

Stockholm's arctic winter of 1942 (3_23)

Choosing Stockholm

This paper presents an example of the extraordinary winter conditions in a number of places along the 'cold axis' stretching from Stockholm to London during the three arctic war winters of 1939-42. (A) As a representative example Stockholm is chosen to study these conditions. On the one hand the weather observation at Stockholm was properly done during war times, and the resultant data was analysed comprehensively by eminent Swedish meteorologist Goesta H. Liljequist (see below). On the other hand, Stockholm was close to the enormous activities in the Baltic Sea from June 1941 until December 1941 connected with the invasion of Russia by Germany, when sea icing halted naval warfare at sea. (B) To this extent, Stockholm was not only one of the top freezing cities along the 'cold-axis', but was bound to take the trophy for the ultimate top freezing winter. (C)

Further details: (A) Three war winters, 3_31; (B) Barbarossa, 3_21; War winter 1941/42, 3_22.

The following elaborations seek to show that this event did not come about as



a 'natural variation', not even a little bit. Like the previous two war winters of 1939/40 and 1940/41 the winter 1941/42 was also caused by the war at sea in the waters of Northern Europe. However, with regard to Stockholm, the appearance of the war winter 1941/42 is a massive evidence

showing that waging a six months naval warfare in the Baltic Sea inevitably catapulted Stockholm into a record cold even beyond the conditions experienced in the Little Ice Age.

Sweden already out of tune in 1941

Sweden experienced a very variant year with a number of extremes. As elsewhere in north-western Europe the winter of 1940/41 was very cold. The summer 1941 was generally warm. In Stockholm the temperature was +11.5°C above the usual mean. The highest temperature measured in Sweden in summer 1941 was 36.8°C on July 14th (at Lindhult, Skaraborgs lan). With regard to precipitation also the year was highly variant. In general they were too low, particularly the spring was very dry. Southern Sweden received excessive rain in August and in the first half of September, quite often with heavy cloudburst and hail¹.

December 1941 also remained variant. From 6th to the end of the month with two exceptions, the weather was dominated by passing cyclones sometimes with opposite wind directions (Norrland – easterly; Götaland –westerly), enormous weather variations and ‘a deep fall’ in temperature of up to 15



degrees in 24 hours. On 27/28 December wind-forces 10 and 11 Beaufort were registered at the West- and South coast.

Another extraordinary event was a temperature drop in the middle between Narvik and Stockholm before the year 1941 ended. On

December 13th on a plain alcohol thermometer at Malgoviks primary school, Laxbaecken, Vaesterbotton lan, (64 ° 37' North, 16° 25' East) a very low temperature was recorded. Based on the comparison with a common thermometer it could be assumed that a temperature of minus 53°C was registered. According to the Swedish Meteorological Service² it was a new record for Sweden.

¹ Statens

² Statens

The Swedish winter 1941/42 in detail

Amazement of a scientific witness

Goesta Liljequist expressed his amazement about the winter 1941/42 as follows: After the two hard winters of 1939/40 and 1940/41 and the difficulties they generated for the shipping and the fuel supply for the country, one has awaited and expected that the winter of 1941/42 would bring a return of the mild winters, which had recently predominated. Instead this winter became one of the toughest, if not the severest of all winters during the last 200 years³.

January 1942

General Overview: During the first few days of the month a moderate westerly airflow dominated. On 4th a high pressure zone developed in the NW of Lappland, which brought cold winds to the whole of the country. On 7th a small low pressure area moved over Norrland to the East, where the air pressure remained equally distributed but afterwards increased in general. On 13th there was a high-pressure zone over the northerly Scandinavia. Wind came from an easterly direction in most parts of the country until the end of the month. The highest air pressure of 1,045 mb was measured on 21st in Norrland. Together with the easterly winds snowfall occurred temporarily, particularly on the Baltic coast. On 24th very cold air came from the East, despite a cloudy sky, the temperatures dropped down to -25°C and to -30°C, with a wind speed of more than 10 m/sec at the same time. On 26th temperatures recorded were between -35°C and -40°C with a clear sky and calm as far south as Smaland. Especially, between the days 25-26 and 29-30 a great difference in air pressure was recorded between northerly Sweden and southerly Baltic Sea, with easterly winds (kultje) dominating temporarily at the Baltic Sea.

Air pressure: The mean value was higher as usual all over the country. The deviation in the northerly Norrland was the highest (17-18 mb), but decreased gradually towards the south, so that at Skane the deviation was still 4-5 mb. Never before had such a high January mean air pressure been recorded for Norrland. Usually the air pressure in Norrland is lower than in Götaland. Westerly and south-westerly winds usually dominate then. In January 1942 the situation was completely reversed, which caused permanent easterly or north-easterly winds.

Temperatures: The biggest temperature deficit – about -10°C - was recorded in the interior parts of Götaland, northern Varmeland, Dalarna and southern Norrland. A number of record temperatures were recorded in Götaland and

³ Liljequist, 1941/42

⁴ Statens

Svealand. The temperatures were 6 to 7°C lower than the lowest known temperatures until then⁴.

A depiction of the circumstances evidently demonstrates that the Baltic Sea (and North Sea) had lost their usual heat reserve.

