



The Danish  
Meteorological  
Institute

# Denmark – DMI Historical Climate Data Collection 1768- 2020

DMI Report 21-02  
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## Colophon

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## 1 Abstract

This report contains the available DMI historical data collection 1768-2020 for Denmark, including observations (atmospheric pressure), long daily, monthly and annual series of station based data, country-wise values and a list of storms.

## 2 Resumé

Denne rapport indeholder tilgængelige historiske DMI datasamlinger 1768-2020 for Danmark. Det drejer sig om observationer af lufttryk, lange daglige, månedlige og årlige stationsdataserier, landstal og en stormliste.

## 3 Introduction

This report contains a DMI historical data collection 1768-2020 for Denmark, including long series of station based data comprising observations of atmospheric pressure plus daily, monthly and annual values of selected parameters and some selected graphics. Finally selected country-wise (region) values and a list of storms for Denmark are published. Description of the general weather and climate in Denmark [31] is included.

This information has been published earlier in different DMI reports [16], [17], [18], [19], [20] and [25]. It is now published in one report divided in sections covering the different data types.

The data collection comprises observational, daily, monthly, annual and country-wise (region) blended data sets with a long record (blended station and country-wise data series) and also daily station data series (single station data series; not blended). A description of the blending and other metadata can be found in Appendices.

Changes in station position, measuring procedures or observer may all significantly bias a time series of observations. For that reason metadata ("data on data") are important. All available information on station positions and relocations are included in Appendix. Other metadata as descriptions of the construction of data sets and data series behind, rain gauge exposure, information concerning atmospheric pressure data from old manually operated climate stations, the introduction of the Hellmann rain gauge and the introduction of Stevenson screens (thermometer screen, notes on monthly values etc. can also be found in Appendices.

A compiled set of various metadata up to 1996, covering aspects such as station position and relocations, change of instrumentation and observation units etc., that is essential to know when homogenizing time series of climate data can be found in DMI Technical Report 03-24 [35]. This publication contains information concerning a major part of the stations included in this report.

## 4 General data overview

Below is a quick general overview of all the information from Denmark you can find in this report:

- A station map and -list showing weather stations (present name and location) from where the station based data sets presented in this report come from.
- A survey and description of the different data collections and parameters.
- Description of the general weather and climate in Denmark.
- Detailed metadata (data about data).
- File formats describing the different data files included in this report.

Guidance: Find the data collection you are interested in the data collections overview. Read detailed about it in the specific section and appendix. Find the data set among the data files, which can be downloaded from the publication part of DMI web pages together with this report.

**Figure 1. Map showing station position of the stations in Denmark referred to in this report.**

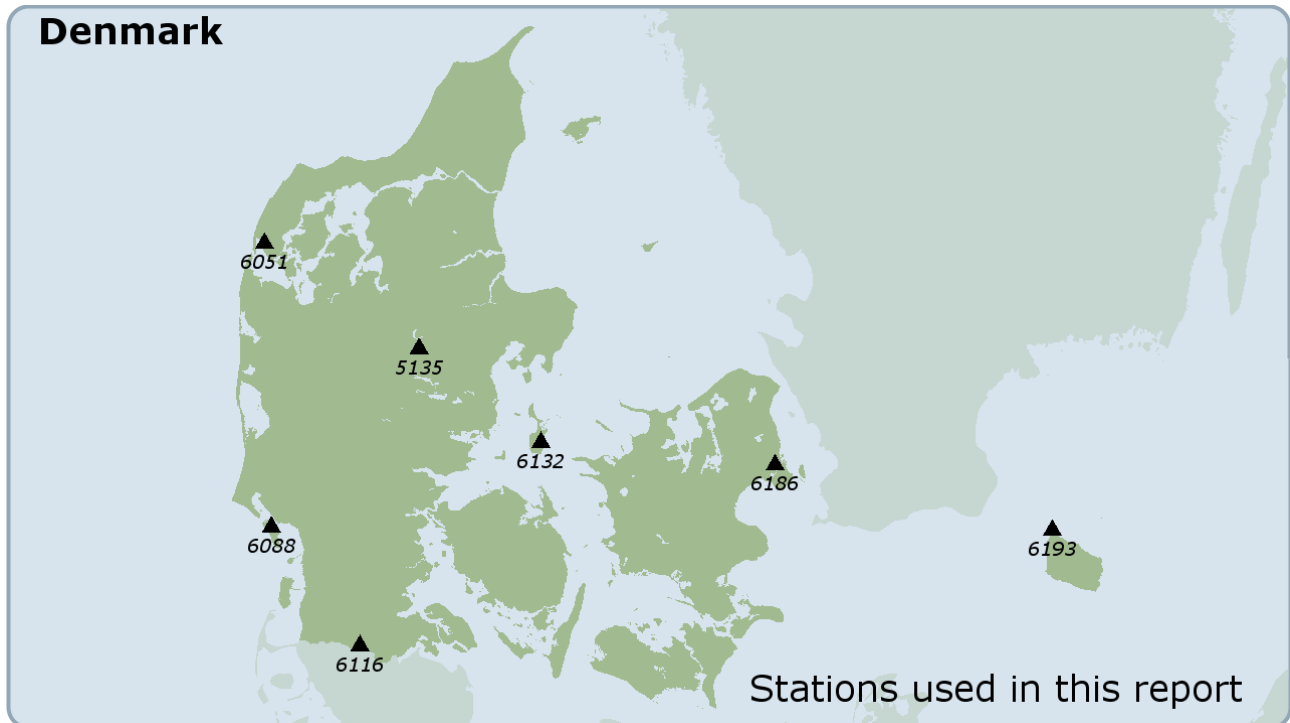


Figure 1 note: The map shows the station positions of the stations where the data sets referred to in this report come from. Only the latest positions are marked. The official WMO station identifiers for Denmark consist of 5 digits “06xxx”. However, in this report the in front “0” is omitted, giving 4 digits i.e. “6132” for Tranebjerg, which is also used on the map. The Danish national station identifiers describing climate/precipitation stations in Denmark consist of 5 digits, either the new format “05XXX” (the in front “0” is omitted), giving 4 digits i.e. “5135” for Grønbæk or the old format, where the station number started with 20-32 dependent on the region i.e. “27080” for the old Tranebjerg station.

**Table 1. Description of the data set id (station number), station name and first year of appearance for the data you can find in this report.**

Data set id*	Station*	First year of appearance
6051	Vestervig	1874
5135	Grønbæk	1874
6088	Nordby/Fanø	1872
6116	Store Jyndevad	1920
6132	Tranebjerg/Samsø	1872
6186	København	1768
6193	Hammer Odde Fyr/Bornholm	1873

Table 1 note: \*latest station number and name.

## 5 Data collections; general overview

Data types/parameters marked with “bold” in the “Data Collections” column represent a data set for every station/region mentioned. The data sets can be downloaded from the publication part of DMI web pages together with this report and are described in the sections and appendices specified.

**Table 2. General overview – data collections in this report.**

Type	Data Collections	Section, Page, Appendix
Observation	<ul style="list-style-type: none"> <li><b>Atmospheric pressure (msl)</b> 3 data sets (blended): 6051 Vestervig (1874-2020) 6088 Nordby/Fanø (1874-2020) 6193 Hammer Odde Fyr (1874-2020)</li> </ul>	Sec 7, p 14, App 2
Daily	<ul style="list-style-type: none"> <li><b>Air temperature 12 UTC (13 DNT)</b> 2 data sets (single stations): 27080 Tranebjerg (1872-2003) 6132 Tranebjerg (2003-2020) 1 data set (blended): 6132 Tranebjerg (1872-2020)</li> <li><b>Highest air temperature</b></li> <li><b>Lowest air temperature</b> 22 data sets (single stations): 21100 Vestervig (1874-2003) 6051 Vestervig (2003-2020) 25140 Nordby/Fanø (1874-2003) 6088 Nordby/Fanø (2003-2020) 27080 Tranebjerg (1872-2003) 6132 Tranebjerg (2003-2020) 30380 Landbohøjskolen (1874-1997) 6186 Landbohøjskolen (1995-2020) 32030 Sandvig (1874-1970) 32020 Hammer Odde Fyr (1971-1987) 6193 Hammer Odde (1984-2020) 10 data sets (blended): 6051 Vestervig (1874-2020) 6088 Nordby/Fanø (1874-2020) 5165 Tranebjerg (1872-2020) 6186 København (1874-2020) 6193 Hammer Odde (1874-2020)</li> <li><b>Average atmospheric pressure</b> 5 data sets (single stations): 21100 Vestervig (1874-1987) 6052 Thyborøn (1961-2020) 25140 Nordby/Fanø (1874-1987) 6080 Esbjerg Airport (1959-2020) 6193 Hammer Odde Fyr (1874-2020) 3 data sets (blended): 6051 Vestervig (1874-2020) 6088 Nordby/Fanø (1874-2020) 6193 Hammer Odde (1874-2020)</li> </ul>	Sec 8, p 17-21, App 3

Type	Data Collections	Section, Page, Appendix
	<ul style="list-style-type: none"> <li>• <b>Accumulated precipitation</b></li> <li>15 data sets (single stations):</li> <li>6051(21100) Vestervig (1874-2020)</li> <li>5135 (21430) Grønbæk (1874-2020)</li> <li>6088 (25140) Nordby/Fanø (1874-2020)</li> <li>26410 Broderup (1920-1993)</li> <li>26409 Tinglev (1995-2006)</li> <li>6116 (26400) Store Jyndevad (1987-2020)</li> <li>27080 Tranebjerg (1872-2001)</li> <li>6132 (27082) Tranebjerg Øst (2001-2020)</li> <li>30380 Landbohøjskolen (1874-1996)</li> <li>30210 Meteorologisk Institut (1875-1922)</li> <li>30210 Meteorologisk Institut (1961-1984)</li> <li>5735 (30370) Botanisk Have (1961-2020)</li> <li>32030 Sandvig (1874-1970)</li> <li>32020 Hammer Odde Fyr (1961-1987)</li> <li>6193 Hammer Odde (1984-2020)</li> <li>7 data sets (blended):</li> <li>6051 Vestervig (1874-2020)</li> <li>5135 Grønbæk (1874-2020)</li> <li>6088 Nordby/Fanø (1874-2020)</li> <li>5165 Tranebjerg (1872-2020)</li> <li>6116 Store Jyndevad (1920-2020)</li> <li>5735 København (1874-2020)</li> <li>6193 Hammer Odde (1874-2020)</li> <li>• <b>Cloud Cover 8, 14 and 21 DNT</b></li> <li>1 dataset (single station):</li> <li>6132 Tranebjerg (1872-2000)</li> </ul>	
<b>Monthly/ Annual</b>	<ul style="list-style-type: none"> <li>• <b>Average air temperature</b></li> <li>• <b>Average daily minimum air temperature</b></li> <li>• <b>Average daily maximum air temperature</b></li> <li>• <b>Highest air temperature</b></li> <li>• <b>Lowest air temperature</b></li> <li>• <b>Average atmospheric pressure (msl)</b></li> <li>• <b>Hours of bright sunshine</b></li> <li>• <b>Accumulated precipitation</b></li> <li>• <b>Highest 24-hour precipitation</b></li> <li>• <b>No. of days with snow cover</b></li> <li>• <b>Average cloud cover</b></li> <li>5 data sets (blended):</li> <li>6051 Vestervig (1874-2020)</li> <li>6088 Nordby/Fanø (1872-2020)</li> <li>6132 Tranebjerg (1873-2020)</li> <li>6186 København (1768-2020)</li> <li>6193 Hammer Odde Fyr (1873-2020)</li> </ul>	<b>Sec 9, p 24-28, App 4</b>
<b>Country-wise/ Monthly/ Annual</b>	<ul style="list-style-type: none"> <li>• <b>Country-wise (Denmark) climate data 1874-2020; Average air temperature, Average of minimum and maximum air temperatures, highest/lowest air temperatures, accumulated precipitation, highest 24-hour precipitation and hours of bright sunshine; tables</b></li> </ul>	<b>Sec 10, p 30-32, App 5</b>

Type	Data Collections	Section, Page, Appendix
	<p>2 data sets: All months/years 1891-2020 are characterised by a short text as well as the weather during Easter, Christmas and Midsummer Day. Record breaking months and years are marked and normals 1961-1990, average 2001-2010 and average 2006-2015 are included. The country-wise extremes are calculated separately in a data set.</p> <ul style="list-style-type: none"> <li>• <b>Country-wise (Denmark) climate data 1874-2020; Average air temperature, accumulated precipitation, and hours of bright sunshine</b></li> </ul> <p>4 data sets: Average air temperature; published (1873-2020) Average air temperature; corrected (1873-2020) Accumulated precipitation (1874-2020) Hours of bright sunshine (1920-2020)</p>	
<p><b>Graphics/ Annual</b></p>	<ul style="list-style-type: none"> <li>• <b>Average air temperature; graph</b></li> </ul> <p>7 data sets (blended): 6051 Vestervig (1874-2020) 6088 Nordby/Fanø (1872-2020) 6132 Tranebjerg (1873-2020) 6186 København (1768-2020) 6193 Hammer Odde Fyr (1873-2020) Country-wise; published (1873-2020) Country-wise; corrected (1873-2020)</p> <ul style="list-style-type: none"> <li>• <b>Accumulated hours of bright sunshine; graph</b></li> </ul> <p>2 data set (blended): 6186 København (1876-2020) Country-wise (1920-2020)</p> <ul style="list-style-type: none"> <li>• <b>Accumulated precipitation; graph</b></li> </ul> <p>6 data sets (blended): 6051 Vestervig (1874-2020) 6088 Nordby/Fanø (1872-2020) 6132 Tranebjerg (1873-2020) 6186 København (1821-2020) 6193 Hammer Odde Fyr (1873-2020) Country-wise (1874-2020)</p>	<p><b>Sec 11, p 35-49, App 6</b></p>
<p><b>Storm</b></p>	<ul style="list-style-type: none"> <li>• <b>List of storms 1891-2020 (Denmark); table</b></li> </ul> <p>1 data set: All strong gales to hurricanes registered in Denmark, have been ranked in terms of strength and wind direction and whether there has been snowfall involved.</p>	<p><b>Sec 12, p 50-55, App 7</b></p>

General note to table 2: The cut-off data for the quality control of Danish 2020 data is March 2021. Minor changes can take place after this date. This is related to an ongoing quality control of data. Also when compared to earlier published data collections before 2020 minor changes can have been introduced for the same reason.



Elements/Parameters used in this report can be seen in the table 3 below. The DMI system of element numbers contains more than the shown elements.

**Table 3. Data dictionary for the parameters published in the report.**

Element Number	Element/Parameter	Method	Unit
101	Average air temperature	average	°C
111	Average of daily maximum air temperature	average	°C
112	Highest air temperature	max	°C
121	Average of daily minimum air temperature	average	°C
122	Lowest air temperature	min	°C
401	Atmospheric pressure (msl)	obs/average	hPa
504	Hours of bright sunshine (Star level)	sum	hours
601	Accumulated precipitation	sum	mm
602	Highest 24-hour precipitation	max	mm
701	No. of days with snow cover (> 50 % covered)	sum	days
801	Average cloud cover	average	%

Table 3 note: 'Method' specifies whether the element is a sum, an average, an extreme or an observation. The units of the values in the data files are specified in 'Unit'.

## 6 Weather and climate in general; Denmark

### **Between ocean and continent**

Danish weather is extremely changeable. Denmark lies in the path of the westerlies, an area characterised by fronts, extratropical cyclones and unsettled weather. At the same time, the country is situated on the edge of the European Continent, where winters are cold and summers hot. Compared to other geographical areas on the same latitude, Denmark enjoys a relatively warm climate. This is due to the warm Gulf Stream that originates in the tropical ocean off the eastern coast of the USA. By way of comparison, Denmark is situated on the same latitude as Hudson Bay in Canada and Siberia in Russia, areas almost uninhabitable due to their short summers and harsh winters.

### **The weather changes according to the prevailing wind direction**

Denmark has a typical coastal climate with mild, humid weather in winter and cool, changeable weather in summer, and average air temperatures do not vary greatly between the two seasons. However, the climate and weather in Denmark is strongly influenced by the country's proximity to both the sea and the European Continent. This means that the weather changes according to the prevailing wind direction. The westerly wind from the sea typically brings relatively homogeneous weather both summer and winter: mild in winter, cool during summer, always accompanied by clouds, often with rain or showers. If the wind comes from the east or south, the weather in Denmark tends to resemble the weather currently prevailing on the Continent: hot and sunny during summer, cold during winter. Thus, the wind direction and the season are key factors in describing Danish weather.

### **The westerly wind**

As the wind in Denmark is predominantly westerly, depressions, with their windy and rainy weather, generally move along different tracks from the west in a direction north of Denmark. Summer and winter, such weather brings the depressions and their associated frontal systems close by Denmark - one after the other. This brings about the passage of fronts with continued rain, followed by areas with showers in the cold air behind the front. During winter, precipitation from the fronts will often commence as snow if the previous weather was cold with frost. As the depressions often succeed each other like pearls on a string or in 'clusters', the weather in these situations will often repeat itself at intervals of one or two days, and the weather type itself may last from a few days up to several weeks.

The passage of extratropical cyclones is accompanied by a wind - often a strong wind - on the south side of the low. This is normally strongest after the front passes, when the cold air has arrived. Most gales occur in autumn and early winter when the air temperature difference between the still warm Southern Europe and rapidly cooling Scandinavia is greatest.

During summer, a change in the weather to a westerly wind will usually mean a drop in air temperature during passage of the cold front, often followed by quite humid weather with rain or showers. During winter, a change to a westerly wind will often be preceded by cold weather, perhaps, frost. When the cold front passes, air from the ocean will, in fact, be warmer (being heated by the ocean) than the air over land. The air temperature thus rises, even though a cold front is passing! Only if the air behind the front is really cold, such as when it comes from the north or north east, will the passage of a cold front during winter mean colder weather.

### **The calm anticyclones (highs)**

If the extratropical cyclones from the west steer well clear of Denmark, periods of relatively settled anticyclone weather will ensue. During summer this means the ground will continue to be heated, resulting in increasingly hot air temperatures. But with just a light breeze from the sea, a cover of very thin cloud - called stratocumulus - often forms at low altitude, blocking the sun and perhaps ruining an otherwise perfect day for the beach. For Denmark to experience hot and dry summer weather, the air must preferably come from the continent, where it is usually hot and dry during the summer.

Highs during winter normally mean cold, clear and calm weather. However, because of the substantial radiation, especially at night, fog may easily form which is not readily dispersed during the day. Being very low during winter, the sun fails to heat the ground sufficiently during the short day to make the air temperature rise. In fact, in clear weather during the months of December and January there will be a radiative deficit day and night, also at midday. This means that the air temperature in clear weather will continually drop, in extreme situations falling to below  $-25^{\circ}\text{C}$  inland away from coastal areas. This is rather unusual though and also requires that the air is deprived of any kind of heat from elsewhere. The presence of snow cover is of great importance in this connection, as this increases the albedo while also acting as insulation. Without snow cover the air temperature will only rarely fall below  $-10^{\circ}\text{C}$ , because of the heat supplied from the earth's surface. Finally, the weather must be totally calm to reach extremely low air temperatures, as even a light breeze will bring in milder, more humid air from the sea surrounding Denmark. Should any clouds move in over land, they will act as a blanket, thus ending the cold spell/weather.

### **The easterly wind**

In Denmark, the easterly wind is not as frequent as the westerly, as it is a sign of the inverse of the normal distribution of lows and highs, namely lows to the south and highs to the north. In this situation, the weather is subject to considerable continental influence, since the air originates from the great continental land mass to the east. This means cold weather during winter and warm weather during summer. The easterly wind is especially common during late winter or spring, at which time the cold continental winter-high over Europe has often been dissolved while the similar high over Scandinavia or Russia remains intact. This weather situation is quite stable and may produce cold and windy weather for days or weeks, thus prolonging the cold of winter far into the spring.

Especially in early winter, however, the relatively warm waters of Baltic partly heat the cold easterly wind which may intensify precipitation and cause snow showers in the Baltic Sea, particularly on Bornholm and Lolland/Falster.

### **The southerly wind**

As with air arriving from the east, air reaching Denmark from the south is of continental origin. This causes cold during winter and heat during summer. But air coming from the south will often be moist and accompanied by haze or fog. During summer, the moisture input may cause heavy showers, possibly with thunder. However, this is fairly rare, as thunder will most frequently be associated with fronts - especially cold ones. Moist air from the south preceding the passage of a cold front makes good conditions for thunderstorms. A prolonged heat wave is often terminated by just such a thunder cold front and followed by a change to cooler weather.

### **The northerly wind**

North is the least frequent wind direction in Denmark. While air from the polar regions is generally cold and dry, it makes a great difference whether the air comes from the north west or from the north east. Since the north-westerly wind comes from the sea, it may be regarded as a colder and drier version of the westerly wind. The north-westerly wind will often only give rise to a few showers and little precipitation, and because of the effect of the Norwegian Mountains it brings dry and sunny weather, particularly to northern Jutland, although this effect may extend as far as Copenhagen. In these situations there will often be showers in south and west Jutland.

By comparison, air from the north and north east more closely resembles a cold and dry version of the typical easterly wind. North-easterly is thus the coldest wind direction in Denmark, and if very cold air from Sweden moves out over, say, the Kattegat, exceptionally heavy showers may form which can lead to prolonged local snowfall. These showers - often called "Kattegat showers" - become heavier the further the air moves over the comparatively warm water.

## 7 Observational section: Historical DMI climate data Collection

Table 4. Overview of observational section – data collections in this report.

Type	Data Collections	Section, Page, Appendix
Observation	<ul style="list-style-type: none"> <li>Atmospheric pressure (msl)</li> </ul> 3 data sets (blended): 6051 Vestervig (1874-2020) 6088 Nordby/Fanø (1874-2020) 6193 Hammer Odde Fyr (1874-2020)	Sec 7, p 14, App 2

Table 4 note: Latest earlier report: [21] Cappelen, J. (ed), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02.

Figure 2. Map showing station position where the Danish observational atmospheric pressure daily data sets referred to in the observational section come from.

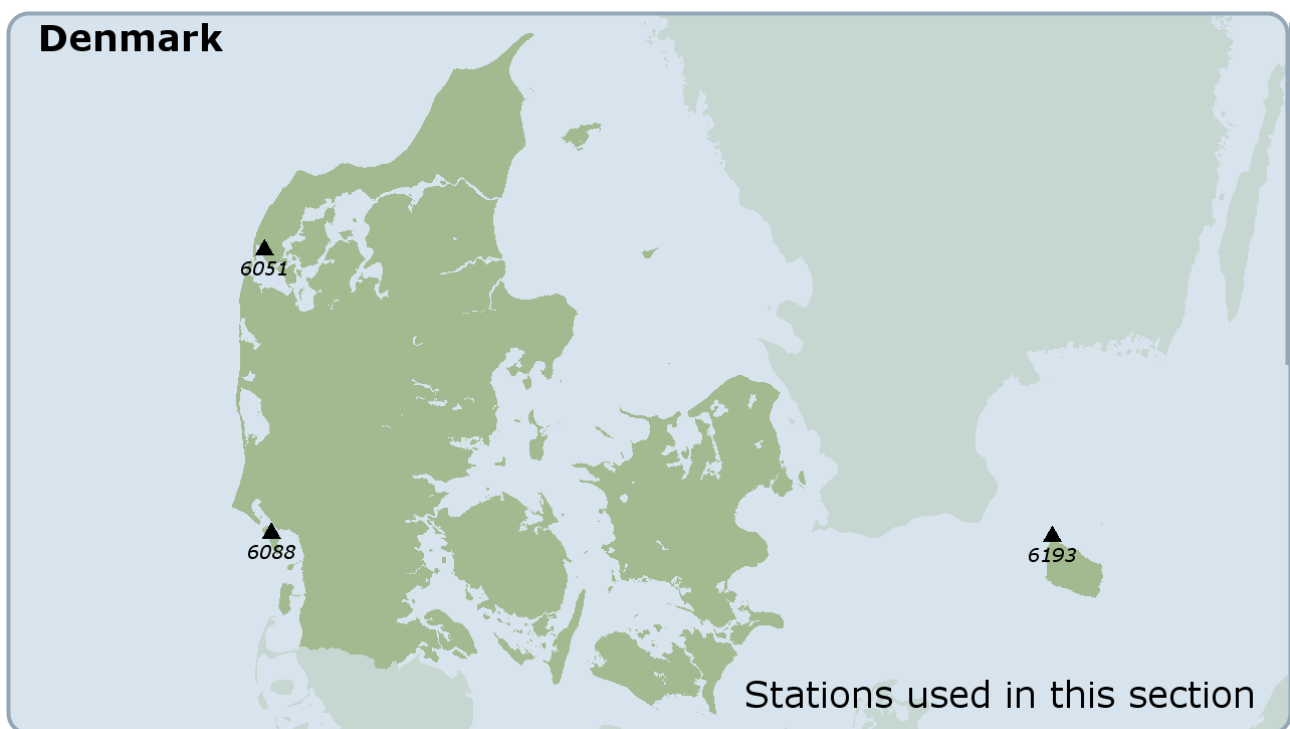


Figure 2 note: The map shows the station positions of the stations where the observational data sets referred to in the observational section come from. Only the latest position is marked. The official WMO station identifiers for Denmark consist of 5 digits “06xxx”. However, in this report the in front “0” is omitted, giving 4 digits i.e. “6051” for Vestervig, which is also used on the map. The Danish national station identifiers describing climate stations in Denmark consist of 5 digits. In the old format the station number started with 20-32 dependent on the region i.e. “21100” for the old Vestervig station. See more details in Appendix 1 and 2.

According to the intentions to update regularly, preferably every year, this particular report contains an update (2020 data) of the Danish mean sea level atmospheric pressure series originally published in DMI Technical Report 97-3: North Atlantic-European pressure observations 1868-1995 - WASA dataset version 1.0 [43].

As part of a former project called WASA, selected DMI series of atmospheric pressure observations from Denmark, Greenland and the Faroe Islands 1874-1970 on paper were digitised. The pressure observations were digitised from the meteorological yearbooks, which means that the observations were station level data corrected for index error, air temperature and, since 1893, gravity. From 1971 the pressure data were taken from the DMI Climate Database. The WASA project was originally titled: "The impact of storms on waves and surges: Changing climate in the past 100 years and perspectives for the future" [44].

