2010	14.14	1924	2010	14.2	0.060
2471	Saint Leo	1895	2010	21.49	1895	2010	20.9	-0.590
1613	Trincomalee	1881	2006	28.88	1881	2010	28.87	-0.010

Station Mt. Gambier in Fig. 13 depicts the temperature curves and trend lines of the 2010 and 2012 data sets, producing gradients of 0.0133°C/a and 0.0201°C/a respectively, which results in an overall increase of 0.0068°C/a.

Fig. 13: Methods of alteration – adjusting the values of the end section of the data set upwards enhances warming, example Mt. Gambier:

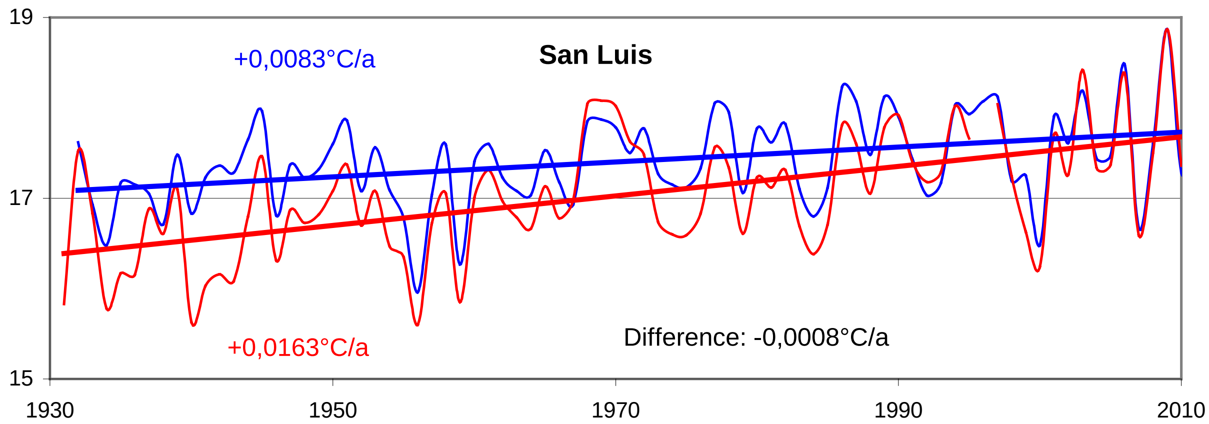


3.1.2 Alterations that enhance the cooling trend

So far, the alterations of the 2012-data compared to the 2010-data have been examined to see how warming up was enhanced and how previously recorded cooling was retroactively changed to warming. However, also the opposite was detected: warming recorded in 2010 appears reduced in 2012 and, moreover, already recorded cooling in 2010 was made even cooler in 2012.

Here, the same methods were applied to alter the results, but in the reverse direction: the annual mean values of the early and middle sections of the datasets were not lowered but elevated, while those of the end sections of the data sets were lowered. The temperature curves of the station San Luis illustrates this in Fig. 14: The trend line of the 2010-temperaturve curve indicates a gradient of 0.0163°C/a, while the trend line of the 2012-temperature curve yields 0.0083°C/a, thus the altered cooling achieved is 0.008°C/a.

Fig. 14: Methods of modification – elevating the early and middle values of the data sets has a cooling effect, example San Luis



3.1.3 Comparing the gradients

Analogously to the earlier comparisons, Table 10 compares the gradients of the temperature curves resulting from the 2010-data and the 2012-data, and lists their respective differences.

The 2010-data show that 8 stations indicate cooling. However, the modified 2012-data show that these stations show warming. In other cases the warming shown in the 2010-data appeared even stronger in the 2012-data. These changes were largely achieved by a leaving out the data from 1881 to 1950. In three cases the 2012 warming was less than the 2010 warming, which suggests relative cooling down of the data.

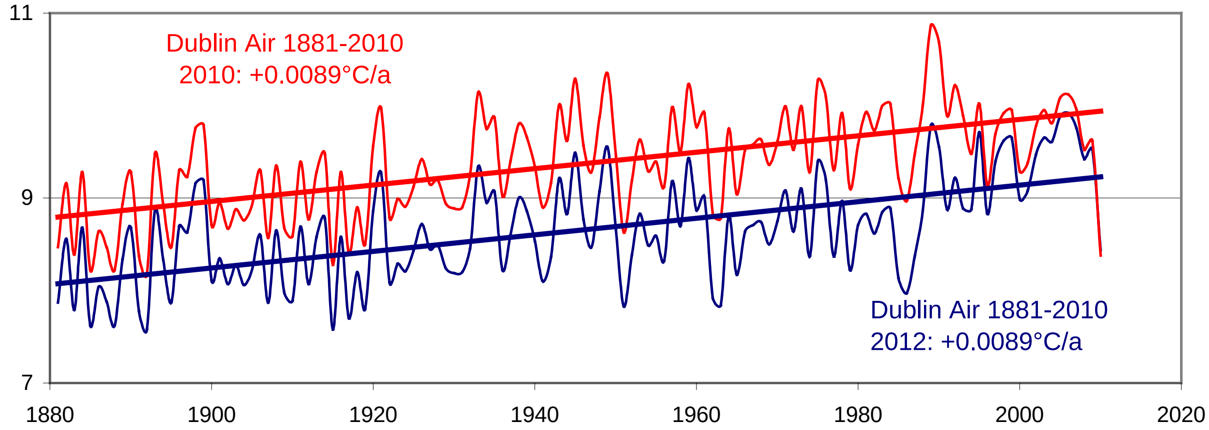
Table 10: Comparison of the gradients of the temperature curves from 2010-data and 2012-data:

	warmer in 2012	Comparison of gradients since 1881 and since 1912 until 2010						
	cooler in 2012	Data available		recorded	Data available		recorded	
ID	Station	from	to	**in 2010**	from	to	**in 2012**	**Difference**
5113	Almaty	1881	2010	0,0241	1916	2010	0,0239	-0,0002
4605	Aomori	1886	2010	0,0092	1886	2010	0,0107	0,0015
284	Auckland Air	1881	1992	0,0034	1952	1992	0,0046	0,0012
751	Brisbane Eagle	1950	2010	-0,0045	1951	2010	0,0187	0,0232
5332	Bucuresti	1881	2010	0,0062	1881	2010	0,0072	0,001
443	Capetown	1881	2010	-0,0025	1932	2010	0,0109	0,0134
2200	Casa Blanca	1895	2010	-0,0040	1952	1990	0,0126	0,0166
157	Christchurch	1905	2010	0,0035	1951	2010	0,0108	0,0073
653	Durban Louis	1885	2010	-0,0140	1948	2009	0,0088	0,0228
143	Invercargill	1950	2009	-0,0002	1950	2009	0,0107	0,0109
3869	Isparta	1949	2010	0,0061	1949	2010	0,0128	0,0067
2788	Jerusalem	1881	1995	-0,0047	1881	1995	0,0097	0,0144
698	Kimberley	1897	2010	0,0061	1956	2010	0,0185	0,0124
4404	Krasovodsk	1883	2010	-0,0063	1924	2010	0,0119	0,0182
5125	Marseille	1881	2010	0,0099	1934	2010	0,0195	0,0096
7360	Ostrov Vize	1951	2010	0,0240	1951	2010	0,0195	-0,0045
4285	Palma de Mall	1881	2010	-0,0076	1881	2010	0,0049	0,0125
484	Pudahuel	1881	2010	0,0050	1924	2010	0,0113	0,0063
2471	Saint Leo	1895	2010	0,0053	1895	2010	0,0011	-0,0042
1613	Trincomalee	1881	2006	0,0039	1881	2010	0,0068	0,0029

3.2 Classification of groups and their portions

The 2012-data of all 120 stations that were analysed had been altered. Some were changed very little, for instance Chattanooga with a change from 0.000007°C/a in 2010 to -0.0005°C/a in 2012. The alteration applied to the Dublin Airport station is curious: both temperature curves shown in Fig. 15 yielded identical gradients, +0.0089°C/a, but the 2012-temperatures had been shifted downward by 0.6°C/a, hence the two temperature curves run parallel to each other. The reason for the shift downward is unknown. Perhaps an alteration was intended and unexpectedly produced the similar result.

Fig. 15: Dublin Airport station – identical temperature curves produced from 2010 and 2012-data, both are exactly parallel but at different levels



Overall, the alterations applied to the 2012-data leads to various types of temperature curves that are sorted into 10 groups, not including Group 0 for the peculiar Dublin Airport type. These groups are characterised by the following features and each are illustrated by Figures 16-26:

Group 1: 2010-data showed cooling; 2012-data showed warming due to trend inversion, 19 stations (15.83%).
Group 2: 2010-data showed warming; 2012-data showed even stronger warming due to leaving out data, 12 stations (10.00%).
Group 3: 2010-data showed cooling; 2012-data showed warming due to leaving out data, 5 stations (4.17%).
Group 4: 2010-data showed warming; 2012-data showed stronger warming due to adjusting of early values downwards, 40 stations (32.33%).
Group 5: 2010-data showed warming; 2012-data showed less warming due to adjusting early values upwards, 28 stations (23.33%).
Group 6: 2010-data showed warming; 2012-data showed less warming due to leaving out values, 1 station (0.833%).
Group 7: 2010-data showed warming; 2012-data showed cooling due to trend inversion, 6 stations (5.00%).
Group 8: 2010-data showed cooling; 2012-data showed stronger cooling, mostly due to adjusting the early values upwards, 3 stations (2.5%).
Group 9: 2010-data showed warming; 2012-data showed cooling due to leaving out values, 1 station (0.83%).
Group 10: 2010-data showed cooling; 2012-data showed less cooling due to adjusting end values upwards, 2 stations (1.67%).

Groups 5 and 10 need particular comments because similar procedures were applied, though with opposite aims:

- Group 5: The somewhat reduced warming shown by the 2012-data trend lines of the 28 stations could be considered as cooling if these alterations had not been achieved by the upwards adjustment of the early and middle section of the data set. A classification as cooling resulting from the upwards adjustment of the early and middle sections of the data set would be contradictory.
- Group 10: Compared to the 2010-data, the temperature curves resulting from the 2012-data indicated a little less cooling. This could be considered as a relative warming had these alterations not been achieved by the downward adjustment of the early and middle section of

the data set. A classification as warming resulting from the downward adjustment of the early and middle sections of the data set would also be contradictory.