The following table shows the deviation in January 1942 against the mean monthly January temperatures, and in comparison with the values of 1880, the previous 'severe winter' (on about place ten of the severe winters since 1757 at Stockholm, see below).

Location	Means monthly Temperatures		Highest and lowest Temperatures			
	Period 1901-30	January 1942	1880	1942	1880	1942
Harnsand	-5.8	-14.7	+10.0	+3.0	-35	-27
Stockholm	-2.5	-10.6	+10.5	+2.8	-23	-28.2
Joenkoeping	-1.5	-11.2	+10.5	+4.0	-25.3	-33
Göteborg	0.0	-8.9	+9	+4.8	-24	-26
Karlshamn	-0.3	-8.4	+11	+4	-20.5	-27

February 1942

Wind and snow restrained the navigation and rail traffic. The difficulties reached their height in Skane on 12th. On 15-16 with mild winds temperatures returned to positive figures in North Sweden, while there was a severe cold in South Sweden.

The air pressure had been higher than usual over the whole country. Deviation 9-10mb in Norrland; in Skane 4 mb.

The temperatures had been lower than in February 1940 at a number of locations.

Location	Means monthly temperatures		Highest and lowest Temperatures			
	Period 1901-30	February 1942	1880	1942	1880	1942
Harnsand	- 5.3	-11.7	+12.5	+0.2	-32	-26
Stockholm	-2.6	-10.5	+9.3	-0.2	-24.5	-18.8
Joenkoeping	-1.7	-11.3	+12.2	-0.4	-31	-33.3
Göteborg	-0.3	-7.9	+9	+1.0	-25	-19
Karlshamn	-0.6	-6.6	+13	+1.0	-24	-16

Source: Statens, Arsbok Vol.24

It is worth noting the remarkable difference of highest temperature values in 1880 compared with 1942, which demonstration again, that the Baltic Sea was deprived of the common seasonal heat reserve in January and February 1942.

March 1942

In the southern Götaland and Gotland Island it was the coldest March since 1860⁵. The sea ice conditions in Swedish coastal waters were severe and long lasting.

Considerations

The following factors seem to be particularly interesting:

- The fact that the deviation from the lowest mean temperature was significantly severe in the middle and southern parts of Sweden.
- The 'highest monthly temperatures' were far lower than in 1880. The difference of 7°C in January, and 10°C in February (see tables above), is a clear indication that the Baltic Sea had 'cooled out' very early so that the sea could hardly supply the atmosphere with any energy.
- The high air pressure in Norrland is certainly worth noting as well as the change of position with Gotland with regard to higher/lower air pressure.

Stockholm's ice winter 1941/42

In 1943 Goesta Liljequist made a thorough assessment of the "The severity of the winters at Stockholm 1757 – 1942". The following data have been gathered from his work.⁶

The winter 1941/42 ranks high in the list of very severe winters. Under a group of 15 most severe winters since 1757, the winter of 1939/40 ranks about 10, and the winter 1941/42 in the top ranking as follows:

No	Mean temp. of Dec. – March	Mean temp. of the three coldest months	Sum of negative monthly means temp.
1	1788/89, -8.0°	1941/42, -9.2°	1788/89, -31.9°
2	1808/09, -7.6°	1788/89, -9.1°	1808/09, -30.5°
3	1941/42, -7.5°	1808/09, -8.7°	1941/42, -30.5°

Liljequist points to the fact that since temperature observations were taken about 1760 the mean winter temperatures had increased by about 2°C and that this tendency was especially well marked from the middle of the 19th century. Insofar the deviation from 'normal' became even more evident.

⁵ Liljequist, 1941/42

⁶ Liljequist, Severity

It should be noted that the ranking of winters on the basis of the ‘three coldest months’ is a clear indication that the heat reservoir of the Baltic Sea had diminished to the lowest level. A general assessment of the summer and autumn weather conditions (see above) does not necessarily indicate that a ‘break-down’ of the Baltic’s heat reservoir was in progress. This should not come as a surprise. Massive ‘stirring’ of huge water areas over the autumn months by naval activities presumably supplied plenty of humidity that gave the impression of a sort of ‘normality’. At the same time the water quickly lost a lot of stored summer heat. This is particularly confirmed by the fact that since February 15-16, North Sweden moved to some positive temperature gains, but a severe cold continued in South Sweden. The latter aspect points to the fact, similar to the winter of 1939/40, that the Baltic Sea was a front player in bringing about the harsh winter.

Conclusion

The place of the winter of 1941/42 deep in the time of the Little Ice Age is remarkable. It is even more remarkable given that a global warming was evident for many decades. The winter of 1941/42 was for this reason more outstanding than the two other top ranking winters about 150 years earlier.

The reasons are anthropogenic. The military combat between the German and Russian naval forces (A), in the Baltic Sea for over five months in autumn 1941, shifted the course of the Baltic climate and gave Stockholm a record arctic winter.



Further details: Barbarossa, Baltic battlefield, 3_21.

When the Baltic Sea saw a cease of naval warfare due to heavy sea icing the war went global. Japan attacked the United States on Hawaii on 7 December 1941. The impact of the attack can certainly not be measured in climate statistics, as it was only the prelude for intense naval warfare in all oceans and seas for four years.