**Figure 3. Location of the stations that originally provided atmospheric pressure observations to the WASA pressure data set.**

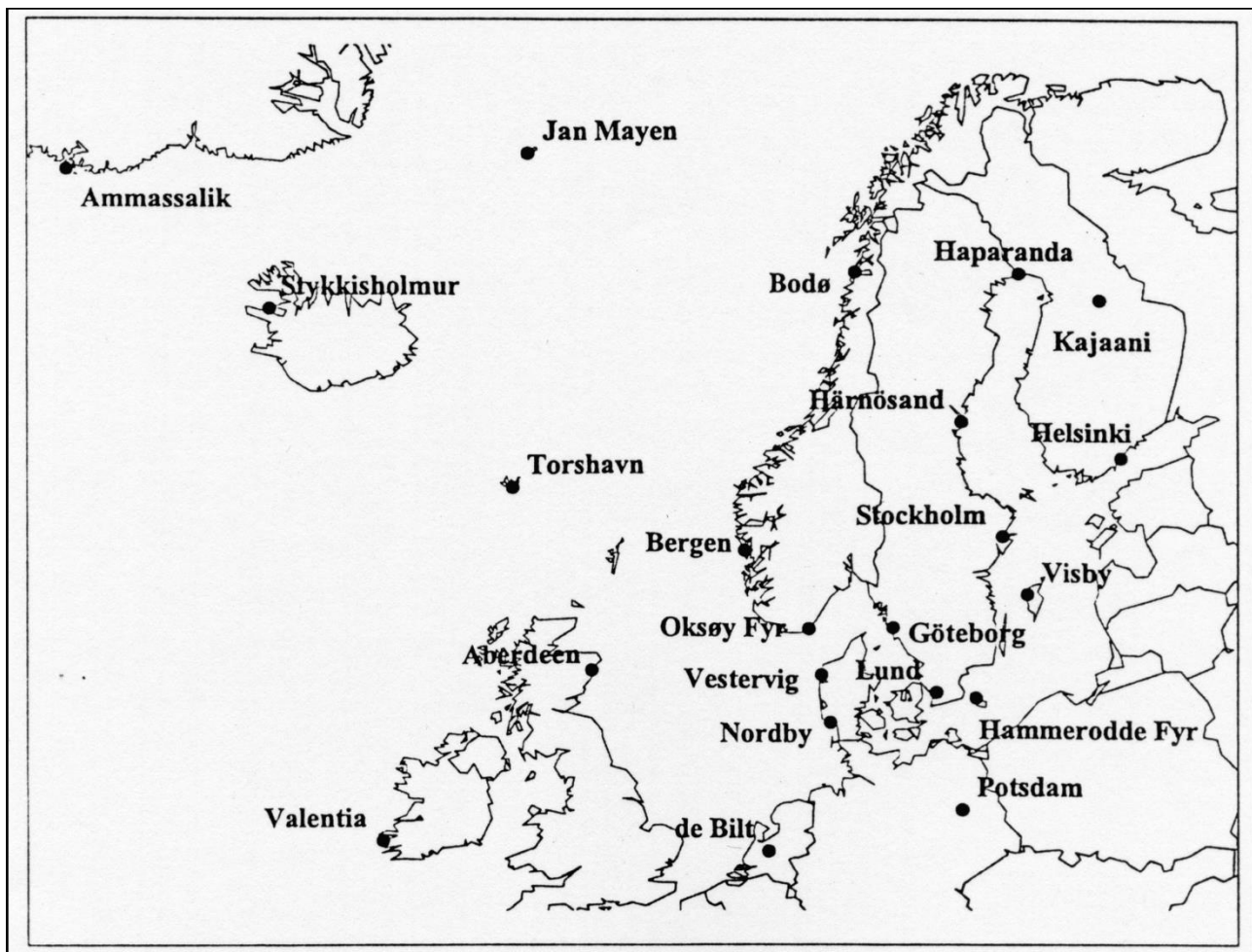


Figure 3 note: The original WASA pressure data sets were published in [43]. Pressure data sets from Greenland (Tasiilaq/Ammassalik) and Tórshavn, The Faroe Islands are presented in the representative historical Climate Data Collection; DMI Report 21-04 [23] and DMI Report 21-05 [24].

Climate change studies and the related analysis of observed climatic data call for long time series of climate data on all scales, but please note that the digitisation of the observations of atmospheric pressure can only be considered as the first step towards sensible utilisation of the observations for climate change studies. Next follows testing for homogeneity of the series, ensuring that any discovered trend are natural.

During the WASA project the data have been homogenised. The updated series presented in this section has been tested and corrected carefully, mainly based on visual tests. Thus it must be stressed that the updated atmospheric pressure data after the WASA project consist of the values as observed, and that no final testing for homogeneity has been performed on these observations for the whole period up to now.

They are therefore not necessarily homogenized as such and this should be considered before applying the data series for climate research purposes.

For the benefit of scientists that may wish to conduct such testing various results and remarks concerning observational atmospheric pressure data have been included in the report. For supplementary metadata, see also [43]. The station history can be found in Appendix 1.

The Danish atmospheric pressure measurements started 1874 at national climate stations. Measurements of atmospheric pressure were stopped at these manually operated climate stations in 1987. Therefore the atmospheric pressure datasets in table 5 had to be continued from nearby synoptic stations measuring atmospheric pressure. In the WASA project the data were merged into long homogeneous series seen in table 5. Appendix 2 indicates how the stations were merged and how many observations the series contains in the different parts.

Important note: Please be aware that the daily series of atmospheric pressure presented in section 8 are constructed using the digitised material mentioned above only applying the formulas that can be seen in Appendix 3. Other adjustments (also in Appendix 3) have not been applied to the daily value dataset. This is the explanation for small differences between the daily series of atmospheric pressure presented in section 8 and the daily series that can be calculated using the homogenized atmospheric pressure observations presented here in this section. It is advised for the reader to take this probable need of adjustment into account when using the daily value data set.

**Table 5. Data sets and station series; observations of atmospheric pressure (at msl, mean sea level; element number 401). See details in Appendix 2.**

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1874-2020	Vestervig	dk_obs_401: 6051	1874-1987	Atmospheric pressure (msl)
	Thyborøn		1987-2020	Atmospheric pressure (msl)
Nordby/Fanø 1874-2020	Nordby/Fanø	dk_obs_401: 6088	1874-1987	Atmospheric pressure (msl)
	Esbjerg Airport		1987-2020	Atmospheric pressure (msl)
Hammer Odde Fyr 1874-2020	Sandvig or Hammer Odde Fyr	dk_obs_401: 6193	1874-1987	Atmospheric pressure (msl)
	Hammer Odde Fyr		1987-2020	Atmospheric pressure (msl)

Table 5 general note: During the WASA project the atmospheric pressure datasets 1874-1995 has been homogenised. Since then the updated series presented in this report have been tested and corrected carefully, mainly based on visual tests.

Table 5 note:

\*Blended data sets, see details in Appendix 2.

\*\*Single station series are not a part of the observational section.

**Table 6. Data dictionary for the observational pressure parameter published in the report.**

Element number	Element/Parameter	Method	Unit
401	Atmospheric pressure (msl)	obs	hPa

Table 6 note: 'Method' specifies that the element is an observation. The units of the observation values in the observational data files are specified in 'Unit'.

The mean sea level atmospheric pressure data sets from Denmark can be downloaded from the publication part of DMI web pages. Details about the data sets and file formats can be seen in Appendix 2.

## 8 Daily Section: Historical DMI Data Collection

Table 7. Overview of daily section – data collections in this report.

Type	Data Collections	Section, Page, Appendix
Daily	<ul style="list-style-type: none"> <li>• <b>Air temperature 12 UTC (13 DNT)</b> 2 data sets (single stations): 27080 Tranebjerg (1872-2003) 6132 Tranebjerg (2003-2020) 1 data set (blended): 6132 Tranebjerg (1872-2020)</li> <li>• <b>Highest air temperature</b></li> <li>• <b>Lowest air temperature</b> 22 data sets (single stations): 21100 Vestervig (1874-2003) 6051 Vestervig (2003-2020) 25140 Nordby/Fanø (1874-2003) 6088 Nordby/Fanø (2003-2020) 27080 Tranebjerg (1872-2003) 6132 Tranebjerg (2003-2020) 30380 Landbohøjskolen (1874-1997) 6186 Landbohøjskolen (1995-2020) 32030 Sandvig (1874-1970) 32020 Hammer Odde Fyr (1971-1987) 6193 Hammer Odde (1984-2020) 10 data sets (blended): 6051 Vestervig (1874-2020) 6088 Nordby/Fanø (1874-2020) 5165 Tranebjerg (1872-2020) 6186 København (1874-2020) 6193 Hammer Odde (1874-2020)</li> <li>• <b>Average atmospheric pressure</b> 5 data sets (single stations): 21100 Vestervig (1874-1987) 6052 Thyborøn (1961-2020) 25140 Nordby/Fanø (1874-1987) 6080 Esbjerg Airport (1959-2020) 6193 Hammer Odde Fyr (1874-2020) 3 data sets (blended): 6051 Vestervig (1874-2020) 6088 Nordby/Fanø (1874-2020) 6193 Hammer Odde (1874-2020)</li> <li>• <b>Accumulated precipitation</b> 15 data sets (single stations): 6051(21100) Vestervig (1874-2020) 5135 (21430) Grønbæk (1874-2020) 6088 (25140) Nordby/Fanø (1874-2020) 26410 Broderup (1920-1993) 26409 Tinglev (1995-2006) 6116 (26400) Store Jyndevad (1987-2020)</li> </ul>	Sec 8, p 17-21, App 3

Type	Data Collections	Section, Page, Appendix
	27080 Tranebjerg (1872-2001) 6132 (27082) Tranebjerg Øst (2001-2020) 30380 Landbohøjskolen (1874-1996) 30210 Meteorologisk Institut (1875-1922) 30210 Meteorologisk Institut (1961-1984) 5735 (30370) Botanisk Have (1961-2020) 32030 Sandvig (1874-1970) 32020 Hammer Odde Fyr (1961-1987) 6193 Hammer Odde (1984-2020) 7 data sets (blended): 6051 Vestervig (1874-2020) 5135 Grønbæk (1874-2020) 6088 Nordby/Fanø (1874-2020) 5165 Tranebjerg (1872-2020) 6116 Store Jyndevad (1920-2020) 5735 København (1874-2020) 6193 Hammer Odde (1874-2020)  <ul style="list-style-type: none"> <li>• <b>Cloud Cover 8, 14 and 21 DNT</b></li> </ul> 1 dataset (single station): 6132 Tranebjerg (1872-2000)	

Table 7 note: Latest earlier report: [21] Cappelen, J. (ed), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02.

The purpose of this section is to publish available long daily DMI data series 1873-2020 for Denmark. This includes air temperature, lowest (minimum) and highest (maximum) air temperature, average mean sea level atmospheric pressure, accumulated precipitation and cloud cover.

According to the intentions to update regularly, preferably every year, this particular report contains an update (2020 data) of the “DMI Daily Climate Data Collection” for the first time published in that form in DMI Technical Report 04-03 [37]. A similar collection of long DMI monthly and annual Danish climate data series can be found in chapter 9 in this report.

The digitisation of a great part of the data presented in this chapter and also much of the station history presented are results of various projects. The WASA project [43,44], ACCORD project [1], NACD project [27] and the Danish CD-ROM “Vejr&Vind” [39] have all contributed regarding the data from Denmark together with a digitisation during spring 1999 funded by the Danish Climate Centre (established 1998 at DMI, closed 2014 in a reorganisation of DMI).

Climate change studies and the related analysis of observed climatic data call for long time series of daily climate data. In this context the report also serves as the DMI contribution of daily values to the European Climate Assessment & Dataset (ECA&D; project homepage: <http://www.ecad.eu/>). ECA&D was initiated by the European Climate Support Network (ECSN; established in 1992 in order to provide a forum and framework for stimulating and supporting increased collaboration between NMHSs in the field of climatology). ECSN was a project within the Network of European Meteorological Services (EUMETNET; <http://www.eumetnet.eu/>).

Please note that the digitisation of the observations only can be considered as the first step towards sensible utilisation of the observations for climate change studies. Next follows testing for homogeneity of the series, ensuring that any discovered trend are natural. Thus it must be stressed that the series presented here mostly consist of the values as observed, and that no testing for homogeneity has been performed on these



daily observations. They are therefore not necessarily homogenized as such, and the report description of each series should therefore be read carefully before applying the data series for climate research purposes.

For the benefit of scientists that may wish to conduct such testing various metadata together with homogeneity test results on relevant series of monthly data have been included in the report (see Appendix 3). For supplementary metadata see also DMI Technical Report 03-24 [35].

**Figure 4. Map showing station position stations where the Danish daily data sets referred to in the daily section come from.**

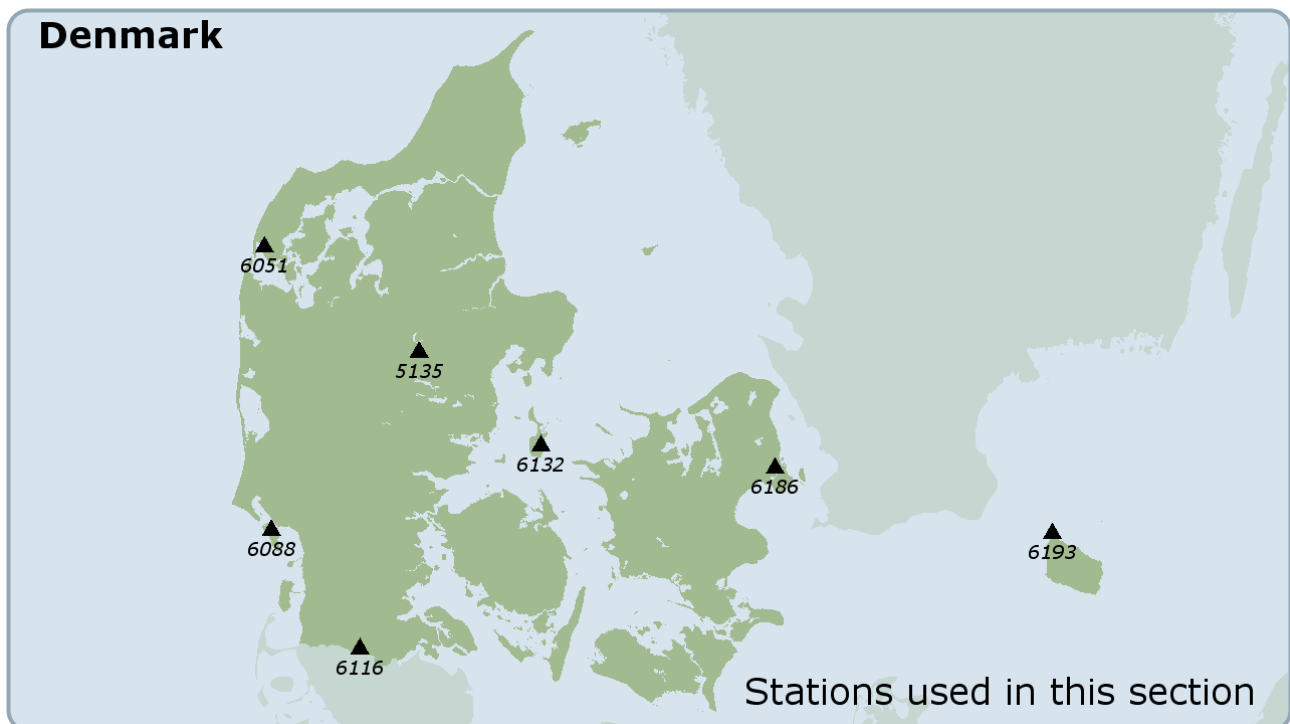


Figure 4 note: The map shows the station positions of the stations where the daily data sets referred to in the daily section come from. Only the latest positions are marked. The official WMO station identifiers for Denmark consist of 5 digits “06xxx”. However, in this report the in front “0” is omitted, giving 4 digits i.e. “6132” for Tranebjerg, which is also used on the map. The Danish national station identifiers describing climate/precipitation stations in Denmark consist of 5 digits, either the new format “05XXX” (the in front “0” is omitted), giving 4 digits i.e. “5135” for Grønnebæk or the old format, where the station number started with 20-32 dependent on the region i.e. “27080” for the old Tranebjerg station. See more details in Appendix 1 and 3.

Two (2) Danish station series with a record of air temperatures measured at 14 hours DNT (old part of the series) or 12 UTC (= 13 hours DNT, newer part of the series) can be blended into one long dataset. Table 8 presents an overview of these station data series (identified by the station name and number) and the possible blended datasets making up the long series. Overlap periods in the single station series have been included when available.

**Table 8. Air temperature at 14 hours DNT/13 UTC or 12 UTC (element number 101); data sets and station series. See details in Appendix 3.**

Dataset*	Station series	Dataset id	Period	Parameter
Tranebjerg	Tranebjerg	dk_daily_101: 27080	1872-2003	Air temperature 14DNT/13UTC**

Dataset*	Station series	Dataset id	Period	Parameter
1872-2020	Tranebjerg Øst	dk_daily_101: 6132	2003-2020	Air temperature 13DNT/12UTC**

Table 8 general note: The single daily station series mostly consist of the values as observed. No DMI testing for homogeneity has been performed on these daily (hourly; 14 hours DNT/13 UTC) observations. They have however been carefully quality-tested and corrected, mainly based on visual tests.

Table 8 note: \*Possible blended full daily datasets using the single daily station series are also a part of this daily section. No DMI testing for homogeneity has been performed on the blended series. See also the European Climate Assessment & Dataset (ECA&D) project homepage: <http://www.ecad.eu/> for their "blend"/data handling and quality/homogeneity test. This site also contains the single Danish station series.

Table 8 note: \*\*DNT refers to Danish normal time, which is the time in a given time zone in contrast to summer time, where 1 hour is added. In Denmark the normal time is UTC+1. UTC is "Universal Time Coordinated" - a global indication of time, which refers to the mean solar time on the meridian of Greenwich, England, which is the conventional 0-meridian for geographic longitude.

Eleven (11) Danish station series with a record of daily highest air temperatures can be blended into five (5) long datasets. Table 9 presents an overview of these station data series (identified by the station name and number) and the possible blended datasets making up the long series. Overlap periods in the single station series have been included when available.

**Table 9. Daily highest air temperature (element number 112); data sets and station series. See details in Appendix 3.**

Dataset*	Station series	Dataset id	Period	Parameter
Vestervig 1874-2020	Vestervig	dk_daily_112: 21100	1874-2003	Highest temperature
	Vestervig	dk_daily_112: 6051	2003-2020	Highest temperature
Nordby/Fanø 1874-2020	Nordby/Fanø	dk_daily_112: 25140	1874-2003	Highest temperature
	Nordby/Fanø	dk_daily_112: 6088	2003-2020	Highest temperature
Tranebjerg 1873-2020	Tranebjerg	dk_daily_112: 27080	1873-2003	Highest temperature
	Tranebjerg Øst	dk_daily_112: 6132	2003-2020	Highest temperature
København 1874-2020	Landbohøjskolen	dk_daily_112: 30380	1874-1997	Highest temperature
	Landbohøjskolen	dk_daily_112: 6186	1995-2020	Highest temperature
Hammer Odde Fyr 1874-2020	Sandvig	dk_daily_112: 32030	1874-1970	Highest temperature
	Hammer Odde Fyr	dk_daily_112: 32020	1971-1987	Highest temperature

Table 9 general note: The single daily station series mostly consist of the values as observed. No DMI testing for homogeneity has been performed on these daily (hourly; 14 hours DNT/13 UTC) observations. They have however been carefully quality-tested and corrected, mainly based on visual tests.

Table 9 note: \*Possible blended full daily datasets using the single daily station series are also a part of this daily section. No DMI testing for homogeneity has been performed on the blended series. See also the European Climate Assessment & Dataset (ECA&D) project homepage: <http://www.ecad.eu/> for their "blend"/data handling and quality/homogeneity test. This site also contains the single Danish station series.

Eleven (11) Danish station series with a record of daily lowest air temperatures can be blended into five (5) long datasets. Table 10 presents an overview of these station data series (identified by the station name and number) and the possible blended datasets making up the long series. Overlap periods in the single station series have been included when available.

**Table 10. Daily lowest air temperature (element number 122); data sets and station series. See details in Appendix 3.**

Dataset*	Station series	Dataset id	Period	Parameter
Vestervig 1874-2020	Vestervig	dk_daily_122: 21100	1874-2003	Lowest temperature
	Vestervig	dk_daily_122: 6051	2003-2020	Lowest temperature
Nordby/Fanø 1874-2020	Nordby/Fanø	dk_daily_122: 25140	1874-2003	Lowest temperature
	Nordby/Fanø	dk_daily_122: 6088	2003-2020	Lowest temperature
Tranebjerg 1872-2020	Tranebjerg	dk_daily_122: 27080	1872-2003	Lowest temperature
	Tranebjerg Øst	dk_daily_122: 6132	2003-2020	Lowest temperature
København 1874-2020	Landbohøjskolen	dk_daily_122: 30380	1874-1997	Lowest temperature
	Landbohøjskolen	dk_daily_122: 6186	1995-2020	Lowest temperature
Hammer Odde Fyr 1874-2020	Sandvig	dk_daily_122: 32030	1874-1970	Lowest temperature
	Hammer Odde Fyr	dk_daily_122: 32020	1971-1987	Lowest temperature
	Hammer Odde Fyr	dk_daily_122: 6193	1984-2020	Lowest temperature

Table 10 general note: The single daily station series mostly consist of the values as observed. No DMI testing for homogeneity has been performed on these daily observations. They have however been carefully quality-tested and corrected, mainly based on visual tests.

Table 10 note: \*Possible blended full daily datasets using the single daily station series are also a part of this daily section. No DMI testing for homogeneity has been performed on the blended series. See also the European Climate Assessment & Dataset (ECA&D) project homepage: <http://www.ecad.eu/> for their “blend”/data handling and quality/homogeneity test. This site also contains the single Danish station series.

Five (5) Danish station series with a record of average daily atmospheric pressure data can be blended into three (3) long datasets. Table 11 presents an overview of these station data series (identified by the station name and number) and the possible blended datasets making up the long series. Overlap periods in the single station series have been included when available.

It is common for all three sites that the atmospheric pressure measurements started 1874 at national climate stations. In Denmark measurements of atmospheric pressure was stopped at these manually operated climate stations in 1987. Therefore the atmospheric pressure series had to be continued from nearby synoptic stations measuring atmospheric pressure. One of the series, that of ‘6193 Hammer Odde Lighthouse’, consists of data from stations sufficiently close that it was straightforward to present the data in one series, 1874-2020.

For the other two sites, the synoptic stations are a little further apart from the old climate stations and therefore these two synoptic stations are presented as independent series. In both cases there should nonetheless be sufficient overlap for it to be fairly straightforward for the reader to merge the data into long series for the old Vestervig and Nordby/Fanø sites also, just as it was done for the pressure observations of the WASA project [43], see also section 7.

**Table 11. Daily atmospheric pressure (at msl, mean sea level; element number 401); data sets and station series. See details in Appendix 3.**

Dataset*	Station series	Dataset id	Period	Parameter
Vestervig 1874-2020	Vestervig	dk_daily_401: 21100	1874-1987	Average atm. pressure (msl)
	Thyborøn	dk_daily_401: 6052	1962-2020	Average atm. pressure (msl)
Nordby/Fanø 1874-2020	Nordby/Fanø	dk_daily_401: 25140	1874-1987	Average atm. pressure (msl )
	Esbjerg Airport	dk_daily_401: 6088	1959-2020	Average atm. pressure (msl)
Hammer Odde Fyr 1874-2020	Sandvig or	dk_daily_401: 32030	1874-1987	Average atm. pressure (msl)
	Hammer Odde Fyr	dk_daily_401: 32020		Average atm. pressure (msl)

Dataset*	Station series	Dataset id	Period	Parameter
	Hammer Odde Fyr	dk_daily_401: 6193**	1987-2020	Average atm. pressure (msl)

Table 11 general note: The single daily station series mostly consist of the values as observed. No DMI testing for homogeneity has been performed on these daily observations. They have however been carefully quality-tested and corrected, mainly based on visual tests.

Table 11 note: \*Possible blended full daily datasets using the single daily station series are also a part of this daily section. No DMI testing for homogeneity has been performed on the blended series. See also the European Climate Assessment & Dataset (ECA&D) project homepage: <http://www.ecad.eu/> for their “blend”/data handling and quality/homogeneity test. This site also contains the single Danish station series.

Table 11 note: \*\*The Hammer Odde series is presented with station number 6193, 1874-2020.

Fifteen (15) Danish station series with a record of daily accumulated precipitation can be blended into seven (7) long datasets. Table 12 presents an overview of these station data series (identified by the station name and number) and the possible blended datasets making up the long series. Overlap periods in the single station series have been included when available.

**Table 12. Daily accumulated precipitation (element number 601); data sets and station series. See details in Appendix 3.**

Dataset*	Station series	Dataset id	Period	Parameter
Vestervig 1874-2020	Vestervig	dk_daily_601: 6051 (21100)	1874-2020	Acc. prec.
Grønbæk 1874-2020	Grønbæk	dk_daily_601: 5135 (21430)	1874-2020	Acc. prec.
Nordby/Fanø 1874-2020	Nordby/Fanø	dk_daily_601: 6088 (25140)	1874-2020	Acc. prec.
Store Jyndevad 1920-2020	Broderup	dk_daily_601: 26410	1920-1993	Acc. prec.
	Tinglev	dk_daily_601: 26409	1995-2006	Acc. prec.
	Store Jyndevad	dk_daily_601: 6116 (26400)	1987-2020	Acc. prec.
Tranebjerg 1872-2020	Tranebjerg	dk_daily_601: 27080	1872-2001	Acc. prec.
	Tranebjerg Øst	dk_daily_601: 5165 (27082)	2001-2020	Acc. prec.
København 1874-2020	Landbohøjskolen	dk_daily_601: 30380	1874-1996	Acc. prec.
	Meteorologisk Inst.	dk_daily_601: 30210	1875-1922	Acc. prec.
	Meteorologisk Inst.	dk_daily_601: 30210	1961-1984	Acc. prec.
	Botanisk Have/Livgardens Kaserne	dk_daily_601: 5735 (30370)	1961-2020	Acc. prec.
Hammer Odde Fyr 1874-2020	Sandvig	dk_daily_601: 32030	1874-1970	Acc. prec.
	Hammer Odde Fyr	dk_daily_601: 32020	1961-1987	Acc. prec.
	Hammer Odde Fyr	dk_daily_601: 6193	1984-2020	Acc. prec.

Table 12 general note: The single daily station series mostly consist of the values as observed. No DMI testing for homogeneity has been performed on these daily observations. They have however been carefully quality-tested and corrected, mainly based on visual tests.

Table 12 note: \*Possible blended full daily datasets using the single daily station series are also a part of this daily section. No DMI testing for homogeneity has been performed on the blended series. See also the European Climate Assessment & Dataset (ECA&D) project homepage: <http://www.ecad.eu/> for their “blend”/data handling and quality/homogeneity test. This site also contains the single Danish station series.

One Danish station series with a long record of cloud cover at 8, 14 and 21 hours DNT exists. Table 13 presents an overview of this station data series (identified by the station name and number).