The relevant features for the statistical evaluation of the 120 stations are listed in Table 11a in Annex 1. Relevant features are foremost the resulting trend lines and their gradients of the temperature curves, i.e. the annual rates of change of the temperature. Table 11a also specifies the groups of the various alteration types, each one with its number and share of the stations. Table 11b shows an excerpt, and Table 12 is a summary.

Table 11b: Statistical evaluation of alterations: gradients, differences, number and the share by each group (excerpt from Table 11 in Annex 1).

Legend:					
2010	*warmer*	*2012*	*warmer*	*2012*	*warming reduced*
2010	*cooler*	*2012*	*cooler*	*2012*	*cooling reduced*

	Station	Data from	Gradients 2010	Gradients 2012	Difference	Groups of Warming 0	1	2	3	4	5	6	Groups of Cooling 7	8	9	10
1	FARADAY	1950	0.0528	0,0554	0,0026					1						
2	BASE ORCADAS	1903	0.0205	0,0099	-0,0106						1					
79	AUSTIN	1895	0.0127	0,0067	-0,0060						1					
80	Palma de Mall	1881	-0.0076	0,0049	0,0125		1									
118	Angmagssalik	1895	0.0086	0,0017	-0,0069						1					
119	Bodo Vi	1881	0.0073	0,0134	0,0061					1						
	Warming	(n)	91	108												
	Warming	(%)	75.8	90.0												
	Cooling	(n)	29	12												
	Cooling	(%)	24.2	10.0												
	Number of stations related to groups (n)					1	19	12	5	41	29	1	6	3	1	2
	Portion of stations related to groups (%)					0.8	15.8	10.0	4.2	34.2	24.2	0.8	5.0	2.5	0.8	1.7
	Portions of warming up / cooling					**90.0**							**10.0**			

Table 12: Classification, number of stations, and their share of groups resulting from alteration of data:

2010-data Warming		2010-data Cooling		2012-data	Modification by	Warmer (n)	Warmer (%)	Cooler (n)	Cooler (%)
without differentiation				Group 0	Parallel translation of data	1	0.83		
				Group 1	Warming due to inversion	19	15.83		
				Group 2	Deletion of data	12	10		
				Group 3	Deletion of data	5	4.17		
				Group 4	Lowering of initial data	41	34.2		
				Group 5	Lifting of initial data	29	24.2		
				Group 6	Deletion of data	1	0.83		
				Group 7	Cooling due to inversion			6	5
				Group 8	Lifting of initial data			3	2.5
				Group 9	Deletion of data			1	0.83
				Group 10	Lifting of final data			2	1.67
91	**75.8**	**29**	**24.2**	<< Number / Portion >>		**108**	**90**	**12**	**10**

Table 11a shows that the 2010-data and 2012-data of all stations show unequal gradients of their trend lines, thus unequal differences in between. Consequently all 2012-data were altered – except the Dublin Airport station mentioned above and illustrated in Fig. 15.

Figures 16 – 26 illustrate the methods of alteration used for each of the ten groups. The 2010 and 2012-temperature curves are arranged one above the other in order to allow a larger size graphic and thus allow better comparability. The number and portion of stations are given for each group.

The temperature curves of all 120 stations are shown in Annex 2 where the 2010 and 2012 temperature curves are placed right opposite.

Fig. 16: Group 1 - Inversion. 2010-data show cooling. But the 2012-data show an inversion to warming; 19 stations (**15.83%)**

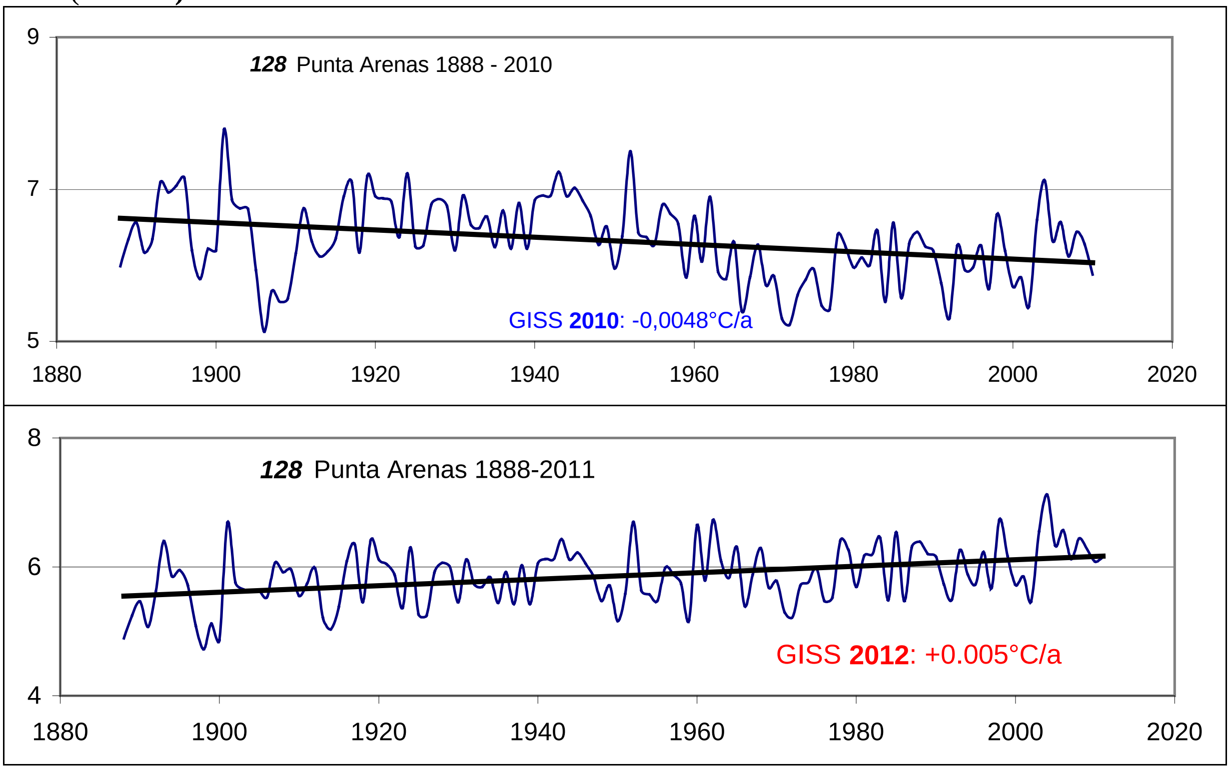


Fig. 17: Group 2 – Increased warming. 2010-data show warming but the 2012-data show enhanced warming because the early section of the data set is deleted; 12 stations **(10.0%)**

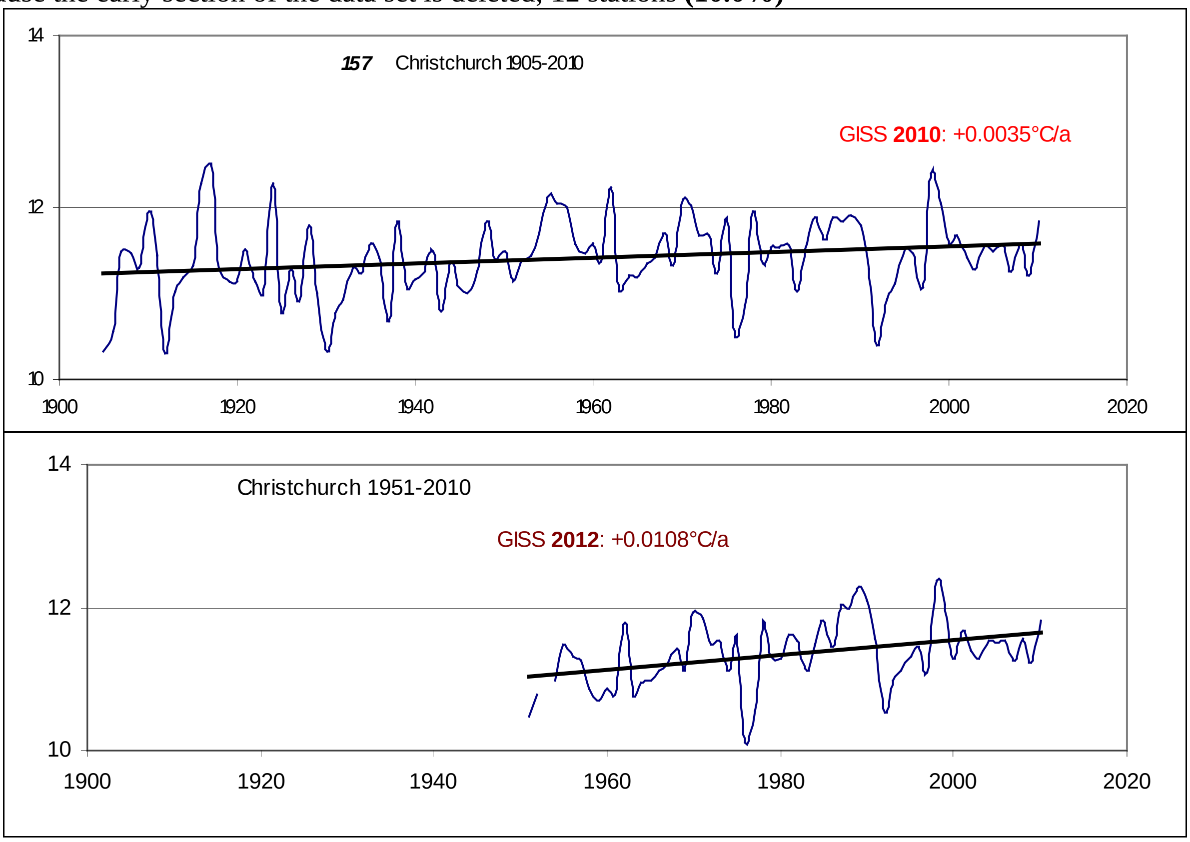


Fig. 18: Group 3 – Warming instead of Cooling . 2010-data show cooling, but 2012-data show warming is achieved by deleting 1880-1963 section and adjusting the end data set values upwards; 5 stations (4.17%).

