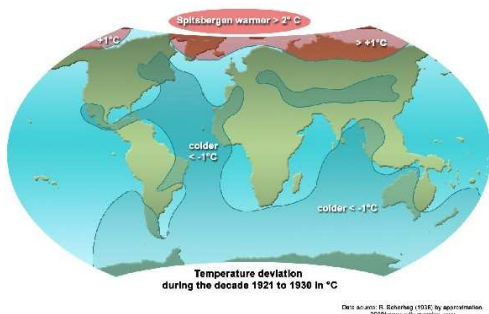




The start of the previous Arctic warming 90 years ago.

By Arnd Bernaerts, Here posted on 30th November 2010
 Earlier posting (20Nov/10) [diggingintheclay](#) & (29Nov/10) [The Air Vent](#)

Introduction: Surprisingly, 90 years ago there was a pronounced warming all over the Northern Hemisphere for two decades, but it is still not clear when this warming started. A

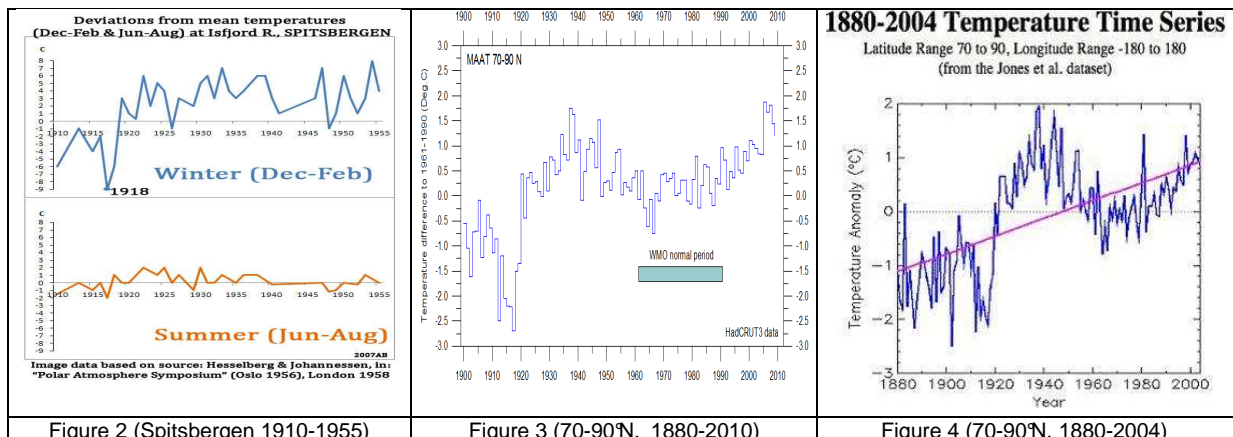


number of authors identify as period the 1920s and 1930s and the IPCC Report 2007 mention the time from 1925 to 1945¹, and a recent posting at: Verity Jones Blog on [„Mapping global warming“ by ‘KevinUK’ \(January 18, 2010\)](#) marked 1910 as the beginning of the warming period, and analysing convincingly that: *“much of the claimed global warming is hardly global at all. In fact it looks to be more accurately Northern Hemisphere warming, and for that matter primarily Northern Hemisphere*

WINTER warming!”