**Table 13. Cloud cover at 8, 14 and 21 hours DNT (element number 801); data sets and station series. See details in Appendix 3.**

Dataset	Station series	Dataset id	Period	Parameter
Tranebjerg 1872-2000	Tranebjerg	dk_daily_801: 27080	1872-2000	Cloud cover 8,14,21DNT*

Table 13 general note: The single daily station series mostly consist of the values as observed. No DMI testing for homogeneity has been performed on these daily (hourly; 8, 14 and 21 hours DNT) observations. They have however been carefully quality-tested and corrected, mainly based on visual tests.

Table 13 note: See also the European Climate Assessment & Dataset (ECA&D) project homepage: <http://www.ecad.eu/> for their "blend"/data handling and quality/homogeneity test. This site also contains the single Danish station series.

Table 13 note: \* DNT refers to Danish normal time, which is the time in a given time zone in contrast to summer time, where 1 hour is added. In Denmark the normal time is UTC+1.

**Table 14. Data dictionary for the daily parameters published in the report.**

Element number	Element/Parameter	Method	Unit
101	Air temperature measured at a certain time	obs	°C
112	Highest air temperature	max	°C
122	Lowest air temperature	min	°C
401	Atmospheric pressure (msl)	average	hPa
601	Accumulated precipitation	sum	mm
801	Cloud cover measured at a certain time	obs	various

Table 14 note: 'Method' specifies whether the element is a sum, an average, an extreme or an observation. The units of the daily values in the data files are specified in 'Unit'.

The daily station data series can be downloaded from the publication part of DMI web pages. Details about the data sets and file formats can be seen in Appendix 3.

## 9 Monthly/annual section: Historical DMI climate data Collection

Table 15. Overview of monthly/annual section – data collections in this report.

Type	Data Collections	Section, Page, Appendix
Monthly/ Annual	<ul style="list-style-type: none"> <li>• Average air temperature</li> <li>• Average daily minimum air temperature</li> <li>• Average daily maximum air temperature</li> <li>• Highest air temperature</li> <li>• Lowest air temperature</li> <li>• Average atmospheric pressure (msl)</li> <li>• Hours of bright sunshine</li> <li>• Accumulated precipitation</li> <li>• Highest 24-hour precipitation</li> <li>• No. of days with snow cover</li> <li>• Average cloud cover</li> </ul> <p>5 data sets (blended):            6051 Vestervig (1874-2020)            6088 Nordby/Fanø (1872-2020)            6132 Tranebjerg (1873-2020)            6186 København (1768-2020)            6193 Hammer Odde Fyr (1873-2020)</p>	Sec 9, p 24-28, App 4

Table 15 note: Latest earlier report: [21] Cappelen, J. (ed), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02.

The purpose of this section is to publish available long monthly and annual DMI data series 1768-2020 for Denmark. The data parameters include average air temperature, average of minimum and maximum air temperature, lowest and highest air temperature, average atmospheric pressure, accumulated precipitation, highest 24-hour precipitation, hours of bright sunshine, number of days with snow and average cloud cover. Only one data set has data before the 1870s – Copenhagen.

According to the intentions to update regularly, preferably every year, this particular report contains an update (2020 data) of the “DMI Monthly and Annual Climate Data Collection” published for the first time in that form in 1) DMI Technical Report 03-26: DMI Monthly Climate Data Collection 1860-2002, Denmark, The Faroe Island and Greenland. An update of: NACD, REWARD, NORDKLIM and NARP datasets, Version 1, Copenhagen 2003 [29] and 2) DMI Technical Report 05-06: DMI Annual Climate Data Collection 1873-2004, Denmark, The Faroe Islands and Greenland - with Graphics and Danish Abstracts. Copenhagen 2005 [12]. A similar collection of long DMI daily Danish climate data series can be found in section 8 in this report.

Some of the monthly data have over the years been published in connection with different Nordic climate projects like NACD (North Atlantic Climatological Dataset [27]), REWARD (Relating Extreme Weather to Atmospheric circulation using a Regionalised Dataset [26]), NORDKLIM (Nordic Co-operation within Climate activities) and NARP (Nordic Arctic Research Programme).

The original DMI Monthly Climate Data Collection published in DMI Technical Report 03-26 [29] was besides a publication of a collection of recommended DMI long monthly data series 1860-2002, also an revision/update of the NACD, REWARD, NORDKLIM and NARP datasets with a clarification on what has been done with the data previously. The method used in this clarification was based on 3 different datasets:

- 1) **Recommended** - a collection of DMI recommended well-documented data series.

- 2) **Observed** - based strictly on raw observations, which have to fulfil certain criteria in terms of frequency etc., in order for arithmetic averages, maximums, minimums etc. to be calculated depending on the parameter. These dataset acts as a baseline, since many of the time-series previously published represent adjusted data, which are not very well documented.
- 3) **Previous** - represents the time-series generated earlier primarily in connection with NACD and REWARD. These time-series are quite complete for the period 1890 – 1995 and many holes have been filled compared to the observed dataset.

The revision/update of those datasets is considered done with the DMI Technical Report 03-26 [29].

Therefore only already published recommended DMI monthly (and also annual) data series with relevant updates/corrections have been included since and will be included in this and the coming reports comprising DMI monthly and annual data collections from Denmark.

**Figure 5. Map showing station position stations where the Danish monthly/annual data sets referred to in the monthly/annual section come from.**

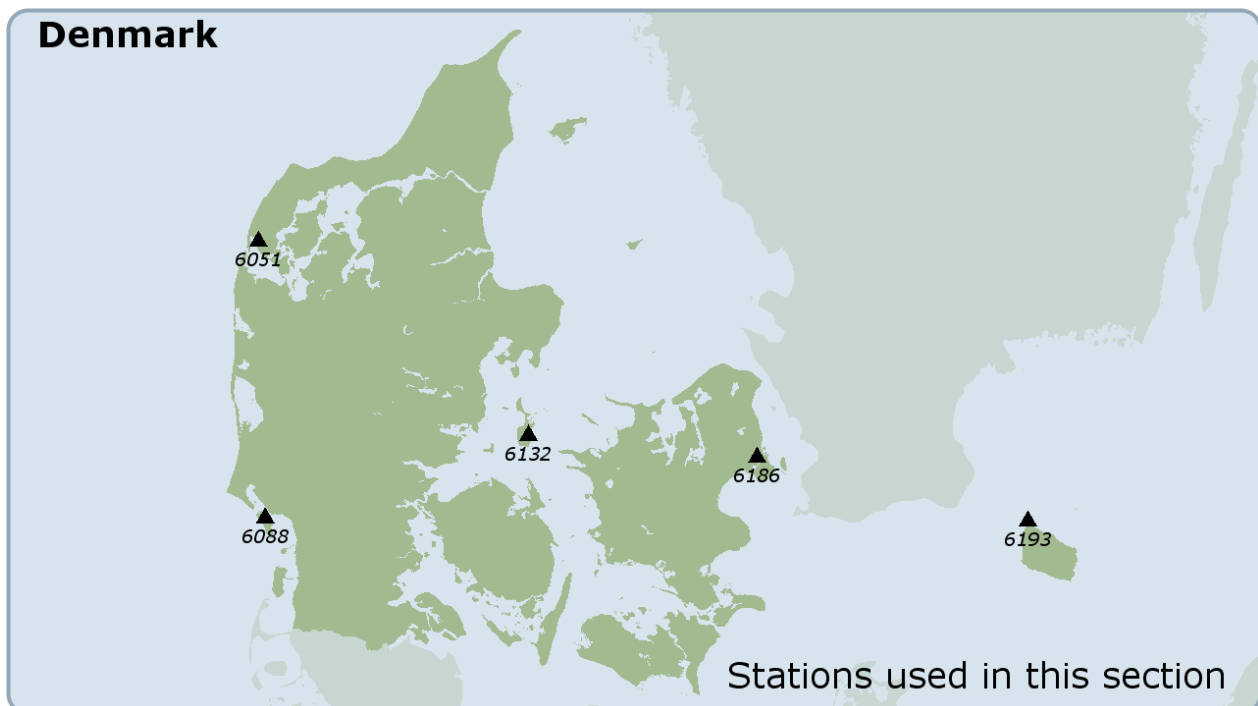


Figure 5 note: The map shows the station positions of the stations where the monthly/annual data sets referred to in the monthly/annual section come from. Only the latest positions are marked. The official WMO station identifiers for Denmark consist of 5 digits “06xxx”. However, in this report the in front “0” is omitted, giving 4 digits i.e. “6132” for Tranebjerg, which is also used on the map. The Danish national station identifiers describing climate/precipitation stations in Denmark consist of 5 digits, either the new format “05XXX” (the in front “0” is omitted), giving 4 digits i.e. “5165” for Tranebjerg or the old format, where the station number started with 20-32 dependent on the region i.e. “27080” for the old Tranebjerg station. See more in Appendix 1 and 4.

During some of the former data projects (i.e. NACD) the data have been homogenised based on tests against neighbouring stations.

The updated series presented in this section have been tested and corrected carefully, mainly based on visual tests. Otherwise it is clearly indicated in Appendix 4, if care should be taken when using the series.

Special care should be taken concerning the series with average cloud cover. There are still problems to be solved in the data sets mainly due to the difficult character of the observation – visual back in time and the shift to automatic detection with a ceilometer starting approximately in the beginning of the new millennium. Another visual parameter is observations of snow - the number of days with snow cover. It is however still observed manually in the same manner as all ways. Finally please notice that the recently introduction of automatic rain gauges can have caused small inhomogeneities, not to be discovered in the visual check.

Five (5) stations in Denmark have long records with monthly/annual values of different parameters within the period 1768-2020. The monthly/annual parameters in this report are listed below in tables 16-27.

**Table 16. Monthly/annual average air temperature (element number 101); data sets and station series. See details in Appendix 4.**

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1874-2020	Vestervig	dk_monthly_all_ 1768_2020: 6051	1874-2020	Average temperature
Nordby/Fanø 1872-2020	Nordby/Fanø	dk_monthly_all_ 1768_2020: 6088	1872-2020	Average temperature
Tranebjerg 1873-2020	Tranebjerg	dk_monthly_all_ 1768_2020: 6132	1873-2003	Average temperature
	Tranebjerg Øst		2003-2020	
København 1768-2020	Rundetårn	dk_monthly_all_ 1768_2020: 6186	1768-1819	Average temperature
	Gl. Botanisk Have		1820-1859	
	Landbohøjskolen		1860-2020	
Hammer Odde Fyr 1873-2020	Sandvig	dk_monthly_all_ 1768_2020: 6193	1873-1953	Average temperature
	Sandvig/Hammer Odde		1953-1960	
	Hammer Odde Fyr		1961-2020	

Table 16 note:

\*Blended monthly/annual data sets part of the monthly/annual section.

\*\* Single station series are not a part of the monthly/annual section.

**Table 17. Monthly/annual average daily maximum air temperature (element number 111); data sets and station series. See details in Appendix 4.**

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1875-2020	Vestervig	dk_monthly_all_ 1768_2020: 6051	1875-2020	Average daily max temperature
Nordby/Fanø 1875-2020	Nordby/Fanø	dk_monthly_all_ 1768_2020: 6088	1875-2020	Average daily max temperature
Tranebjerg 1873-2020	Tranebjerg	dk_monthly_all_ 1768_2020: 6132	1873-2003	Average daily max temperature
	Tranebjerg Øst		2003-2020	
København 1861-2020	Landbohøjskolen	dk_monthly_all_ 1768_2020: 6186	1861-2020	Average daily max temperature
Hammer Odde Fyr 1875-2020	Sandvig	dk_monthly_all_ 1768_2020: 6193	1875-1953	Average daily max temperature
	Sandvig/Hammer Odde		1953-1960	



Dataset*	Station series**	Dataset id	Period	Parameter
	Hammer Odde Fyr		1961-2020	

Table 17 note:

\*Blended monthly/annual data sets part of the monthly/annual section.

\*\* Single station series are not a part of the monthly/annual section.

**Table 18. Monthly/annual highest air temperature (element number 112); data sets and station series. See details in Appendix 4.**

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1875-2020	Vestervig	dk_monthly_all_ 1768_2020: 6051	1875-2020	Highest temperature
Nordby/Fanø 1874-2020	Nordby/Fanø	dk_monthly_all_ 1768_2020: 6088	1874-2020	Highest temperature
Tranebjerg 1874-2020	Tranebjerg	dk_monthly_all_ 1768_2020: 6132	1874-2003	Highest temperature
	Tranebjerg Øst		2003-2020	
København 1861-2020	Landbohøjskolen	dk_monthly_all_ 1768_2020: 6186	1861-2020	Highest temperature
Hammer Odde Fyr 1874-2020	Sandvig	dk_monthly_all_ 1768_2020: 6193	1874-1953	Highest temperature
	Sandvig/Hammer Odde		1953-1960	
	Hammer Odde Fyr		1961-2020	

Table 18 note:

\*Blended monthly/annual data sets part of the monthly/annual section.

\*\* Single station series are not a part of the monthly/annual section.

**Table 19. Monthly/annual average daily minimum air temperature (element number 121); data sets and station series. See details in Appendix 4.**

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1875-2020	Vestervig	dk_monthly_all_ 1768_2020: 6051	1875-2020	Average daily min temperature
Nordby/Fanø 1875-2020	Nordby/Fanø	dk_monthly_all_ 1768_2020: 6088	1875-2020	Average daily min temperature
Tranebjerg 1873-2020	Tranebjerg	dk_monthly_all_ 1768_2020: 6132	1873-2003	Average daily min temperature
	Tranebjerg Øst		2003-2020	
København 1861-2020	Landbohøjskolen	dk_monthly_all_ 1768_2020: 6186	1861-2020	Average daily min temperature
Hammer Odde Fyr 1873-2020	Sandvig	dk_monthly_all_ 1768_2020: 6193	1873-1953	Average daily min temperature
	Sandvig/Hammer Odde		1953-1960	
	Hammer Odde Fyr		1961-2020	

Table 19 note:

\*Blended monthly/annual data sets part of the monthly/annual section.

\*\* Single station series are not a part of the monthly/annual section.

**Table 20. Monthly/annual lowest air temperature (element number 122); data sets and station series. See details in Appendix 4.**

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1875-2020	Vestervig	dk_monthly_all_ 1768_2020: 6051	1875-2020	Lowest temperature
Nordby/Fanø 1875-2020	Nordby/Fanø	dk_monthly_all_ 1768_2020: 6088	1875-2020	Lowest temperature
Tranebjerg 1873-2020	Tranebjerg	dk_monthly_all_	1873-2003	Lowest temperature
	Tranebjerg Øst	1768_2020: 6132	2003-2020	
København 1861-2020	Landbohøjskolen	dk_monthly_all_ 1768_2020: 6186	1861-2020	Lowest temperature
Hammer Odde Fyr 1873-2020	Sandvig	dk_monthly_all_	1873-1953	Lowest temperature
	Sandvig/Hammer Odde	1768_2020: 6193	1953-1960	
	Hammer Odde Fyr		1961-2020	

Table 20 note:

\*Blended monthly/annual data sets part of the monthly/annual section.

\*\* Single station series are not a part of the monthly/annual section.

**Table 21. Monthly/annual average atmospheric pressure (msl; element number 401); data sets and station series. See details in Appendix 4.**

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1874-2020	Vestervig	dk_monthly_all_	1874-1987	Average atmospheric pressure
	Thyborøn	1768_2020: 6051	1987-2020	
Nordby/Fanø 1874-2020	Nordby/Fanø	dk_monthly_all_	1874-1987	Average atmospheric pressure
	Esbjerg/Blåvand/Rømø	1768_2020: 6088	1987-2020	
Tranebjerg 1872-2020	Tranebjerg	dk_monthly_all_	1872-1987	Average atmospheric pressure
	Røsnæs Fyr	1768_2020: 6132	1987-2020	
København 1923-2020	Landbohøjskolen	dk_monthly_all_	1923-1987	Average atmospheric pressure
	Københavns Lufthavn	1768_2020: 6186	1987-2020	
Hammer Odde Fyr 1873-2020	Sandvig	dk_monthly_all_	1873-1970	Average atmospheric pressure
	Hammer Odde Fyr	1768_2020:	1971-1987	
	Hammer Odde Fyr	6193	1987-2020	

Table 21 note:

\*Blended monthly/annual data sets part of the monthly/annual section.

\*\* Single station series are not a part of the monthly/annual section.

**Table 22. Monthly/annual hours of bright sunshine (Star level) (element number 504); data sets and station series. See details in Appendix 4.**

Dataset*	Station series**	Dataset id	Period	Parameter
København 1876-2020	Landbohøjskolen (visual obs)	dk_monthly_all_	1876-1887	Hours of bright sunshine
	Københavns Toldbod (Campbell-Stokes)	1768_2020: 6186	1887-2004	
	Københavns Toldbod (Star)		2005-2020	

Table 22 note:

\*Blended monthly/annual data sets part of the monthly/annual section.

\*\* Single station series are not a part of the monthly/annual section.

**Table 23. Monthly/annual accumulated precipitation (element number 601); data sets and station series. See details in Appendix 4.**

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1874-2020	Vestervig	dk_monthly_all_ 1768_2020: 6051	1874-2020	Accumulated precipitation
Nordby/Fanø 1872-2020	Nordby/Fanø	dk_monthly_all_ 1768_2020: 6088	1872-2020	Accumulated precipitation
Tranebjerg 1873-2020	Tranebjerg	dk_monthly_all_	1873-2001	Accumulated precipitation
	Tranebjerg Øst	1768_2020: 6132	2001-2020	
København 1821-2020	Gl. Botanisk Have	dk_monthly_all_	1821-1859	Accumulated precipitation
	Landbohøjskolen	1768_2020: 6186	1860-1995	
	Botanisk Have/ Livgardens Kaserne		1996-2020	
Hammer Odde Fyr 1873-2020	Sandvig	dk_monthly_all_ 1768_2020: 6193	1873-1971	Accumulated precipitation

Table 23 note:

\*Blended monthly/annual data sets part of the monthly/annual section.

\*\* Single station series are not a part of the monthly/annual section.

**Table 24. Monthly/annual highest monthly/annual 24-hours accumulated precipitation (element number 602); data sets and station series. See details in Appendix 4.**

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1874-2020	Vestervig	dk_monthly_all_ 1768_2020: 6051	1874-2020	Highest 24-hour precipitation
Nordby/Fanø 1872-2020	Nordby/Fanø	dk_monthly_all_ 1768_2020: 6088	1872-2020	Highest 24-hour precipitation
Tranebjerg 1873-2020	Tranebjerg	dk_monthly_all_	1873-2001	Highest 24-hour precipitation
	Tranebjerg Øst	1768_2020: 6132	2001-2020	
København 1843-2020	Gl. Botanisk Have	dk_monthly_all_	1843-1859	Highest 24-hour precipitation
	Landbohøjskolen	1768_2020: 6186	1860-1995	
	Botanisk Have/ Livgardens Kaserne		1996-2020	
Hammer Odde Fyr 1873-2020	Sandvig	dk_monthly_all_ 1768_2020: 6193	1873-1971	Highest 24-hour precipitation
	Hammer Odde Fyr		1971-2020	

Table 24 note:

\*Blended monthly/annual data sets part of the monthly/annual section.

\*\* Single station series are not a part of the monthly/annual section.

**Table 25. Monthly/annual number of days with snow cover (element number 701); data sets and station series. See details in Appendix 4.**

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1939-2020	Vestervig	dk_monthly_all_ 1768_2020: 6051	1939-2020	No. of days with snow cover
Nordby/Fanø 1957-2020	Nordby/Fanø	dk_monthly_all_	1957-2001	No. of days with snow cover
	Esbjerg Lufthavn	1768_2020: 6088	2001-2006	
	Outrup		2007-2020	
Tranebjerg	Tranebjerg	dk_monthly_all_	1949-2000	No. of days with snow

Dataset*	Station series**	Dataset id	Period	Parameter
1949-2020	Tranebjerg Øst	1768_2020: 6132	2004-2020	cover
København 1938-2020	Landbohøjskolen	dk_monthly_all_ 1768_2020: 6186	1938-1996	No. of days with snow cover
	Københavns Lufthavn		1997-2009	
	Botanisk Have		2010-2018	
	Meteorologisk Institut		2018-2020	
Hammer Odde Fyr 1939-2020	Sandvig/Hammer Odde	dk_monthly_all_ 1768_2020: 6193	1939-2002	No. of days with snow cover
	Klemensker		2002-2010	

Table 25 note:

\*Blended monthly/annual data sets part of the monthly/annual section.

\*\* Single station series are not a part of the monthly/annual section.

**Table 26. Monthly/annual average cloud cover (element number 801); data sets and station series.  
See details in Appendix 4.**

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1874-2020	Vestervig	dk_monthly_all_ 1768_2020: 6051	1874-1995	Average cloud cover
	Thyborøn		1996-2020	
Nordby/Fanø 1872-2020	Nordby/Fanø	dk_monthly_all_ 1768_2020: 6088	1872-1999	Average cloud cover
	Esbjerg Lufthavn		2000	
	Rømø		2000-2020	
Tranebjerg 1874-2001	Tranebjerg	dk_monthly_all_ 1768_2020: 6132	1872-2000	Average cloud cover
	Røsnæs Fyr		2000-2001	
København 1876-2020	Landbohøjskolen	dk_monthly_all_ 1768_2020: 6186	1923-1995	Average cloud cover
	Københavns Lufthavn		1996-2020	
Hammer Odde Fyr 1873-2020	Sandvig	dk_monthly_all_ 1768_2020: 6183	1873-1889	Average cloud cover
	Sandvig/Hammer Odde		1890-1995	

Table 26 note:

\*Blended monthly/annual data sets part of the monthly/annual section.

\*\* Single station series are not a part of the monthly/annual section.

**Table 27. Data dictionary for the monthly/annual parameters published in the report.**

Element Number	Element/Parameter	Method	Unit
101	Average air temperature	average	°C
111	Average of daily maximum air temperature	average	°C
112	Highest air temperature	max	°C
121	Average of daily minimum air temperature	average	°C
122	Lowest air temperature	min	°C
401	Average atmospheric pressure (msl)	average	hPa
504	Hours of bright sunshine (Star level)	sum	hours
601	Accumulated precipitation	sum	mm
602	Highest 24-hour precipitation	max	mm
701	No. of days with snow cover (> 50 % covered)	sum	days
801	Average cloud cover	average	%

Table 27 note: 'Method' specifies whether the element is a sum, an average or an extreme. The units of the monthly/annual values in the data files are specified in 'Unit'.

The monthly/annual data sets can be downloaded from the publication part of DMI web pages. Details about the data sets and file formats can be seen in Appendix 4.

## 10 Country-wise section: Historical DMI climate data Collection

Table 28. Overview of country-wise section – data collections in this report.

Type	Data Collections	Section, Page, Appendix
Country-wise Monthly/annual	<ul style="list-style-type: none"> <li><b>Country-wise (Denmark) climate data 1874-2020; Average air temperature, Average of minimum and maximum air temperatures, highest/lowest air temperatures, accumulated precipitation, highest 24-hour precipitation and hours of bright sunshine; tables</b></li> </ul> <p>2 data sets: All months/years 1891-2020 are characterised by a short text as well as the weather during Easter, Christmas and Midsummer Day. Record breaking months and years are marked and normals 1961-1990, average 2001-2010 and average 2006-2015 are included. The country-wise extremes are calculated separately in a data set.</p> <ul style="list-style-type: none"> <li><b>Country-wise (Denmark) climate data 1874-2020; Average air temperature, accumulated precipitation, and hours of bright sunshine</b></li> </ul> <p>4 data sets: Average air temperature; published (1873-2020) Average air temperature; corrected (1873-2020) Accumulated precipitation (1874-2020) Hours of bright sunshine (1920-2020)</p>	Sec 10, p 30-32, App 5

Table 28 note: Latest earlier report: [21] Cappelen, J. (ed), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02.

The purpose of this section is to publish different country-wise (Denmark) monthly and annual climate data. That is:

- Monthly and annual country-wise values of different parameters in the period 1874-2020 in table form together with a short describing monthly/annual text as well as the weather during Easter, Christmas and Midsummer Day.
- Monthly and annual climate extremes for the whole period 1874-2020 in table form from the above material separately.
- Monthly and annual data sets of country-wise values of the main parameters; published/corrected air temperature, accumulated precipitation and hours of bright sunshine.

Country-wise values also regularly form part (graphical) of the yearly publication “Danmarks Klima”. The newest one published in 2021 is DMI Rapport 21-01: Danmarks klima 2020 – with English Summary. København [22].

According to the intentions to update regularly, preferably every year, this particular section contains an annual update (2020 data) of the monthly and annual selected country-wise values published for the first time in that form in 1) DMI Teknisk Rapport 06-02: Dansk vejr siden 1874 – måned for måned med temperatur, nedbør og soltimer samt beskrivelser af vejret - with English translations. København 2006 [13] and 2) “DMI Annual Climate Data Collection” published for the first time in that form in DMI Technical Report

05-06: DMI Annual Climate Data Collection 1873-2004, Denmark, The Faroe Islands and Greenland - with Graphics and Danish Abstracts. Copenhagen 2005 [12].

The Danish Meteorological Institute (DMI) has since the beginning in 1872 observed various weather elements at different observation sites in Denmark. These observations have over the years been the basis for the calculation of different country-wise values as i.e. air temperature, precipitation and hours of bright sunshine. Every year since 1874 DMI has continuously published meteorological country-wise values (averages and extremes) for Denmark as a whole in table form, calculated using a selection of stations.

In 1991 monthly and annual country-wise values of air temperature, precipitation and hours of bright sunshine supplemented by a short description of the weather were published in the book "Dansk Vejr i 100 år" [41]. The period covered was 1891-1990. The last 6th edition of the book was published in 2000, covering the period 1891 - August 2000. This climate information from this latest 6th edition has been the data source for this report supplemented with information covering the period 1874-1890 and September 2000 - December 2020. Those the whole period from 1874-2020 are covered. In 2007 the book "Dansk Vejr i 100 år - i tekst og billeder" [42] was published, covering the period 1907-2007. Minor insignificant differences, compared to the information in this DMI report, can be found in this "latest version" of the first book from 1991.

Looking back in history the calculations of the different parameters always have been based upon the existing station- and data availability at that specific time. Furthermore different methods of data weighting have been used. The selection of stations back in time and the different methods of the calculations have never been published and for that reason the exact details concerning the meteorological parameters for the country as a whole partly are unknown. Since 1950s and up till 2006 (inclusive) it is however known, that methods and data more or less look similar what concerns the area weighting – data from Jutland are weighted with 7/10 and data from the islands with 3/10 (see below for more information). From 2007 the country-wise average values of air temperature, precipitation and hours of bright sunshine are based on interpolation of station data in a fine-meshed grid covering Denmark. The highest and lowest air temperatures are off course still directly measured values.