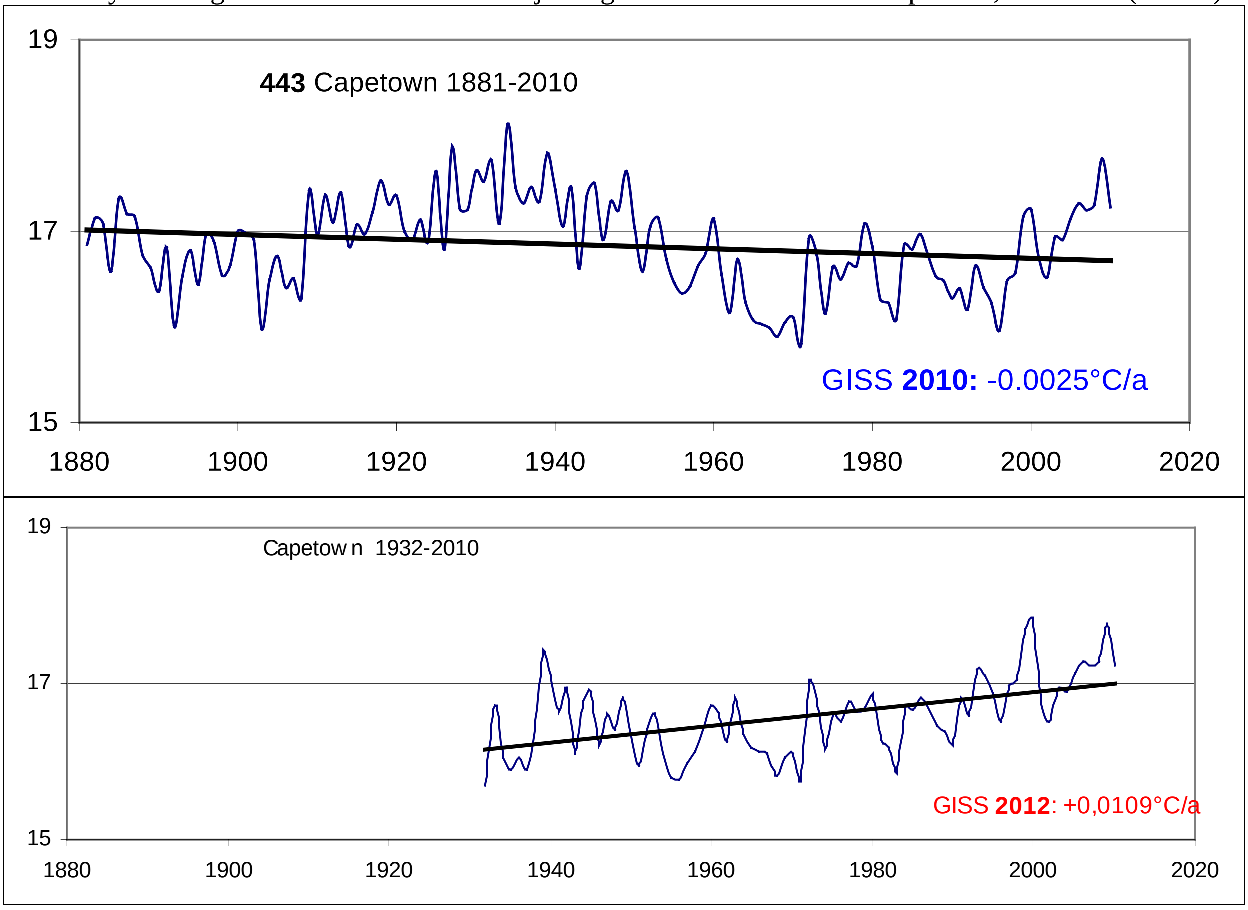


Fig. 19: Group 4 – Stronger warming . The 2010-data yield warming, but the 2012-data show enhanced warming by adjusting the early and middle sections of the data set downwards and lifting the values at the end of the dataset; 41 stations (34.2%).

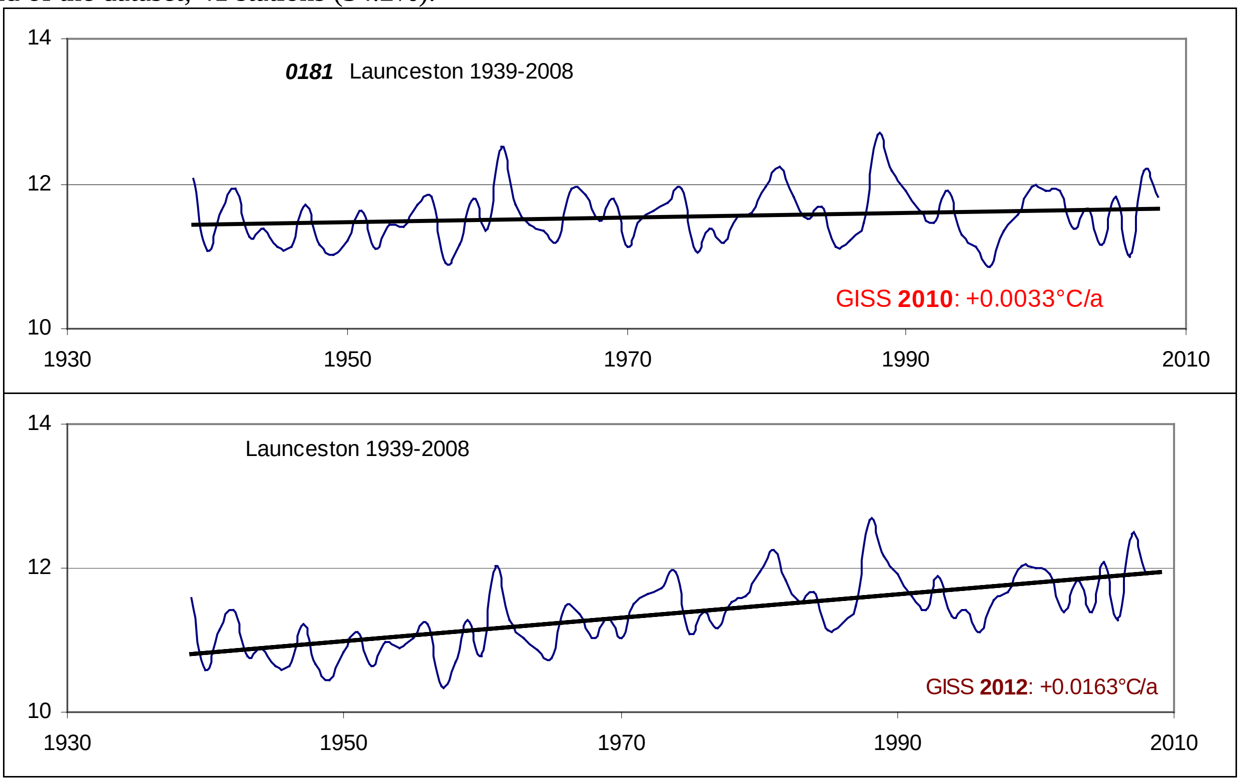
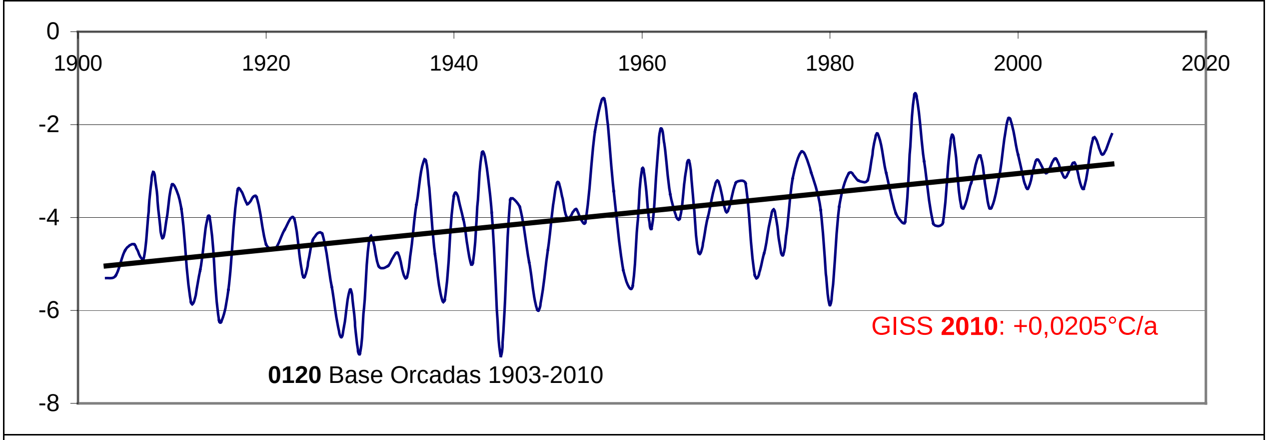


Fig. 20: Group 5 –Reduced warming. 2010-data show warming, but 2012-data show the warming is reduced by adjusting the values of the early section of the data set upwards; 29 stations (**24.2%**).