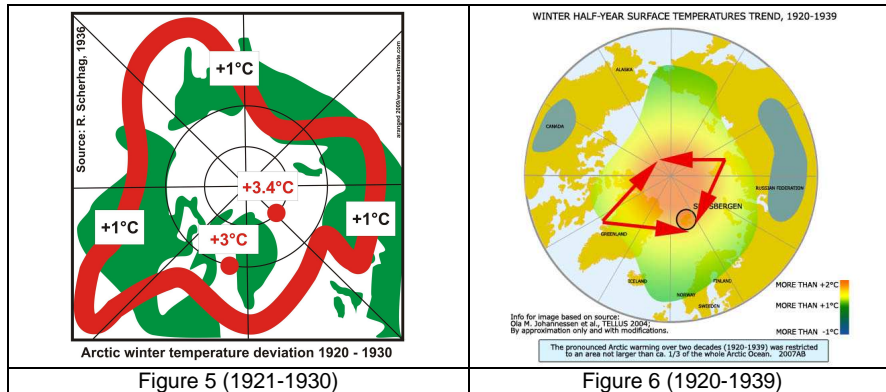
With interesting access to data and maps it is an enjoyable reading, confirming that since 1880 there had been four distinct warming/cooling time periods i.e. from 1880 to 1909 (cold), 1910 to 1939 (warm), 1940 to 1969 (cold) and 1970 to 2010 (warm). From the dates given, I would like to object the date 1909/10, which should not be considered as the change from a cold to a warm period, as this happened some years later towards the end of the decade 1910-1920, between 1916 to 1920, presumably in winter 1918/19. Figure 1 reflects the situation from 1921 to 1930 (Details to the figures in the annex).

Does it matter to be very persistent in this respect? The answer is clearly yes. The more precisely a shift from a warm to cold period, and the region where it occurred is identified, the more it might be possible to identify the cause. For this reason the following discussion is about the start of the first pronounced warming period after the end of the Little Ice Age, which actually commenced as an Arctic warming, primarily close to the Fram Strait region.

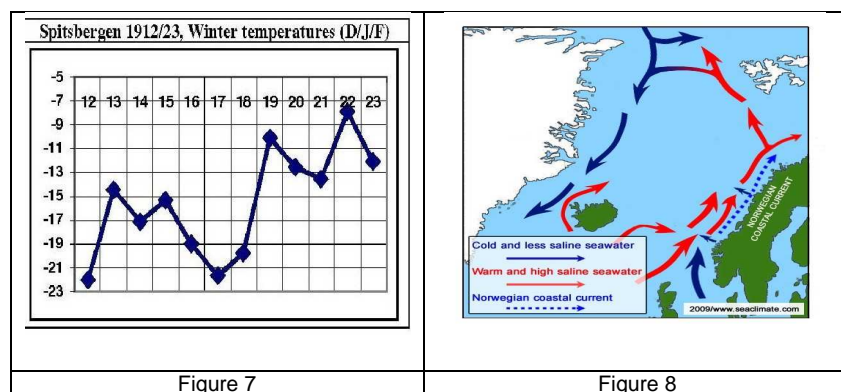


¹ For details see the link in Further Reading: “Arctic Heats Up”, Chapter 2, p. 16f., (i.e. Drinkwater, 2006; Bengtsson, 2004, Johannessen, 2004)

Overview: A substantial point observed by 'KevinUK', as already mentioned, is the more pronounced warming of the Northern Hemisphere and primarily during the winter season. That is exactly what the warming period in the early 20th Century is primarily about. While the summer temperatures increased only modestly, the winters generated the steep warming as observed at Spitsbergen (Fig.2), which is also well reflected in the annual data set for north of latitude 70°N (Fig. 3 & 4). The decade from 1921 to 1930 showed a remarkable winter warming (Fig. 5 & 6), which lasted until 1940 (Fig. 3 & 4). This fact is a paramount aspect to identify the reason for this significant shift during the winter period as the influence of the sun is remote north of 50°N (i.e. London, Vancouver), but any warming must have been coming from somewhere.



Time and Region: The Figures 1, 5 & 6, give a clear indication that the previous warming period in the 1920s and 1930s was primarily located in the North Atlantic section of the Arctic Ocean. Figure 2, 3 & 4 demonstrate equally that the temperature rise commenced before 1920 (Fig. 5 & 6), probably in 1918 (Fig. 2). The later date (1918) should be regarded as the time the Arctic suddenly moved into a strong warming period. Actually, the warming started in the Spitsbergen region in winter 1918/19 (Fig 7, Spitsbergen D/J/F), and was only subsequently observed beyond this station. Under these circumstances it seems difficult to regard the year 1910 as starting point. With some generalisation there had been a modest temperature increase before 1910 (Fig. 4), with a significant decrease from 1910 to 1917. At Spitsbergen the shift is between DJF-1912/18 and DJF-1919/23 is about 8°C, for the whole Arctic region the increase between the decades before and after 1919 (Fig.3 & 4) is about 2°C.