In table 29 and 30 a dataset in table form comprising monthly and annual country-wise values of average air temperature, average of minimum and maximum air temperatures, highest/lowest air temperatures, accumulated precipitation, highest 24-hour precipitation and accumulated hours of bright sunshine from Denmark since 1874 are described. In addition every month and year in the period 1891-2020 are characterised by a short text as well as the weather during Easter, Christmas and Midsummer Day. The different record breaking months and years are also marked. Finally the figures can be compared with the Standard Normal values from the period 1961-90 (latest WMO recommended), average 2001-2010 and average 2006-2015.

**Table 29. Country-wise products; monthly/annual climate data in table form. Details in Appendix 5.**

Product*	Dataset id	Period	Parameters
Table; Country-wise climate data 1874-2020	dk_country_table	1874-2020	See table 30

Table 29 note: \*Blended datasets (only in Danish).

**Table 30. Data dictionary for the country-wise parameters (table form) published in the report.**

Element Number	Element/Parameter	Method	Unit	First year
101	Average air temperature	average	°C	1874
111	Average of daily maximum air temperature	average	°C	1953
112	Highest air temperature	max	°C	1874
121	Average of daily minimum air temperature	average	°C	1953
122	Lowest air temperature	min	°C	1874

Element Number	Element/Parameter	Method	Unit	First year
504	Accumulated hours of bright sunshine	sum	hours	1920
601	Accumulated precipitation	sum	mm	1874
602	Highest 24-hour precipitation at a single station	max	mm	1874

Table 30 note: 'Method' specifies whether the element is a sum, an average or an extreme. The units of the monthly/annual values in the data files are specified in 'Unit'. Year of first appearance is also added.

The country-wise climate extremes for the whole period 1874-2020 from the above material are published separately. See table 31 for the data set and table 32 for the parameters.

**Table 31. Country-wise products; monthly/annual climate extremes in table form. Details in Appendix 5.**

Product*	Dataset id	Period	Parameters
Table; Country-wise climate extremes 1874-2020	dk_country_table_extremes	1874-2020	See table 32

Table 29 note: \*Only in Danish.

**Table 32. Data dictionary for the country-wise extremes (table form) published in the report.**

Element Number	Element/Parameter	Method	Unit	First year
101	Highest average of air temperature	max	°C	1874
101	Lowest average of air temperature	min	°C	1874
112	Highest air temperature	max	°C	1874
122	Lowest air temperature	min	°C	1874
504	Highest accumulated hours of bright sunshine	max	hours	1920
504	Lowest accumulated hours of bright sunshine	min	hours	1920
601	Highest accumulated precipitation	max	mm	1874
601	Lowest accumulated precipitation	min	mm	1874
602	Highest 24-hour precipitation at a single station	max	mm	1874

Table 32 note: 'Method' specifies that the element is an extreme. The units of the monthly/annual values in the data files are specified in 'Unit'. Year of first appearance is also added.

When compared to earlier published key country-wise values minor changes can be found. This can be related to an ongoing quality control of data.

The country-wise sunshine values have been corrected compared to earlier published material. The instruments for registration of hours of bright sunshine have been changed several times since 1920. In 2002 DMI converted to a new, automatic and more precise measuring method. That introduced a very large gap between old and new measurements. At the same time the opportunity to correct all the "old" sunshine values also was exploited in such a way so the time series of hours of bright sunshine now can be compared from 1920 to now. This report contains this new data set of hours of bright sunshine. The correction of hours of bright sunshine is also described in details in DMI Technical Report 03-19 [34].

It should also be mentioned that both corrected and uncorrected country-wise air temperature values exist as two separate published series. In the report "Danmarks Klima 1991" [10], an examination of air temperature for Denmark as a whole is described on page 40 in the chapter "Danmarks middeltemperatur i perspektiv". The examination pointed out, that in order to compare values of that parameter on a time scale, it would be necessary to correct the values in periods where a different area weighting has been used.

In the period 1873-1956 the average air temperatures for Denmark as a whole have been calculated using 25 well distributed stations, one half in Jutland and the rest on the Islands. Thus the area weighting at that time was 5/10 for both Jutland and the Islands. In 1957 there was a change. From that year and until 1975; 20 stations was used in Jutland and 10 from the Islands.

In the period 1976-1986 the basis was about 100 stations, where Jutland was weighted with 7/10 and the Islands 3/10. This area weighting reflects that the area of Jutland accounts for about 7/10 of Denmark.

Since 1987 an area weighting using about 20 stations in Jutland and 10 stations on the Islands once more have been used. From 2007 a change for some parameters have been introduced, see above.

Nevertheless the examination described above concluded that only the change in 1957 requires a correction. By comparing the figures before and after 1956/1957, correction factors (in degrees Celsius) were given, which can be added to average air temperatures for Denmark in the period 1873-1956 (see table 33). The correction factors have been added to the air temperature series in some cases, but not all. Consequently the Danish air temperature series from 1873 since the beginning of the 1990s have existed in 2 versions – one with correction and one without.

In general corrected data have been used in all presentations of the air temperature series on a time scale, while the uncorrected data have been used in all the cases, where it was important to compare the values with already published data in yearbooks back in time.

**Table 33. Correction factors (in degrees Celsius).**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
-0,06	-0,01	-0,04	-0,07	-0,09	-0,20	-0,21	-0,18	-0,14	-0,15	-0,14	-0,15	-0,12

Table 33 note: The correction factors can be added to the average air temperatures for Denmark in the period 1873-1956.

Table 34 and 35 describes the monthly and annual data sets where country-wise values of the main parameters published/corrected air temperature, accumulated precipitation and hours of bright sunshine are included.

**Table 34. Country-wise products; monthly/annual climate data series. Details in Appendix 5.**

Dataset*	Dataset id	Period	Parameters
Country-wise climate data 1873-2020	dk_country_dataseriers_tps	1873-2020	See table 35

Table 34 note: \*Blended datasets.

**Table 35. Data dictionary for the country-wise parameters in the climate data series published in the report.**

Element Number	Element/Parameter	Method	Units	First year
101	Average air temperature (published)	average	°C	1873
101	Average air temperature (corrected)	average	°C	1873
601	Accumulated precipitation	sum	mm	1874
504	Hours of bright sunshine	sum	hours	1920

Table 35 note: 'Method' specifies whether the element is a sum or an average. The units of the monthly/annual values in the data files are specified in 'Unit'. Year of first appearance is also added.

The country-wise data sets can be downloaded from the publication part of DMI web pages. Details about the data sets and file formats can be seen in Appendix 5. The country-wise graphics can be seen in section 11.



## 11 Graphics section: Historical DMI climate data Collection

Table 36. Overview of graphics section – data collections in this report.

Type	Data Collections	Section, Page, Appendix
Graphics/ Annual	<ul style="list-style-type: none"> <li>• <b>Average air temperature; graph</b> 7 data sets (blended): 6051 Vestervig (1874-2020) 6088 Nordby/Fanø (1872-2020) 6132 Tranebjerg (1873-2020) 6186 København (1768-2020) 6193 Hammer Odde Fyr (1873-2020) Country-wise; published (1873-2020) Country-wise; corrected (1873-2020)</li> <li>• <b>Accumulated hours of bright sunshine; graph</b> 2 data set (blended): 6186 København (1876-2020) Country-wise (1920-2020)</li> <li>• <b>Accumulated precipitation; graph</b> 6 data sets (blended): 6051 Vestervig (1874-2020) 6088 Nordby/Fanø (1872-2020) 6132 Tranebjerg (1873-2020) 6186 København (1821-2020) 6193 Hammer Odde Fyr (1873-2020) Country-wise (1874-2020)</li> </ul>	Sec 11, p 35-49, App 6

Table 36 note: Latest earlier report: [21] Cappelen, J. (ed), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02.

The purpose of this section is to publish different graphics based on annual climate data from Denmark. That is annual average air temperature, annual accumulated precipitation and annual hours of bright sunshine within the period 1768-2020 for Denmark.

According to the intentions to update regularly, preferably every year, this particular report contains an update (2020 data) of the "DMI Climate Data Graphics Collection" published for the first time in that form in DMI Technical Report 05-06: DMI Annual Climate Data Collection 1873-2004, Denmark, The Faroe Islands and Greenland - with Graphics and Danish Abstracts. Copenhagen 2005 [12].

Five (5) meteorological stations with a long record of air temperature have been operated in Denmark, four of them since the 19th century, one of them since the 18th century. The longest series have digitised records back to 1768 (the Danish Meteorological Institute (DMI) was established 1872. Five (5) meteorological stations with a long record of precipitation have been operated in Denmark since the 19th century, one of them back to 1821. One (1) meteorological station with a long record of hours of bright sunshine has been operated in Denmark since 1876. Country-wise annual values of average air temperature, accumulated precipitation and hours of bright sunshine can be found back to 1873.

It is obvious that the quality and homogeneity of the series have been affected in various degrees. The series have been corrected in the best possible way i.e. in connection with:

- The development of the North Atlantic Climatological Dataset: DMI Scientific Report 96-1: North Atlantic Climatological Dataset (NACD Version 1) - Final report. Copenhagen 1996 [27]
- The regularly publication of the DMI historical monthly/annual data collection in section 9.
- The regularly publication of climatological yearbooks back in time.

**Figure 6. Map showing station position stations where the Danish graphical data sets referred to in the graphics section come from.**

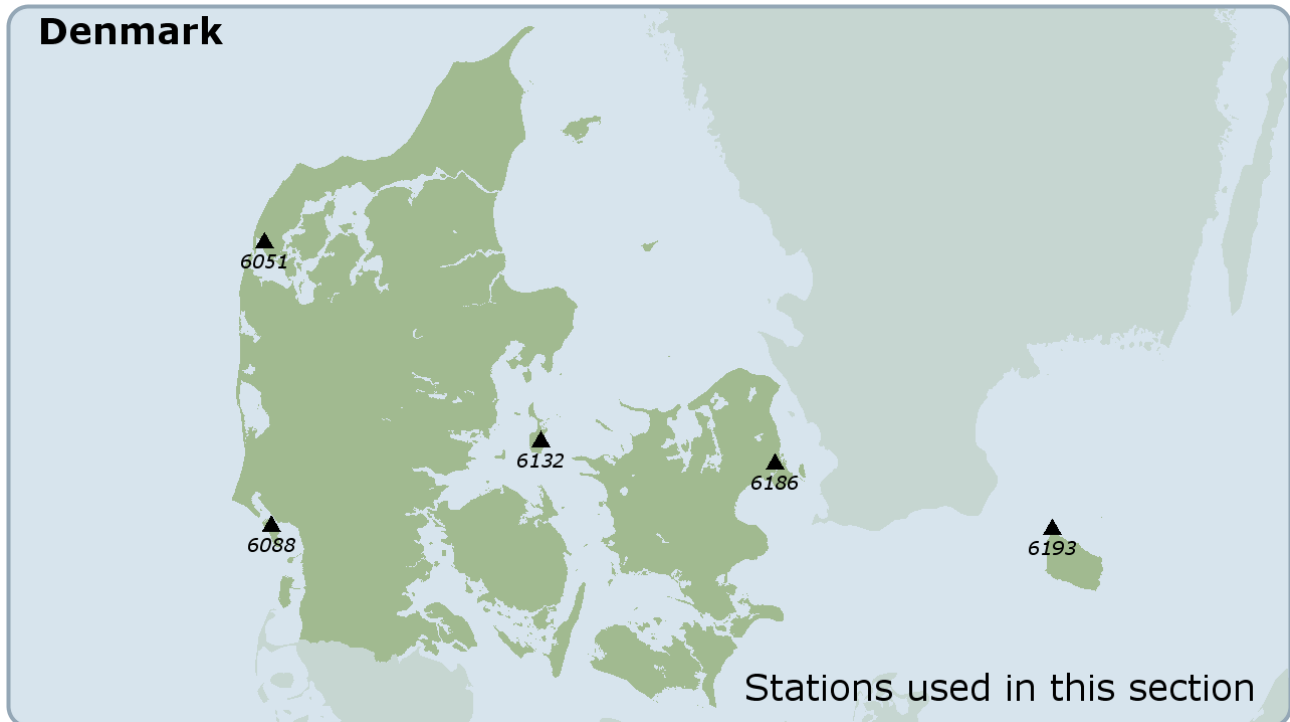


Figure 6 note: The map shows the station positions of the stations where the graphical data sets referred to in the graphics section come from. Only the latest positions are marked. The official WMO station identifiers for Denmark consist of 5 digits “06xxx”. However, in this report the in front “0” is omitted, giving 4 digits i.e. “6132” for Tranebjerg, which is also used on the map. The Danish national station identifiers describing climate/precipitation stations in Denmark consist of 5 digits, either the new format “05XXX” (the in front “0” is omitted), giving 4 digits i.e. “5165” for Tranebjerg or the old format, where the station number started with 20-32 dependent on the region i.e. “27080” for the old Tranebjerg station. See more in Appendix 1 and 4.

Annual graphics are available for three (3) parameters; average air temperature, accumulated precipitation and hours of bright sunshine within the period 1768-2020 both for country-wise and for five (5) air temperature data sets, five (5) precipitation data sets and one (1) hours of bright sunshine data set (see table 37-41). The graphs are available in an English version.

The annual data behind the graphics are described in section 9 and can be downloaded together with the monthly/annual/country-wise data (see appendix 4 and 5). The graphs are shown on the next pages. They show annual average air temperatures and annual accumulated precipitation (2x5 station data sets and 2 country-wise), plus annual accumulated hours of bright sunshine (1 station data set and country-wise). The values are shown relative to average 1981-2010. Average values for this 30-years normal period are also shown in graphs and tables.

**Table 37. Graphical products; country-wise annual average air temperature (element number 101), accumulated precipitation (element number 601) and hours of bright sunshine (element number 504). Details in Appendix 6.**

Product*	Graph id	Period	Parameter
Graph; country-wise (temperature; published) 1873-2020	dk_graph_annual_pub temperature_country	1873-2020	Average temperature
Graph; country-wise (temperature; corrected) 1873-2020	dk_graph_annual_corr temperature_country	1873-2020	Average temperature
Graph; country-wise (precipitation) 1874-2020	dk_graph_annual_ precipitation_country	1874-2020	Accumulated precipitation
Graph; country-wise (sunshine) 1920-2020	dk_graph_annual_ sunshine_country	1920-2020	Acc. hours of bright sunshine

Table 37 note: Graph (English version).

Table 37 note: \* Blended datasets.

**Table 38. Graphical products; annual average air temperature (element number 101). Details in Appendix 6.**

Product*	Station series	Graph id	Period	Parameter
Graph; Vestervig 1874-2020	Vestervig	dk_graph_annual_ temperature_6051	1874-2020	Average temperature
Graph; Nordby (Fanø) 1872-2020	Nordby (Fanø)	dk_graph_annual_ temperature_6088	1872-2020	Average temperature
Graph; Tranebjerg (Samsø) 1873-2020	Tranebjerg (Samsø)	dk_graph_annual_ temperature_6132	1873-2020	Average temperature
Graph; København 1768-2020	København	dk_graph_annual_ temperature_6186	1768-2020	Average temperature
Graph; Hammer Odde Fyr 1873-2020	Hammer Odde Fyr (Bornholm)	dk_graph_annual_ temperature_6193	1873-2020	Average temperature

Table 25 note:\*Graph (English version).

**Table 39. Graphical products; hours of bright sunshine (element number 504). Details in Appendix 6.**

Dataset*	Station series	Dataset id	Period	Parameter
Graph; København 1876-2020	Københavns toldbod	dk_graph_annual_ sunshine_6186	1876-2020	Acc. hours of bright sunshine hours

Table 39 note:\*Graph (English version).

**Table 40. Graphical products; annual accumulated precipitation (element number 601). Details in Appendix 6.**

Product*	Station series	Graph id	Period	Parameter
Graph; Vestervig 1874-2020	Vestervig	dk_graph_annual_ precipitation_6051	1874-2020	Accumulated precipitation
Graph; Nordby (Fanø) 1872-2020	Nordby (Fanø)	dk_graph_annual_ precipitation_6088	1872-2020	Accumulated precipitation
Graph; Tranebjerg (Samsø) 1873-2020	Tranebjerg (Samsø)	dk_graph_annual_ precipitation_6132	1873-2020	Accumulated precipitation

Product*	Station series	Graph id	Period	Parameter
Graph; København 1821-2020	København	dk_graph_annual_ precipitation_6186	1821-2020	Accumulated precipitation
Graph; Hammer Odde Fyr 1873-2020	Hammer Odde Fyr (Bornholm)	dk_graph_annual_ precipitation_6193	1873-2020	Accumulated precipitation

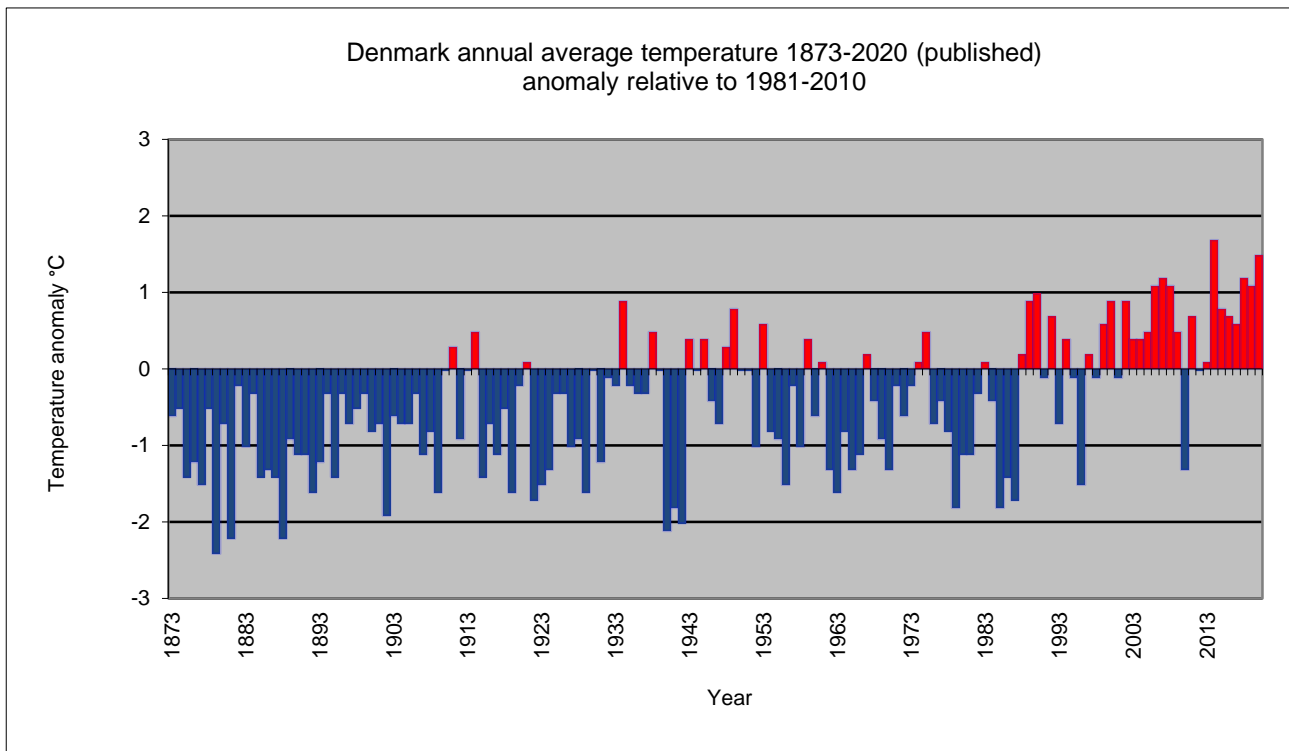
Table 40 note:\*Graph (English version).

**Table 41. Data dictionary for the graphical parameters published in the report.**

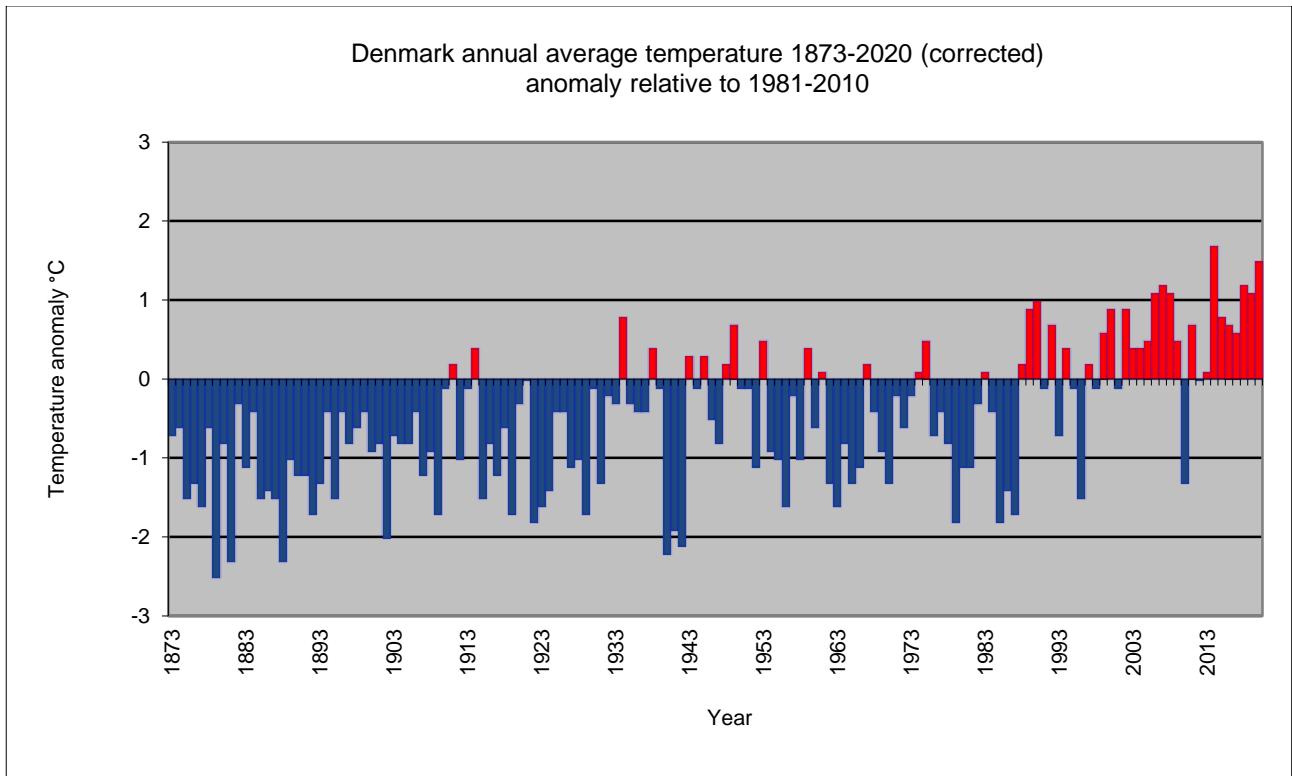
Element Number	Element/Parameter	Method	Unit
101	Average air temperature	average	°C
504	Hours of bright sunshine (Star level)	sum	hours
601	Accumulated precipitation	sum	mm

Table 41 note: 'Method' specifies whether the element is a sum or an average. The units of the monthly/annual values in the data files are specified in 'Unit'.