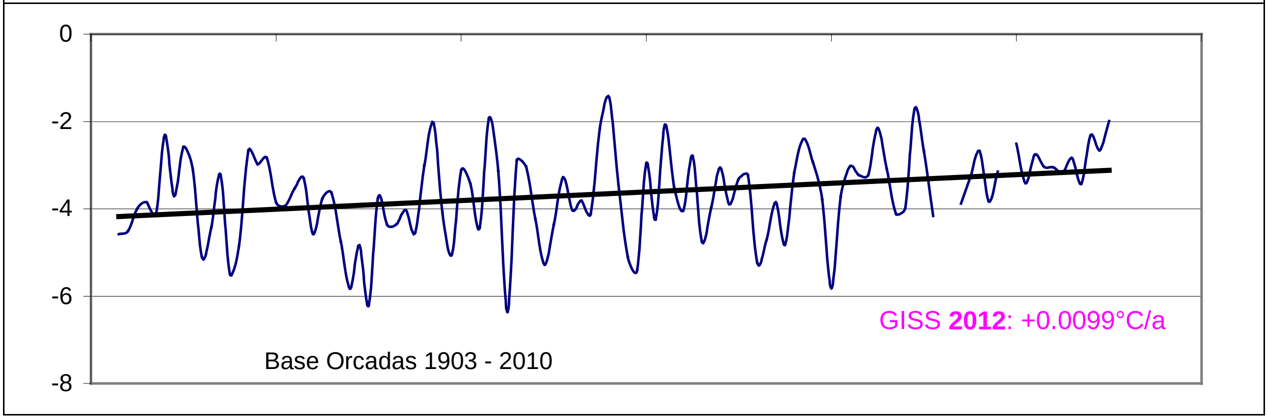
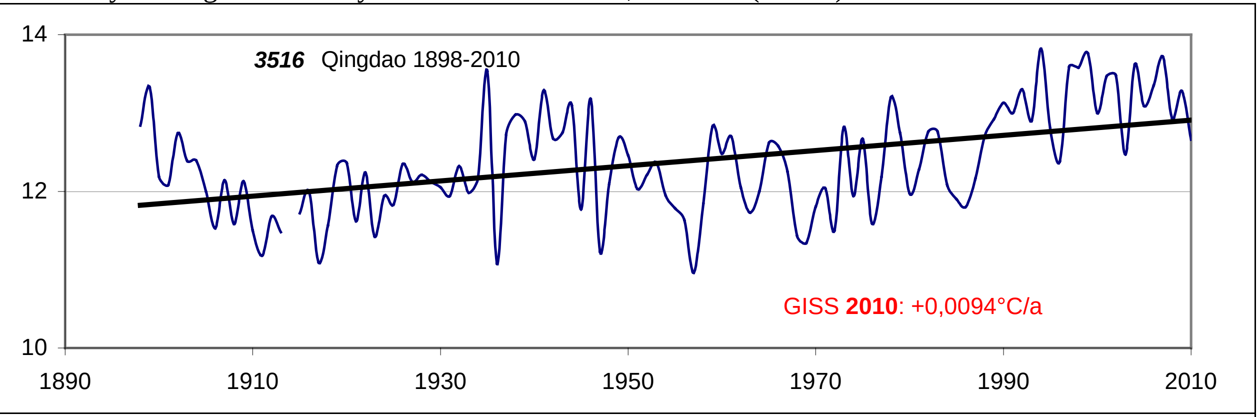


Fig. 21: Group 6 – Reduced warming. 2010-data show warming, but 2012-data show reduced warming caused by leaving out the early section of the dataset; 1 station (0.83%).



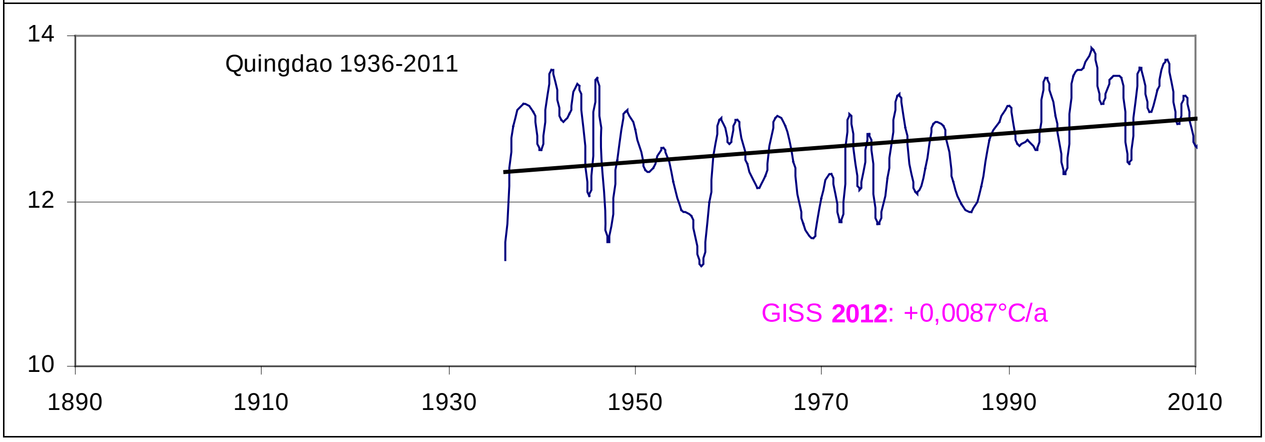


Fig. 22: Group 7 – Warming inverted to cooling. 2010-data show warming, but 2012-data show the warming is inversed to cooling; 6 stations (5.0**%**).

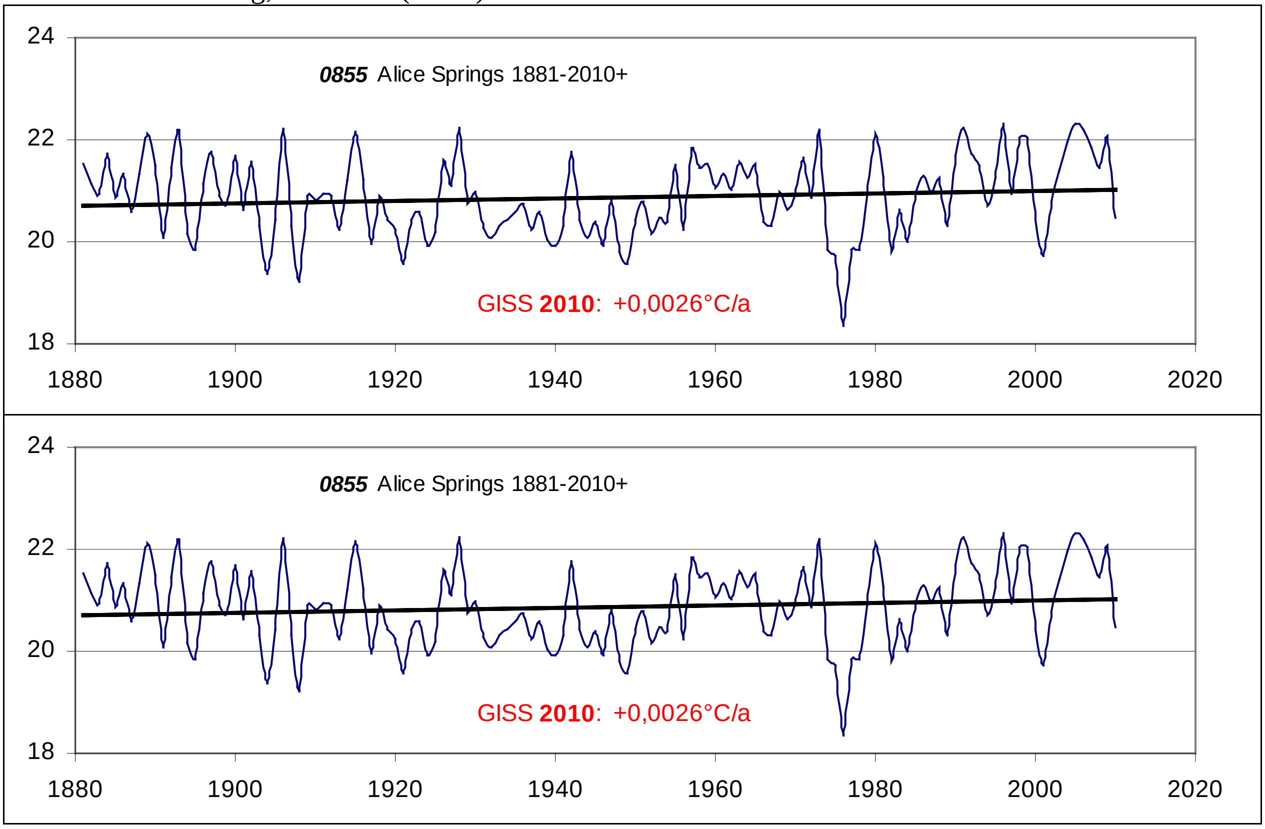


Fig. 23: Group 8 – Stronger cooling. 2010-data show cooling, but 2012-data show increased cooling caused by lowering and/or lifting individual values; 3 stations (2.5%).

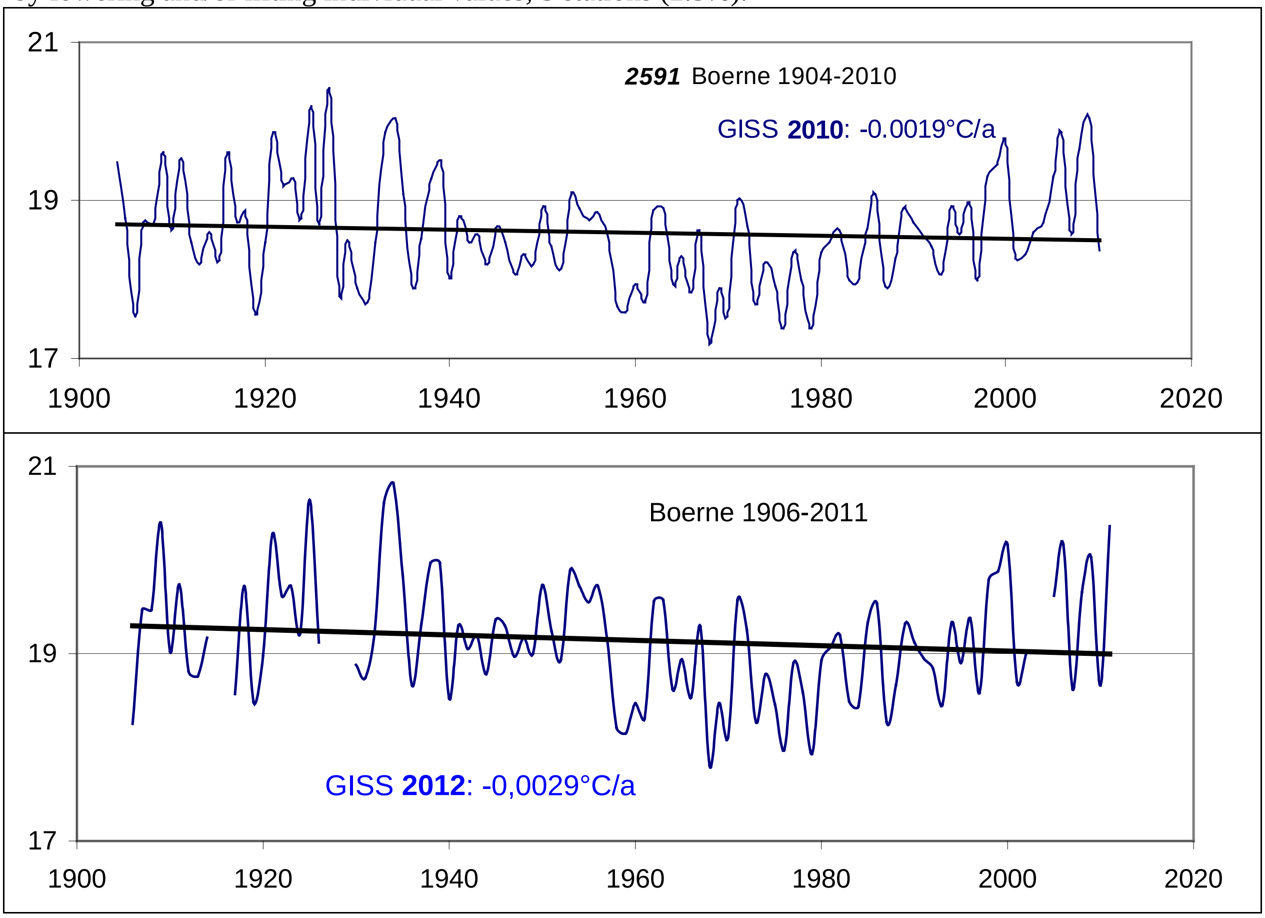


Fig. 24: Group 9 – Warming inverted to cooling. 2010-data registered warming, but 2012-data show an inversion to cooling achieved by deleting and lifting middle values of the data set; 1 station (0.83%).

