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Homogenisation of monthly maximum and minimum temperature series 1961-2020

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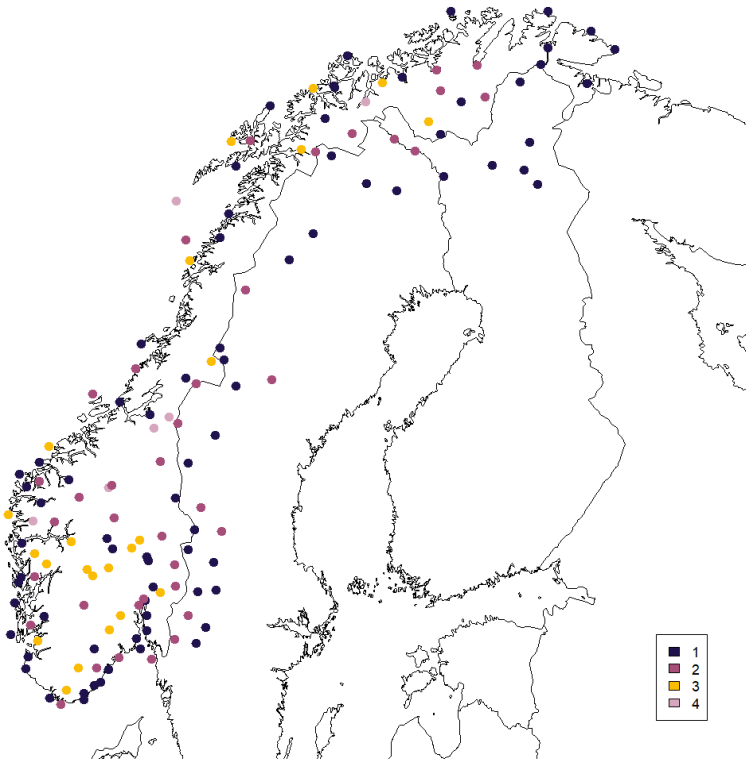

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Abstract
This study performs a homogeneity analysis of 107 monthly mean maximum and minimum temperature series in the period 1961-2020 using the homogenisation software HOMER. There were 166 breaks in the maximum temperature series while there were 150 breaks in the minimum temperature series. 92 of the 107 maximum temperature series had one or more breakpoints while 85 of the 107 minimum temperature series had one or more breakpoints. Relocation is the most common cause of inhomogeneities both in the maximum and minimum series, explaining more than half of the adjusted inhomogeneities.

Keywords
Homogenisation, climate normals, maximum temperature, minimum temperature

Disiplinary signature

Responsible signature

Abstract

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Introduction

Homogeneous time series are important when studying the climate and its variability. They should consist of measurements that have not been affected by factors such as instrumental changes, relocations, change in measurement time and frequency, new observers, and changes in the physical environment around the station such as new buildings or changed ground cover. A homogeneous series will reflect climate variability and climate changes, and not station changes.

Few long time series are homogeneous because the factors listed above occur quite commonly. It is rare to have a series where measurements have been done at the same time in the exact same way by the same person using the same instrument in a location that has remained unchanged. Homogeneity analysis of time series is therefore important when assessing climate variability and trends.

This homogeneity analysis is a continuation of the «New climate normals» project at the Norwegian Meteorological Institute (MET Norway). In this project, homogeneous datasets are used as a basis for the further calculation of new standard climate normals for the 30-year period 1991-2020. In this project, monthly mean temperature series and monthly precipitation series have already been homogenised (Kuya et al. 2020, Kuya et al. 2021) using two different homogenisation softwares: HOMER (Mestre et al. 2013) and Climatol (Guijarro 2019). To be consistent with the homogeneity analysis of mean temperature (Kuya et al. 2020), the homogenisation software HOMER is used in this analysis.

This study performs a homogeneity analysis of 107 monthly mean maximum and minimum temperature series in the period 1961-2020 using HOMER.

Methods

1.1 HOMER

HOMER (HOMogenisation softwarE in R) is a homogenisation software that uses relative homogenisation methods which means it uses networks of neighbouring series in the analysis. It was developed during the European COST action ES0601 and includes features of several homogenisation methods (Mestre et al. 2013).

HOMER has three break detection functions in its homogenisation process: Pairwise detection, joint detection and ACMANT detection. We refer to the detailed description of HOMER that was provided in the report describing the homogenisation analysis of mean temperature (Kuya et al. 2020) and will not go into further details about HOMER in this report.

The settings used for the homogenisation procedure was *additive correction* using a *minimum correlation* of 0.95 to select the network of neighbour series (reference series), but with a *minimum number* of 8 reference series in the network. The series were tested on an *annual and seasonal* basis in the pairwise detection.

After quality control and outlier checks, the homogeneity analysis was conducted in this order:

1. Pairwise detection
2. Joint detection
3. Correction
4. Pairwise detection
5. ACMANT detection
6. Joint detection
7. Correction
8. Pairwise detection
9. Correction
10. Assess month of change
11. Final correction

1.2 Metadata

Metadata, or recorded changes at the station in form of inspection notes, pictures, maps and letters, were used as support in the analysis. Metadata can help when deciding whether to accept a detected break point and also give a precise date for the detected break point. The metadata used in this analysis is stored both digitally and in paper form at MET Norway.

1.3 Criteria for homogeneity breaks

The criteria below were followed in the homogeneity analysis:

- Breaks in the first five years and last five years of the series were not accepted.
- Breaks with no metadata were accepted if the break showed up in 75 % of the reference stations in Pairwise detection. If the break showed up in Joint detection and ACMANT, this was also taken into consideration.
- Breaks supported by metadata were accepted if it showed up in at least three reference series in Pairwise detection.
- Breaks detected in Joint detection or ACMANT were generally treated with caution and only accepted if supported by metadata and if it showed up in at least four reference series in Pairwise detection.

Breaks within five years of each other were carefully assessed. If both breaks passed the criteria for being accepted, the break point with metadata or with the metadata having the most plausible or obvious cause was set as the break point to avoid too many breaks within short time periods. Breaks that seemed to be caused by outliers were generally rejected. Some exceptions were made when we had metadata explaining and justifying the cases, see Table 1 and 2.

When there were periods of missing data before a break (for instance when a station was shut down one year and a new replacement station was not in place until a few years later), the break point was put at the start of the missing data period.

For cases where accepted breaks were not supported by metadata, the date suggested by HOMER in the «assess month of change» step was used.

Data

In this report, 107 Norwegian monthly mean maximum and minimum temperature series were analysed, see Figure 1. Series from Finnish and Swedish stations along the borders were also included as support in the analysis.

The monthly series are calculated as the monthly average of the daily maximum and minimum temperatures. The series are the same as those analysed in the mean temperature report (Kuya et al. 2020), except for one station that did not have extreme temperature series long enough to be included in the analysis (*66720 Berkåk-Terminalveien*).

The analysis was performed to give a homogenous data set for calculation of new standard normals for the period 1991-2020. The analysed time period was extended to 1961-2020 to get longer time series and thus a more robust result.

The data series included in the analysis were to have no more than 10 missing years of data in total. There was one exception to this rule. The series from *75410 Nordøyan fyr* had missing data in summer (June, July and August) in the time period 1965 -1996. The series was still included because it is located in an area with relatively few stations and would therefore be of great help in the homogenisation analysis for the three remaining seasons that had data in this period.

1.4 Merging of series

Many series were merged with series from neighbour stations to get long enough series for the analysis, see Table A1 in the appendix. The criteria for merging two series were a maximum distance of 10 km and a maximum difference in height above sea level of 100 m.

In cases of overlap in the two series that were merged, the data from the newest station was chosen. There were two exceptions to this, *10380 Røros* and *91740 Sørkjosen lufthavn*, where the new station had poor data coverage in the beginning. Data from the old station was then used until the new station stabilised.

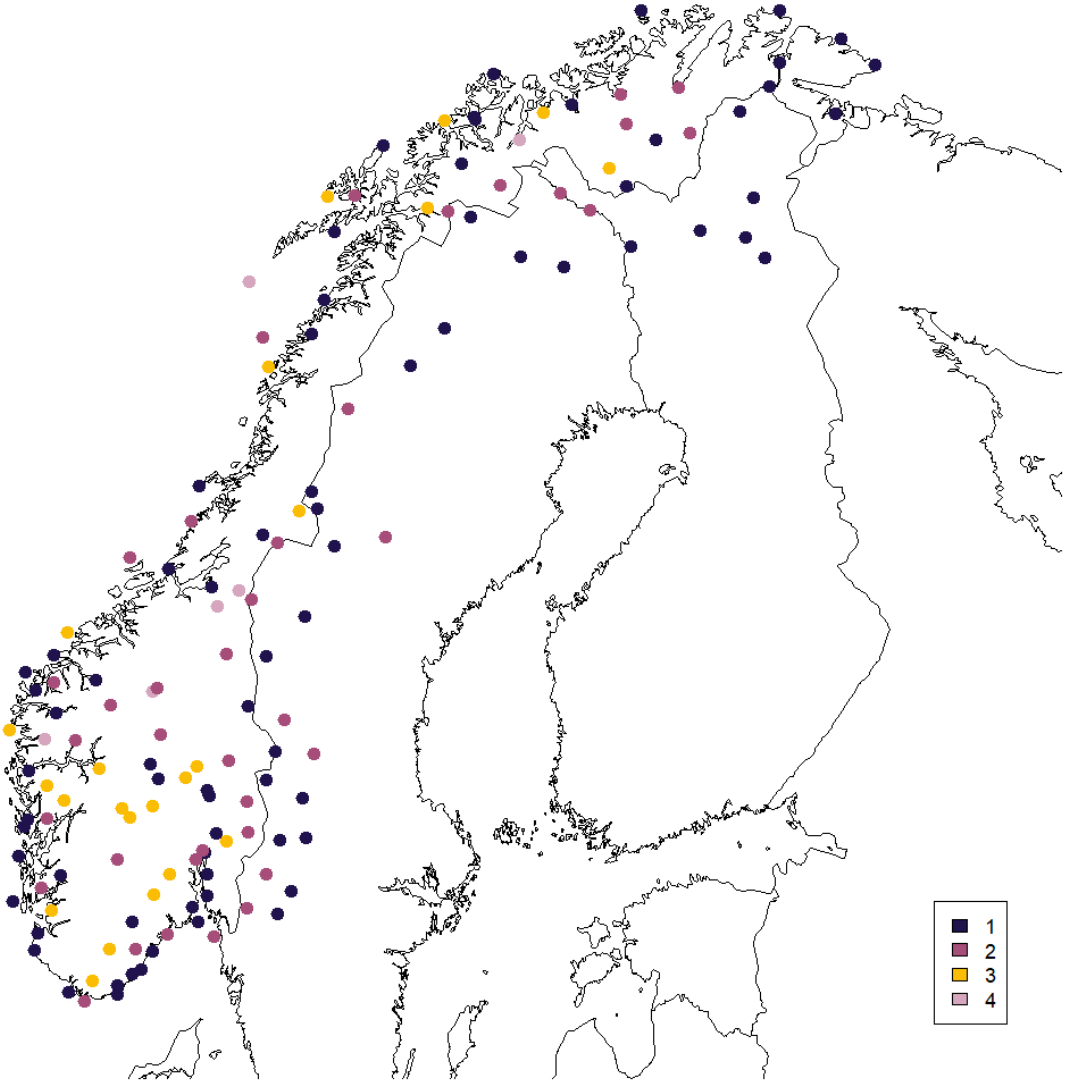

Figure 1. Locations of the stations used in the homogeneity analysis of maximum and minimum temperature series. The 107 Norwegian, 7 Finnish and 29 Swedish stations are shown. The colours show whether the series are merged and if so, how many series are included in the merged series.

1.5 Finnish and Swedish data

Finnish and Swedish series from the areas along the Norwegian border were included as support in the analysis. For the 7 Finnish series and 29 Swedish series there were no metadata available other than date of merging of series (i.e., relocation of the station). The Finnish and Swedish stations were included in the analysis as reference series only, and no detailed analysis of the homogeneity breaks in these series was done. All breaks in the Finnish and Swedish series were accepted, see Table A5 and A6 in the appendix.