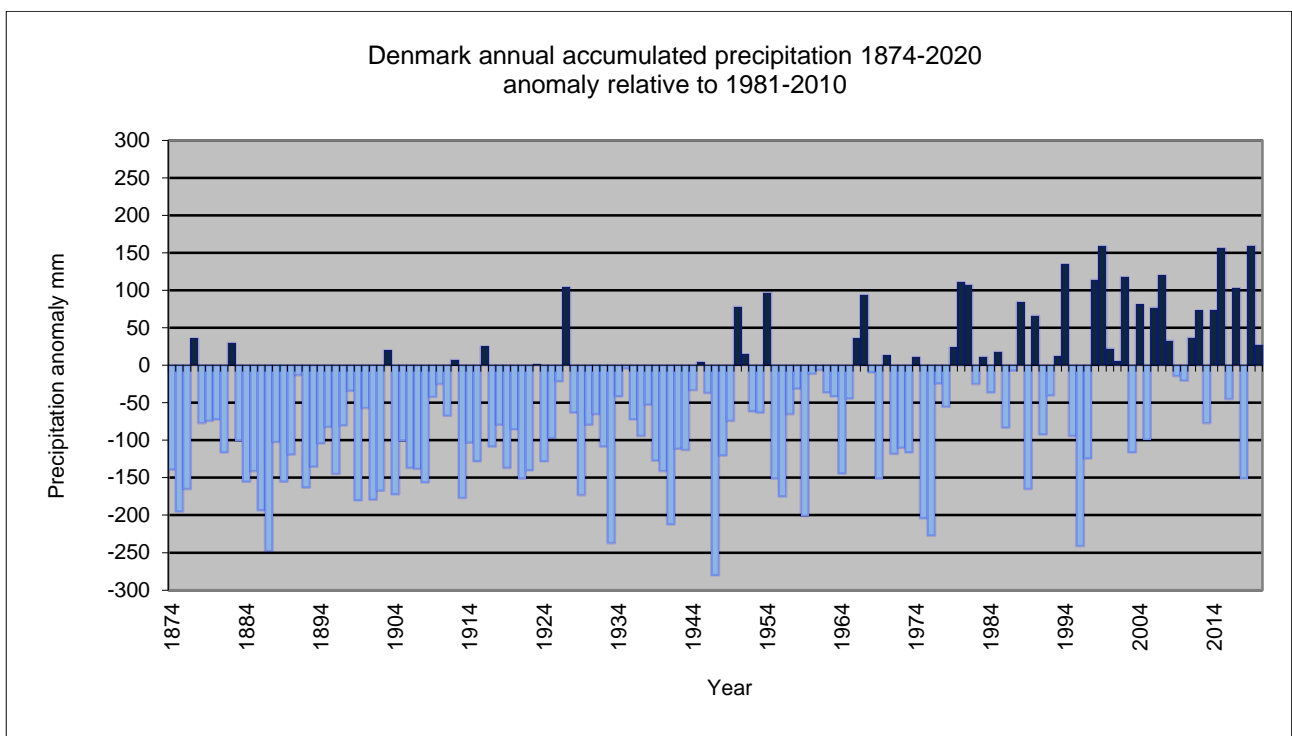
**Figure 7. Annual average air temperature (published values) since 1873, Denmark. Anomaly relative to 1981-2010.**



**Figure 8. Annual average air temperature (corrected values) since 1873, Denmark. Anomaly relative to 1981-2010.**



**Figure 9. Annual accumulated precipitation since 1874, Denmark. Anomaly relative to 1981-2010.**



**Figure 10. Annual accumulated hours of bright sunshine since 1920, Denmark. Anomaly relative to 1981-2010.**

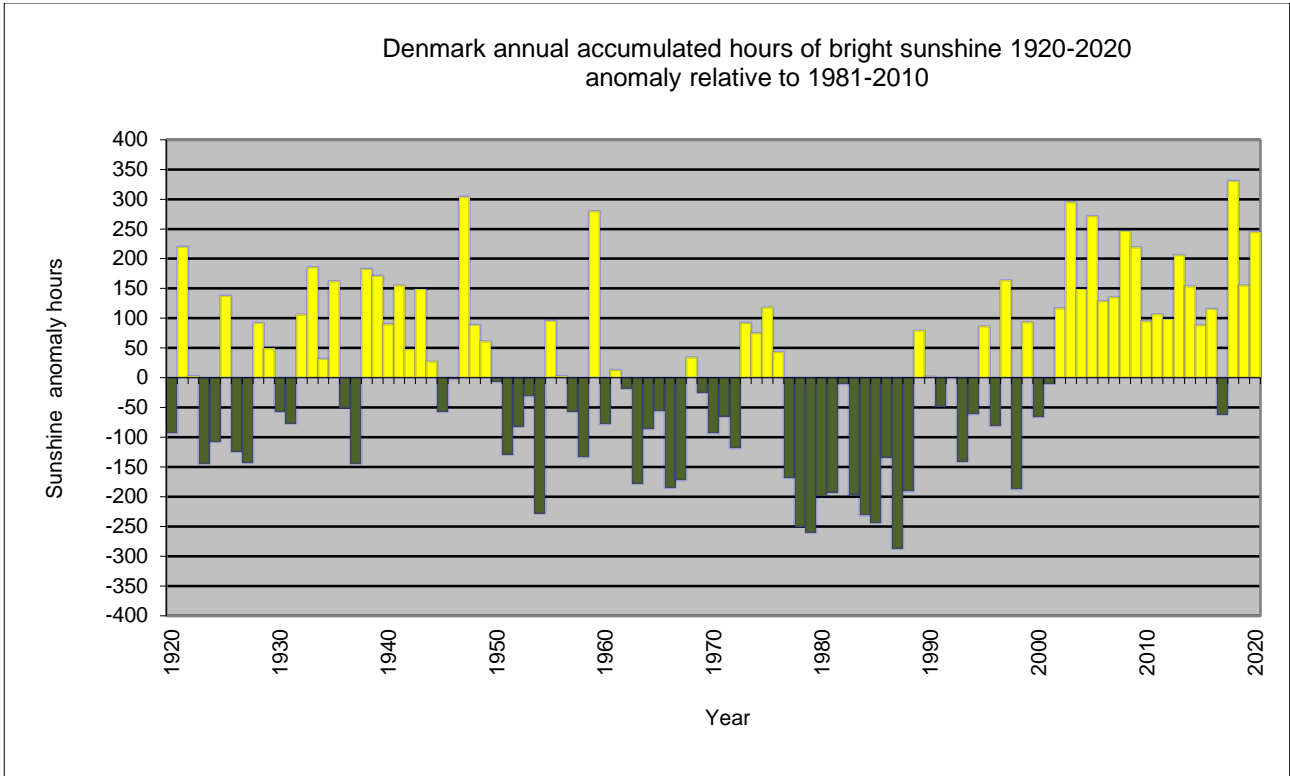
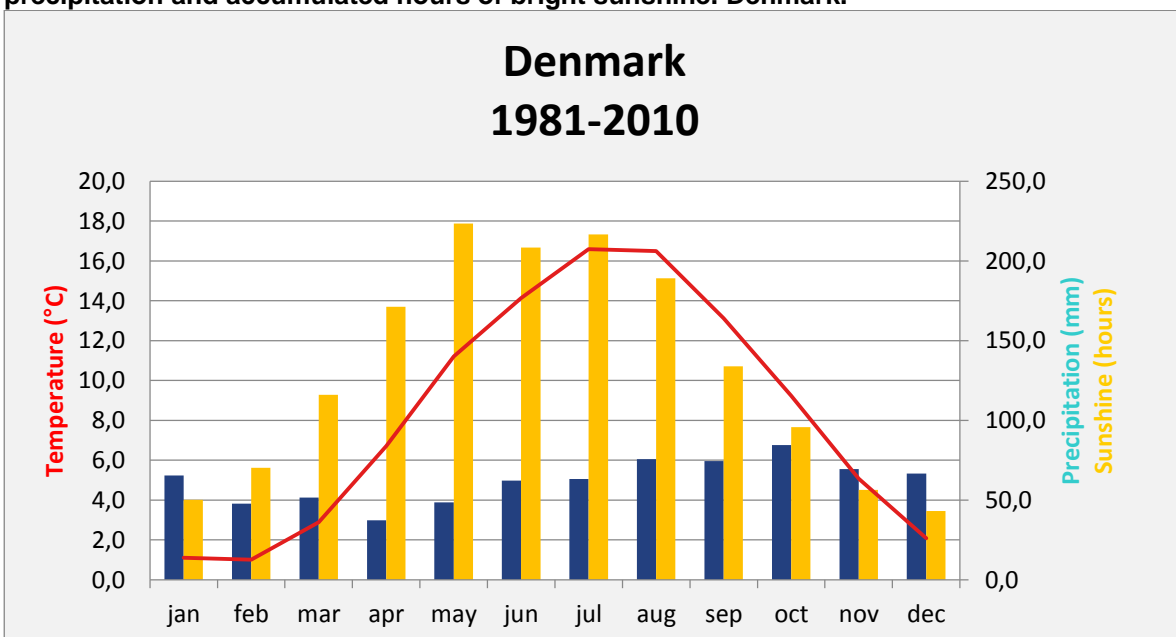


Figure 10 note: OBS! DMI has since 2002 observed the hours of bright sunshine using measurements of global radiation instead of measurements from a traditional Campbell-Stokes sunshine recorder. For that reason “new” and “old” not adjusted hours of bright sunshine cannot directly be compared. It should be noted that all values before 2002 are adjusted ensuring comparability to the new level. For details on that, see [33].

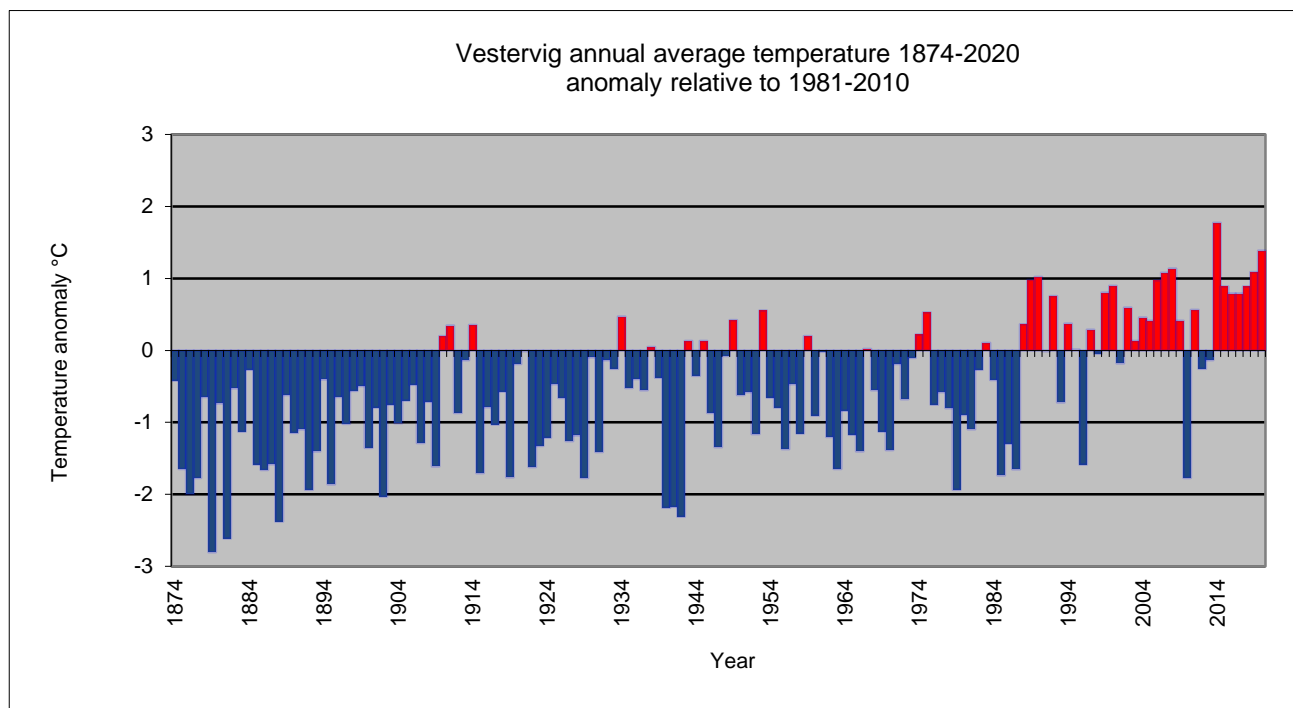
**Figure 11. Average monthly values for the period 1981-2010; air temperature, accumulated precipitation and accumulated hours of bright sunshine. Denmark.**



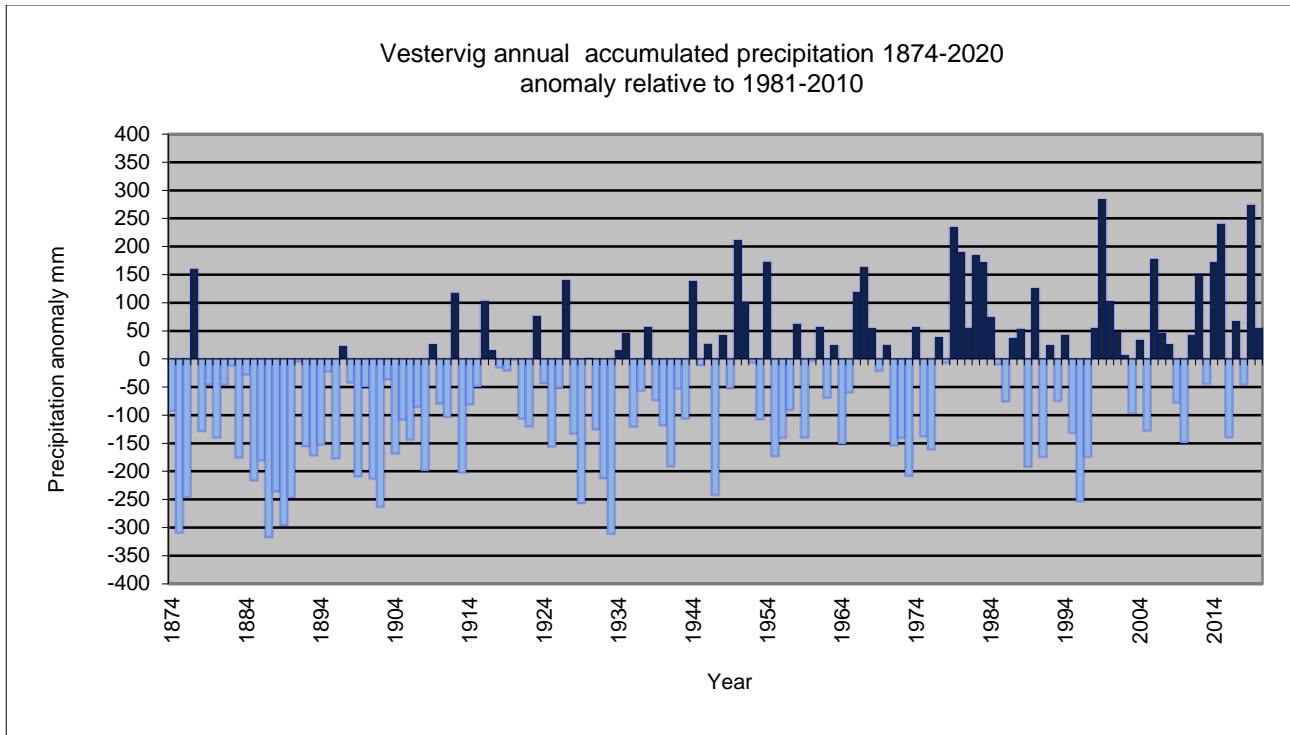
**Table 42. Average monthly values for the period 1981-2010; air temperature, accumulated precipitation and accumulated hours of bright sunshine. Denmark.**

Denmark (1981-2010)			
Month	Temperature (°C)	Precipitation (mm)	Sunshine (hours)
jan	1,1	65,4	50,2
feb	1,0	47,7	70,2
mar	2,9	51,6	115,9
apr	6,7	37,3	171,2
may	11,2	48,5	223,5
jun	14,1	62,1	208,4
jul	16,6	63,1	216,6
aug	16,5	75,7	189,1
sep	13,1	74,4	133,8
oct	9,2	84,5	95,7
nov	5,1	69,5	56,4
dec	2,1	66,6	43,1
<b>Year</b>	<b>8,3</b>	<b>746,2</b>	<b>1574,1</b>

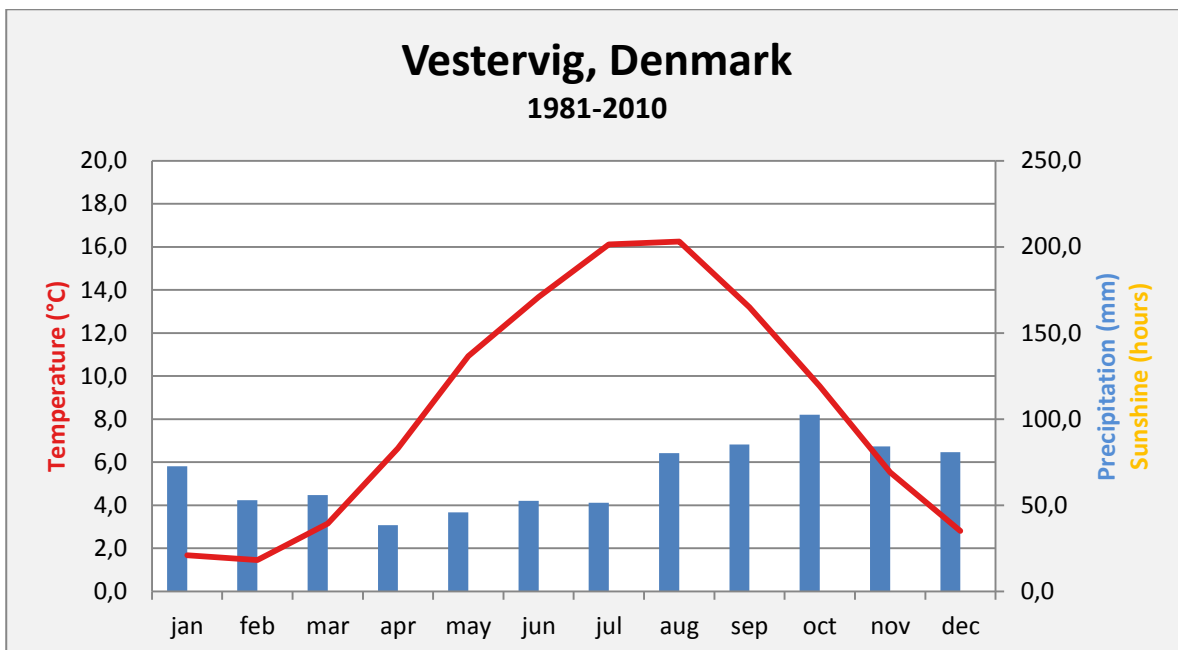
**Figure 12. Annual average air temperature since 1874, Vestervig. Anomaly relative to 1981-2010.**



**Figure 13. Annual accumulated precipitation since 1874, Vestervig. Anomaly relative to 1981-2010.**



**Figure 14. Average monthly values for the period 1981-2010; air temperature and accumulated precipitation. Vestervig.**

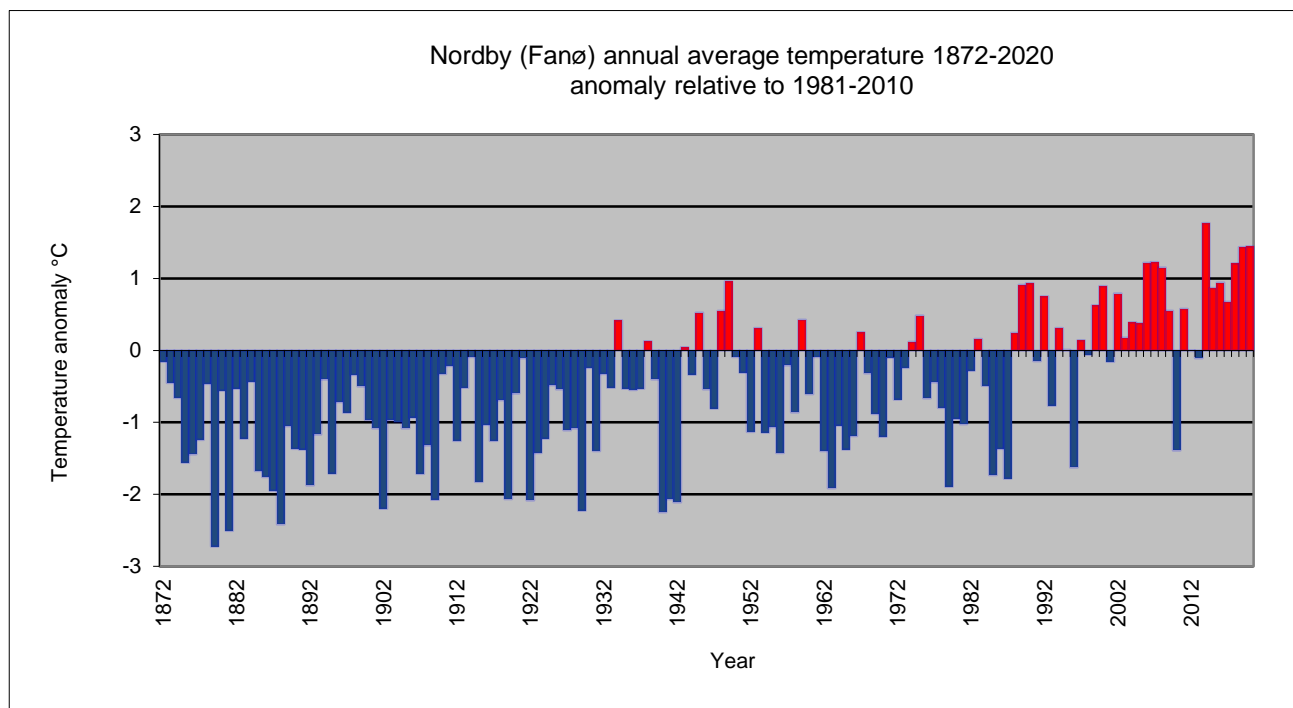




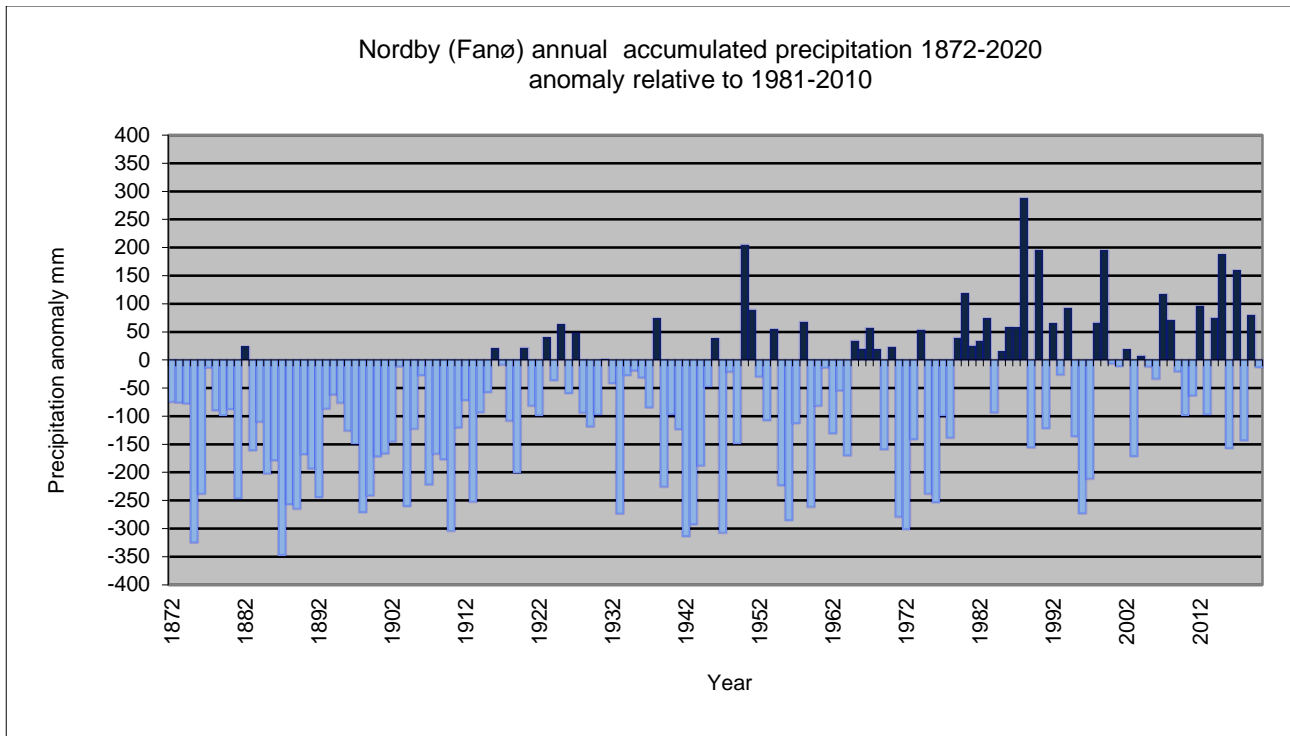
**Table 43. Average monthly values for the period 1981-2010; air temperature and accumulated precipitation. Vestervig.**

Vestervig, Denmark (1981-2010)			
Month	Temperature (°C)	Precipitation (mm)	Sunshine (hours)
jan	1,7	72,6	
feb	1,5	52,9	
mar	3,1	55,9	
apr	6,7	38,4	
may	10,9	45,9	
jun	13,7	52,6	
jul	16,1	51,4	
aug	16,3	80,2	
sep	13,2	85,3	
oct	9,5	102,6	
nov	5,5	84,2	
dec	2,8	80,9	
<b>Year</b>	<b>8,4</b>	<b>802,8</b>	

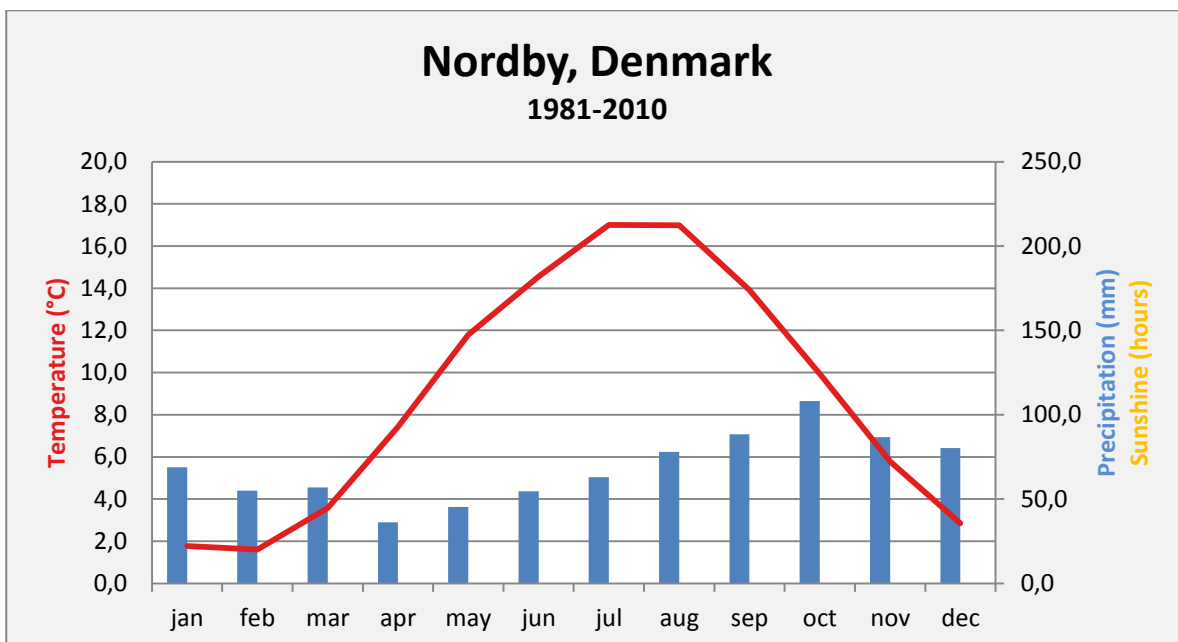
**Figure 15. Annual average air temperature since 1872. Nordby (Fanø). Anomaly relative to 1981-2010.**



**Figure 16. Annual accumulated precipitation since 1872, Nordby (Fanø). Anomaly relative to 1981-2010.**



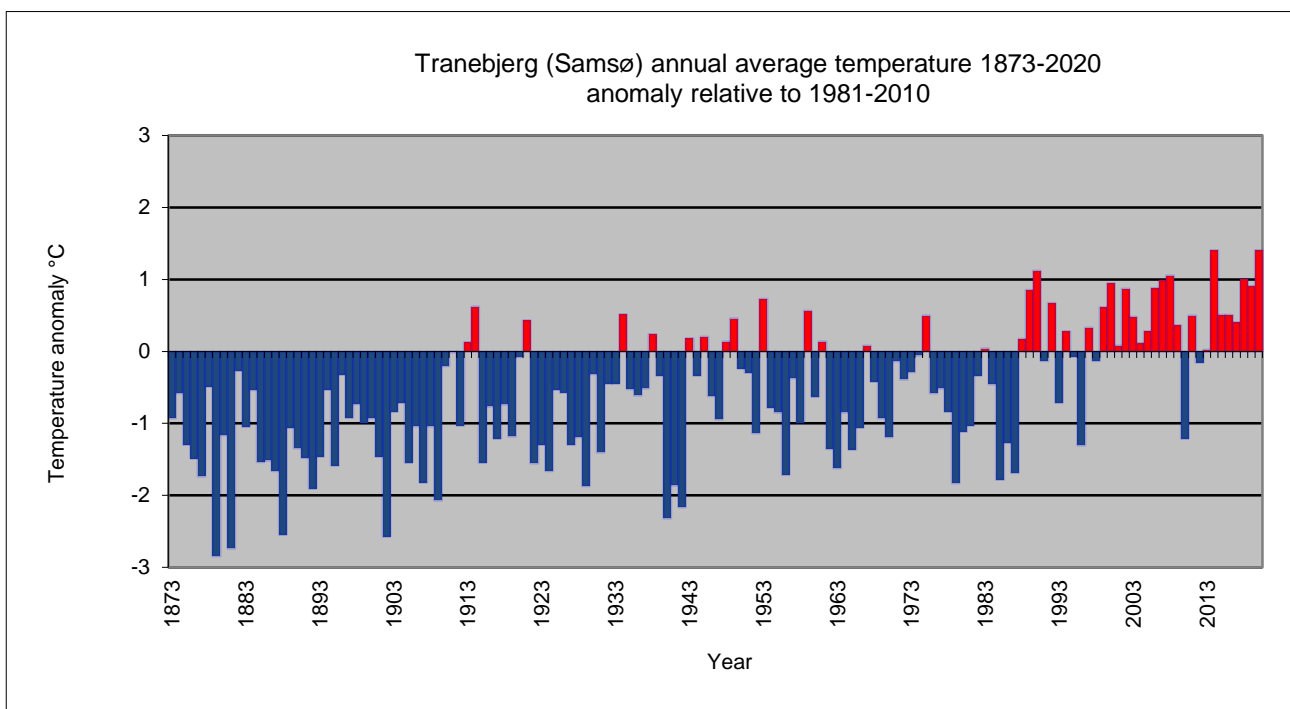
**Figure 17. Average monthly values for the period 1981-2010; air temperature and accumulated precipitation. Nordby (Fanø).**