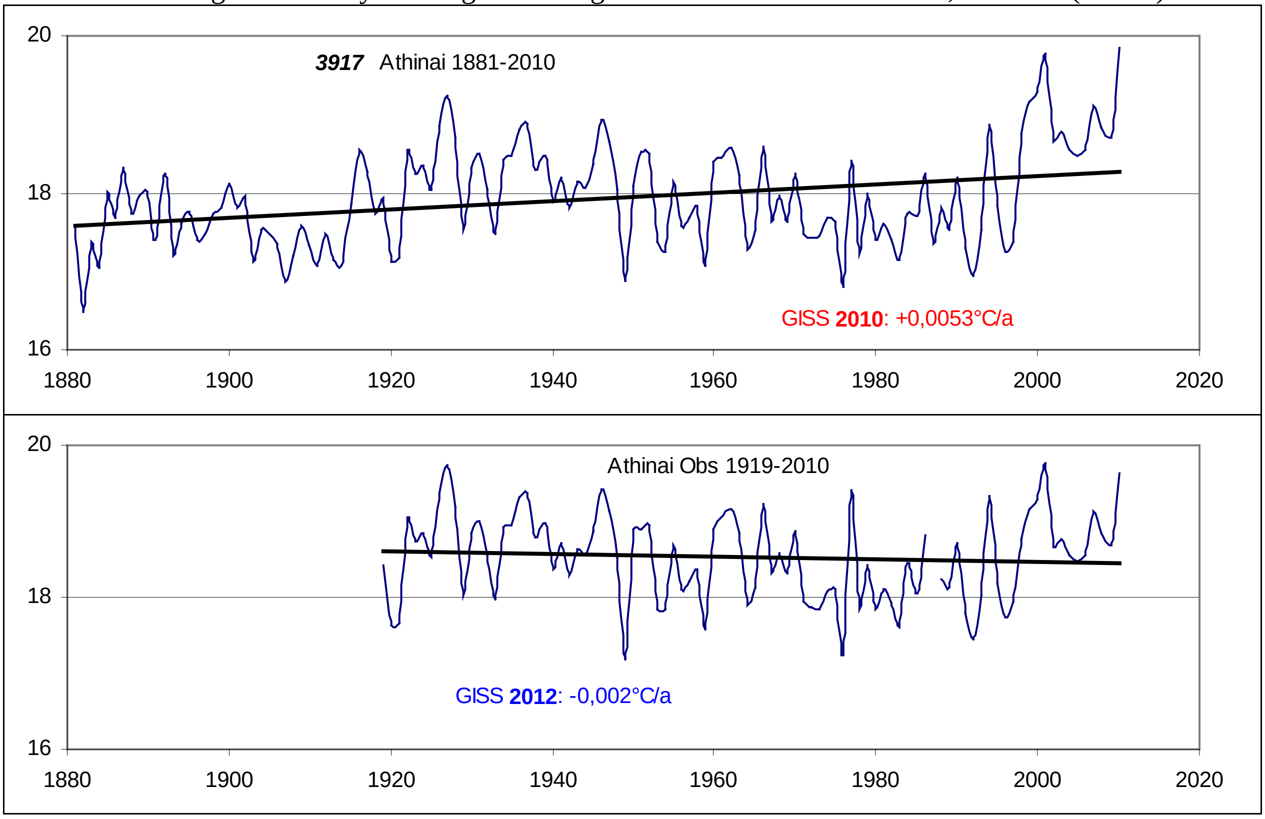
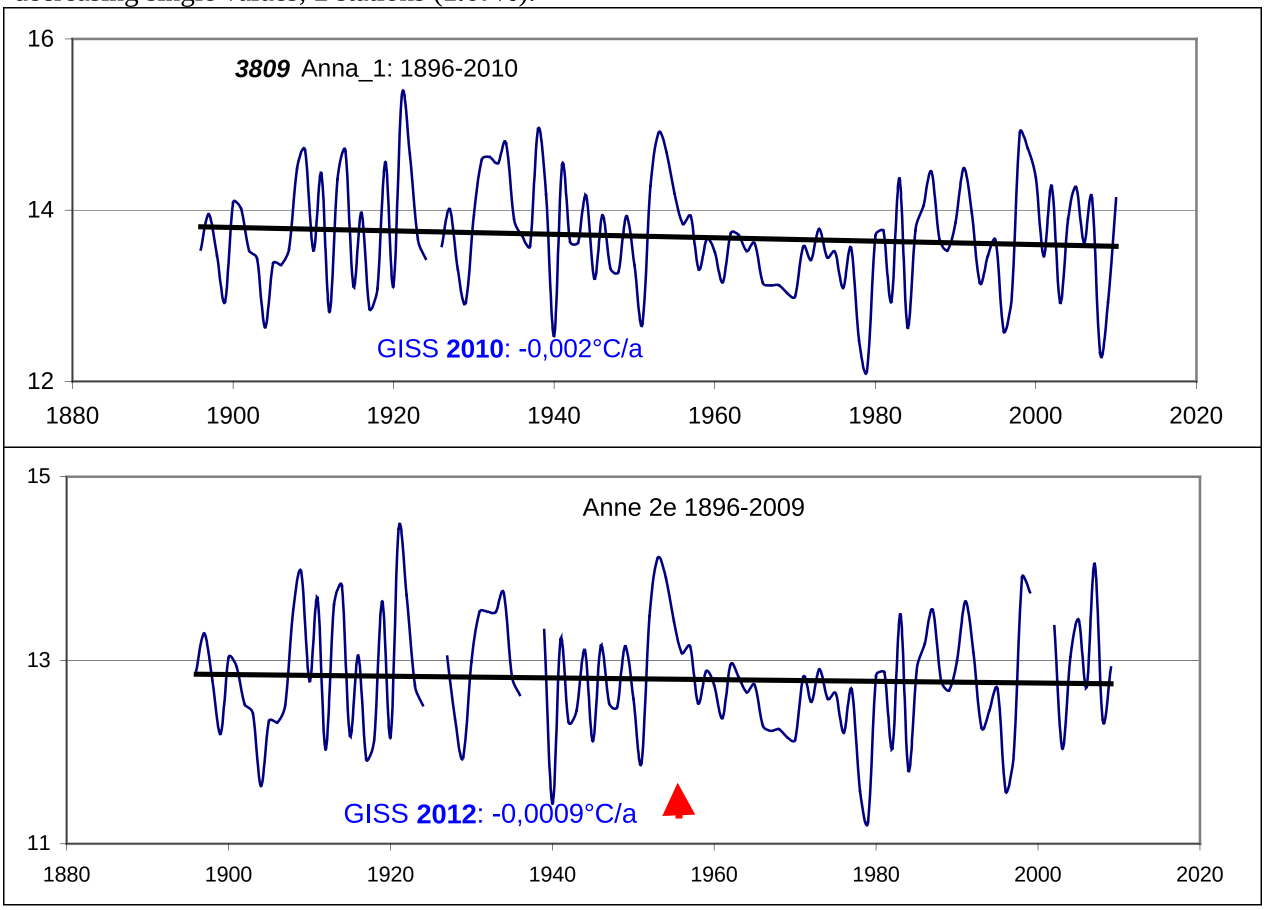


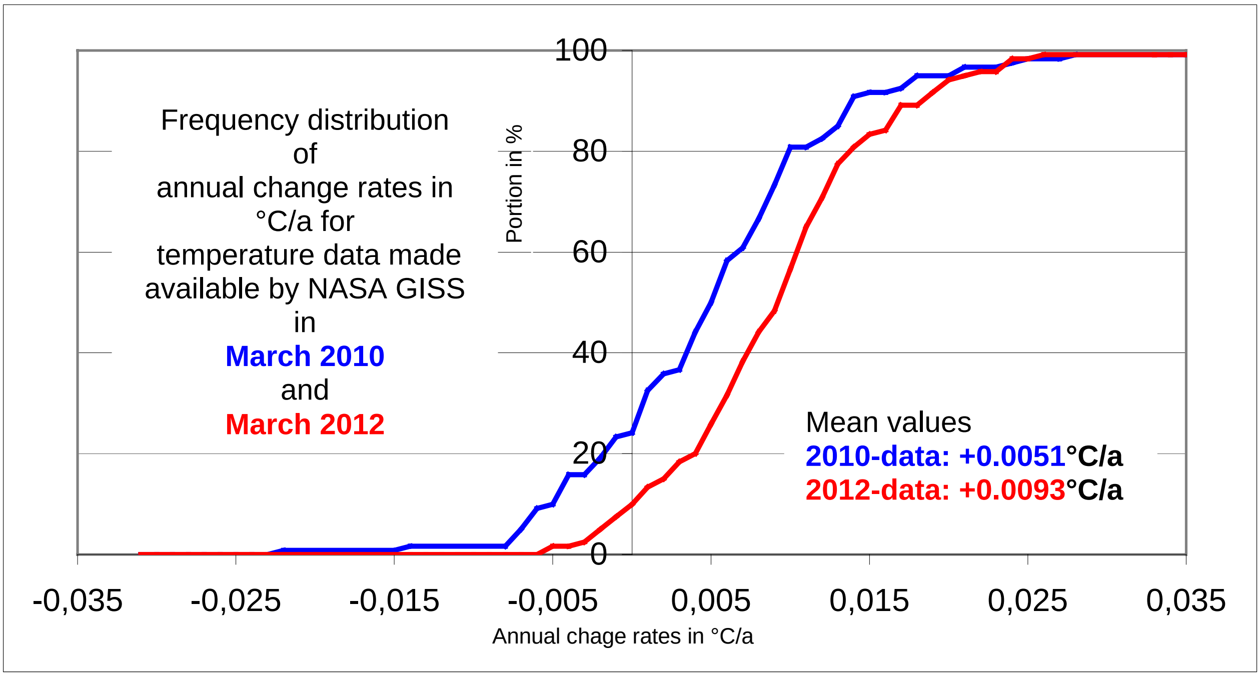
Fig. 25: Group 10 – Cooling increased. 2010-data registered cooling, but 2012-data show reduced cooling by decreasing single values; 2 stations (**1.67**%).