1.6 Outliers

There were several suspiciously high or low values in the minimum and maximum temperature series that were further inspected by comparing the daily minimum temperature series to neighbour series. In most cases the values were deemed valid, but some were not accepted and were deleted from the data files. A few series had longer periods of suspiciously low or high values. See Table 1 and 2 for an overview of the removed and adjusted outliers.

For two of the series with longer periods of suspicious values *(85890 Røst lufthavn* and *86740 Bø i Vesterålen III*), it was decided to set breaks to adjust the period with suspicious data.

For *85890 Røst lufthavn* the measurements seem to have been unstable in 2014-2016. The exact reason is unknown, but there were reports of an unstable logger and problems with the data flow in this period. The temperature sensor was also replaced by a new one in July 2015, although this does not seem to have fixed the issues completely. Because of this, the suspiciously low values were adjusted by setting breaks in 2014 and 2016.

For *86740 Bø i Vesterålen III*, the suspicious values in 2001-2003 were due to the merging of the series with the neighbouring series *86780 Litløy fyr* and because of this the values were adjusted by setting breaks in 2001 and 2003.

*Table 1. Outliers in **minimum** temperature series.*

Station	Date (yyyy.mm)	Notes and action
4920 Årnes	2011.06, 2011.07	Removed
41175 Laudal-Kleiven	1995.08	Removed
42160 Lista fyr	2001.1	Removed
44080 Obrestad fyr	1998.05, 2002.10	Removed
46610 Sauda	2016.06 - 2017.07	Removed
59680 Ørsta-Volda lufthamn	2019.11	Removed
62480 Ona	1961-1963	Merging of series in 1963. Too early in series to adjust. No action taken.
80102 Solvær III	2005.04, 2005.05, 2005.09	Removed
85890 Røst lufthavn	2014.07-2016.09	Even though close dates, decided to set breaks in 2014.07 and 2016.09 to adjust the suspiciously low values.
86500 Sortland	1977.04 - 1977.08	Removed
	1978.06 - 1978.08	Removed
86740 Bø i Vesterålen III	2001.07-2003.05	Even though close dates, decided to set breaks in 2001.07 and 2003.05 because this period has data from a neighbour station.

*Table 2. Outliers in **maximum** temperature series.*

Station	Date (yyyy.mm)	Notes and action
44560 Sola	1978.04 - 1978.06	Removed
44080 Obrestad fyr	1998.05	Removed
59680 Ørsta-Volda lufthamn	2019.11	Removed
85890 Røst lufthavn	2014.07-2016.09	Even though close dates, decided to set breaks in 2014.07 and 2016.09 to adjust the suspiciously low values.
86500 Sortland	1976.11 - 1976.12	Removed
	1977.01, 1977.02, 1977.11, 1977.12	Removed
	1978.01 - 1978.02	Removed
86740 Bø i Vesterålen III	2001.07-2003.05	Even though close dates, decided to set breaks in 2001.07 and 2003.05 because this period has data from a neighbour station.
88690 Hekkingen fyr	2017.04 - 2017.09	Removed
	2018.04 - 2018.09	Removed

Results, analysis, discussion

When adjusting breaks, the newest part of the time series is considered the homogeneous part and the level which we want to adjust the older and inhomogeneous parts of the series up or down to. Because of this, HOMER gives two different adjustment numbers for each break, one called *break amplitude* and one just called *adjustment*.

Adjustment is the break adjustment relative to the newest part of the series and is used for the actual correction of the series. *Break amplitude* is the amplitude of the adjustment relative to the proceeding time series level after the break, and not necessarily to the newest part of the time series. When there is only one break in the series, the break amplitude and the adjustment is the same, but with two or more breaks in the series they are different. It is specified in the text when break amplitude is used instead of adjustment in this chapter.

1.7 Number of breaks

There were 166 breaks in the maximum temperature series while there were 150 breaks in the minimum temperature series. 92 of the 107 maximum temperature series had one or more breakpoints while 85 of the 107 minimum temperature series had one or more breakpoints, leaving 15 and 22 homogenous series for maximum and minimum temperature respectively, see Figure 2a.

There were more breaks in the maximum temperature series than in the minimum temperature series, especially in the 1990s and after 2005, see Figure 2b.

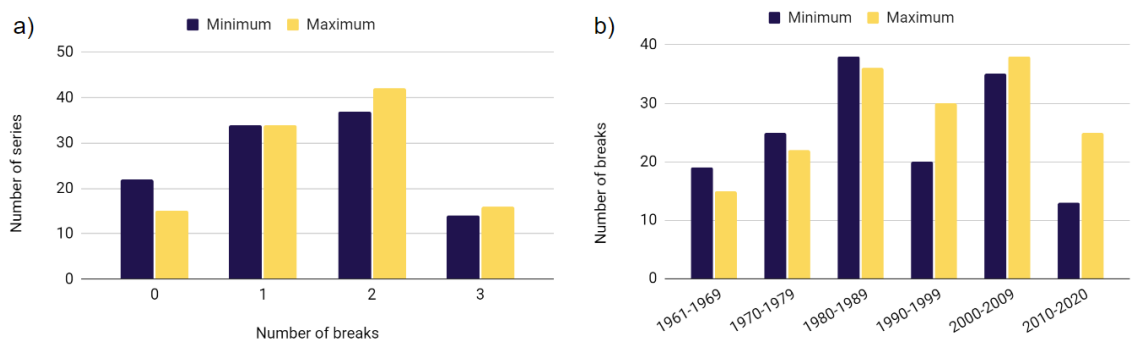

Figure 2. a) Number of series with 0, 1, 2 or 3 breaks, and b) number of breaks per decade for the minimum and maximum temperature series.

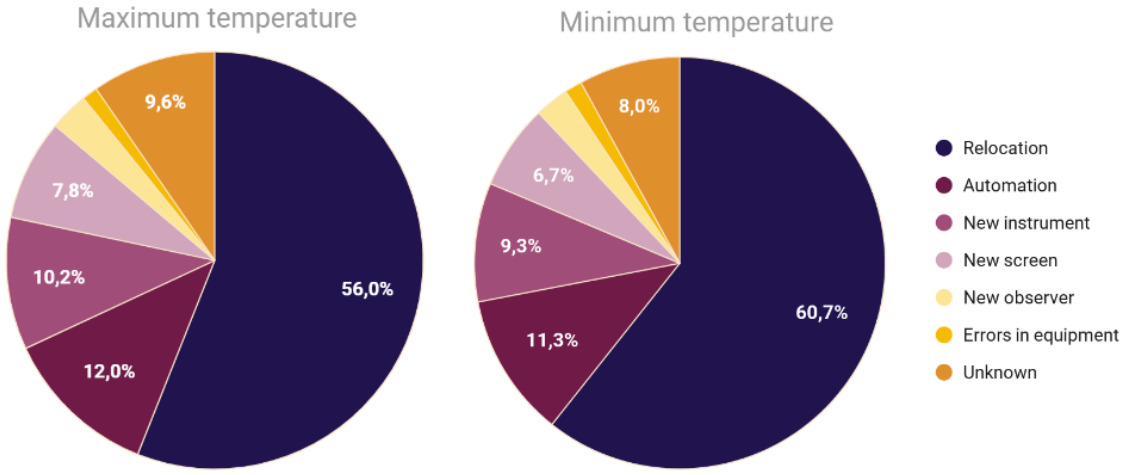

Figure 3. Reasons for homogeneity breaks in the maximum and minimum temperature series. The reasons include relocation of the radiation screen, automation of the station, new thermometers, new radiation screens, change of observers, a couple of cases of correcting errors in the measuring equipment as well as unknown reasons.

1.8 Main causes of homogeneity breaks

Relocation is the most common cause of inhomogeneities both in the maximum and minimum series, see Figure 3. Relocations can lead to change in exposure. The new location may be more sheltered, located higher or lower above sea level, closer or further away from a water body, or have different ground cover. All of these factors may impact the measurements. It is important to note that relocation often leads to changes in instrumentation and radiation screen as well. Relocations that caused homogeneity breaks in this analysis ranged from a few metres to several kilometres.

56 % of the breaks in maximum temperature series were explained by relocation. The break amplitudes were evenly distributed around zero (Figure 4) and were within the interval [-0.62, 0.71] °C.

61 % of breaks in the minimum temperature series were explained by relocation. Relocation was also the cause of the largest breaks in the minimum series, the break amplitudes were within the interval [-1.53, 2.14] °C (see also section 1.9).

A majority of the relocations led to lower minimum temperatures in the new location, giving an average break amplitude of -0.16 °C. Before 1990 the break amplitudes are relatively evenly spread around zero, while after 1990 there is a majority of negative break amplitudes, see Figure 5.

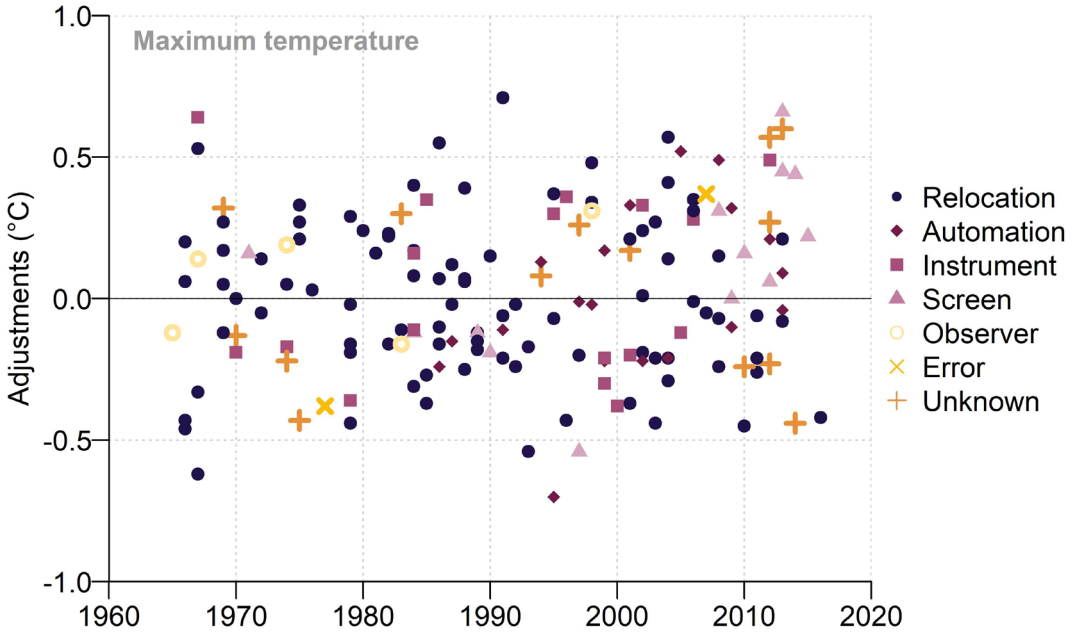

Figure 4. Annual break amplitude for the detected breaks in the maximum temperature series plotted against time and grouped by cause of break.

One of the reasons for this might simply be that the instruments are moved to new locations with exposure that gives lower minimum temperatures. Another reason could be that many of the relocations after 1990 also included automation and a new cylindrical screen (MI-2001B), which is known to give slightly lower minimum temperatures (Mjelstad et al. 2002).

Automation was the second most common cause of inhomogeneities both in the maximum and minimum series, being the reason for 12 % and 11 % of the breaks respectively, see Figure 3. When a station is automated there are many changes that occur at the same time. The station is equipped with new sensors and in many cases a new type of screen. The measurement frequency changes, and automation of the station very often comes with a small or large relocation as well.

Because of all of these different factors there are both positive and negative adjustments of the breaks caused by automation, and no clear pattern in the adjustments for maximum temperature, see Figure 4. For minimum temperature, there was a slight majority of negative break amplitudes, see Figure 5.

New instruments may give inhomogeneities if they are calibrated differently compared to the old one, or if replacing a faulty instrument. This was the cause of 8 % and 9 % of the breaks in the maximum and minimum series respectively.