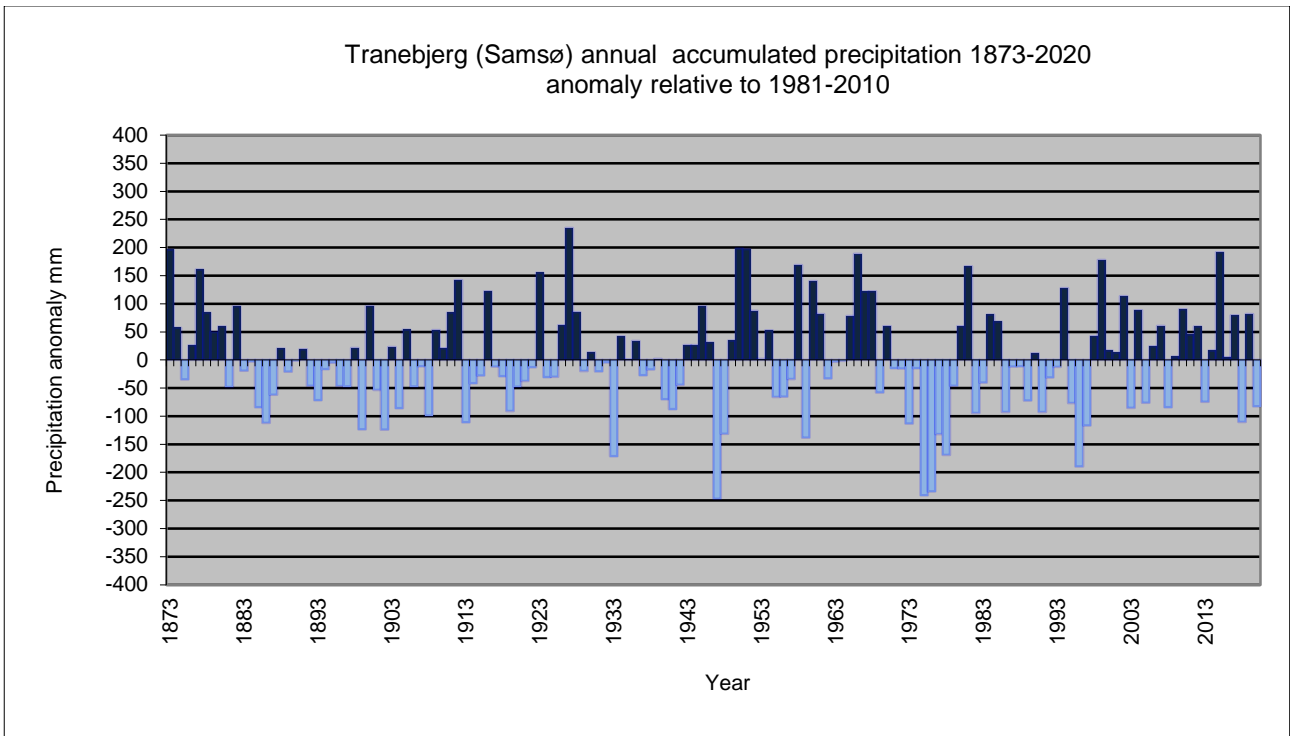
**Table 44. Average monthly values for the period 1981-2010; air temperature and accumulated precipitation. Nordby (Fanø).**

Nordby, Denmark (1981-2010)			
Month	Temperature (°C)	Precipitation (mm)	Sunshine (hours)
jan	1,8	68,8	
feb	1,6	54,9	
mar	3,6	56,9	
apr	7,4	36,1	
may	11,8	45,3	
jun	14,6	54,6	
jul	17,0	63,0	
aug	17,0	77,9	
sep	13,9	88,3	
oct	9,9	108,2	
nov	5,8	86,6	
dec	2,9	80,3	
<b>Year</b>	<b>8,9</b>	<b>820,8</b>	

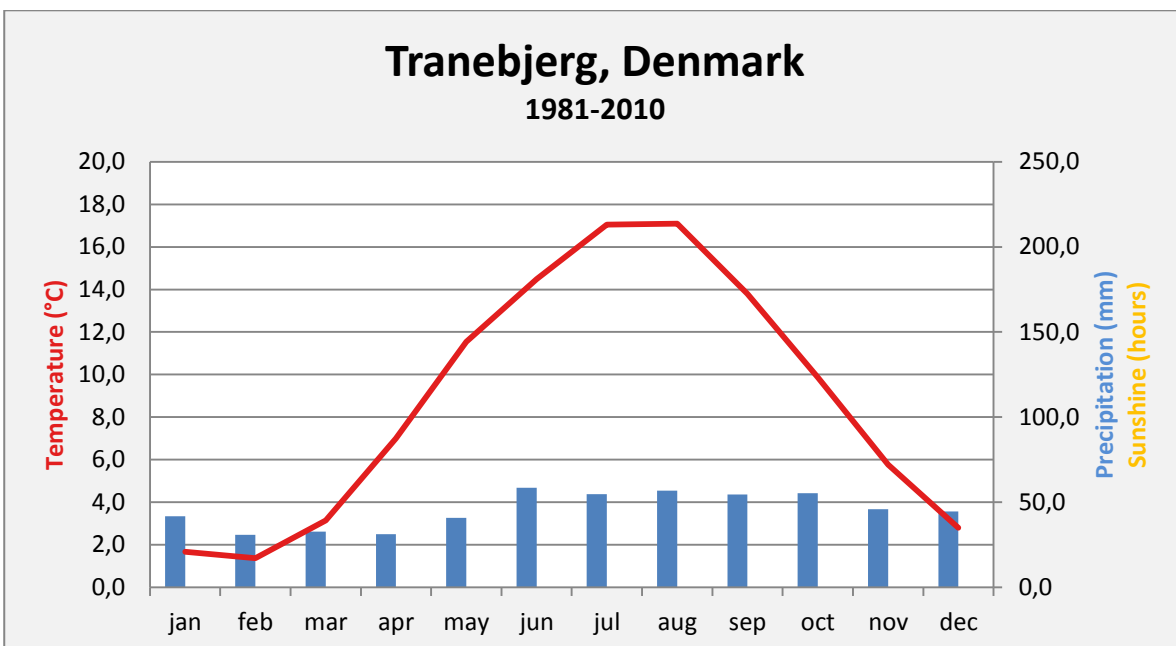
**Figure 18. Annual average air temperature since 1873, Tranebjerg (Samsø). Anomaly relative to 1981-2010.**



**Figure 19. Annual accumulated precipitation since 1873, Tranebjerg (Samsø). Anomaly relative to 1981-2010.**



**Figure 20. Average monthly values for the period 1981-2010; air temperature and accumulated precipitation. Tranebjerg (Samsø).**



**Table 45. Average monthly values for the period 1981-2010; air temperature and accumulated precipitation. Tranebjerg (Samsø).**

Tranebjerg, Denmark (1981-2010)			
Month	Temperature (°C)	Precipitation (mm)	Sunshine (hours)
jan	1,7	41,8	
feb	1,4	30,8	
mar	3,1	32,7	
apr	7,0	31,2	
may	11,5	40,8	
jun	14,5	58,5	
jul	17,0	54,8	
aug	17,1	56,9	
sep	13,8	54,6	
oct	9,9	55,3	
nov	5,8	45,9	
dec	2,8	44,5	
<b>Year</b>	<b>8,8</b>	<b>552,6</b>	

**Figure 21. Annual average air temperature since 1768, København. Anomaly relative to 1981-2010.**

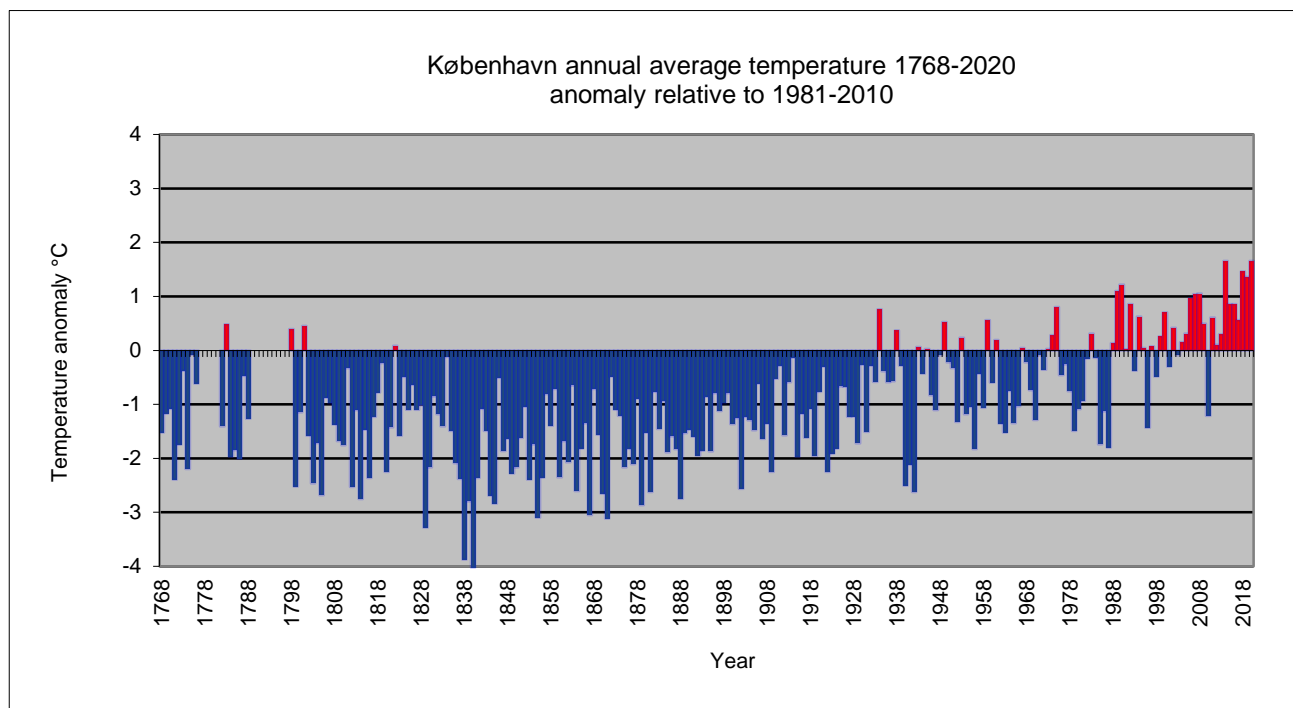


Figure 21 note: There are missing values for some early years 1777-1781 and 1789-1797.

**Figure 22. Annual accumulated precipitation since 1821, København. Anomaly relative to 1981-2010.**

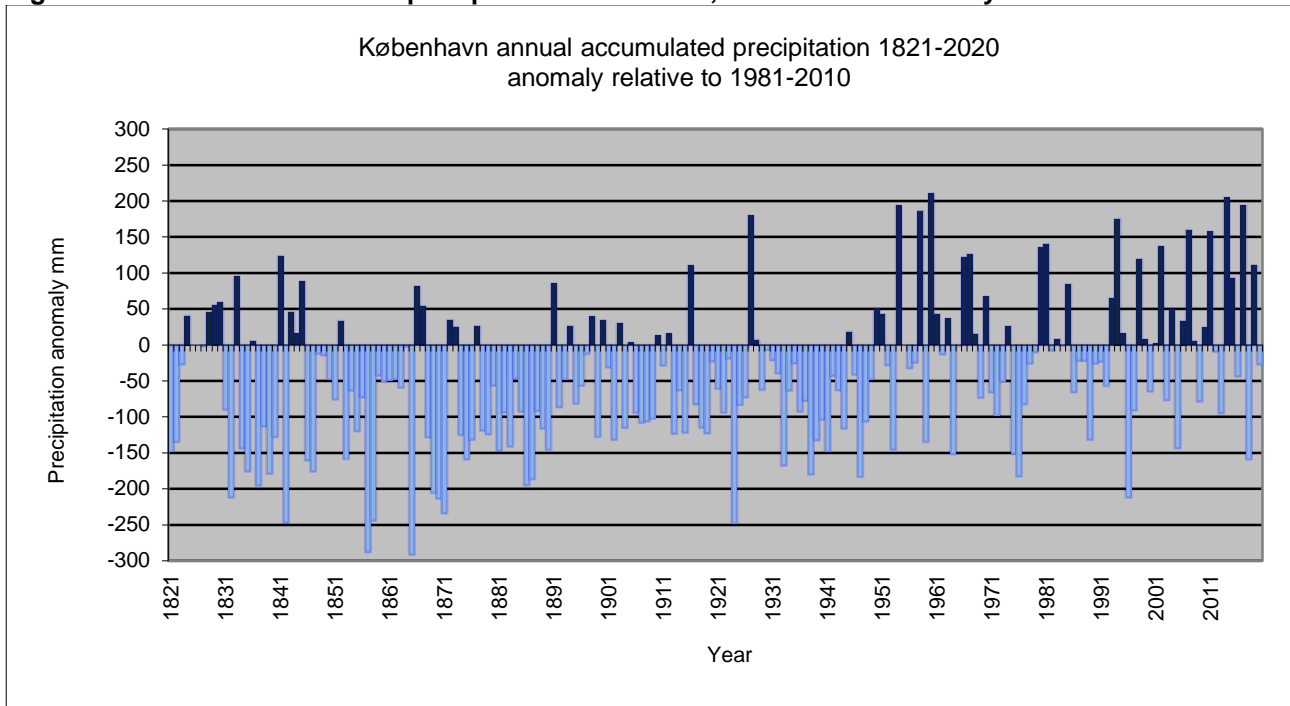


Figure 22 note: There are missing values for some early years 1825-1826.

**Figure 23. Annual accumulated hours of bright sunshine since 1876, København. Anomaly relative to 1981-2010.**

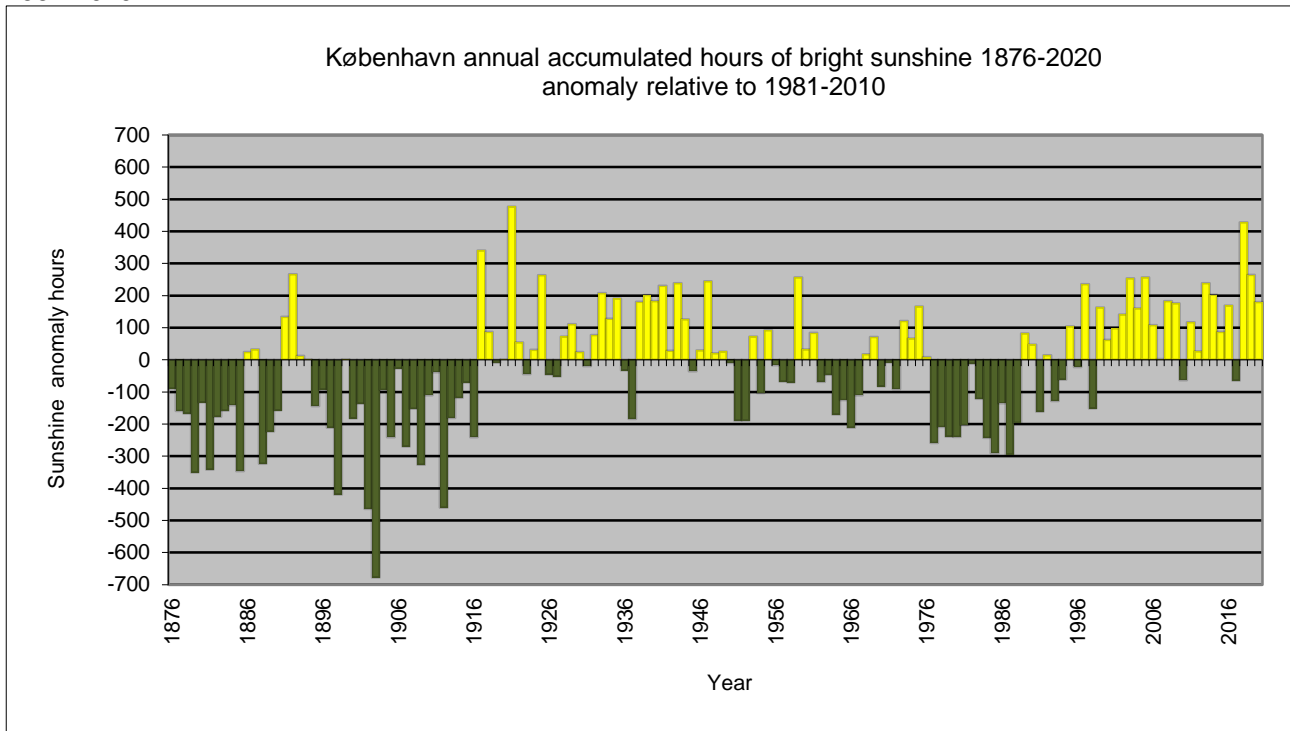
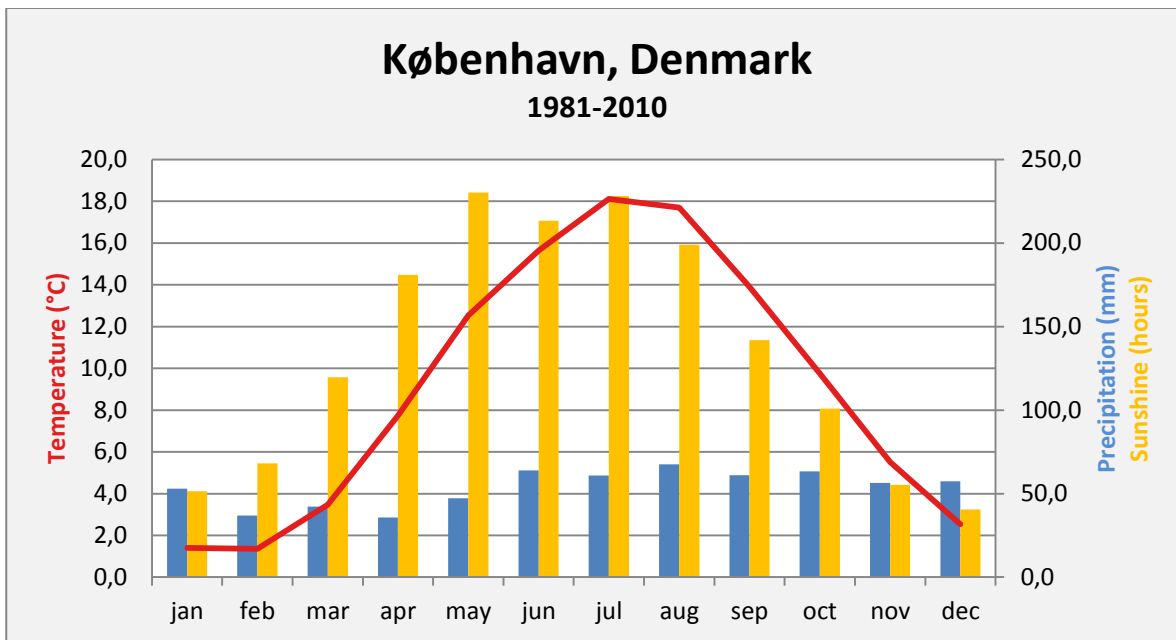


Figure 23 note: OBS! DMI has since 2002 observed the hours of bright sunshine using measurements of global radiation instead of measurements from a traditional Campbell-Stokes sunshine recorder. For that

reason “new” and “old” not adjusted hours of bright sunshine cannot directly be compared. It should be noted that all values before 2002 are adjusted ensuring comparability to the new level. For details on that, see [33].

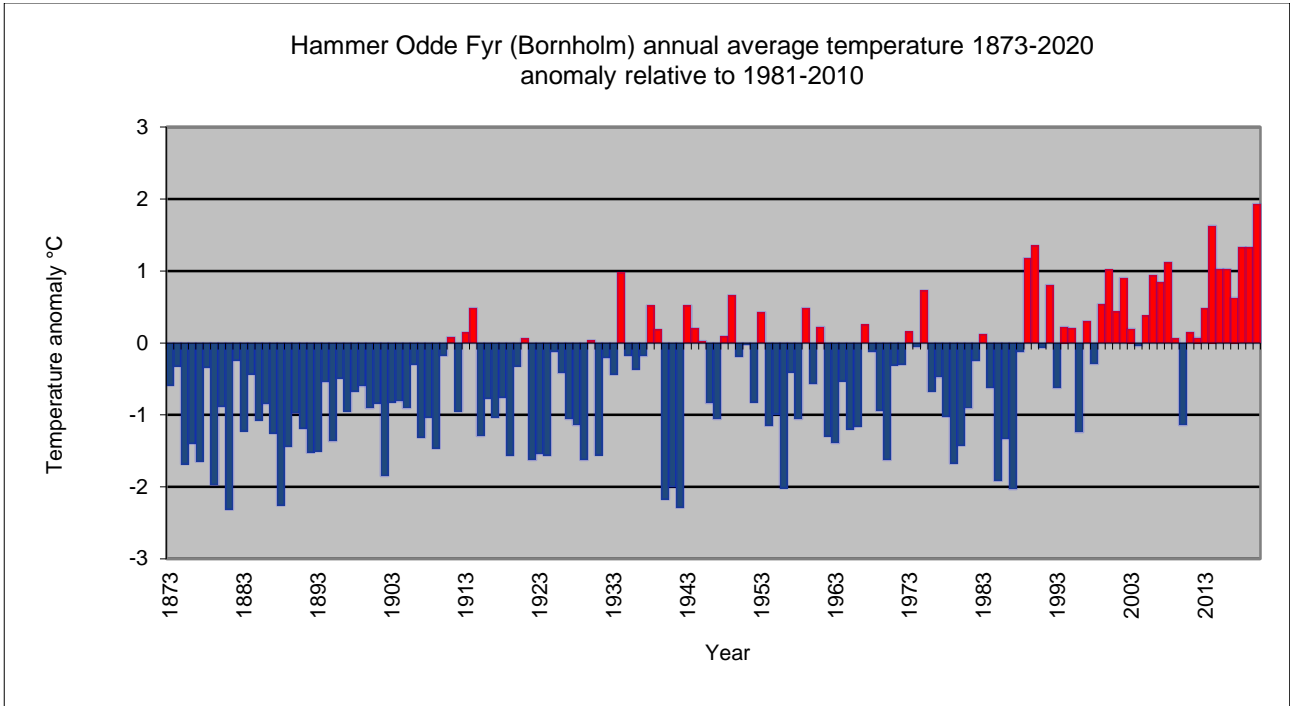
**Figure 24. Average monthly values for the period 1981-2010; air temperature, accumulated precipitation and accumulated hours of bright sunshine. København.**



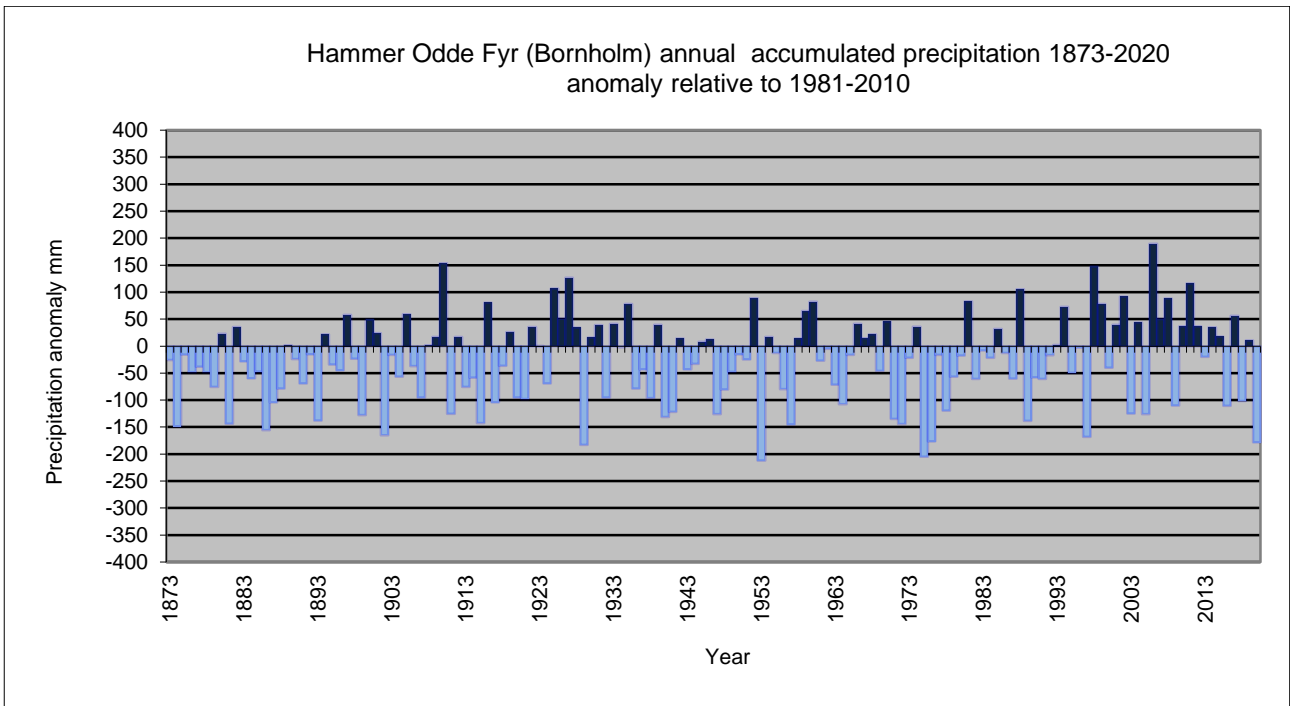
**Table 46. Average monthly values for the period 1981-2010; air temperature, accumulated precipitation and accumulated hours of bright sunshine. København.**