The 2010-data sets show warming had occurred at 91 stations, i.e. 75.8%, and cooling at 29 stations, i.e. 24.2%. After the alterations, the 2012-data yielded 108 stations showing warming and only 12 stations showing cooling, i.e. 90.0% versus 10.0%. Thus the previous cooling was converted into warming at 17 stations. This is already sizable alteration and the alterations give the impression of a stronger warming in general. More importantly, the 2010-data of the 120 stations yielded a mean value of +0.0051°C/a while the 2012-data show an average of +0.0093°C/a, i.e. this is nearly a doubling of the previous warming rate.

To be meaningful, the mean values have to be supplemented by the frequency distribution of the individual values. Summation lines therefore have been determined to fulfil this purpose (Fig 26). They confirm that the higher mean value correspondingly reflects the individual annual change rates, i.e. a higher warming.

Fig. 26: Summation lines showing the frequency distribution of annual change rates:



4. Alterations continue

This analysis began in March/April 2012 after it was detected that NASA GISS had altered its temperature records. In March 2010 the author downloaded the data and saved them in archives. Hence in March 2012 it was possible to compare the 2010-data to the new 2012-data. These comparisons soon revealed remarkable discrepancies. In order to find out whether this involved only isolated cases, the 2012-temperatuve curves of 60 stations were copied and compared with the 2010-temperature curves. In addition, the annual mean values of Reykjavik, Palma de Majorca, and Darwin stations were evaluated to identify the methods used for the alterations.

In August 2012 the analysis was completed. Another 60 stations were downloaded and evaluated, including also the annual mean values from all 120 stations. Herewith it became possible to quantitatively analyse the data from all these stations. During the following months it was discovered that yet more alterations had been carried out between March/April and August/September 2012, and new changes were discovered even in December 2012 and January 2013. Presumably these alterations are still continuing.

As already described, the annual mean values of the early, middle, and end sections of the data sets tell us if the 2012-data differ from the 2010-data. Hence the annual mean values from the early and end sections of the data series from March, 2012 have been compared with those of August, 2012 and those of August 2012 have been compared to those of December, 2012. The results in Table 13 show that alterations of the data series had been carried during both periods and for all stations. It applies for the values of the early and end sections of the data set. Between March, 2012 and August, 2012 the data were altered for 19 of 20 stations, and even at all stations between August and December. Recall that these 20 stations listed in Table 13 represent all 120 stations analysed.

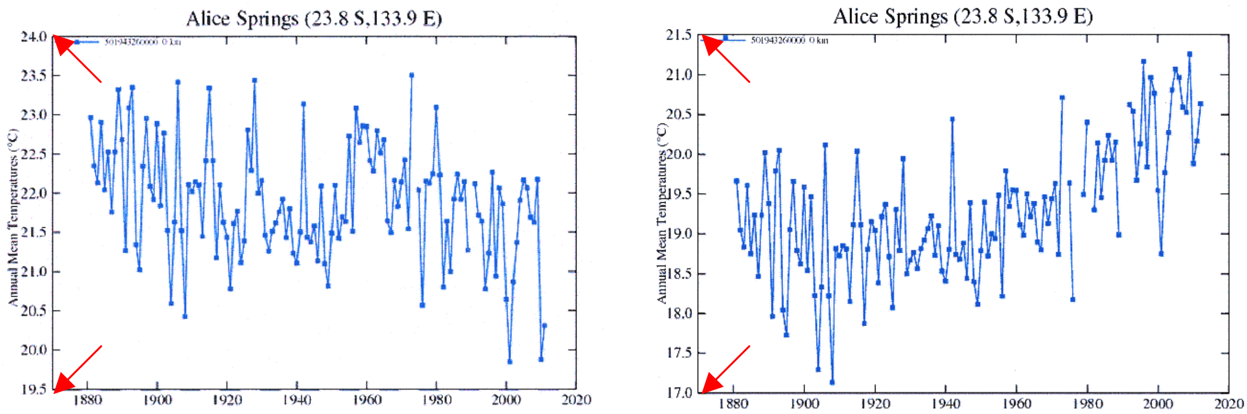
Table 13: Examples showing on-going data alteration between March 2012 and December 2012:

All End-Data		Data downloaded in						Alteration between			
refer to 2010		March 2012		August 2012		December 2012		March / August		August / December	
Stations		Begin	End	Begin	End	Begin	End	Begin	End	Begin	End
5113	Almaty	8.5	10.7	8.31	10.67	9.01	10.67	-0.19	-0.03	0.70	0.00
4605	Aomori	9.5	11.1	9.98	11.02	9.57	11.02	0.48	-0.08	-0.41	-0.41
284	Auckland	14.95	15.7	14.77	15.73	14.67	15.72	-0.18	0.01	-0.10	-0.10
751	Brisbane Eagle	19.8	20.7	19.72	20.71	19.52	20.71	-0.08	0.01	-0.20	-0.20
5332	Bucuresti	8.7	10.9	8.67	10.91	8.57	10.81	-0.03	0.01	-0.10	-0.10
443	Capetown	15.3	17.3	16.72	17.22	16.01	17.42	1.42	-0.08	-0.71	-0.71
2200	Casa Blanca	24.6	25.1	24.60	24.68	24.46	24.68	0.00	-0.46	-0.14	-0.14
157	Christchurch	10.4	11.8	10.47	11.83	9.93	11.83	0.07	0.03	-0.54	-0.54
653	Durban Louis	19.9	20.75	20.87	20.78	20.84	20.78	0.97	0.03	-0.03	-0.03
143	Invercargill	9.7	9.9	9.77	9.91	9.88	9.91	0.07	0.01	0.11	0.11
3869	Isparta	10.6	13.9	10.62	13.89	10.82	13.89	0.02	-0.01	0.20	0.20
2788	Jerusalem	16.1	17.7	16.10	17.01	15.7	17.08	0.00	-0.69	-0.40	-0.40
698	Kimberley	17.2	17.3	17.23	18.19	17.48	18.8	0.03	0.89	0.25	0.25
4404	Krasovodsk	15.1	16.41	14.97	16.41	15.59	16.41	-0.13	0.00	0.62	0.62
5125	Marseille	13.5	14.8	13.73	14.8	14.53	14.8	0.23	0.00	0.80	0.80
7360	Ostrov Vize	-13.7	-10.3	-12.17	-10.27	-13.98	-12.76	1.53	0.03	-1.81	-1.81
4285	Palma de Mall	16.66	17.31	16.76	16.4	15.56	16.4	0.10	-0.91	-1.20	-1.20
484	Pudahuel	13.6	14.2	13.52	14.31	12.85	14.21	-0.08	0.11	-0.67	-0.10
2471	Saint Leo	21.2	20.9	21.180	20.9	20.65	22.08	-0.02	0.00	-0.53	-0.53
1613	Trincomalee	27.45	28.87	27.450	28.87	27.95	28.87	**0.00**	**0.00**	0.50	0.50

Here all alterations can only be illustrated by the tabulated comparison of typical and specific annual mean values of 20 randomly selected stations. A complete assessment of the obviously continuing alterations will have to be done in a new study.

Once it was realised that data were repeatedly modified over the course of the year 2012, further alterations have to be expected also for today and for the future. Usually NASA-GISS internet portal provides the monthly and annual mean values of the temperatures in tables. But as of the end of February 2013, they are no longer accessible and are forbidden for public use. This makes a quantitative evaluation impossible. However, the temperatures curves are still available and they can be copied and compared to those already downloaded in August and September 2012. A spot check was made by comparing the August/September 2012 temperature curves of the Alice Springs station to the most recent available. The comparison is shown in Fig. 27 and confirms the presumption that modifications are still going on. In this case, cooling was inverted into warming, also with the help of serious changes of the temperature scale, marked by red arrows.

Fig. 27: NASA GISS temperature curves for Alice Springs station from August/September 2012 (left) and February 2013 (right) respectively:



Finally, it can be concluded that these alterations follow a systematic approach meant for all stations or, at least, a major part of them. The repeated alterations suggest a software that is able to alter the data according to well defined criteria is used.

5. Prior alterations

The on-going alterations raise doubts on whether the 2010-data are still identical with the original temperatures readings recorded at the stations. Had NASA-GISS possibly modified them already prior to 2010? To answer that question, only a spot check can be carried out using original data from a real station. These were kindly provided by the Agencia Estatal de Meteorologia (AE*Met*) for the Palma de Majorca station. Their records begin in 1879 and proceed until 2012. Fig. 28 below shows an excerpt of the monthly and annual mean values for the years 1978 to 1983. The temperature curve based on these records is shown in Fig. 59. It differs sensationally from all temperature curves derived from NASA-GISS data compiled in this report.