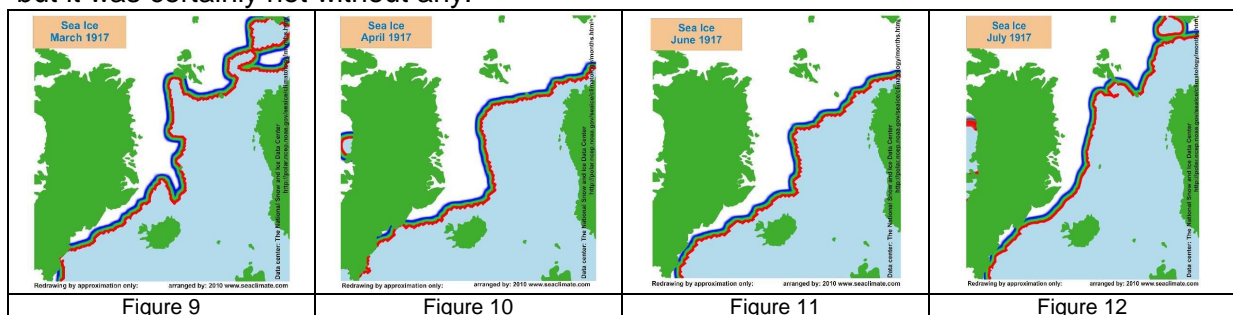


Causation I: West Spitsbergen Current: Having established the time and region of the sudden temperature shift close to Spitsbergen and narrowed it to the winter 1918/19, it is time to ask, what caused and sustained the warming for two decades. For example 'Kevin/UK' states on the analysis of his Figure 8 that: "This is demonstrates clear and significant natural climatic variability during this time period in different parts of the world", and is reasoning in one comment that: "I've personally far happy to convinced that these observable difference in differential warming/cooling trend could be caused by differences in

water vapour concentration/relative cloud cover, particularly late evening/night time cloud cover.” The cause is presumably another one.

The Arctic Ocean winter weather is dominated by a sunless period over more than 6 months, a full sea ice cover, extreme cold, low humidity, low cloudiness, and anticyclones. Neither sun spots, nor carbon dioxide, nor water vapor can be considered as a significant direct contributor to generate a sudden remarkable shift, and keep it sustained over two decades. As there is not any indication that the warming had been generated elsewhere, and subsequently been moved to the polar region (Fig. 1, 5 & 6), it must have been a local source, namely warm high saline Atlantic water, which is carried by the West Spitsbergen Current to the Arctic Ocean. Whether this change was due to an increase of the water masses, or due to a change in the structure over the various sea levels over a considerable depths around the gate to the Arctic Ocean, the Fram Strait, is not known. It seems that the latter is the more likely reason. [\(More details in Book-Chapter 7\)](#)

Causation II: Shift of sea level structure. Little is known about an extraordinary North Atlantic sea ice season in 1917. To my knowledge, such a long and extensive sea ice cover occurred only once through out the 20th Century. Usually there remains a sea ice free tongue off the shore of Spitsbergen (Fig. 9). Against all rules, the tongue disappeared in April 1917, the sea ice extended far to the South (Fig.10), remained very high throughout June (Fig.11), and only retreated in July 1917 (Fig. 12). About the consequences one can only speculate, but it was certainly not without any.



Throughout the long freezing process the ice-covered sea surface level must take the release salt, which makes the sea water heavy, and thus increases the vertical water exchange with deeper levels. During the subsequent melting process since July 1917 the sea surface receives a huge amount of fresh water, which stays at the surface level, until the salinity and/or water temperature is back to the normal. This highly unusual event in the Northern North Atlantic from April to July 1917 could well have contributed to a shift in the ocean structure between Spitsbergen and the Fram Strait, which subsequently caused the warming of the Northern Hemisphere from winter 1918/19 to 1940.