København, Denmark (1981-2010)			
Month	Temperature (°C)	Precipitation (mm)	Sunshine (hours)
jan	1,4	53,0	51,5
feb	1,4	36,9	68,1
mar	3,5	42,3	119,7
apr	7,7	35,8	180,9
may	12,5	47,2	230,2
jun	15,6	63,9	213,3
jul	18,1	60,9	228,1
aug	17,7	67,5	198,9
sep	13,9	61,0	141,9
oct	9,8	63,3	100,9
nov	5,5	56,4	55,3
dec	2,5	57,4	40,6
Year	9,1	645,7	1629,7

**Figure 25. Annual average air temperature since 1873, Hammer Odde Fyr (Bornholm). Anomaly relative to 1981-2010.**

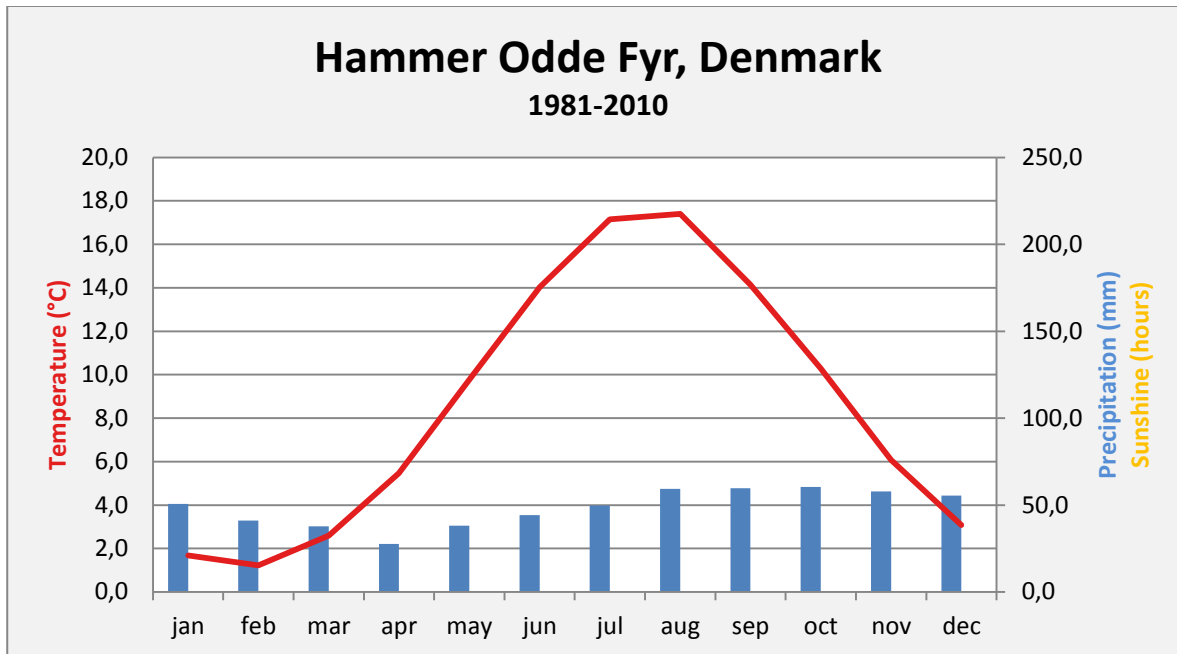


**Figure 25. Annual accumulated precipitation since 1873, Hammer Odde Fyr (Bornholm). Anomaly relative to 1981-2010.**





**Figure 26. Average monthly values for the period 1981-2010; air temperature and accumulated precipitation. Hammer Odde Fyr (Bornholm).**



**Table 47. Average monthly values for the period 1981-2010; air temperature and accumulated precipitation. Hammer Odde Fyr (Bornholm).**

Hammer Odde Fyr, Denmark (1981-2010)			
Month	Temperature (°C)	Precipitation (mm)	Sunshine (hours)
jan	1,7	50,7	41,1
feb	1,2	41,1	37,7
mar	2,6	37,7	27,6
apr	5,5	27,6	38,1
may	9,8	38,1	44,2
jun	14,0	44,2	49,7
jul	17,2	49,7	59,3
aug	17,4	59,3	59,7
sep	14,1	59,7	60,4
oct	10,3	60,4	57,9
nov	6,1	57,9	55,4
dec	3,1	55,4	44,2
<b>Year</b>	<b>8,6</b>	<b>581,9</b>	

The graphics can be downloaded from the publication part of DMI web pages. Details about the data sets and file formats can be seen in Appendix 6.

## 12 Storm section: Historical DMI climate data Collection

**Table 48. Overview of storm section – data collections in this report.**

Type	Data Collections	Section, Page, Appendix
Storm	<ul style="list-style-type: none"> <li>List of storms 1891-2020 (Denmark); table</li> </ul> 1 data set: All strong gales to hurricanes registered in Denmark, have been ranked in terms of strength and wind direction and whether there has been snowfall involved	Sec 12, p 50-55, App 7

Table 48 note: Latest earlier report: [21] Cappelen, J. (ed), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02.

**Table 49. Storm table product; List of storms in Denmark. Details in Appendix 7.**

Product*	Dataset id	Period	Parameter
Table; list of storms; Denmark 1891-2020	dk_storm_table	1891-2020	Classification, see table 50

Table 49 note: \*English version.

Since 1891, all strong gales to hurricanes, registered in Denmark, have been ranked in terms of strength and wind direction and whether there has been snowfall involved. They are all shown in table 50 and the four major top events are marked in grey.

The list of Danish storms 1891-2020 are shown in table 50 below, but can also be found on dmi.dk (continuously updated): Storms in Denmark since 1891 (English only)

[https://www.dmi.dk/fileadmin/user\\_upload/Bruger\\_upload/Stormlisten/STORMS\\_IN\\_DENMARK\\_SINCE\\_1891.pdf](https://www.dmi.dk/fileadmin/user_upload/Bruger_upload/Stormlisten/STORMS_IN_DENMARK_SINCE_1891.pdf) [25].

**Table 50. The list of classified storms in Denmark 1891-2020 and the classification rules.**

Classification rules	
Classification of storms are based on a climatological valuation, based on 10 minutes average wind speed	
N or n - wind from north	
E or e - wind from east	
S or s - wind from south	
W or w - wind from west	
X or x - variable wind direction	
* or . - snow storm (no wind direction indicated in most cases)	

Class 4		Class 3		Class 2		Class 1	
Capital	Small	Capital	Small	Capital	Small	Capital	Small
Strong storm to hurricane, > 28,5 m/s	Strong storm to hurricane, > 28,5 m/s	Strong storm, (hurricane-like) > 26,5 m/s	Strong storm (hurricane-like) > 26,5 m/s	Storm, > 24,5 m/s	Storm, > 24,5 m/s	Stormy, > 21 m/s	Stormy, > 21 m/s
National > 30%	Regional 10-30%	National > 30%	Regional 10-30%	National > 30%	Regional 10-30%	National > 30%	Regional 10-30%

Period		Remarks	Classification	
Days	Year		Date	Index
4-5/1	1891	Snow storm	5/1-1891	*2
10-11/12	1891		11/12-1891	SW2
24-25/6	1892		25/6-1892	W1
12/2	1894		12/2-1894	W2
25-25/3	1895	Strong storm	25/3-1895	W3
6-7/12	1895		7/12-1895	W2
30-31/1	1898		31/1-1898	W2
24-25/3	1898		25/3-1898	E2
11-12/5	1898		12/5-1898	W1
14/7	1898	Jylland	14/7-1898	NW2
24-25/7	1898		25/7-1898	NW1
31/8	1898		31/8-1898	W1
17/10	1898		17/10-1898	E1
18/10	1898		18/10-1898	E1
19/10	1898		19/10-1898	E1
2-3/12	1898		3/12-1898	SW1
10-11/12	1898		11/12-1898	W1
27/12	1898		27/12-1898	SW1
17/8	1899		17/8-1899	W1
22-23/9	1899		23/9-1899	W1
24/11	1899		24/11-1899	W1
16-17/2	1900	Stormy, snow	17/2-1900	*1
17-18/2	1900	Stormy, snow	18/2-1900	*1
25-26/12	1902	Hurricane, The "1902 Christmas Storm"	26/12-1902	w4
17/1	1905		17/1-1905	SE1
31/1	1905		31/1-1905	W1
27-28/11	1905	Nordjylland	28/11-1905	w2
13/3	1906		13/3-1906	W1
25/3	1906	Stormy, snow	25/3-1906	*1
28/3	1906		28/3-1906	W1
13/1	1907		13/1-1907	W1
21/2	1907		21/2-1907	W1
16/8	1907	Nordjylland	16/8-1907	W1
8/1	1908	Stormy, snow, Nordjylland	8/1-1908	-1
8/2	1908		8/2-1908	NW1
13/11	1909	Stormy, snow	13/11-1909	*1
3-4/12	1909	Stormy, snow	3/12-1909	*se1
20/12	1909		20/12-1909	W2
24-25/1	1910	Stormy, snow	25/1-1910	*1
25-26/1	1910	Stormy, snow	26/1-1910	*1
24-25/2	1911		25/2-1911	W2
5-6/11	1911	Strong storm	6/11-1911	W3
14/12	1912		14/12-1912	W2
31/1	1913		31/1-1913	S2
19/11	1913		19/11-1913	W2
4/12	1913		4/12-1913	SW2
28/9	1914		28/9-1914	W2
24/12	1915	Stormy, snow, Jylland	24/12-1915	*1

Period		Remarks	Classification	
Days	Year		Date	Index
15/1	1916		15/1-1916	W1
16/2	1916	Strong storm, Sydvestjylland	16/2-1916	w3
24/12	1916		24/12-1916	X1
8/3	1917		8/3-1917	E2
14/9	1917		14/9-1917	W1
21/9	1917		21/9-1917	W1
13/10	1917		13/10-1917	W1
25/10	1917		25/10-1917	W1
27/11	1917		27/11-1917	W1
23/8	1918	Nordjylland	23/8-1918	w1
29/1	1920		29/1-1920	SE1
19/1	1921		19/1-1921	NW1
22/1	1921		22/1-1921	W1
18/6	1921		18/6-1921	NW1
23-24/10	1921	Hurricane, The "Ulv sund" storm	24/10-1921	n4
1-2/11	1921		2/11-1921	W1
17-18/12	1921		18/12-1921	W2
31/12	1921	Strong storm	31/12-1921	W3
20/9	1922		20/9-1922	W1
30/8	1923		30/8-1923	w1
9-10/10	1923		10/10-1923	W1
16/12	1923		16/12-1923	W2
24/12	1923	Stormy, snow, The "Christmas snow storm"	24/12-1923	*1
10/9	1924		10/9-1924	W2
2-3/1	1925		3/1-1925	W1
14/6	1925		14/6-1925	W1
4/11	1925	The southern parts of Denmark	4/11-1925	w2
10/10	1926	The southern parts of Denmark	10/10-1926	w2
2-3/10	1927	Strong storm	3/10-1927	W3
24/11	1928		24/11-1928	W1
11-12/10	1929	The southern parts of Denmark	12/10-1929	w2
9/10	1930		9/10-1930	W1
8-9/7	1931	Strong storm, the southeastern parts of Denmark	9/7-1931	sw3
11/10	1933	Strong storm, Jylland	11/10-1933	SW3
8/2	1934	Strong storm, Jylland	8/2-1934	NW3
27/10	1936		27/10-1936	SW1
19/1	1937		19/1-1937	E2
24/11	1938		24/11-1938	SW2
23-24/8	1940		24/8-1940	NW1
3/5	1944		3/5-1944	W1
24/2	1946	Stormy, snow	24/2-1946	*1
1/3	1947	Stormy, snow	1/3-1947	*1
7/3	1947	Stormy, snow	7/3-1947	*1
13/3	1947	Stormy, snow	13/3-1947	*1
1/3	1949	Stormy, snow	1/3-1949	*1
24/10	1949	Strong storm	24/10-1949	W3
26/10	1949	Strong storm	26/10-1949	W3
6/1	1950	Stormy, snow	6/1-1950	*1
28/5	1951	The eastern parts of Denmark	28/5-1951	ne1

Period		Remarks	Classification	
Days	Year		Date	Index
1/12	1951	Nordjylland	1/12-1951	w2
28/1	1953	Stormy, The "Holland storm"	28/1-1953	W1
11/2	1953	Stormy, snow	11/2-1953	*1
21/2	1953		21/2-1953	W2
16/1	1954		16/1-1954	W1
20/1	1954		20/1-1954	W1
21/1	1956		21/1-1956	W2
7-8/12	1959		8/12-1959	E1
26-27/3	1961		27/3-1961	NW1
12/2	1962		12/2-1962	W1
16-17/2	1962	The "Hamborg" storm	17/2-1962	NW2
25/6	1962		25/6-1962	NW1
23/2	1967		23/2-1967	W1
17-18/10	1967	Hurricane	18/10-1967	w4
15-16/1	1968	Strong storm	16/1-1968	W3
22/9	1969		22/9-1969	W2
21/11	1971	Snow storm	21/11-1971	*2
19/11	1973	Strong storm	19/11-1973	NW3
26/1	1975		26/1-1975	w2
3/1	1976	Hurricane, Sydvestjylland	3/1-1976	w4
24/12	1977	The southern parts of Denmark	24/12-1977	w2
28/12	1978	Stormy, snow, the southern parts of Denmark	28/12-1978	-1
29/12	1978	Snow storm, the southern parts of Denmark	29/12-1978	-2
30/12	1978	Snow storm, strong, the southern parts of Denmark	30/12-1978	-3
31/12	1978	Snow storm, the southern parts of Denmark	31/12-1978	-2
1/1	1979	Snow storm, the southern parts of Denmark	1/1-1979	-2
2/1	1979	Snow storm, the southern parts of Denmark	2/1-1979	-2
3/1	1979	Stormy, snow, the southern parts of Denmark	3/1-1979	-1
4/1	1979	Stormy, snow, the southern parts of Denmark	4/1-1979	-1
21/8	1980		21/8-1980	W1
8/2	1981		8/2-1981	W2
2/11	1981		2/11-1981	W2
20-21/11	1981		21/11-1981	W1
24-25/11	1981	Hurricane	25/11-1981	W4
18/1	1983	Hurricane	18/1-1983	w4
13/1	1984	Hurricane	13/1-1984	w4
23/6	1984	The southern parts of Denmark	23/6-1984	w2
16-17/11	1984		17/11-1984	E1
6/9	1985		6/9-1985	W2
6/11	1985	Strong storm	6/11-1985	W3
2/12	1986		2/12-1986	W2
24/9	1988	The southern parts of Denmark	24/9-1988	w2
29/11	1988		29/11-1988	W2
14/2	1989	Vestjylland	14/2-1989	w2
25-26/1	1990	Hurricane	26/1-1990	sw4
26/2	1990	Hurricane	26/2-1990	w4
20/8	1990	The southwestern parts of Denmark	20/8-1990	w1
21/9	1990	The southwestern parts of Denmark	21/9-1990	w2
9/1	1991	Hurricane	9/1-1991	w4

Period		Remarks	Classification	
Days	Year		Date	Index
22/5	1991		22/5-1991	W1
14/1	1993	Hurricane-like, the southern parts and Bornholm	14/1-1993	w3
22/1	1993		22/1-1993	W2
3/12	1999	Hurricane, mostly the southern parts of Denmark	3/12-1999	W4
17/12	1999		17/12-1999	sw1
29-30/1	2000	Storm	30/1-2000	W2
28-29/1	2002	The southernmost parts of Denmark	29/1-2002	W2
27-28/10	2002	The southern parts of Denmark	28/10-2002	nw1
6/12	2003	Stormy, Kattegat and coastal areas of Nordsjælland	6/12-2003	n1
18/11	2004	Stormy, few coastal areas	18/11-2004	w1
8/1	2005	Strong storm, Hurricane mostly the northern part of Jutland and the coastal western Jutland	8/1-2005	W3
27/10	2006	Stormy, few coastal areas	27/10-2006	w1
1/11	2006	Stormy, few coastal areas	1/11-2006	-n1
1/1	2007	Stormy, few coastal areas	1/1-2007	w1
11-12/1	2007	Stormy, few coastal areas	12/1-2007	w1
14/1	2007	Stormy, few coastal areas	14/1-2007	w1
27/6	2007	Stormy, the southernmost parts of Denmark	27/6-2007	w1
31/1-1/2	2008	Stormy, few coastal areas	31/1-2008	sw1
22/2	2008	Stormy, few coastal areas	22/2-2008	w1
1/3	2008	Stormy, few coastal areas	1/3-2008	nw1
18/11	2009	Stormy, few coastal areas	18/11-2009	w1
7-8/2	2011	Stormy, coastal areas	8/2-2011	w1
27-28/11	2011	Storm, most significant in the northern and eastern parts of Denmark	28/11-2011	W2
8-9/12	2011	Stormy, most significant in the western and northern parts of Denmark	9/12-2011	W1
3-4/1	2012	Storm, most significant in the western and northern parts of Denmark	4/1-2012	w2
28/10	2013	Hurricane, southern parts of Denmark, record breaking in average wind speed and gust, named Allan	28/10-2013	sw4
5-6/12	2013	Hurricane, named Bodil	6/12-2013	nw4
14-15/3	2014	Stormy, the northern parts of Jutland, Kattegat and Bornholm, named Carl	15/3-2014	nw1
2-3/1	2015	Stormy, coastal areas	2/1-2015	w1
9/1	2015	Stormy, coastal areas, named Dagmar	9/1-2015	w1
10-11/1	2015	Storm, the northern parts of Jutland and coastal areas, named Egon	10/1-2015	w2
7-8/11	2015	Stormy, the northern parts of Jutland and some coastal areas, named Freja	8/11-2015	W1
29/11	2015	Strong storm (hurricane-like), coastal areas, named Gorm	29/11-2015	w3
4/12	2015	Stormy, the northern parts of Jutland and some coastal areas along the west coast of Jutland, named Helga	4/12-2015	w1
26-27/12	2016	Storm, the northwestern parts of Jutland, west facing coastal areas and Bornholm, named Urd	27/12-2016	w2
3-4/1	2017	Stormy, coastal areas; the western parts of Jutland	4/1-2017	nw1
13-14/9	2017	Stormy, coastal areas; the southern parts of Denmark	13/9-2017	sw1
29/10	2017	Stormy, coastal areas, named Ingolf	29/10-2017	NW1
10/8	2018	Stormy, coastal areas, named Johanne	10/8-2018	W1

Period		Remarks	Classification	
Days	Year		Date	Index
21/9	2018	Stormy, coastal areas, named Knud; the northwestern parts of Denmark	21/9-2018	sw1
1-2/1	2019	Stormy, coastal areas, named Alfrida; the western parts of Jutland and Kattegat area	2/1	nw1
15/12	2019	Stormy, coastal areas, the southern parts of Denmark	15/12	w1
9/2	2020	Stormy, coastal areas	9/2	s1
22-23/2	2020	Stormy, coastal areas	22/2	w1
25/2	2020	Stormy, coastal areas	25/2	w1
12/3	2020	Stormy, coastal areas, named Laura	12/3	w1

**Number of classified storms in each class and in total**

Class 4	13
Class 3	17
Class 2	52
Class 1	110
<b>Total</b>	<b>192</b>

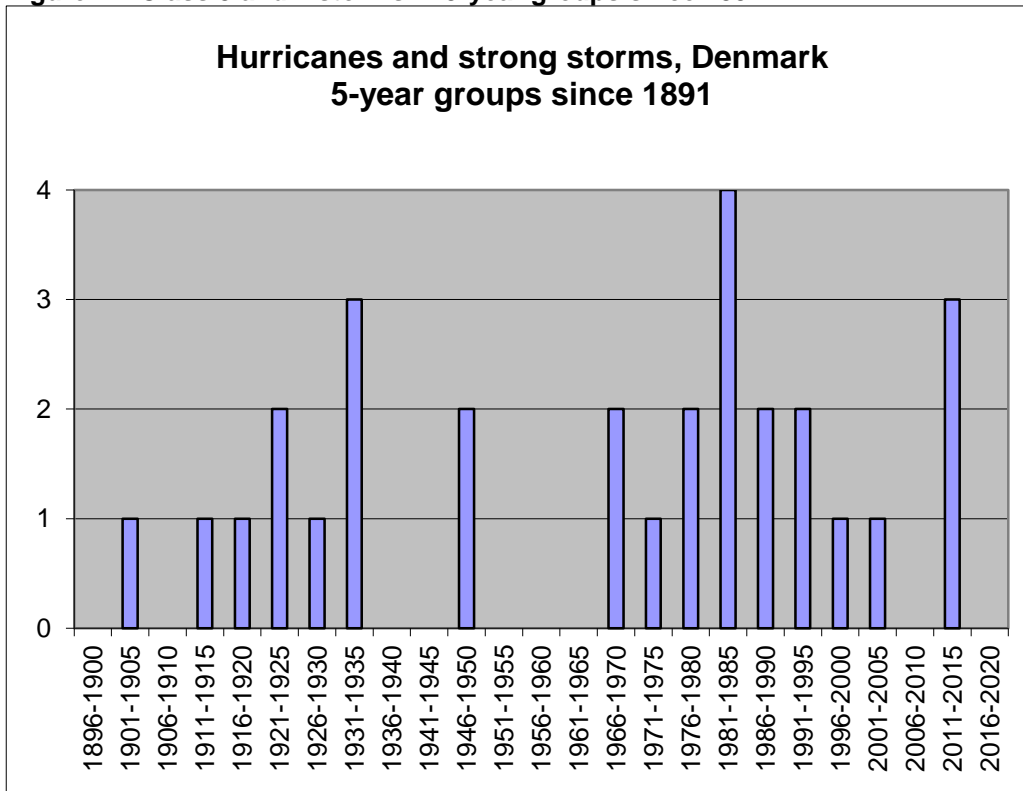
Table 50 note: The four major top events (in 1902, 1967, 1981 and 1999) in the table are marked in grey.

**Table 51. Graphical storm product; Danish class 3 and 4 storms in Denmark. Details in Appendix 7.**

Product*	Graph id	Period	Parameter
Graph; number of storms 1891-2020	dk_storm_graph	1891-2020	Class 3 and 4 storms; see table 50

Table 51 note: \*English version.

**Figure 27. Class 3 and 4 storms in 5-year groups since 1891.**



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## 14 Previous reports

Previous reports from the Danish Meteorological Institute can be found on:

<https://www.dmi.dk/publikationer/>

## 15 Appendix 1: Station history - File Formats and metadata

A station file included in this report contains the digitised information on the station positions and thereby on any removals of the stations during the operation period. The same metadata can also be seen in tables 52-58 on page 60-65.

The file name is: dk\_station\_position.dat

Format of the station position fixed format text file:

Position	Format	Description
1-5	F5.0	Station number
6-35	A30	Station name
36-45	A10	Station type (synop_dk = part of WMO synoptic net, clima_man = manual climate station, clima_aut = automatic climate station, precip_man = manual precipitation station, snow_man = manual snow observing station)
46-56	Date11	Start date (dd-mmm-yyyy)
57-67	Date11	End date (dd-mmm-yyyy)
68-70	A3	UTM zone
71-81	F11.0	Eastings
82-92	F11.0	Northings
93-98	F6.0	Elevation (metres above msl, average sea level)
99-109	F11.0	Latitude, degrees N (dddmmss)
110-120	F11.0	Longitude, degrees E (dddmmss)

Data are only to be used with proper reference to the accompanying report: Cappelen, J. (ed), 2021: Denmark - DMI Historical Climate Data Collection 1768-2020. DMI Report No. 21-02. Copenhagen.

By convention a time series is named after the most recent primary station delivering the data. In the tables 52-58 are presented an overview back in time of the positions and relocations and starting and (if any) closing dates of the stations used in this report. Also presented are any positions or relocations and starting and closing dates of other stations forming part of the series and therefore referred to in the description of the different data series in the report. More metadata on the series/station may be found in [35].

**Figure 28. Map showing station position of the Danish stations referred to in this report.**

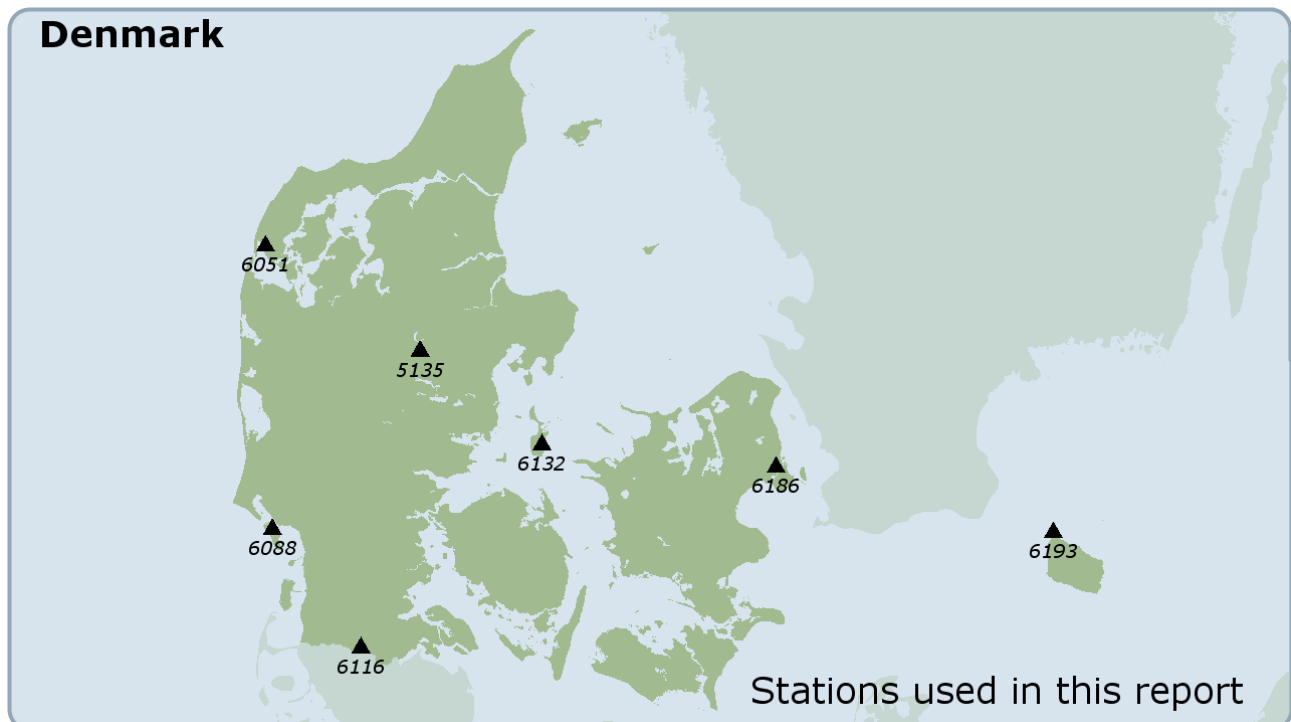


Figure 28 note: The map shows the station positions of the stations where the data sets referred to in this report come from. Only the latest positions are marked. The official WMO station identifiers for Denmark consist of 5 digits "06xxx". However, in this report the in front "0" is omitted, giving 4 digits i.e. "6132" for Tranebjerg, which is also used on the map. The Danish national station identifiers describing climate/precipitation stations in Denmark consist of 5 digits, either the new format "05XXX" (the in front "0" is omitted), giving 4 digits i.e. "5135" for Grønbæk or the old format, where the station number started with 20-32 dependent on the region i.e. "27080" for the old Tranebjerg station.