Fig. 28: Original temperature records provided by AEMet for Station Palma de Majorca.(excerpt)

GOBIERNO DE ESPAÑA
MINISTERIO DE AGRICULTURA, ALIMENTACIÓN Y MEDIO AMBIENTE

Delegación Territorial en Illes Balears
Delegació Territorial en Illes Balears

Muelle de Poniente s/n
07015 Palma
Tel 971403511
Fax 971403600
xclbal@aemet.es

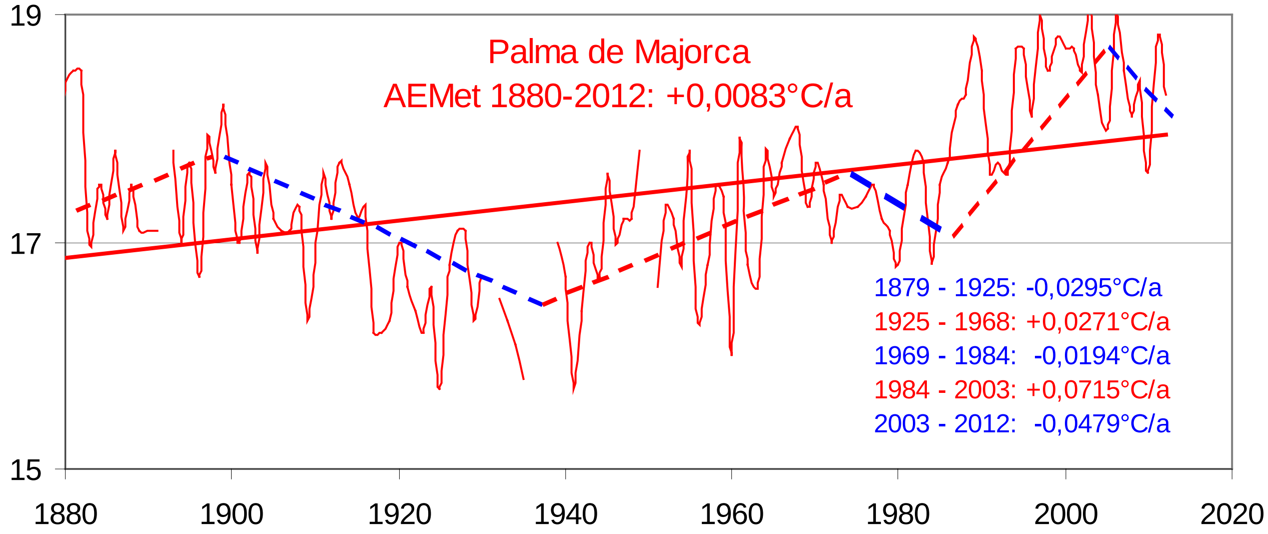
AEMet Agencia Estatal de Meteorología

Indicativo: B228M PALMA MONTESION		
Altitud: 19m	Latitud: 39°34'10"N	Longitud: 02°39'16"E

Temperatura media mensual (°C)

Año	enero	febrero	marzo	abril	mayo	junio	julio	agosto	septiembre	octubre	noviembre	diciembre	Media
1879	12,4	10,7	13,3	15,3	16,9	23,0	25,3	27,1	23,4	19,4	15,2	9,7	17,6
1880	10,1	12,4	14,0	15,6	18,3	21,9	26,6	26,8	25,0	21,3	15,2	13,1	18,4
1881	11,9	13,9	14,9	16,8	18,6	21,4	27,5	27,6	23,6	18,2	15,6	11,8	18,5
1882	11,5	12,1	14,2	16,5	20,4	24,2	25,7	26,9	22,9	19,4	16,4	12,3	18,5
1883	11,2	12,3	10,6	14,8	18,3	21,1	24,6	24,5	22,3	18,7	15,2	9,9	17,0
2005	10,5	9,5	12,6	15,8	20,1	24,6	26,5	25,7	23,0	20,8	15,5	11,5	18,0
2006	11,0	11,1	13,6	17,1	20,2	24,1	27,3	25,7	23,8	22,1	18,0	13,6	19,0
2007	12,7	14,0	13,4	16,9	20,5	23,3	25,4	25,6	23,1	19,5	14,8	12,9	18,5
2008	13,0	12,9	13,7	16,0	18,5	22,4	25,6	26,0	23,5	20,0	14,4	11,7	18,1
2009	11,4	11,5	12,8	15,0	20,3	23,5	26,5	26,8	23,3	19,9	16,7	13,2	18,4
2010	11,3	11,8	12,3	15,3	17,9	21,6	26,2	25,8	23,3	19,2	15,0	12,1	17,6
2011	11,4	12,3	13,5	17,7	20,3	22,4	25,0	26,3	24,5	20,7	17,3	13,9	18,8
2012	11,6	8,5	13,4	15,5	19,3	24,4	25,4	27,5	23,2	20,6	16,4	13,4	18,3

Fig. 29: Original data yield general warming including warming and cooling phases



Considering the discrepancies, it has to be concluded that even the 2010-data of NASA GISS are presumably not always identical to those of the original records. AE*Met* vouched for the original state of its records. This is absolutely convincing because the changes between the cooling and warming phases registered during the observation time in Palma de Majorca correspond quite well with similar developments registered in most stations worldwide.

6. Long-term temperature records

Official climate institutes reckon a warming of approx. 0.7°C for the last century. That is false because several factors remain ignored:

- All stations are distributed over a small part of the Earth's surface only. Systematic temperature readings were impossible over oceans, in deserts, jungles, swamps, mountains and glaciers.
- The temperatures readings by satellites will be useful in the future, but are not yet really usable today: WMO defined "Climate" as the average weather over 30 years, and since comparisons are needed to assess developments, the next data segment has to be awaited in order to derive more usefulness from the satellite service.
- It is largely ignored that warming has been registered at about three quarters of all stations, while the others recorded cooling. There, the Little Ice Age still persists.
- The warming rates mentioned above include the Urban Heat Island (UHI) effect, which can easily reach a few tenths of a degree. The different rates given by the Vienna station in Figures 5 a+b clearly demonstrate the impact. This effect is mostly not taken into account, particularly when short-term records are involved.

In that respect the UHI is of essential importance. Its influence became effective particularly in newly growing areas during the latter decades due to the recent population growth and industrial development. Moreover, an additional factor impairs our assessment of climate development: All NASA GISS data series are short-term records which cover only 130 years at most. The UHI-period constitutes a considerable part of that observation time. The shorter the dataset, the greater is the UHI's impact.

The already discussed long-term temperature records of Prague, Vienna, and Hohenpeissenberg, demonstrate that their temperature curves and gradients lead to a completely different interpretation of the development of the climate. These stations are by no means exceptions; rather they are representative of all long-term records as shown by the longest-possible data sets available listed in Table 14 [3]. Their readings began in the 18th century – i.e. approx. 300 years ago.

Table 14: Gradients of long-term temperature records beginning in the 18th century:

	Data available			Gradient		Data available			Gradient		Data available			Gradient
Station	from	to	years	°C/a	Station	from	to	years	°C/a	Station	ab	bis	years	°C/a
Berlin	1701	2008	307	0,0044	Paris	1757	1995	238	-0,0007	Moskau	1779	2009	230	0,0043
De Bilt	1706	2008	302	0,0048	Mailand	1764	1992	228	-0,0005	Budapest	1780	2009	229	0,0048
Uppsala	1722	2005	283	0,0019	Kopenhagen	1768	1988	220	0,0022	Hohenpeißenberg	1781	2008	227	0,0013
St.Petersburg	1750	2000	250	-0,0027	Prag	1773	2008	235	0,0017	München	1781	1993	212	0,000
Boston	1753	1993	240	0,0125	Wien	1774	2008	234	0,0015	Stuttgart	1792	1999	207	-0,001
Basel	1755	1980	225	0,0037	Innsbruck	1777	1999	222	-0,0046	Breslau	1792	2009	217	0,0048
Stockholm	1756	1988	232	0,0037	Vilnius	1777	2007	230	-0,0004	Armagh	1796	2001	205	0,0077
Frankfurt	1757	2001	244	0,000	Warschau	1779	2009	230	0,0052	Strassburg	1801	2008	207	0,0049

The data show that the instead of a warming rate of 0.7°C quoted by official institutes for the last century, the very long-term datasets yield an average warming of 0.6°C per 100 years over the last 300 years (Table 15). They still indicate a UHI effect, thus meaning the real natural warming is only a few tenths of a degree, which is smaller than what is indicated in Table 15. We saw stronger variations during the last thousand years.

Table 15: Long-term temperature records – Portions of warming and cooling, averages, and extremes, quoted from [3]:

Type of changes	Number (n)	Portion (%)	Average (°C/a)	Max (°C/a)	Min (°C/a)
Warmer + UHI	60	73,1	0,006	0,077	0,0001
Invariable	3	3,7	0	0	0
Cooler	19	23,2	-0,002	-0,009	-0,0005

7. Alterations – why?

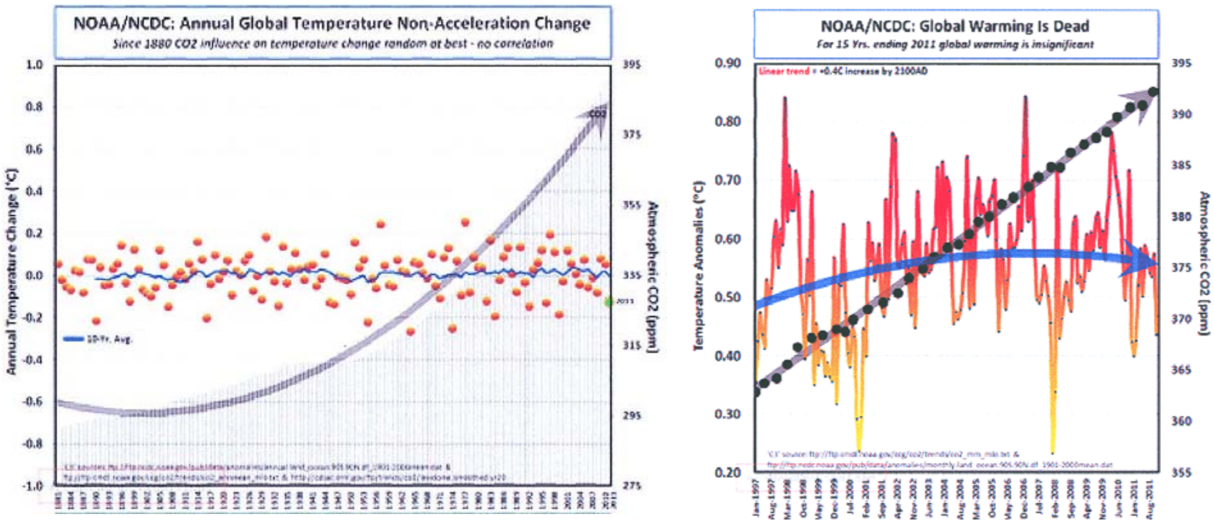
In the past temperature records were regarded as sacrosanct documents. Why have they suddenly been modified retroactively? The facts allow us to presume a reason.