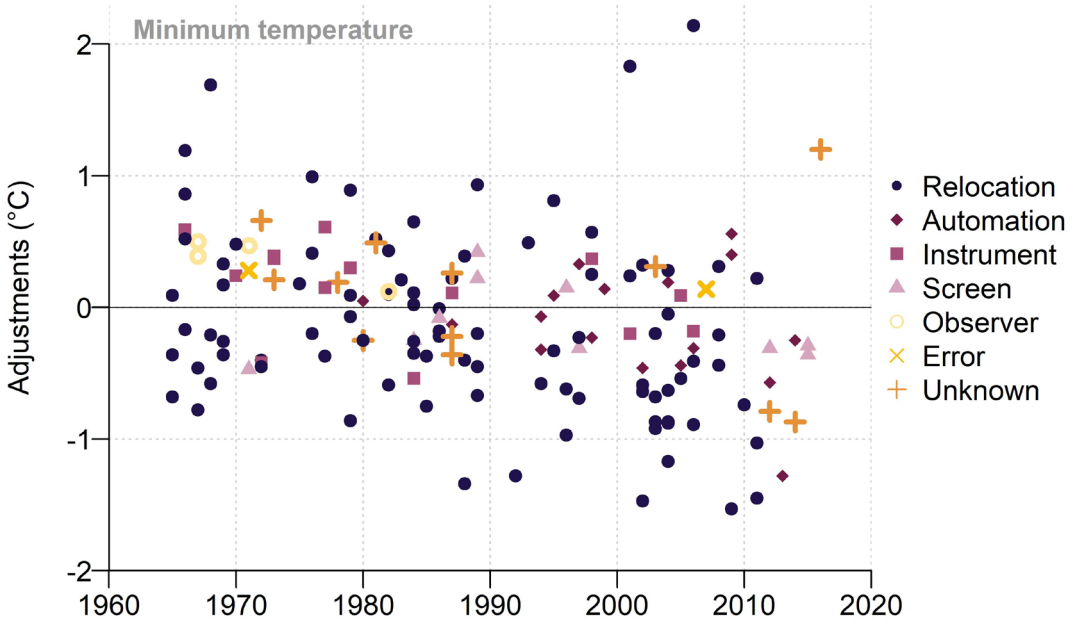

Figure 5. Annual break amplitude for the detected breaks in the minimum temperature series plotted against time and grouped by cause of break.

New screens were the reason for around 8 % and 7 % of the breaks in the maximum and minimum temperature series respectively. Several different screen types have been in use in the Norwegian station network in the analysed period in this report: Two types of wooden free-standing screens (MI-33 and MI-46) and two types of cylindrical plastic screens (MI-74 and MI-2001B (which is an improved version of MI-74)). Comparisons (e.g., Mjelstad et al. 2002) show that a change from a wooden free-standing screen to a cylindrical plastic screen generally gives higher maximum temperatures and lower minimum temperatures. There are however seasonal differences. See also Nordli et al. (1997) for more details about the different radiation screens.

This analysis exhibits the same pattern as Mjelstad et al. (2002). For the maximum series, the breaks caused by a change from a wooden screen to a cylindrical plastic screen resulted in higher maximum temperatures. For the minimum temperature series, these changes resulted in lower minimum temperatures.

A new observer should in theory not affect the measurements, but in some cases differences in daily routine or reading errors may cause inhomogeneities. This was the cause of about 3 % of the breaks in both the maximum and minimum series.

Errors in equipment were the reason for two breaks for both maximum and minimum temperature.

Around 10 % and 8 % of the breaks in the maximum and minimum temperature analysis had **unknown reasons** and could not be explained by the metadata available at MET Norway. The break amplitudes were in the interval [-0.79, 0.66] °C for minimum temperature and [-0.44, 0.6] °C for maximum temperature.

This «unknown»-category also includes the breaks in the series *85890 Røst lufthavn* that were added to adjust suspiciously low values in the period 2014-2016. The break amplitudes for these breaks were -1.11 °C and 1.17 °C for maximum temperature and -0.87 °C and 1.2 °C for minimum temperature.

1.9 Large breaks in minimum temperature series

There were larger breaks in the minimum temperature series than in the maximum temperature series. The break amplitude for the breaks in the maximum temperature series were well within ±1 °C (except for the outlier adjustment break at *85890 Røst lufthavn*). For minimum temperature the break amplitudes were all within ±2 °C except for one break with an amplitude of 2.14 °C.

The large breaks in the minimum temperature series are mostly caused by relocation and a corresponding change in exposure, either from moving up or down valley sides, or moving closer to or further away from the coast.

1.10 Impact of homogenisation

One series from each of the seven temperature regions in Norway (Hanssen-Bauer et al. 2022) were plotted before and after homogenisation, see Figure 6. The figure clearly shows that the homogenised series have a much more similar temperature development and have a smaller span especially in the first half of the series than the non-homogenised series. The homogenised series are more spatially coherent than the non-homogenised series. This underlines the importance of homogeneity testing of series before studying climate variability and trends.

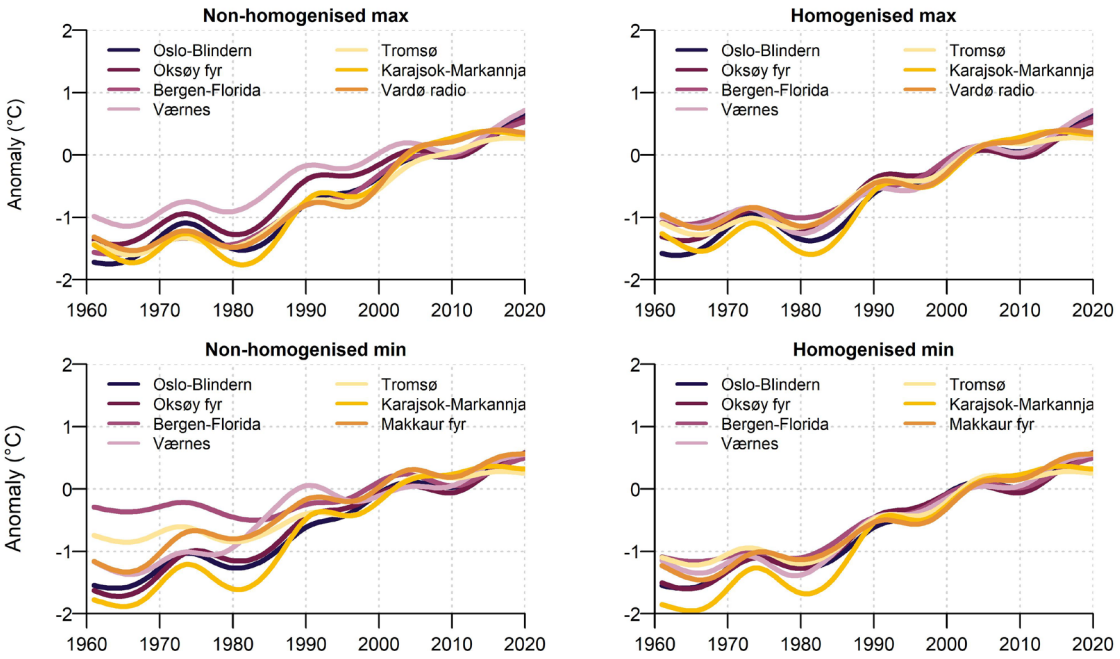

Figure 6. Annual anomaly series with respect to the 1991-2020 mean before and after homogenisation for one series in each of the seven temperature regions of Norway. The anomaly series have been filtered using a 10-year Gaussian density function.

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2 Appendix

2.1 Station list

Table A1. Maximum and minimum temperature series analysed in this study. The station identifier number, name, merged series, latitude, longitude, altitude (metres above sea level) and data period are included in the table.

Number	Name	Merged	Name	Lat (°N)	Lon (°E)	Alt (m)	Start	End
700	Drevsjø			61.8872	12.048	672	1961	2020
4780	Gardermoen			60.2065	11.0802	202	1961	2020
4920	Årnes	4930	Hvam	60.1024	11.3849	162	1961	1983
		4940	Hvam - Tolvhus	60.1057	11.4017	159	1983	2003
		4920	Årnes	60.1268	11.3933	160	2010	2020
5590	Kongsvinger	5650	Vinger	60.2198	12.028	175	1961	2004
		5590	Kongsvinger	60.1903	12.1967	148	2006	2020
6020	Flisa II	6040	Flisa	60.6173	12.017	184	1961	1998
		6020	Flisa II	60.6141	12.0125	185	2003	2020
7950	Rena flyplass	7010	Rena - Haugedalen	61.1603	11.4427	240	1961	2013
		7950	Rena flyplass	61.1847	11.3747	255	2011	2020
10380	Røros lufthavn	10400	Røros	62.5742	11.3787	628	1961	2003
		10380	Røros lufthavn	62.5773	11.3518	625	2002	2020
11500	Østre Toten - Apelsvoll			60.7002	10.8695	264	1961	2020
12550	Kise på Hedmark			60.7733	10.8055	128	1961	2020
12680	Lillehammer - Sætherengen	12660	Lillehammer II	61.0958	10.4742	226	1961	1969
		12640	Lillehammer III	61.0808	10.4756	271	1969	1981
		12680	Lillehammer - Sætherengen	61.0917	10.4761	240	1982	2020
13655	Skåbu	13670	Skåbu - Storslåen	61.5152	9.3823	890	1968	2010
		13655	Skåbu	61.5308	9.4023	928	2011	2020
15730	Bråtå - Slettom	15720	Bråtå	61.9067	7.86	712	1965	1998
		15730	Bråtå - Slettom	61.8957	7.8955	664	1998	2020
16560	Dombås - Nordigard	16550	Dombås II	62.0767	9.1285	643	1961	1972
		16540	Dombås - Kirkenær	62.0757	9.1232	645	1972	1976
		16740	Kjøremsgrende	62.0938	9.0436	626	1977	2009
		16560	Dombås - Nordigard	62.0717	9.1147	638	2006	2020
16610	Fokstugu	16600	Fokstua	62.1188	9.277	973	1961	1968

		16610	Fokstugu	62.1133	9.2862	973	1968	2020
17150	Rygge			59.3742	10.798	40	1961	2020
17850	Ås			59.6605	10.7818	92	1961	2020
18700	Oslo - Blindern			59.9423	10.72	94	1961	2020
18950	Tryvannshøgda	18950	Tryvannshøgda	59.9847	10.6693	514	1961	1975
		18960	Tryvasshøgda II	59.9886	10.6678	528	1976	1997
		18950	Tryvannshøgda	59.9847	10.6693	514	1997	2020
19710	Asker	19710	Asker	59.8558	10.4358	163	1961	1977
		19720	Asker brannstasjon	59.8335	10.4358	112	1978	1982
		19710	Asker	59.8558	10.4358	163	1983	2020
21680	Vest-Torpa II	21670	Aust-Torpa II	60.9417	10.1208	485	1963	1979
		21690	Vest-Torpa	60.9355	10.0347	562	1980	1986
		21680	Vest-Torpa II	60.9345	10.0358	542	1986	2020
23160	Åbjørsbråten			60.918	9.2893	639	1961	2017
23500	Løken i Volbu			61.122	9.063	521	1961	2020
24890	Nesbyen Todokk	24870	Nesbyen II	60.5667	9.1333	165	1961	1976
		24880	Nesbyen - Skoglund	60.5685	9.122	167	1977	2003
		24890	Nesbyen - Todokk	60.567	9.1323	166	2003	2020
25630	Geilo - Oldebråten	25610	Geilo - Strand	60.5294	8.2118	768	1961	1966
		25590	Geilo - Geilostølen	60.5263	8.223	795	1966	2006
		25630	Geilo - Oldebråten	60.53	8.1948	772	2006	2020
27450	Melsom			59.23	10.3483	26	1961	2020
27500	Færder fyr			59.0272	10.5242	6	1961	2020
28380	Kongsberg brannstasjon	28360	Kongsberg II / III	59.6633	9.6483	171	1961	1979
		28370	Kongsberg IV	59.663	9.65	168	1979	2002
		28380	Kongsberg brannstasjon	59.6247	9.6377	170	2003	2020
29720	Dagali lufthavn	29770	Dagali - Fagerlund	60.4166	8.453	871	1961	1988
		29790	Dagali II	60.4113	8.4444	828	1988	2005
		29720	Dagali Lufthavn	60.4188	8.5263	798	2002	2020
31620	Møsstrand II	31610	Møsstrand	59.8522	8.0648	948	1963	1976
		31620	Møsstrand II	59.8397	8.1785	977	1980	2020
32060	Gvarv - Nes	32100	Gvarv	59.3885	9.1723	26	1961	1989
		32080	Gvarv - Lindem	59.3868	9.202	71	1989	1994
		32060	Gvarv - Nes	59.3822	9.2128	93	1997	2020
34130	Jomfruland	34120	Jomfruland fyr	58.8653	9.5975	12	1961	1993
		34130	Jomfruland	58.8565	9.5745	3	2002	2020
35860	Lyngør fyr			58.6361	9.1479	4	1961	2020
36200	Torungen fyr			58.3988	8.7893	12	1961	2020