Causation III: The change in the northern NA ocean structure. This is worth to be discussed separately another time. For now only this brief comment: As there was nothing in “the air”, for example a volcanic eruption, or a major earth quake, or a tsunami, or a meteorite plunging on land or into the sea, it might be necessary to recall what happened in Europe from 1914 to November 1918. Over four years a devastating battle on land, in the air and at sea took place. Huge naval forces battled in the waters in the east and west of Great Britain, it is my view that this may have changed the sea structure with respect to heat and salinity over many meters depth. All water moved north with the Norwegian Current, and the West Spitsbergen Current, to enter the Arctic Ocean after a time period of several weeks or months (Fig. 8). That could have influenced the exceptional sea ice conditions during summer 1917, or even may have contributed alone, via a change in the ocean structure between Spitsbergen and Greenland, the climatic shift in the high north in winter 1918/19. [\(More details in Book-Chapter 8\)](#)

Further Reading:

___Book (2009)___ **“Arctic Heats Up. Spitsbergen 1919 to 1939”**; <http://www.arctic-heats-up.com>

___Paper (2010)___ **“Indian Drought and North Atlantic 1917 & 1918”** (PDF, 1MB)

___Paper (2009)___ **“The Circumstances of the Arctic Warming in the early 20th Century”** (PDF, 0,9MB)

___Home Page___ <http://www.arctic-warming.com/>

Figures:

___Fig. 1; based on material by: R. Scherhag, (1936), “Die Zunahme der atmosphärischen Zirkulation in den letzten 25 Jahren.”, Annalen der Hydrographischen Meteorologie, Vol. 64, p. 397ff, Tafel 62, Figure 10.

___Fig. 2; based on material by: Hesselberg, Th., Johannessen, T. Werner; (1958); in: R.C. Sutcliffe, ed.; ‘Polar Atmosphere Symposium – Part I, Meteorology Section; Symposium at Oslo 2-8 July 1956, London, pp. 18ff; Figure 2.

___Fig. 3; download from: <http://www.climate4you.com/index.htm> >>“Temperature in Polar regions: Arctic and Antarctic”, >> [Arctic temperature change](#), showing the mean annual surface air temperature (MAAT) anomaly 70-90°N compared to the WMO normal period 1961-1990, as estimated by Hadley CRUT. HadCRUT3 temperature data from the [Climatic Research Unit \(CRU\)](#) has been used to prepare the diagram.

___Fig.4; Download from <http://www.pi-news.net/wp/uploads/2008/10/arktis3.jpg>

___Fig. 5; based on material by: R. Scherhag, (1936), see Fig. 1; Tafel 58, Fig. 2 (Temperature deviation from November to March 1921-1930 versus long term mean.

___Fig. 6; based on material by: Ola M. Johannessen, Lennart Bengtsson, Martin W. Miles, Svetlana I. Kuzmina, Vladimir A. Semenov, Genrikh V. Alekseev, Andrei P. Nagurnyi, Victor F. Zakharov, Leonid Bobylev, Lasse H. Pettersson, Klaus Hasselmann and Howard P. Cattle; “Arctic climate change – Observed and modeled temperature and sea ice variability”; Nansen Environmental and Remote Sensing Center, Report No. 218, Bergen 2002; Tellus 56A, (2004), p. 328 –341, Figure 2 (SAT trends north of 30°N in the winter period from November to April, 1920-1939)

___Fig. 7; based on Giss data: Source: Paper (2010) **“Indian Drought and North Atlantic 1917 & 1918”**

___Fig. 8; Source: <http://www.arctic-warming.com/the-warming-event-in-detail.php> (here: amended)

___Fig. 9 – 12: based on data from:

<http://polar.ncep.noaa.gov/seaice/climatology/months.shtml>; Source: Paper (2010) **“Indian Drought and North Atlantic 1917 & 1918”**