7.1 Homogenisation

NASA GISS receives temperature data from the NOAA and GHCN and then offers them in its Internet portal after *"GISS homogeneity adjustment,"* which *"is based on night light radiance data. The GISS analysis uses only GISS homogeneity adjusted data."* This is quoted from the GISS NASA site [4].

It is unknown, of course, whether and to what extent the data taken over from NOAA and GHCN had been changed already beforehand. None of the 261 diagrams published by NOAA, NCDC, NASA GISS, etc. that present the historical and modern development of both temperature and atmospheric CO_2-content gives the impression of an on-going warming of the Earth. Fig. 30 shows two examples of those diagrams, which were downloaded in April 2012. They are accessible at ‘C3 Headlines’ by opening ‘Modern’ and ‘Historical’. In these diagrams NOAA/NCDC concludes that man-made climate change is not occurring.

Fig. 30: Yearly changes of temperature and atmospheric CO_2 content. Left: from 1881 until 2012; right: from January 1997 to August 2011, quoted from C3 [5]

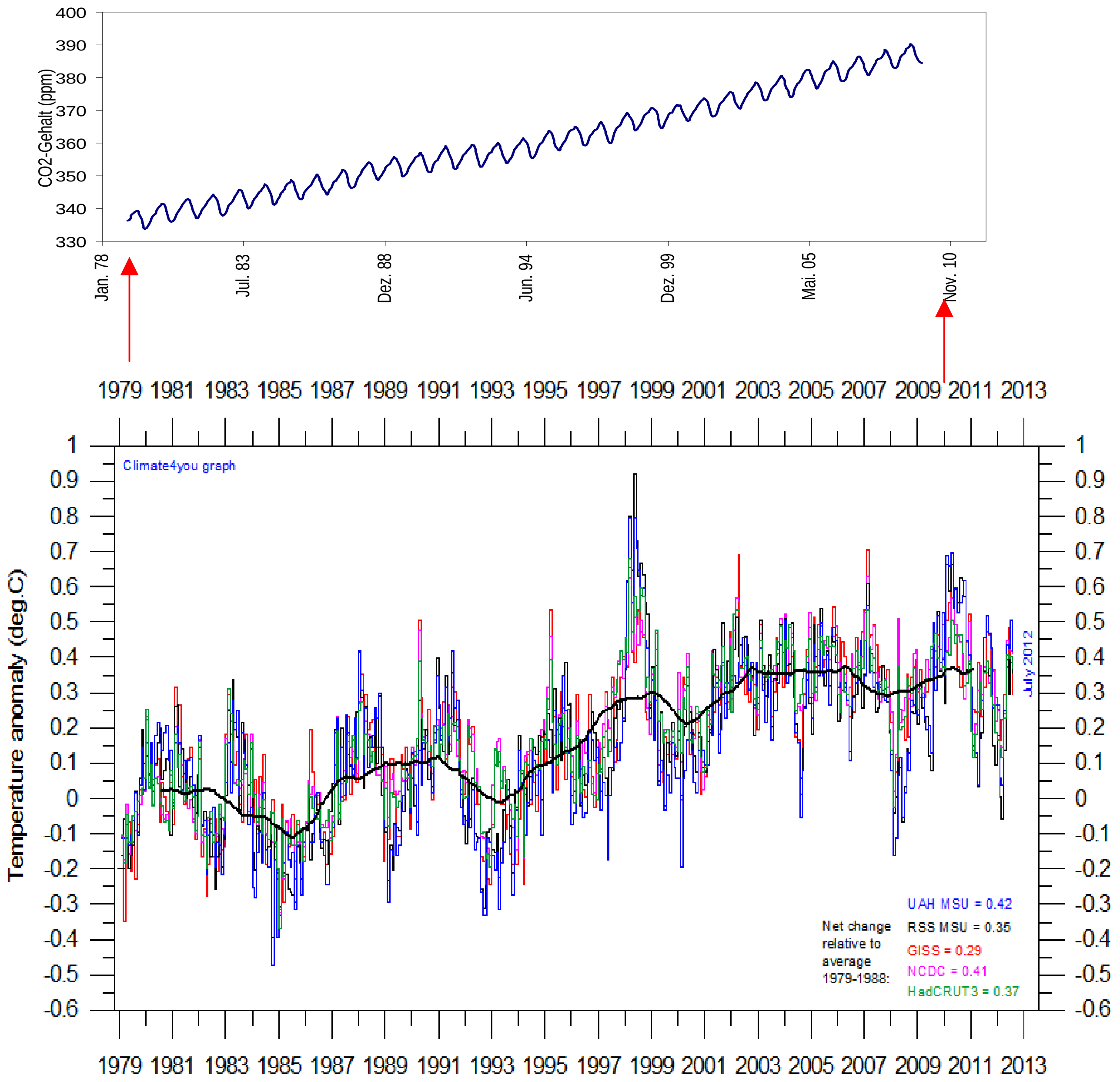


It cannot be discussed in this report whether and to what extent ‘homogeneity’ of temperature readings is scientifically justified. But everyone can agree that the message of the data have to be preserved. Here the undertaken alterations violate that requirement. It is unacceptable that:

- Temperature curves are inverted by reducing or increasing the registered temperatures in order to produce warming instead of the recorded cooling, or vice versa;
- Temperature trends are inverted by leaving out a sizable section of data in order to produce a stronger cooling or warming;
- Reducing or increasing registered temperatures is done at selected sections to produce a stronger cooling or warming trend and;
- The temperature dataset and curves are interrupted by the deletion of data, and thus hide disturbing transitions.

Such alterations were carried out. Yet, they cannot be considered as ‘homogeneity adjustments’, or justified as such. Moreover, if these alterations were intended as homogenisation only, the alterations should at least led to warming and cooling more or less offsetting each other. This, however, definitely does not apply, as the unequal distribution of the groups and their shares shown in Table 11a (Annex 1) and Table 11b demonstrate. The 2010-data showed warming in 91 stations compared to 108 stations using the 2012-data. Vice versa, the share of cooling decreased from 29 to 12. Moreover, the alterations to the 2012-data resulted in almost a doubling of the warming rate. The question whether an increasing and progressive warming was the main intent cannot be answered here. Perhaps it is a side effect. Be that as it may, a stronger warming contradicts the real-life development of the temperature, as made evident in [6] by UAH MSU, RSS MSU, GISS, NCDC and HadCRUT shown in Fig. 31. According to this chart, no further warming has taken place since 2002 despite the ever increasing CO_2-concentration in the atmosphere.

Fig. 31: Development of atmospheric CO_2-concentration and temperature since 1979, as announced by UAH MSU, RSS MSU, GISS, NCDC, and HadCRUT:

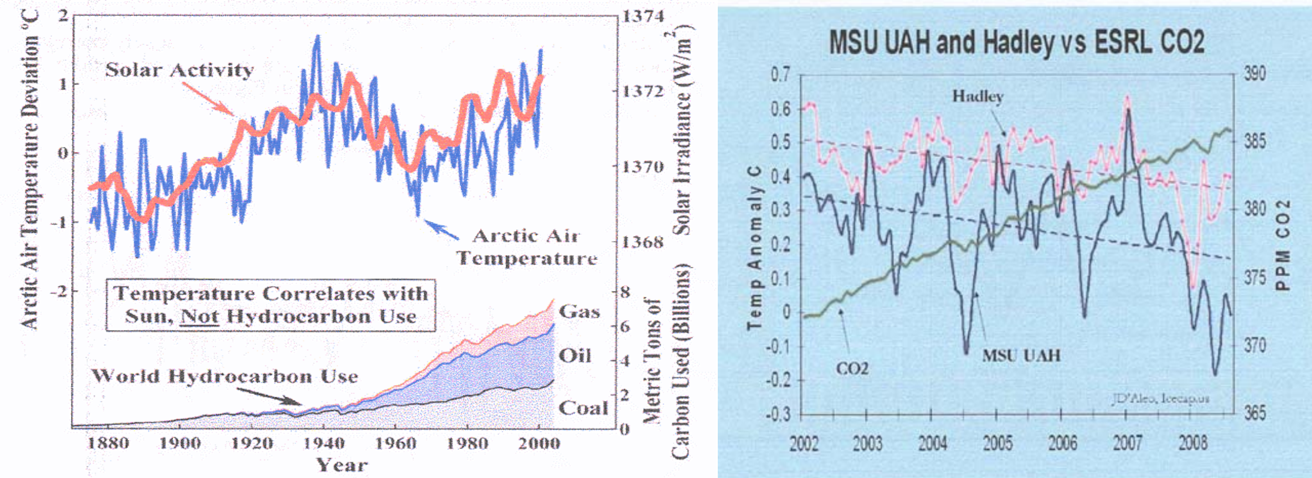


7.2 Warming and cooling periods contradict industrial production of CO_2

According to official climate policy and publicly financed climatologic research, a progressive warming is occurring due to rising emissions of CO_2. The computer based simulation models that are used to forecast a further man-made warming have deficiencies, which the public discussion attempts to completely avoid. The crucial facts are illustrated in Fig. 32:

- The stronger CO_2 production began later than 1960 and then increased progressively.
- Two cooling phases occurred in spite of growing CO_2-emissions: between 1960 and 1980 and, after a short interim warming, again from 1995, which is still on-going.
- Two warming phases took place during the 20th century, the stronger one occurred already between 1920 and 1960, thus, before the really substantial CO_2-production started in earnest.

Fig. 32: Left: development of solar activity, Arctic temperature, and world consumption of hydrocarbons [7]. Right: falling temperatures despite growing atmospheric CO_2-concentration [8]:



7. The cause comes first, the effect later

Since a strong warming had taken place already prior to increasing industrial CO_2-production and since cooling phases have occurred despite our CO_2-emissions, reality contradicts the official climate postulate. In fact, the contradiction refutes the "model" of a climate change that has anthropogenic origins. We say "model" with quotation marks because it is based only on computer generated scenarios and there is no real evidence. That lack of clear scientific evidence has since been detected, at a rather late stage, and now efforts are being made to get out of this trap. To salvage the model of a CO_2-caused climate change, the temperature data of the first warming phase of the 20th century had to be adjusted downwards for all stations of the USA – as illustrated in Fig. 2.

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