36560	Nelaug	36580	Nelaug - Øynes	58.6705	8.617	147	1961	1966
		36560	Nelaug	58.6582	8.63	142	1966	2020
37230	Tveitsund			59.0257	8.5187	252	1961	2020
38140	Landvik			58.34	8.5225	6	1961	2020
39040	Kjevik			58.2	8.0767	12	1961	2020
39100	Oksøy fyr			58.0732	8.0532	9	1961	2020
39750	Byglandsfjord - Neset	39710	Byglandsfjord II	58.6655	7.8117	206	1961	1969
		39690	Byglandsfjord - Solbakken	58.6662	7.8085	212	1969	2011
		39750	Byglandsfjord - Neset	58.6863	7.803	207	2011	2020
41175	Laudal - Kleiven	41660	Konsmo - Eikeland	58.25	7.3167	260	1964	1989
		41670	Konsmo - Høyland	58.267	7.3807	263	1992	2016
		41175	Laudal - Kleiven	58.2772	7.4388	280	2016	2020
41770	Lindesnes fyr	41760	Lindesnes fyr	57.9828	7.0467	17	1961	1969
		41770	Lindesnes fyr	57.9826	7.0478	16	1969	2020
42160	Lista fyr			58.109	6.5675	14	1961	2020
44080	Obrestad fyr			58.6592	5.5553	24	1961	2020
44560	Sola			58.8843	5.637	7	1961	2020
45870	Fister - Sigmundstad	45900	Fister	59.1767	6.0683	1	1961	1991
		45880	Fister - Tønnevik	59.16	6.0365	50	1992	2007
		45870	Fister - Sigmundstad	59.16	6.0365	30	2007	2020
46610	Sauda			59.6478	6.35	5	1961	2020
46930	Vats i Vindafjord	46910	Nedre Vats	59.484	5.7507	64	1969	2012
		46930	Vats i Vindafjord	59.4927	5.7208	20	2011	2020
47300	Utsira fyr			59.3065	4.8723	55	1961	2020
48330	Slåtterøy fyr			59.9083	5.0683	25	1961	2020
50310	Kvamskogen - Jonshøgdi	50300	Kvamskogen	60.3933	5.9133	408	1961	2006
		50310	Kvamskogen - Jonshøgdi	60.3887	5.964	455	2006	2020
50500	Flesland			60.2892	5.2265	48	1961	2020
50540	Bergen - Florida			60.383	5.3327	12	1961	2020
51530	Vossevangen	51580	Voss - Tvilde	60.6377	6.452	121	1962	1967
		51590	Voss - Bø	60.6421	6.4893	125	1967	2002
		51530	Vossevangen	60.625	6.4262	54	2004	2020
52310	Modalen III	52300	Modalen	60.8383	5.9333	104	1961	1980
		52290	Modalen II	60.841	5.9533	114	1980	2008
		52310	Modalen III	60.8562	5.9733	125	2008	2020
52860	Takle			61.0272	5.3813	38	1961	2020
54110	Lærdal IV	54130	Lærdal - Tønjum	61.0617	7.5167	36	1961	1996
		54120	Lærdal - Moldo	61.0663	7.5142	24	1996	2008

		54110	Lærdal IV	61.1033	7.5025	2	2008	2020
55820	Fjærland - Bremuseet	55840	Fjærland - Skarestad	61.4352	6.7707	10	1961	2004
		55820	Fjærland - Bremuseet	61.4233	6.7642	3	2005	2020
57420	Førde - Tefre	57170	Førde i Sunnfjord	61.454	5.8608	3	1961	1965
		57180	Førde i Sunnfjord II	61.4647	5.8412	41	1965	1985
		57190	Førde - Vie	61.4505	5.8845	11	1985	1992
		57420	Førde - Tefre	61.4647	5.9212	64	1992	2017
57770	Ytterøyane fyr	57760	Kinn	61.5641	4.7905	10	1961	1967
		57750	Kinn	61.5612	4.7697	9	1967	1988
		57770	Ytterøyane fyr	61.5717	4.6817	26	1984	2020
58070	Sandane			61.788	6.1837	51	1961	2020
59610	Fiskåbygd			62.103	5.5817	41	1969	2018
59680	Ørsta-Volda lufthamn	59710	Ørstavik - Velle	62.2025	6.1323	35	1961	1996
		59680	Ørsta-Volda lufthavn	62.181	6.0807	74	2003	2020
59800	Svinøy fyr			62.3293	5.268	38	1961	2020
60500	Tafjord			62.2305	7.4218	11	1961	2020
60990	Vigra			62.5617	6.115	22	1961	2020
62480	Ona II	62500	Ona	62.8634	6.5443	11	1961	1963
		62490	Ona - Husøy	62.8589	6.5388	8	1963	1978
		62480	Ona II	62.8585	6.5378	20	1978	2020
65940	Sula	65950	Sula fyr	63.8475	8.4537	28	1961	1974
		65940	Sula	63.8467	8.4667	5	1975	2020
68290	Selbu II	68300	Selbu	63.2058	11.111	197	1961	1976
		68310	Selbu - Bogstad	63.191	11.0875	181	1976	1979
		68340	Selbu - Stubbe	63.2058	11.1175	242	1979	2006
		68290	Selbu II	63.2248	11.1975	160	2007	2020
69100	Værnes			63.4597	10.9305	12	1961	2020
69380	Meråker - Vardetun	69360	Meråker II	63.4229	11.7604	218	1961	1969
		69340	Meråker - Lillesve	63.4382	11.6915	115	1969	1973
		69330	Meråker - Krogstad	63.4431	11.6992	145	1974	1993
		69370	Meråker - Utsyn	63.4188	11.7588	239	1994	2004
		69380	Meråker - Vardetun	63.4115	11.7277	169	2004	2020
70850	Snåsa - Kjevlia			64.1587	12.4692	195	1961	2020
71550	Ørland III			63.7045	9.6105	10	1961	2020
71990	Buholmråsa fyr	71980	Kalværet	64.3346	10.3195	12	1963	1965
		71990	Buholmråsa fyr	64.4013	10.455	18	1965	2020
73500	Nordli - Holand	73470	Nordli III	64.4619	13.5916	402	1961	1966
		73490	Nordli - Brattvold	64.4473	13.713	462	1967	1984

		73470	Nordli III	64.4619	13.5916	402	1985	1987
		73500	Nordli - Holand	64.4458	13.7181	433	1988	2019
75410	Nordøyan fyr			64.7977	10.5493	33	1961	2020
80102	Solvær III	80100	Nord-Solvær	66.3683	12.6445	7	1961	1998
		80101	Solvær - Sleneset	66.3663	12.6153	6	1998	2005
		80102	Solvær III	66.3708	12.6108	10	2007	2020
80610	Myken	80600	Myken	66.7605	12.4775	19	1961	1991
		80610	Myken	66.7628	12.486	17	1992	2020
80700	Glomfjord			66.8102	13.9793	39	1961	2020
82290	Bodø VI			67.267	14.3637	11	1961	2020
84700	Narvik lufthavn	84790	Narvik II	68.4688	17.4922	32	1961	1975
		84800	Narvik III	68.4697	17.4983	17	1975	2002
		84700	Narvik lufthavn	68.4397	17.3887	31	2002	2017
85380	Skrova fyr			68.1535	14.6485	14	1961	2020
85890	Røst lufthavn	85900	Røst	67.5061	12.069	8	1961	1969
		85910	Røst II	67.5063	12.0762	10	1979	1997
		85891	Røst III	67.525	12.104	4	1998	2008
		85890	Røst lufthavn	67.5267	12.1038	4	2002	2020
86500	Sortland	86520	Sortland - Kleiva	68.648	15.2832	14	1961	1991
		86500	Sortland	68.7033	15.4157	3	1985	2019
		86520	Sortland - Kleiva	68.648	15.2832	14	2019	2020
86740	Bø i Vesterålen III	86760	Bø i Vesterålen II	68.6322	14.463	12	1961	2001
		86780	Litløy fyr	68.5932	14.3103	30	2001	2003
		86740	Bø i Vesterålen III	68.6067	14.4333	8	2003	2020
87110	Andøya			69.3073	16.1312	10	1962	2019
88690	Hekkingen fyr	90280	Sommarøy i Senja	69.6332	18.0106	2	1961	1967
		88680	Leirkjosen	69.5517	17.9128	9	1967	1979
		88690	Hekkingen fyr	69.6013	17.8303	33	1979	2020
89350	Bardufoss			69.0577	18.5437	76	1961	2020
89940	Dividalen II	89950	Dividalen	68.7783	19.71	228	1961	2009
		89940	Dividalen II	68.7817	19.7017	204	2009	2020
90450	Tromsø			69.6536	18.9368	100	1961	2020
90490	Tromsø - Langnes			69.6767	18.9133	8	1964	2020
90800	Torsvåg fyr			70.2452	19.4997	21	1961	2020
91380	Skibotn II	91350	Skibotn	69.3777	20.3024	46	1961	1972
		91360	Skibotn - Melå	69.3667	20.2833	8	1974	1984
		91370	Skibotn - Fossbakk	69.3683	20.2683	5	1984	2004
		91380	Skibotn II	69.3875	20.2823	20	2004	2020

91740	Sørkjosen lufthavn	91750	Nordreisa	69.7412	21.0235	1	1961	1992
		91760	Nordreisa - Øyeng	69.7468	21.0267	5	1992	2006
		91740	Sørkjosen lufthavn	69.7887	20.9553	6	2005	2020
92350	Nordstraum i Kvænangen			69.8362	21.8958	20	1965	2020
93140	Alta lufthavn	93150	Alta aeradio	69.9715	23.3587	62	1961	1963
		93140	Alta lufthavn	69.9775	23.3582	3	1963	2020
93301	Suolovuopmi - Lulit	93300	Suolovuopmi	69.5883	23.5317	377	1963	2004
		93301	Suolovuopmi - Lulit	69.5797	23.5345	381	2004	2020
93700	Kautokeino	93700	Kautokeino	68.9968	23.0335	307	1961	1970
		93710	Kautokeino II	69.0167	23.034	330	1970	1995
		93700	Kautokeino	68.9968	23.0335	307	1996	2020
93900	Sihccajavri			68.7553	23.5387	382	1961	2020
94500	Fruholmen fyr			71.0937	23.9817	13	1961	2020
95350	Banak	95430	Brennelv	70.0667	25.1167	35	1961	1981
		95350	Banak	70.06	24.99	5	1965	2020
96400	Slettnes fyr			71.0888	28.217	8	1961	2020
96800	Rustefjelbma			70.3968	28.1928	10	1961	2013
97251	Karasjok - Markannjarga	97250	Karasjok	69.4683	25.4817	155	1961	2004
		97251	Karasjok - Markannjarga	69.4635	25.5023	131	2004	2020
97350	Cuovddatmohkki			69.3695	24.4312	286	1966	2020
98400	Makkaur fyr			70.7057	30.07	9	1961	2020
98550	Vardø radio			70.3707	31.0962	10	1961	2020
99370	Kirkenes lufthavn			69.7255	29.8977	89	1964	2020

2.2 Finnish and Swedish station list

Table A2. Finnish and Swedish maximum and minimum temperature series. The station identifier number, name, merged series, latitude, longitude, altitude (metres above sea level) and data period are included in the table.

Number	Name		Merged	Name	Lat (°)	Lon (°)	Alt (m)	Start	End
101969	Muonio Alamuonio	Fin			67.969	23.672	252	1961	2015
101994	Kittilä Pokka	Fin			68.17	25.783	276	1972	2020
102000	Sodankylä Lokka	Fin			67.822	27.746	240	1961	2020
102001	Sodankylä Vuotso	Fin			68.084	27.185	248	1961	2020
102033	Inari Ivalo lentoasema	Fin			68.613	27.419	140	1961	2020
102035	Utsjoki Kevo	Fin			69.756	27.007	107	1962	2020
102036	Utsjoki Nuorgam	Fin			70.082	27.897	22	1970	2020
81540	Nordkoster A	Swe	81640	Ursholmen	58.8333	11	6	1961	1965
		Swe	81540	Nordkoster A	58.892	11.1938	33	1967	2020
92100	Säffle	Swe			59.1407	12.9336	53	1961	2020
92130	Blomskog A	Swe	91130	Bredviken	59.2184	11.9858	100	1961	1995
		Swe	92130	Blomskog A	59.2213	12.0754	170	1995	2020
92410	Arvika A	Swe	92400	Arvika	59.6658	12.591	77	1961	1995
		Swe	92410	Arvika A	59.6743	12.6354	66	1995	2020
93220	Karlstad Flygplats	Swe			59.4446	13.3374	107	1961	2020
102540	Höljes	Swe			60.9066	12.5843	230	1961	2020
103080	Torsby	Swe			60.1075	12.9908	127	1961	2013
103090	Gustavsfors	Swe			60.1514	13.7975	190	1961	2020
103410	Malung	Swe			60.6717	13.7058	310	1961	2017
112170	Grundforsen	Swe			61.2797	12.8568	412	1961	2012
113420	Särna A	Swe	113410	Särna	61.7068	13.1335	437	1961	2000
		Swe	113420	Särna A	61.6912	13.1865	425	2000	2020
114140	Älvdalen A	Swe	114160	Älvdalen II	61.2549	14.0348	250	1968	1995
		Swe	114140	Älvdalen A	61.2536	14.0355	252	1995	2020
122330	Ljusnedal	Swe			62.5493	12.6043	585	1961	2020
132170	Storlien-Storvallen A	Swe	132180	Storlien-Visjövalen	63.3028	12.1253	642	1962	2010
		Swe	132170	Storlien-Storvallen A	63.2826	12.1218	583	2010	2020
132590	Edevik	Swe	142030	Björkede	64.0432	12.9414	451	1961	1980
		Swe	132590	Edevik	63.9812	12.8709	425	1980	2020
133050	Höglekardalen	Swe			63.0785	13.7488	595	1962	2020
134590	Almdalen	Swe			63.9967	14.6701	615	1964	2020

143440	Jormlien	Swe			64.7291	13.9819	383	1967	2020
144300	Gäddede	Swe			64.5037	14.1596	328	1961	2008
146050	Hoting A	Swe	146070	Hoting	64.1236	16.2149	240	1969	1996
		Swe	146050	Hoting A	64.0875	16.2356	242	1996	2020
155970	Hemavan Flygplats	Swe	155940	Hemavan	65.821	15.086	482	1965	2008
		Swe	155970	Hemavan Flygplats	65.8077	15.0854	458	2008	2020
166810	Jäckvik	Swe			66.3874	16.9714	434	1961	2020
167980	Kvikkjokk-Årrenjarka	Swe			66.8876	18.0179	314	1961	2013
180940	Kiruna Flygplats	Swe			67.827	20.3387	459	1961	2020
181900	Vittangi	Swe			67.6943	21.6335	250	1961	2020
188800	Abisko	Swe			68.3557	18.8206	388	1966	2018
188820	Katterjåkk	Swe	188830	Riksgränsen	68.4284	18.1302	508	1961	1969
		Swe	188820	Katterjåkk	68.4218	18.1698	515	1969	2019
191910	Naimakka A	Swe	191900	Naimakka	68.6779	21.5277	403	1961	1996
		Swe	191910	Naimakka A	68.6762	21.5229	402	1995	2020
192840	Karesuando A	Swe	192830	Karesuando	68.4421	22.4502	330	1961	2008
			192840	Karesuando A	68.4418	22.4435	330	2009	2020

2.3 Corrected breaks - maximum temperature

Table A3. Detected breaks in the maximum temperature series. The annual break amplitude (Amp) and annual break adjustment (Adj) is included together with metadata. Series with no corrected break points are listed at the bottom of the table.

Number	Name	Month	Year	Amp	Adj	Metadata
700	Drevsjø	7	1987	0.12	0.12	Relocation 75 m WNW from Småbekken to Skaug 10.1987. Last month with data 07.1987.
4780	Gardermoen	10	1972	0.14	-0.11	Relocation 180 m ENE and new screen 31.10.1972.
		1	1997	-0.01	-0.24	Automation 02.1997
		4	2012	-0.23	-0.23	-
4920	Årnes	6	1983	-0.11	0.16	Relocation 700 m ESE 08.1983. Last month with data 06.1983. Merged series 4930 and 4940.
		3	2003	0.27	0.27	Relocation 2 km N and automation 01.2010. Last month with data 03.2003. Merged series 4940 and 4920.
5590	Kongsvinger	12	1965	-0.12	0.30	New observer 01.01.1966.
		11	2004	0.41	0.41	Relocation and automation 12.2004. Last month of data 11.2004. Merged series 5650 and 5590.
6020	Flisa II	11	1998	0.48	0.48	Relocation and automation 12.2003. Last month with data 11.1998. Merged series 6040 and 6020.
7950	Rena flyplass	1	1975	-0.43	0.02	-
		8	1991	0.71	0.45	Relocation 80 m NNE 08.1991.
		11	2011	-0.26	-0.26	Relocation and automation 12.2011. Merged series 7010 and 7950.
11500	Østre Toten - Apelsvoll	9	1974	-0.17	0.09	New thermometer 01.09.1974
		11	2012	0.27	0.27	-
12550	Kise på Hedmark	9	1994	0.08	0.56	-
		12	2012	0.49	0.49	New thermometer 01.2013.
12680	Lillehammer - Sætherengen	7	1969	0.17	0.22	Relocation 2 km S 01.10.1969. Last month with data 07.1969. Merged series 12660 and 12640.
		6	1981	0.16	0.05	Relocation 01.12.1982. Last month with data 06.1981. Merged series 12640 and 12680.
		5	2005	-0.12	-0.12	New thermometer 06.2005.
13655	Skåbu	2	2010	-0.45	-0.45	Relocation and automation 06.2011. Last month with data 02.2010. Merged series 13670 and 13655.
15730	Bråtå - Slettom	6	1998	0.34	0.34	Relocation 11.1998. Last month with data 06.1998. Merged series 15720 and 15730.
16610	Fokstugu	9	1980	0.24	0.18	Relocation 40 m N and new screen 17.09.1980.
		7	1997	-0.54	-0.06	New screen (MI-33) and temperature sensors 08.1997.
		9	2008	0.49	0.49	Automation 10.2008
17150	Rygge	10	1984	-0.12	0.02	New screen (MI-46) 17.10.1984.
		3	1995	-0.07	0.14	Relocation 20.03.1995.
		5	2013	0.21	0.21	Relocation 500 m and new screen (MI-2001B) 13.06.2013.
17850	Ås	5	1967	0.14	0.11	New observer 06.1967.
		4	1988	-0.25	-0.04	Relocation 11.1994. Last month with data 04.1988.
		3	2015	0.22	0.22	New screen (MI-2001B). Exact date not documented, so used suggested date by Homer.
18700	Oslo - Blindern	12	2010	0.16	0.16	New screen (MI-2001B) in the period 12.2008-08.2011. Removed tree 05.07.2011.

18950	Tryvannshøgda	12	1975	0.21	0.01	Relocation 01.01.1976. Merged series 18950 and 18960.
		5	1997	-0.20	-0.20	Relocation 09.1997. Last month with data 05.1997. Merged series 18960 and 18950.
19710	Asker	11	1982	0.22	0.22	Relocation 300 m E (back to old location) 01.1983. Last month with data 11.1982. Merged series 19720 and 19710.
		6	2012	0.21	0.21	Automation 07.2012.
21680	Vest-Torpa II	3	1979	-0.44	-0.64	Relocation 10.1980. Last month with data 03.1979. Merged series 21670 and 21690.
		4	1986	-0.16	-0.20	Relocation 100 m SE 01.08.1986. Last month with data 04.1986. Merged series 21690 and 21680.
		11	2013	-0.04	-0.04	Automation 19.11.2013.
23160	Åbjørsbråten	9	1989	-0.18	-0.18	Relocation 150 m SSW 22.09.1989.
23500	Løken i Volbu	5	1986	-0.24	0.43	Automation 01.06.1986.
		6	2013	0.66	0.66	New screen (MI-2001B) 17.07.2013.
24890	Nesbyen - Todokk	2	1985	0.35	-0.09	New thermometer.
		11	2003	-0.44	-0.44	Relocation and automation 12.2003. Merged series 24880 and 24890.
25630	Geilo - Oldebråten	6	1966	0.06	0.35	Relocation 09.1966. Last month with data 06.1966. Merged series 25610 and 25590.
		7	1995	0.30	0.30	New thermometer.
27450	Melsom	12	1974	0.19	0.19	Ny observatør
27500	Færder fyr	9	1999	-0.22	-0.22	Automation autumn 1999.
28380	Kongsberg brannstasjon	8	1979	-0.16	-0.16	Relocation 01.10.1979. Last month with data 08.1979. Merged series 28360 and 28370.
29720	Dagali lufthavn	9	1988	0.39	0.21	Relocation 10.1988. Merged series 29770 and 29790.
		7	2002	-0.19	-0.19	Relocation and automation 08.2002. Merged series 29790 and 29720.
31620	Møsstrand II	3	1976	0.03	0.37	Relocation 11.1980. Last month with data 03.1976. Merged series 31610 and 31620.
		7	2006	0.34	0.34	Automation 08.2006.
32060	Gvarv - Nes	6	1989	-0.12	-0.13	Relocation 5 km ESE 07.1989. Last month with data 06.1986. Merged series 32100 and 32080.
		8	2009	0.00	0.00	New screen (MI-2001B) and thermometer 12.08.2009.
34130	Jomfruland	9	1974	-0.22	-0.39	-
		10	1993	-0.17	-0.17	Relocation and automation 08.1994. Last month with data 10.1993. Merged series 34120 and 34130.
35860	Lyngør fyr	12	2012	0.06	0.06	New screen (MI-2001B) 01.2013.
36200	Torungen fyr	5	1970	-0.13	-0.32	-
		4	1990	-0.19	-0.19	New screen 08.05.1990.
36560	Nelaug	5	1966	-0.43	-0.54	Relocation 1.6 km SE 06.1966. Merged series 36580 and 36560.
		8	1986	-0.10	-0.10	Relocation 70 m SSW 09.1986.
37230	Tveitsund	10	2008	-0.07	-0.07	Relocation and automation 11.2008.
38140	Landvik	3	1987	-0.15	0.30	Automation 01.1994. No max/min temperatures before end of 06.1997. Last month with data 03.1987.
		8	2013	0.45	0.45	New screen (MI-2001B). Exact date not documented, so used suggested date by Homer.
39040	Kjevik	5	1966	0.20	0.05	Relocation 120 m NE 06.1966
		11	1986	0.55	-0.15	Relocation 12.1986.
		4	1995	-0.70	-0.70	Automation 05.1995.

39100	Oksøy fyr	9	1988	0.06	0.06	Relocation 5.1 m NE 15.09.1988. New screen (same type, MI-33).
39750	Byglandsfjord - Neset	9	1969	0.05	-0.17	Relocation 200 m S 12.1969. Last onth with data 09.1969. Merged series 39710 and 39690.
		5	1982	-0.16	-0.22	Relocation 20 m W 06.1982.
		9	2011	-0.06	-0.06	Relocation and automation 09.2011. Merged series 39690 and 39750.
41175	Laudal - Kleiven	5	1989	-0.12	-0.53	Relocation 01.1992. Last month with data 04.1989. Merged series 41660 and 41670.
		6	2016	-0.42	-0.42	Relocation 4 km E 01.07.2016. Merged series 41670 and 41175.
41770	Lindesnes fyr	2	1969	-0.12	-0.07	Relocation 04.1969. Last month with data 02.1969. Merged series 41760 and 41770.
		8	1979	0.29	0.05	Relocation 50 m ESE 29.08.1979.
		12	2010	-0.24	-0.24	-
42160	Lista fyr	5	1994	0.13	0.13	Automation 06.1994.
44080	Obrestad fyr	6	1991	-0.11	-0.11	Automation 10.1993. Last month with data 06.1991.
44560	Sola	12	1967	0.64	0.13	New thermometer (tetalux) autumn1967. Exact date not found.
		10	1977	-0.38	-0.51	Errors in equipment was fixed 28.10.1977.
		5	1989	-0.12	-0.12	New screen 06.1989.
45870	Fister - Sigmundstad	6	1991	-0.06	-0.11	Relocation 3 km SW 06.1992. Last month with data 06.1991. Merged series 45900 and 45880.
		4	2007	-0.05	-0.05	Relocation and automation 06.2007. Last month with data 04.2007. Merged series 45880 and 45870.
46610	Sauda	12	1969	0.32	-0.05	-
		6	2001	-0.37	-0.37	Relocation and automation 01.07.2001.
46930	Vats i Vindafjord	4	1998	0.31	0.10	New observer 03.1999. Last month with data 04.1998.
		9	2011	-0.21	-0.21	Relocation 2 km NW 10.2011. Merged series 46910 and 46930.
47300	Utsira fyr	7	1970	-0.19	-0.19	New thermometer 02.07.1970.
50310	Kvamskogen - Jonshøgdi	7	2006	-0.01	-0.01	Relocation and automation 01.08.2006. Merged series 50300 and 50310.
50500	Flesland	12	1989	-0.15	-0.15	Relocation 300 m NE 21.12.1989.
50540	Bergen - Florida	8	1982	0.23	0.51	Relocation (from roof to garden) and new screen (MI-46) 01.01.1983.
		9	2006	0.28	0.28	New automatic weather station installed 2006. No exact date found, so used suggested date by Homer.
51530	Vossevangen	5	1967	0.53	0.77	Relocation 2 km E 01.06.1967. Merged series 51580 and 51590.
		11	2002	0.24	0.24	Relocation 4 km SW and automation 02.2004. Last month with data 11.2002. Merged series 51590 and 51530.
52310	Modalen III	4	1987	-0.02	-0.26	Relocation 600 m E 06.1980. Last month with data 04.1980. Merged series 52300 and 52290.
		8	2008	-0.24	-0.24	Relocation 2 km NE and automation 02.10.2008. Last month with data 08.2008. Merged series 52290 and 52310.
52860	Takle	3	1986	0.07	0.07	Relocation 5 m N 04.1986.
55820	Fjærland - Bremuseet	8	1971	0.16	0.17	New screen 09.1971.
		12	1983	0.30	0.00	-
		12	2004	-0.29	-0.29	Relocation and automation 20.11.2005. Last month with data 12.2004. Merged series 55840 and 55820.
57420	Førde - Tefre	5	1985	-0.37	-0.62	Relocation 3 km SE 01.10.1985. Last month with data 06.1985. Merged series 57180 and 57190.
		1	1992	-0.24	-0.24	Relocation 11.1992. Last month with data 01.1992. Merged series 57190 and 57420.

57770	Ytterøyane fyr	9	1967	-0.62	-0.75	Relocation 01.11.1967. Lat month with data 09.1967. Merged series 57760 and 57750.
		8	1984	-0.31	-0.14	Relocation 09.1984. Merged series 57750 and 57770.
		8	1999	0.17	0.17	Automation 09.1999. New screen (MI-46).
59680	Ørsta-Volda lufthamn	3	1996	-0.43	0.18	Relocation 12.2002. Last month with data 03.1996. Merged series 59710 and 59680.
		10	2013	0.60	0.60	-
59800	Svinøy fyr	8	2005	0.52	0.08	Automation 18.08.2005.
		1	2014	-0.44	-0.44	-
60500	Tafjord	10	1997	0.26	0.26	-
60990	Vigra	11	1984	-0.11	0.46	New instruments (MITEF) 18.11.1984.
		9	2012	0.57	0.57	-
65940	Sula	12	1974	0.05	0.20	Relocation 600 m E 01.01.1975. Merged series 65950 and 65940.
		8	1990	0.15	0.15	Relocation 330 m SSW 22.08.1990. New observer.
68290	Selbu II	4	1979	-0.19	0.12	Relocation 2.5 km NE 01.09.1979. Last month with data 04.1979. Merged series 68310 and 68340.
		10	2006	0.31	0.31	Relocation and automation 6 km W 26.09.2007. Last month with data 10.2006. Merged series 68340 and 68290.
69100	Værnes	10	1975	0.33	-0.05	Relocation 500 m W 23.10.1975.
		5	2000	-0.38	-0.38	New thermometer (PT-100). Exact date not found.
69380	Meråker - Vardetun	7	1969	0.27	0.30	Relocation 11.1969. Last month with data 07.1969. Merged series 69360 and 69340.
		10	1993	-0.54	0.03	Relocation 4 km SE 01.08.1994. Last month with data 10.1993. Merged series 69330 and 69370.
		3	2004	0.57	0.57	Relocation 09.05.2004. Last month with data 03.2004. Merged series 69370 and 69380.
70850	Snåsa - Kjevlia	11	2001	0.17	0.17	Unknown reason, possibly new screen.
71550	Ørland III	5	2002	0.33	0.33	New thermometer. Exact date not found.
73500	Nordli - Holand	12	1966	-0.46	0.30	Relocation 06.1967 Last month with data 12.1966. Merged series 73470 and 73490.
		8	1984	0.40	0.76	Relocation 10.1985. Last month with data 08.1984. Merged series 73490 and 73470.
		1	1996	0.36	0.36	New thermometer 19.01.1996.
80610	Myken	6	1991	-0.21	-0.21	Relocation 01.10.1992. Last month with data 06.1991. Merged series 80600 and 80610.
80700	Glomfjord	12	2008	-0.24	-0.24	Relocation 50 m N and new screen (wall cage) 2008.
84700	Narvik lufthavn	7	1975	0.27	0.60	Relocation 01.09.1975. Last month with data 07.1975. Merged series 84790 and 84800.
		4	2002	0.01	0.32	Relocation 11.2002. Last month with data 04.2002. Merged series 84800 and 84700.
		4	2008	0.31	0.31	New screen (MI-2001B) 07.05.2008.
85380	Skrova fyr	12	1979	-0.36	0.08	New thermometer. Exact date not found.
		5	2014	0.44	0.44	New screen (MI-2002B) 13.05.2014.
85890	Røst lufthavn	6	2014	-1.11	0.05	Outliers
		9	2016	1.17	1.17	Outliers
86500	Sortland	12	1984	0.08	0.08	Relocation 01.1985. Merged series 86520 and 86500.
86740	Bø i Vesterålen III	5	2001	0.21	0.00	Relocation 06.2001. Merged series 86760 and 86780.
		5	2003	-0.21	-0.21	Relocation and automation 06.2003. Merged series 86780 and 86740.
87110	Andøya	2	1972	-0.05	-0.29	Relocation 1 km SSE 03.1972.

		4	1988	-0.25	-0.25	Relocation 06.05.1988.
88690	Hekkingen fyr	5	1967	-0.33	-0.35	Relocation 10 km NW 11.1967. Last month with data 05.1967. Merged series 90280 and 88680.
		3	1979	-0.02	-0.02	Relocation 11.1979. Last month with data 03.1979. Merged series 88680 and 88690.
89350	Bardufoss	8	1988	0.07	0.16	Relocation 150 m S 09.1988.
		12	2013	0.09	0.09	Automation 01.2014.
89940	Dividalen II	12	2008	0.15	0.15	Relocation and automation 08.10.2009. Last month with data 12.2008. Merged series 89950 and 89940.
90450	Tromsø	12	2009	0.32	0.32	Automation and relocation 12.2009.
90490	Tromsø - Langnes	8	1985	-0.27	-0.50	Relocation 450 m SE 09.1985.
		9	2002	-0.22	-0.22	Automation 27.09.2002.
90800	Torsvåg fyr	2	2001	-0.20	-0.20	New data logger 22.02.2001.
91380	Skibotn II	7	1984	0.17	0.09	Relocation 08.1984. Merged series 91360 and 91370.
		9	2013	-0.08	-0.08	Relocation 500 m 27.09.2013.
91740	Sørkjosen lufthavn	5	1992	-0.02	0.33	Relocation 07.1992. Last month with data 05.1992. Merged series 91750 and 91760.
		6	2006	0.35	0.35	Relocation and automation 07.2006. Merged series 91760 and 91740.
93140	Alta lufthavn	9	1999	-0.21	-0.21	New thermometer (PT-100). Exact date not found.
93301	Suolovuopmi - Lulit	10	2004	-0.21	-0.21	Relocation and automation 11.2004. Merged series 93300 and 93301.
93700	Kautokeino	5	1970	0.00	0.37	Relocation 06.1970 (and 11.1970). Merged series 93700 and 93710.
		12	1995	0.37	0.37	Relocation and new screen (MI-46) 08.1996. Last month with data 12.1995. Merged series 93710 and 93700.
93900	Sihccajavri	8	2009	-0.10	-0.10	Automation 09.2009.
94500	Fruholmen fyr	9	1998	-0.02	-0.02	Automation 10.1998.
95350	Banak	6	1984	0.16	-0.05	New thermometer (MITEF) 07.1984.
		10	2004	-0.21	-0.21	Automation 11.2004.
96800	Rustefjelbma	12	1983	-0.16	-0.16	New observer 01.01.1984.
97251	Karasjok - Markannjarga	7	2004	0.14	0.14	Relocation 08.2004. Merged series 97250 and 97251.
98550	Vardø radio	8	2001	0.33	0.33	Automation 26.08.2001. New screen 20.08.2000.
99370	Kirkenes lufthavn	11	1999	-0.30	0.07	New thermometer (PT-100) 25.11.1999. Relocation 05.08.1994.
		8	2007	0.37	0.37	Errors in equipment was fixed 22.08.2007.
Series without detected breaks						
10380	Røros lufthavn					
16560	Dombås - Nordigard					
48330	Slåtterøy fyr					
54110	Lærdal IV					
58070	Sandane					
59610	Fiskåbygd					
62480	Ona II					
71990	Buholmråsa fyr					
75410	Nordøyan fyr					
80102	Solvær III					

82290	Bodø VI
92350	Nordstraum i Kvænangen
96400	Slettnes fyr
97350	Cuovddatmohkki
98400	Makkaur fyr

2.4 Corrected breaks - minimum temperature

Table A4. Detected breaks in the minimum temperature series. The annual break amplitude (Amp) and annual break adjustment (Adj) is included together with metadata. Series with no corrected break points are listed at the bottom of the table.

Number	Name	Month	Year	Amp	Adj	Metadata
700	Drevsjø	7	1987	0.22	-0.24	Relocation 75 m WNW from Småbekken to Skaug 10.1987. Last month with data 07.1987.
		10	2002	-0.46	-0.46	Automation
4780	Gardermoen	11	1967	-0.46	0.52	Relocation 330 m SE 21.12.1967
		5	1984	0.65	0.97	Relocation 130 m NNE 06.1984.
		1	1997	0.33	0.33	Automation 02.1997
4920	Årnes	6	1983	0.21	0.01	Relocation 700 m ESE 08.1983. Last month with data 06.1983. Merged series 4930 and 4940.
		3	2003	-0.20	-0.20	Relocation 2 km N and automation 01.2010. Last month with data 03.2003. Merged series 4940 and 4920.
5590	Kongsvinger	11	2004	0.28	0.28	Relocation and automation 12.2004. Last month of data 11.2004. Merged series 5650 and 5590.
6020	Flisa II	11	1998	0.57	0.57	Relocation and automation 12.2003. Last month with data 11.1998. Merged series 6040 and 6020.
7950	Rena flyplass	2	1972	0.66	-0.79	-
		11	2011	-1.45	-1.45	Relocation 5 km NW and automation 12.2011. Merged series 7010 and 7950.
10380	Røros lufthavn	8	2003	-0.92	-0.92	Relocation and automation 10.2003. Merged series 10400 and 10380.
12550	Kise på Hedmark	12	1980	0.05	0.05	Automation 05.1987. Last month with data 12.1980.
12680	Lillehammer Sætherengen	6	1981	0.52	0.62	Relocation 01.12.1982. Last month with data 06.1981. Merged series 12640 and 12680.
		5	2005	0.09	0.09	New thermometer 06.2005.
13655	Skåbu	2	2010	-0.74	-0.74	Relocation and automation 06.2011. Last month with data 02.2010. Merged series 13670 and 13655.
15730	Bråtå - Slettom	6	1998	0.25	0.25	Relocation 11.1998. Last month with data 06.1998. Merged series 15720 and 15730.
16560	Dombås - Nordigard	5	1965	-0.68	-0.27	Relocation 600 m NE 06.1965.
		4	1976	0.41	0.41	Relocation 06.1976. Last month with data 04.1976. Merged series 16540 and 16740.
16610	Fokstugu	4	1968	1.69	1.38	Relocation 1 km E 06.1968. Last month with data 04.1968. Merged series 16600 and 16610.
		7	1997	-0.31	-0.31	New screen (MI-33) and temperature sensors 08.1997.
17150	Rygge	10	1984	-0.25	0.56	New screen (MI-46) 17.10.1984.
		3	1995	0.81	0.81	Relocation 20.03.1995.
17850	Ås	5	1967	0.39	-0.38	New observer 06.1967.
		4	1988	-0.40	-0.76	Relocation 11.1994. Last month with data 04.1988.
		3	2015	-0.36	-0.36	New screen (MI-2001B). Exact date not documented, so used suggested date by Homer.
18950	Tryvasshøgda	5	1997	-0.23	-0.23	Relocation 09.1997. Last month with data 05.1997. Merged series 18960 and 18950.
19710	Asker	8	1977	-0.37	-0.51	Relocation 12.1978. Last month with data 08.1977. Merged series 19710 and 19720.
		11	1982	0.43	-0.14	Relocation 300 m E (back to old location) 01.1983. Last month with data 11.1982. Merged series 19720 and 19710.

		6	2012	-0.57	-0.57	Automation 07.2012.
21680	Vest-Torpa II	3	1979	-0.86	-0.86	Relocation 10.1980. Last month with data 03.1979. Merged series 21670 and 21690.
24890	Nesbyen-Todokk	9	1976	0.99	0.31	Relocation 500 m NW 11.1976. Last month with data 09.1976. Merged series 24870 and 24880.
		11	2003	-0.68	-0.68	Relocation and automation 12.2003. Merged series 24880 and 24890.
25630	Geilo - Olderbråten	6	1966	0.86	0.31	Relocation 09.1966. Last month with data 06.1966. Merged series 25610 and 25590.
		10	2005	-0.54	-0.54	Relocation 08.2006. Last month with data 10.2005. Merged series 25590 and 25630.
27450	Melsom	8	1994	-0.07	-0.07	Automation 05.2002. Last month with data 08.1994.
28380	Kongsberg brannstasjon	8	2002	-0.64	-0.64	Relocation 02.2003. Last month with data 08.2002. Merged series 28370 and 28380.
29720	Dagali lufthavn	9	1988	-1.34	-2.81	Relocation 10.1988. Merged series 29770 and 29790.
		7	2002	-1.47	-1.47	Relocation and automation 08.2002. Merged series 29790 and 29720.
31620	Møsstrand II	3	1976	-0.20	-0.51	Relocation 11.1980. Last month with data 03.1976. Merged series 31610 and 31620.
		7	2006	-0.31	-0.31	Automation 08.2006.
32060	Gvarv - Nes	12	1973	0.39	1.32	New thermometer 01.1974.
		6	1989	0.93	0.93	Relocation 5 km ESE 07.1989. Last month with data 06.1986. Merged series 32100 and 32080.
34130	Jomfruland	10	1993	0.49	0.49	Relocation and automation 08.1994. Last month with data 10.1993. Merged series 34120 and 34130.
35860	Lyngør fyr	8	1989	-0.20	-0.51	Relocation 80 m NNE and new screen (MI-46) 22.08.1989.
		12	2012	-0.31	-0.31	New screen (MI-2001B) 01.2013.
36200	Torungen fyr	4	1970	0.24	0.24	New thermometer 05.1970.
36560	Nelaug	5	1966	1.19	1.17	Relocation 1.6 km SE 06.1966. Merged series 36580 and 36560.
		8	1986	-0.01	-0.01	Relocation 70 m SSW 09.1986.
37230	Tveitsund	7	1987	0.26	0.05	-
		10	2008	-0.21	-0.21	Relocation and automation 11.2008.
38140	Landvik	3	1987	-0.13	-0.13	Automation 01.1994. No max/min temperatures before end of 06.1997. Last month with data 03.1987.
39040	Kjevik	5	1966	-0.17	-0.26	Relocation 120 m NE 06.1966
		11	1986	-0.18	-0.09	Relocation 12.1986.
		4	1995	0.09	0.09	Automation 05.1995.
39100	Oksøy	6	1973	0.37	0.12	New minimum thermometer 18.06.1973. The old thermometer showed 0.3-0.4° too low.
		7	1980	-0.25	-0.25	-
39750	Byglandsfjord -Neset	9	1969	0.17	0.49	Relocation 200 m S 12.1969. Last onth with data 09.1969. Merged series 39710 and 39690.
		5	1982	0.10	0.32	Relocation 20 m W 06.1982.
		9	2011	0.22	0.22	Relocation and automation 09.2011. Merged series 39690 and 39750.
41175	Laudal - Kleiven	4	1989	-0.67	-0.67	Relocation 01.1992. Last month with data 04.1989. Merged series 41660 and 41670.
41770	Lindesnes fyr	2	1969	-0.36	-0.28	Relocation 04.1969. Last month with data 02.1969. Merged series 41760 and 41770.
		8	1979	-0.07	0.08	Relocation 50 m ESE 29.08.1979.
		6	1996	0.15	0.15	New screen (MI-46) 07.1996.
42160	Lista fyr	5	1994	-0.32	-0.32	Automation 06.1994.

44080	Obrestad fyr	1	1978	0.19	0.19	-
44560	Sola	5	1989	0.22	0.22	New screen 06.1989.
45870	Fister - Sigmundstad	8	1966	0.59	0.59	New minimum thermometer 23.08.1966 at 16:00.
46610	Sauda	6	2001	0.24	0.24	Relocation and automation 01.07.2001.
46930	Vats i Vindafjord	9	2011	-1.03	-1.03	Relocation and automation 10.2011. Merged series 46910 and 46930.
50310	Kvamskogen - Jonshøgdi	10	1971	0.28	-0.12	Adjustment of minimum thermometer 10.11.1971.
		6	2006	-0.41	-0.41	Relocation and automation 09.2006. Last month with data 06.2006. Merged series 50300 and 50310.
50500	Flesland	5	1968	-0.58	-0.16	Relocation. No exact date found.
		10	1989	0.42	0.42	New screen 11.1989.
50540	Bergen - Florida	12	1982	-0.59	-0.77	Relocation (from roof to garden) and new screen (MI-46) 01.01.1983.
		9	2006	-0.18	-0.18	New automatic weather station installed 2006. No exact date found, so used suggested date by Homer.
51530	Vossevangen	11	2002	0.32	0.32	Relocation 4 km SW and automation 02.2004. Last month with data 11.2002. Merged series 51590 and 51530.
52310	Modalen III	10	1967	0.50	-0.19	New observer 11.1967.
		4	1980	-0.25	-0.69	Relocation 600 m E 06.1980. Last month with data 04.1980. Merged series 52300 and 52290.
		8	2008	-0.44	-0.44	Relocation 2 km NE and automation 02.10.2008. Last month with data 08.2008. Merged series 52290 and 52310.
52860	Takle	2	1977	0.15	-0.32	New minimum thermometer 03.1977.
		3	1986	-0.22	-0.47	Relocation 5 m N 04.1986.
		4	2014	-0.25	-0.25	Automation 08.05.2014.
54110	Lærdal IV	3	1996	-0.62	-0.31	Relocation 31.05.1996. Last month with data 03.1996. Merged series 54130 and 54120.
		8	2008	0.31	0.31	Relocation and automation 12.09.2008. Last moth with data 08.2008. Merged series 54120 and 54110.
55820	Fjærland - Bremuseet	8	1971	-0.47	-1.15	New screen 09.1971.
		12	1981	0.49	-0.68	-
		12	2004	-1.17	-1.17	Relocation and automation 20.11.2005. Last month with data 12.2004. Merged series 55840 and 55820.
57420	Førde - Tefre	5	1965	0.09	-0.66	Relocation 1.4 km NNW 01.07.1965. Last month with data 05.1965. Merged series 57170 and 57180.
		6	1985	-0.75	-0.75	Relocation 3 km SE 01.10.1985. Last month with data 06.1985. Merged series 57180 and 57190.
57770	Ytterøyane fyr	8	1984	0.11	0.26	Relocation 09.1984. Merged series 57750 and 57770.
		8	1999	0.14	0.14	Automation 09.1999. New screen (MI-46).
58070	Sandane	1	2003	0.31	0.31	-
59610	Fiskåbygd	12	1987	-0.22	-0.22	-
59680	Ørsta - Volda lufthamn	7	1973	0.21	-0.76	-
		3	1996	-0.97	-0.97	Relocation 12.2002. Last month with data 03.1996. Merged series 59710 and 59680.
59800	Svinøy fyr	5	1986	-0.08	-0.08	New screen (MI-33) and small relocation 1.5 m W 06.1986.
60500	Tafjord	5	1984	-0.26	-0.26	Relocation 550 m W 07.1984. Last month with data 05.1984.
60990	Vigra	10	1968	-0.21	-0.63	Relocation 24 m SSE 11.1968.
		10	1998	0.37	-0.42	New thermometer 06.11.1998.

		9	2012	-0.79	-0.79	-
68290	Selbu II	4	1979	0.09	-0.80	Relocation 2.5 km NE 01.09.1979. Last month with data 04.1979. Merged series 68310 and 68340.
		10	2006	-0.89	-0.89	Relocation 6 km W and automation 26.09.2007. Last month with data 10.2006. Merged series 68340 and 68290.
69100	Værnes	12	1977	0.61	0.03	New thermometer 01.1978.
		11	1994	-0.58	-0.58	Relocation 800 m NE 12.1994.
69380	Meråker - Vardetun	7	1969	-0.26	-0.90	Relocation 11.1969. Last month with data 07.1969. Merged series 69360 and 69340.
		3	2004	-0.63	-0.63	Relocation 09.05.2004. Last month with data 03.2004. Merged series 69370 and 69380.
71550	Ørland III	10	1989	-0.45	-0.05	Relocation. Exact date not found.
		5	2009	0.40	0.40	Automation 06.2009.
73500	Nordli - Holand	12	1966	0.52	0.54	Relocation 06.1967 Last month with data 12.1966. Merged series 73470 and 73490.
		8	1984	0.02	0.02	Relocation 10.1985. Last month with data 08.1984. Merged series 73490 and 73470.
84700	Narvik lufthavn	7	1975	0.18	-0.42	Relocation 01.09.1975. Last month with data 07.1975. Merged series 84790 and 84800.
		4	2002	-0.59	-0.59	Relocation 11.2002. Last month with data 04.2002. Merged series 84800 and 84700.
85380	Skrova fyr	12	1979	0.30	0.30	New minimum thermometer. Exact date not found.
85890	Røst lufthavn	6	1997	-0.69	-0.35	Relocation 04.1998. Last month with data 06.1997. Merged series 85910 and 85891.
		7	2014	-0.87	0.33	Outliers
		9	2016	1.20	1.20	Outliers
86500	Sortland	10	1971	0.47	0.13	New observer 11.1971.
		12	1984	-0.35	-0.35	Relocation 01.1985. Merged series 86520 and 86500.
86740	Bø i Vesterålen III	2	1987	0.11	1.07	New minimum thermometer 03.1987.
		5	2001	1.83	0.96	Relocation 06.2001. Merged series 86760 and 86780.
		5	2003	-0.87	-0.87	Relocation and automation 06.2003. Merged series 86780 and 86740.
87110	Andøya	2	1972	-0.40	-0.40	Relocation 1 km SSE 03.1972.
88690	Hekkingen fyr	5	1967	-0.78	-0.18	Relocation 10 km NW. Last month with data 05.1967. Merged series 90280 and 88680.
		3	1979	0.89	0.60	Relocation. Last month with data 03.1979. Merged series 88680 and 88690.
		5	2015	-0.29	-0.29	New screen (MI-2001B). Exact date not documented, so used suggested date by Homer.
89350	Bardufoss	8	1988	0.39	-0.89	Relocation 150 m S 09.1988.
		12	2013	-1.28	-1.28	Automation 01.2014.
89940	Dividalen II	5	2009	-1.53	-1.53	Relocation and automation 08.10.2009. Last month with data 05.2009. Merged series 89950 and 89940.
90450	Tromsø	10	1987	-0.36	-0.36	-
90490	Tromsø - Langnes	3	1972	-0.42	-0.79	New thermometers (Tetalux) 04.1972.
		8	1985	-0.37	-0.37	Relocation 450 m SE 09.1985.
90800	Torsvåg fyr	2	2001	-0.20	-0.20	New data logger 22.02.2001.
91380	Skibotn II	3	1972	-0.45	-1.32	Relocation 04.1974. Last month with data 03.1972. Merged series 91350 and 91360.
		9	2004	-0.87	-0.87	Relocation and automation 11.2004. Last month with data 09.2004. Merged series 91370 and 91380.

91740	Sørkjosen lufthavn	5	1992	-1.28	0.86	Relocation 07.1992. Last month with data 05.1992. Merged series 91750 and 91760.
		6	2006	2.14	2.14	Relocation and automation 07.2006. Merged series 91760 and 91740.
93301	Suolovuopmi - Lulit	1	1982	0.12	-0.75	New observer 08.02.1982.
		10	2004	-0.88	-0.88	Relocation and automation 11.2004. Merged series 93300 and 93301.
93700	Kautokeino	5	1970	0.48	0.15	Relocation 06.1970 (and 11.1970). Merged series 93700 and 93710.
		12	1995	-0.33	-0.33	Relocation and new screen (MI-46) 08.1996. Last month with data 12.1995. Merged series 93710 and 93700.
93900	Sihccajavri	8	2009	0.56	0.56	Automation 09.2009.
94500	Fruholmen fyr	9	1998	-0.23	-0.23	Automation 10.1998.
95350	Banak	7	1965	-0.36	-0.70	Relocation 08.1965. Merged series 95430 and 95350.
		6	1984	-0.54	-0.35	New thermometer (MITEF) 07.1984.
		10	2004	0.19	0.19	Automation 11.2004.
97251	Karasjok - Markannjarga	7	2004	-0.05	-0.05	Relocation 08.2004. Merged series 97250 and 97251.
98400	Makkaur fyr	9	1969	0.33	-0.11	Relocation 50 m NNE 10.1969.
		2	2005	-0.44	-0.44	Automation 10.2005. Last month with data 02.2005.
99370	Kirkenes lufthavn	8	2007	0.14	0.14	Errors in equipment was fixed 22.08.2007.
Series without detected breaks						
11500	Østre Toten - Apelsvoll					
18700	Oslo-Blindern					
23160	Åbjørsbråten					
23500	Løken i Volbu					
27500	Færder fyr					
47300	Utsira fyr					
48330	Slåtterøy fyr					
62480	Ona II					
65940	Sula					
70850	Snåsa - Kjevlia					
71990	Buholmråsa fyr					
75410	Nordøyan fyr					
80102	Solvær III					
80610	Myken					
80700	Glomfjord					
82290	Bodø VI					
92350	Nordstraum i Kvænangen					
93140	Alta lufthavn					
96400	Slettnes fyr					
96800	Rustefjelbma					
97350	Cuovddatmohkki					
98550	Vardø radio					

2.5 Corrected breaks in Finnish and Swedish maximum series

Table A5. Detected breaks in the Finnish and Swedish maximum temperature series. The annual break amplitude (Amp) and annual break adjustment (Adj) is included together with metadata. Series with no corrected break points are listed at the bottom of the table.

Number	Name		Month	Year	Amp	Adj	Metadata
101969	Muonio Alamuonio	Fin	12	1981	-0.22	-0.22	
101994	Kittilä Pokka	Fin	12	1993	0.11	0.11	
102000	Sodankylä Lokka	Fin	11	1967	-0.32	-0.05	
			12	1980	0.09	0.28	
			12	2004	0.19	0.19	
102033	Inari Ivalo lentoasema	Fin	12	1997	-0.18	-0.18	
102035	Utsjoki Kevo	Fin	11	1994	-0.15	-0.15	
81540	Nordkoster A	Swe	12	1965	0.22	-0.36	Relocation (merging)
			2	2000	-0.58	-0.58	
92100	Säffle	Swe	9	1971	0.17	0.31	
			6	1985	0.14	0.14	
92130	Blomskog A	Swe	12	1995	-0.55	-0.55	Relocation (merging)
92410	Arvika A	Swe	12	1995	-0.13	-0.13	Relocation (merging)
93220	Karlstad Flygplats	Swe	11	1965	0.30	-0.09	
			6	1984	-0.33	-0.39	
			12	1996	-0.06	-0.06	
102540	Höljes	Swe	12	1974	0.24	0.39	
			12	1987	-0.06	0.15	
			10	2003	0.21	0.21	
103080	Torsby	Swe	12	1976	-0.12	-0.38	
			12	2005	-0.26	-0.26	
103090	Gustavsfors	Swe	12	1980	-0.34	-0.34	
112170	Grundforsen	Swe	12	2002	0.02	0.02	
113420	Särna A	Swe	12	1981	0.11	0.17	
			12	2000	0.07	0.07	
114140	Älvdalen A	Swe	12	1995	-0.11	-0.11	Relocation (merging)
132170	Storlien-Storvallen A	Swe	12	2009	0.55	0.55	Relocation (merging)
132590	Edevik	Swe	12	1979	-0.03	-0.03	Relocation (merging)
134590	Almdalen	Swe	1	1978	0.20	-0.30	
			2	1986	-0.51	-0.51	
143440	Jormlien	Swe	12	1986	-0.13	-0.13	
144300	Gäddede	Swe	1	1986	0.19	0.19	
146050	Hoting A	Swe	12	1995	0.20	0.20	Relocation (merging)

155970	Hemavan Flygplats	Swe	1	1986	0.27	0.13	
			12	2007	-0.14	-0.14	
166810	Jäckvik	Swe	12	1975	-0.15	-0.15	
167980	Kvikkjokk-Årrenjarka	Swe	3	1966	-0.37	-0.75	
			9	2002	-0.38	-0.38	
180940	Kiruna Flygplats	Swe	8	2003	0.08	0.08	
188800	Abisko	Swe	12	2004	-0.35	-0.35	
188820	Katterjåkk	Swe	12	1970	0.14	-0.23	Relocation (merging)
			11	2008	-0.37	-0.37	
191910	Naimakka A	Swe	12	1995	-0.24	-0.24	Relocation (merging)
192840	Karesuando A	Swe	6	1968	0.13	0.33	
			11	1985	0.43	0.20	
			9	2008	-0.24	-0.24	
Series without detected breaks							
102001	Sodankylä Vuotso	Fin					
103410	Malung	Swe					
122330	Ljusnedal	Swe					
133050	Höglekardalen	Swe					
181900	Vittangi	Swe					

2.6 Corrected breaks in Finnish and Swedish minimum series

Table A6. Detected breaks in the Finnish and Swedish minimum temperature series. The annual break amplitude (Amp) and annual break adjustment (Adj) is included together with metadata. Series with no corrected break points are listed at the bottom of the table.

Number	Name		Month	Year	Amp	Adj	Metadata
101969	Muonio Alamuonio	Fin	1	1987	0.55	0.55	
101994	Kittilä Pokka	Fin	1	1982	0.59	1.15	
			7	2004	0.56	0.56	
102000	Sodankylä Lokka	Fin	10	1972	0.50	0.29	
			2	2009	-0.20	-0.20	
102001	Sodankylä Vuotso	Fin	8	1980	0.54	0.54	
102033	Inari Ivalo lentoasema	Fin	12	1992	-0.4	0.27	
			3	2000	0.67	0.67	
102035	Utsjoki Kevo	Fin	11	2001	0.27	0.27	
102036	Utsjoki Nuorgam	Fin	11	2009	-0.80	-0.80	
81540	Nordkoster A	Swe	12	1964	-1.00	-0.94	Relocation (merging)
			12	1975	-0.26	0.06	
			12	1998	0.32	0.32	
92100	Säffle	Swe	7	1972	-0.80	0.03	
			3	1987	0.27	0.83	
			5	1993	0.22	0.56	
			12	2014	0.34	0.34	
92130	Blomskog A	Swe	2	1976	-0.22	-0.61	
			7	1995	-0.39	-0.39	Relocation (merging)
92410	Arvika A	Swe	5	1964	0.89	-0.53	
			4	1969	0.90	-1.41	
			2	1984	-1.64	-2.31	
			7	1995	-0.67	-0.67	Relocation (merging)
93220	Karlstad Flygplats	Swe	11	1969	-0.24	-1.12	
			11	1984	-0.43	-0.88	
			10	1997	-0.44	-0.44	
102540	Höljes	Swe	12	1971	0.15	0.15	
103080	Torsby	Swe	2	1970	0.68	0.54	
			3	2006	-0.14	-0.14	
103410	Malung	Swe	12	1988	0.17	0.55	
			11	2011	0.38	0.38	
112170	Grundforsen	Swe	2	1965	-0.49	-0.49	

113420	Särna A	Swe	12	1972	1.22	-0.36	
			8	1981	-1.58	-1.58	
114140	Älvdalen A	Swe	12	1995	-0.19	-0.19	Relocation (merging)
122330	Ljusnedal	Swe	12	1987	0.06	0.35	
			12	2005	0.29	0.29	
132170	Storlien-Storvallen A	Swe	10	2009	-1.24	-1.24	Relocation (merging)
132590	Edevik	Swe	3	1980	1.02	1.24	Relocation (merging)
			10	1995	0.22	0.22	
134590	Almdalen	Swe	3	1995	0.20	0.20	
143440	Jormlien	Swe	12	1986	0.46	0.46	
144300	Gäddede	Swe	12	1984	-0.14	-0.14	
146050	Hoting A	Swe	11	1979	-0.59	0.36	
			11	1994	0.95	0.95	Relocation (merging)
155970	Hemavan Flygplats	Swe	12	1986	-0.15	-0.15	
166810	Jäckvik	Swe	4	1987	1.07	1.07	
167980	Kvikkjokk-Årrenjarka	Swe	9	2002	-0.28	-0.28	
180940	Kiruna Flygplats	Swe	11	1998	0.16	0.50	
		Swe	3	2011	0.33	0.33	
181900	Vittangi	Swe	12	1985	0.44	0.44	
188820	Katterjåkk		2	1970	-0.54	-0.54	Relocation (merging)
191910	Naimakka A	Swe	3	1995	-0.35	-0.35	Relocation (merging)
192840	Karesuando A	Swe	3	1965	-0.69	-0.92	
			12	1998	-0.23	-0.23	
Series without detected breaks							
103090	Gustavsfors	Swe					
133050	Höglekardalen	Swe					
188800	Abisko	Swe					