**Table 52. Overview of the positions and relocations and starting and (if any) closing dates of 6051 Vestevig and other stations forming part of the series used in this report.**

**6051 Vestervig**

No.	Name	Start	End	Type	UTM	Northings	Eastings	Longitude	Latitude	Elev.
21100	Vestervig	01-JUN-1873	30-JUN-1879	clima_man	32V	6291160	459820	82100	564600	47
21100	Vestervig	01-JUL-1879	18-SEP-1883	clima_man	32V	6292610	458640	81900	564600	25
21100	Vestervig	19-SEP-1883	16-AUG-1892	clima_man	32V	6291380	458510	81900	564600	18
21100	Vestervig	17-AUG-1892	30-JUN-1924	clima_man	32V	6291395	458670	81900	564600	22
21100	Vestervig	01-JUL-1924	12-APR-1937	clima_man	32V	6291410	458210	81900	564600	17
21100	Vestervig	13-APR-1937	31-MAR-1946	clima_man	32V	6291225	458420	81900	564600	27
21100	Vestervig	01-APR-1946	01-JAN-2000	clima_man	32V	6291492	458551	81919	564551	18
21100	Vestervig	02-JAN-2000	10-SEP-2003	precip_man	32V	6291492	458551	81919	564551	18
21100	Vestervig	11-SEP-2003	01-APR-2011	precip_man	32V	6291492	458551	81919	564551	18
21100	Vestervig	01-JAN-2000	10-SEP-2003	snow_man	32V	6291492	458551	81919	564551	18
21100	Vestervig	11-SEP-2003	30-SEP-2020	snow_man	32V	6291492	458551	81919	564551	18
21100	Vestervig	01-OCT-2020		snow_man	32V					22
21100	Vestervig	17-FEB-2000	10-SEP-2003	clima_aut	32V	6291492	458551	81919	564551	18
21100	Vestervig	11-SEP-2003		clima_aut	32V	6291492	458551	81919	564551	18
21120	Tødsø	05-JUN-1881	30-JUN-1903	clima_man	32V	6298350	488600	84900	565000	33
21120	Erslev	01-NOV-1927	31-DEC-1949	clima_man	32V	6298850	484730	84500	565000	14
21120	Erslev	01-JAN-1950	31-MAY-1961	clima_man	32V	6298820	483850	84400	565000	20
21120	Erslev	01-NOV-1961	31-MAY-1974	clima_man	32V	6299080	483560	84400	565000	25
21120	Erslev	01-JUN-1974	30-JUN-1987	clima_man	32V	6299350	483300	84400	565000	19
21120	Erslev	01-JUL-1987	30-JUN-1993	precip_man	32V	6299280	483340	84400	565000	20
21120	Erslev	01-JUL-1993	01-APR-2011	precip_man	32V	6299080	483585	84400	565000	26
24020	Bovbjerg Fyr	01-MAR-1876	24-MAR-1944	clima_man	32V	6263750	445920	80700	563100	41
24020	Bovbjerg Fyr	03-AUG-1945	30-NOV-1956	clima_man	32V	6263750	445920	80700	563100	41
24020	Bovbjerg Fyr	01-DEC-1956	30-JUN-1987	clima_man	32V	6263750	445950	80700	563100	41
24020	Bovbjerg Fyr	01-MAR-1989	01-AUG-1994	precip_man	32V	6263740	445950	80700	563100	41
6019	Silstrup	22-MAR-2002		synop_dk	32V	6309855	478246	83833	565550	42
6051	Vestervig	11-SEP-2003		synop_dk	32V	6291492	458551	81919	564551	18
6052	Thyborøn	01-JAN-1961	06-FEB-1985	synop_dk	32V	6285030	452360	81300	564200	3
6052	Thyborøn	07-FEB-1985	21-NOV-2000	synop_dk	32V	6284510	452410	81300	564200	2
6052	Thyborøn	22-NOV-2000		synop_dk	32V	6285231	452017	81259	564227	2
6030	Fsn Aalborg	01-JAN-1953		synop_dk	32V	6328631	551614	95107	570549	3
6041	Skagen Fyr	01-JAN-1953	13-DEC-2000	synop_dk	32V	6400730	597240	103800	574400	3
6041	Skagen Fyr	14-DEC-2000		synop_dk	32V	6400740	597229	103759	574413	3
6058	Hvide Sande	01-JAN-1989	06-NOV-2001	synop_dk	32V	6206680	445780	80800	560000	3
6058	Hvide Sande	07-NOV-2001		synop_dk	32V	6207426	446535	80833	560028	2
6060	Fsn Karup	01-JAN-1953		synop_dk	32V	6238954	507127	90655	561739	52

**Table 53. Overview of the positions and relocations and starting and (if any) closing dates of 5135 Grønbæk and other stations forming part of the series used in this report.**

**5135 Grønbæk**

No.	Name	Start	End	Type	UTM	Northings	Eastings	Longitude	Latitude	Elev.
21430	Grønbæk	01-AUG-1862	10-SEP-1879	precip_man	32V	6237065	538290	93700	561700	39
21430	Grønbæk	11-SEP-1879	28-FEB-1885	precip_man	32V	6237085	538310	93700	561700	38
21430	Grønbæk	01-APR-1885	31-DEC-1891	precip_man	32V	6237085	538310	93700	561700	38
21430	Grønbæk	01-NOV-1892	31-DEC-1901	precip_man	32V	6237075	538380	93700	561700	35
21430	Grønbæk	01-AUG-1903	30-SEP-1907	precip_man	32V	6237075	538380	93700	561700	35
21430	Allingskovgård	01-NOV-1907	30-NOV-1917	precip_man	32V	6235150	537715	93700	561600	73
21430	Allingskovgård	01-DEC-1917	30-NOV-1931	precip_man	32V	6235800	538370	93700	561600	37
21430	Grønbæk	01-DEC-1931	31-AUG-1952	precip_man	32V	6237075	538380	93700	561700	35
21430	Grønbæk	01-SEP-1952	31-MAR-1971	precip_man	32V	6237100	538260	93700	561700	40
21430	Grønbæk	01-APR-1971	11-AUG-1999	precip_man	32V	6237220	538567	93700	561700	25
21430	Grønbæk	12-AUG-1999	16-MAR-2005	precip_man	32V	6237215	538567	93700	561700	25
21430	Grønbæk	17-MAR-2005	07-AUG-2009	precip_man	32V	6237217	538557	93700	561700	25
21430	Grønbæk	08-AUG-2009	01-APR-2011	precip_man	32V	6237217	538554	93700	561700	25
5135	Grønbæk	18-JAN-2010		synop_dk	32V	6237215	538556	93722	561637	25

**Table 54. Overview of the positions and relocations and starting and (if any) closing dates of 6088 Nordby (Fanø) and other stations forming part of the series used in this report.**

**6088 Nordby/Fanø**

No.	Name	Start	End	Type	UTM	Northings	Eastings	Longitude	Latitude	Elev.
25140	Nordby	01-SEP-1871	30-APR-1892	clima_man	32U	6144290	462050	82400	552700	4
25140	Nordby	01-MAY-1892	30-NOV-1899	clima_man	32U	6144695	462190	82400	552700	4
25140	Nordby	01-DEC-1899	29-FEB-1904	clima_man	32U	6144290	462050	82400	552700	4
25140	Nordby	01-MAR-1904	29-FEB-1928	clima_man	32U	6144260	462040	82400	552700	4
25140	Nordby	01-MAR-1928	04-APR-1936	clima_man	32U	6144940	462170	82400	552700	4
25140	Nordby	05-APR-1936	15-DEC-1944	clima_man	32U	6144610	462055	82400	552700	5
25140	Nordby	16-DEC-1944	20-NOV-1955	clima_man	32U	6144790	462400	82400	552700	3
25140	Nordby	21-NOV-1955	22-AUG-1960	clima_man	32U	6145210	462330	82400	552700	5
25140	Nordby	23-AUG-1960	10-SEP-1979	clima_man	32U	6144210	461780	82400	552600	6
25140	Nordby	11-SEP-1979	13-JAN-1994	clima_man	32U	6144230	461760	82400	552600	6
25140	Nordby	14-JAN-1994	14-FEB-1996	clima_man	32U	6145165	462375	82400	552700	3
25140	Nordby	15-FEB-1996	01-JAN-2000	clima_man	32U	6145060	462120	82400	552700	4
25140	Nordby	02-JAN-2000	22-JUL-2003	precip_man	32U	6145060	462120	82400	552700	4
25140	Nordby	23-JUL-2003	04-JUL-2007	precip_man	32U	6145047	462147	82406	552656	4
25140	Nordby	05-JUL-2007	01-JAN-2009	precip_man	32U	6145059	462126	82405	552657	4
25140	Nordby	07-FEB-2000	22-JUL-2003	clima_aut	32U	6145060	462120	82400	552700	4
25140	Nordby	23-JUL-2003	04-JUL-2007	clima_aut	32U	6145047	462147	82406	552656	4
25140	Nordby	05-JUL-2007		clima_aut	32U	6145059	462126	82405	552657	4
25140	Nordby	01-JAN-2000	31-MAY-2002	snow_man	32U	6145060	462120	82400	552700	4
25135	Langli	01-AUG-1983	30-JUN-1987	clima_man	32U	6152210	456890	81900	553100	3
25135	Langli	01-JUL-1987	01-SEP-1999	precip_man	32U	6152210	456890	81900	553100	3
25135	Langli	02-JUN-2000	01-DEC-2000	precip_man	32U	6152210	456890	81900	553100	3
25145	Sønderho	01-JUN-1988	23-AUG-1999	precip_man	32U	6134345	466300	82800	552100	4
25145	Sønderho	24-AUG-1999	01-APR-2009	precip_man	32U	6134432	466300	82800	552100	4
25171	Esbjerg R/A V	04-JAN-1979	06-JUN-1985	precip_aut	32U	6149460	464000	82600	552900	3
25171	Esbjerg R/A V	26-AUG-1985	15-JAN-1989	precip_aut	32U	6149500	464120	82600	552900	3
25171	Esbjerg R/A V	16-JAN-1989	06-AUG-1990	precip_aut	32U	6149440	464035	82600	552900	3

No.	Name	Start	End	Type	UTM	Northings	Eastings	Longitude	Latitude	Elev.
25171	Esbjerg R/A V	07-AUG-1990	23-MAY-2012	precip_aut	32U	6149430	464030	82600	552900	3
5340	Esbjerg R/A V	24-MAY-2012		precip_aut	32U	6149500	464020	82550	552921	3
25172	Hjerting	01-DEC-1985	09-JUN-1986	precip_man	32U	6152591	460557	82300	553100	9
25172	Hjerting	10-JUN-1986	01-JAN-2007	precip_man	32U	6152596	460558	82300	553100	9
6088	Nordby	23-JUL-2003	04-JUL-2007	synop_dk	32U	6145047	462147	82406	552656	4
6088	Nordby	05-JUL-2007		synop_dk	32U	6145059	462126	82405	552657	4
6080	Esbjerg Lufthavn	01-JAN-1959	31-MAR-1971	synop_dk	32U	6151640	467420	82900	553000	25
6080	Esbjerg Lufthavn	01-APR-1971	30-SEP-1984	synop_dk	32U	6153140	471550	83300	553100	29
6080	Esbjerg Lufthavn	01-OCT-1984		synop_dk	32U	6153858	472475	83350	553144	25
25348	Vester Vedsted	06-MAY-1986	01-DEC-2003	clima_aut	32U	6127418	478179	83923	551729	3
25348	Vester Vedsted	11-DEC-2003		clima_aut	32U	6127418	478179	83923	551729	3
6081	Blåvandshuk Fyr	01-JAN-1953	31-JAN-1971	synop_dk	32U	6157430	442240	80500	553300	13
6081	Blåvandshuk Fyr	18-SEP-1980		synop_dk	32U	6157424	442226	80503	553329	16
6093	Vester Vedsted	11-DEC-2003		synop_dk	32U	6127418	478179	83923	551729	3
6096	Rømø/juvre	02-MAY-1982	06-APR-2000	synop_dk	32U	6116320	472070	83400	551100	6
6096	Rømø/juvre	07-APR-2000		synop_dk	32U	6116270	472063	83340	551128	6
6058	Hvide Sande	01-JAN-1989	06-NOV-2001	synop_dk	32V	6206680	445780	80800	560000	3
6058	Hvide Sande	07-NOV-2001		synop_dk	32V	6207426	446535	80833	560028	2
25045	Outrup	01-OCT-2004	14-NOV-2006	snow_man	32U	6175575	458141	82000	554300	17
25045	Outrup	15-NOV-2006	19-AUG-2009	snow_man	32U	6175311	458776	82100	554300	15
25045	Outrup	20-AUG-2009	24-OCT-2012	snow_man	32U	6175309	458775	82100	554300	15
25045	Outrup	25-OCT-2012		snow_man	32U	6175662	458165	82002	554325	18

**Table 55. Overview of the positions and relocations and starting and (if any) closing dates of 6116 Store Jynde vad (Broderup) and other stations forming part of the series used in this report.**

**6116 Store Jynde vad (Broderup)**

No.	Name	Start	End	Type	UTM	Northings	Eastings	Longitude	Latitude	Elev.
26400	Store Jynde vad	15-OCT-1960	30-JUN-1978	clima_man	32U	6083960	508370	90800	545400	15
26400	Store Jynde vad	01-JUL-1978	30-JUN-1987	clima_man	32U	6083440	507920	90700	545400	14
26400	Store Jynde vad	01-JUL-1987	30-JUN-1992	precip_man	32U	6083921	508179	90800	545400	15
26400	Store Jynde vad	01-JUL-1992	10-DEC-2001	precip_man	32U	6083960	508268	90800	545400	15
26400	Store Jynde vad	11-DEC-2001	01-APR-2011	precip_man	32U	6083963	508297	90800	545400	15
26409	Tinglev	01-JUN-1995	01-JAN-2007	precip_man	32U	6088366	516348	91500	545600	23
26410	Broderup	01-NOV-1894	28-FEB-1909	precip_man	32U	6084300	516760	91600	545400	22
26410	Broderup	01-AUG-1909	28-FEB-1957	precip_man	32U	6084300	516760	91600	545400	22
26410	Bajstrup	01-MAR-1957	21-SEP-1970	precip_man	32U	6084430	517470	91600	545400	23
26410	Bajstrup	22-SEP-1970	30-JUN-1986	precip_man	32U	6084500	517440	91600	545400	23
26410	Gårdeby	01-DEC-1986	31-MAR-1987	precip_man	32U	6084490	516300	91500	545400	22
26410	Gårdeby	01-APR-1987	03-OCT-1989	precip_man	32U	6084580	516220	91500	545400	22
26410	Gårdeby	04-OCT-1989	30-SEP-1991	precip_man	32U	6084550	516220	91500	545400	22
26410	Rødebæk	01-JUL-1992	28-FEB-1993	precip_man	32U	6082480	517130	91600	545300	25
26410	Broderup Mark	01-MAY-1993	30-JUN-1993	precip_man	32U	6083315	517350	91600	545400	23
6116	Store Jynde vad	05-SEP-1984	23-JUN-1988	synop_dk	32U	6083730	507970	90700	545400	15
6116	Store Jynde vad	06-JUN-2001		synop_dk	32U	6083716	507960	90727	545357	15

**Table 56. Overview of the positions and relocations and starting and (if any) closing dates of 6132 Tranebjerg (Samsø) forming part of the series used in this report.**

**6132 Tranebjerg/Samsø**

No.	Name	Start	End	Type	UTM	Northings	Eastings	Longitude	Latitude	Elev.
27080	Tranebjerg	01-DEC-1872	28-FEB-1877	clima_man	32U	6188790	600080	103600	555000	15
27080	Tranebjerg	01-MAR-1877	31-MAR-1884	clima_man	32U	6188885	599720	103500	555000	17
27080	Tranebjerg	01-APR-1884	31-MAY-1918	clima_man	32U	6188890	599630	103500	555000	17
27080	Tranebjerg	01-JUN-1918	30-APR-1950	clima_man	32U	6188850	599630	103500	555000	17
27080	Tranebjerg	01-MAY-1950	31-OCT-1972	clima_man	32U	6188910	599730	103600	555000	15
27080	Tranebjerg	01-NOV-1972	01-FEB-2000	clima_man	32U	6190400	600010	103600	555100	11
27080	Tranebjerg	02-FEB-2000	29-FEB-2000	precip_man	32U	6190400	600010	103600	555100	11
27080	Tranebjerg	01-MAR-2000	01-AUG-2001	precip_man	32U	6190468	600052	103600	555100	12
27080	Tranebjerg	15-FEB-2000	29-FEB-2000	clima_aut	32U	6190400	600010	103600	555100	11
27080	Tranebjerg	01-MAR-2000	10-AUG-2003	clima_aut	32U	6190468	600052	103600	555100	12
27080	Tranebjerg Øst	20-AUG-2003		clima_aut	32U	6188727	601656	103723	554956	16
6132	Tranebjerg Øst	20-AUG-2003		synop_dk	32U	6188727	601656	103723	554956	16
27082	Tranebjerg Øst	02-AUG-2001	17-NOV-2009	precip_man	32U	6188800	601435	103700	555000	18
27082	Tranebjerg Øst	18-NOV-2009	01-APR-2011	precip_man	32U	6188798	601458	103700	555000	18
5165	Tranebjerg Øst	18-NOV-2010	25-SEP-2011	synop_dk	32U	6188800	601458	103711	554958	18
5165	Tranebjerg Øst	26-SEP-2011		synop_dk	32U	6188796	601457	103711	554958	18
27082	Tranebjerg Øst	01-OCT-2004	17-NOV-2009	snow_man	32U	6188800	601435	103700	555000	18
27082	Tranebjerg Øst	18-NOV-2009		snow_man	32U	6188798	601458	103700	555000	18
27070	Langør	01-JUN-1871	31-MAY-1880	precip_man	32U	6197690	602720	103900	555500	3
27070	Langør	01-JUN-1880	31-DEC-1928	precip_man	32U	6198330	602320	103800	555500	4
27070	Langør	01-JAN-1929	31-OCT-1946	precip_man	32U	6198480	601270	103700	555500	3
27070	Langør	01-NOV-1946	31-DEC-1959	precip_man	32U	6198480	601820	103800	555500	2
27070	Langør	01-JAN-1960	31-MAY-1977	precip_man	32U	6198480	601270	103700	555500	3
27070	Langør	01-JUN-1977	29-FEB-1996	precip_man	32U	6198480	601820	103800	555500	2
27070	Langør	01-MAR-1996	01-MAY-1997	precip_man	32U	6198435	601255	103700	555500	3
27070	Kanhave	02-MAY-1997	01-JAN-2007	precip_man	32U	6196975	600370	103600	555400	2
27090	Ørnslund	01-JAN-1864	30-SEP-1881	precip_man	32U	6182900	600180	103600	554700	11
27090	Ørnslund	01-OCT-1881	30-APR-1958	precip_man	32U	6183200	599650	103500	554700	6
27090	Brattingsborg	01-MAY-1958	31-DEC-1970	precip_man	32U	6183400	599477	103500	554700	6
27090	Brattingsborg	01-JAN-1971	01-JUN-2004	precip_man	32U	6183332	599485	103500	554700	6
28180	Blangstedgård	01-JUL-1885	31-DEC-1982	clima_man	32U	6138250	591690	102700	552300	15
6159	Røsnæs Fyr	01-JAN-1959	14-NOV-2001	synop_dk	32U	6179330	617414	105200	554500	15
6159	Røsnæs Fyr	15-NOV-2001		synop_dk	32U	6179319	617433	105214	554439	14
6073	Sletterhage Fyr	15-MAY-2001		synop_dk	32V	6217942	594237	103053	560546	4
6120	Odense Lufthavn	01-JAN-1959	30-JUN-1975	synop_dk	32U	6148495	584135	102000	552800	16
6120	Odense Lufthavn	01-JUL-1975	30-SEP-2013	synop_dk	32U	6148648	584180	102000	552900	15
6120	H.C.AndersenAirport	01-OCT-2013		synop_dk	32U	6148648	584180	102000	552900	15
6169	Gniben	01-JAN-1961	31-JUL-1974	synop_dk	32V	6209380	642270	111700	560000	4
6169	Gniben	01-AUG-1974	31-MAR-1979	synop_dk	32V	6209340	642190	111700	560000	10
6169	Gniben	01-APR-1979	14-FEB-1983	synop_dk	32V	6209560	642140	111700	560100	13
6169	Gniben	15-FEB-1983		synop_dk	32V	6209553	642156	111648	560032	14

**Table 57. Overview of the positions and relocations and starting and (if any) closing dates of 6186 Københavns Landbohøjskole and other stations forming part of the series used in this report.**

**6186 Københavns Landbohøjskole**

No.	Name	Start	End	Type	UTM	Northings	Eastings	Longitude	Latitude	Elev.
30380	Landbohøjskolen	01-JAN-1860	01-JUL-1997	clima_man	33U	6173560	345420	123200	554100	9
6186	Landbohøjskolen	29-NOV-1995	12-JUN-1997	synop_dk	33U	6173560	345420	123200	554100	9
6186	Landbohøjskolen	13-JUN-1997	01-JUL-1997	synop_dk	33U	6174083	345667	123242	554112	7
6186	Landbohøjskolen	02-JUL-1997		synop_dk	33U	6174083	345667	123242	554112	7
6180	Københavns Lufthavn	01-JAN-1953	30-JUN-1955	synop_dk	33U	6167070	352740	124000	553800	2
6180	Københavns Lufthavn	01-JUL-1955	30-JUN-1959	synop_dk	33U	6167170	352110	123900	553800	3
6180	Københavns Lufthavn	01-JUL-1959	13-JUL-1971	synop_dk	33U	6166370	352440	123900	553700	3
6180	Københavns Lufthavn	14-JUL-1971	15-JUN-1983	synop_dk	33U	6165550	351570	123900	553700	4
6180	Københavns Lufthavn	16-JUN-1983		synop_dk	33U	6165840	351770	123900	553700	5
6183	Drogden Fyr	01-JAN-1961		synop_dk	33U	6157060	355647	124245	553213	18
6184	Danmarks Met. Inst.	01-JUN-2004		synop_dk	33U	6177359	346923	123348	554300	8
6187	Københavns Toldbod	20-FEB-2004		synop_dk	33U	6174236	349105	123559	554121	20
30340	Københavns Toldbod	01-JAN-1886	31-DEC-1949	fuess	33U	6174250	349070	123600	554100	20
30340	Københavns Toldbod	01-JAN-1950	30-JUN-1976	fuess	33U	6174240	349110	123600	554100	20
30340	Københavns Toldbod	01-JAN-1978	30-JUN-1997	fuess	33U	6174240	349110	123600	554100	20
30340	Københavns Toldbod	01-MAY-1968	03-APR-2005	casella	33U	6174240	349110	123600	554100	20
30341	Københavns Toldbod	20-FEB-2004		clima_aut	33U	6174236	349105	123559	554121	20
30210	Meteorologisk Institut	01-JAN-1875	31-DEC-1906	clima_man	33U	6174200	349100	123600	554100	13
30210	Meteorologisk Institut	1-JAN-1907	31-DEC-1922	clima_man	33U	6174200	349100	123600	554100	5
30210	Meteorologisk Institut	01-JAN-1952	28-FEB-1972	clima_man	33U	6182380	347220	123400	554600	15
30210	Meteorologisk Institut	1-MAR-1972	31-MAR-1985	precip_man	33U	6177370	346930	123400	554300	8
30370	Botanisk Have	01-OCT-1955	31-DEC-1970	clima_man	33U	6174193	347579	123500	554100	6
30370	Botanisk Have	01-NOV-1945	30-SEP-1955	precip_man	33U	6174193	347579	123500	554100	6
30370	Botanisk Have	01-JAN-1971	01-APR-2011	precip_man	33U	6174193	347579	123500	554100	6
5735	Botanisk Have	14-JAN-2010	28-NOV-2011	synop_dk	33U	6174196	347575	123431	554118	6
5735	Botanisk Have	29-NOV-2011	23-JUL-2012	synop_dk	33U	6174199	347574	123431	554118	6
5735	Botanisk Have	24-JUL-2012	22-OCT-2019	synop_dk	33U	6174194	347557	123430	554118	6
5735	Livgardens Kaserne	23-OCT-2019		synop_dk	33U	6173767	347662	123436	554109	6
30370	Botanisk Have	01-OCT-2004	30-APR-2017	snow_man	33U	6174193	347579	123500	554100	6
30187	Kettinge	01-SEP-2012		snow_man	33U	6195912	338152	122446	555249	42
30215	Meteorologisk Institut	02-FEB-2018		snow_man	33U	6177370	346930	123400	554300	8
30372	Rundetårn	01-JAN-1751	31-DEC-1817	clima_man	33U	6173480	347655	123437	554055	7*
30371	Gl. Botanisk Have	01-JAN-1818	31-DEC-1859	clima_man	33U	6173160	348485	123525	554045	3

Table 57 note: This station has been subject to urban change. Back in time the surroundings were rural whereas today the park of Landbohøjskolen with the synoptic station is surrounded by the city of Copenhagen. Observations in Copenhagen started 1751 in the tower "Rundetårn", but the first 16 years the thermometer was situated inside a room in a little observatory near the top of the tower. In the beginning of 1767 the thermometer was situated outside the observatory facing north and from 1768 the observations were taken 4 times a day. Therefore the series presented in this report starts 1768.

Table 57 note: \* The ground level of the tower is 7 m above MSL. The thermometer was situated app. 43 m above MSL.



**Table 58. Overview of the positions and relocations and starting and (if any) closing dates of 6193 Hammer Odde Fyr/Lighthouse (Bornholm) and other stations forming part of the series used in this report.**

**6193 Hammer Odde Fyr/Lighthouse (Bornholm)**

No.	Name	Start	End	Type	UTM	Northings	Eastings	Longitude	Latitude	Elev.
32030	Sandvig	11-NOV-1872	31-AUG-1953	clima_man	33U	6127090	486180	144700	551700	13
32030	Sandvig	01-SEP-1953	30-JUN-1966	clima_man	33U	6127105	486140	144700	551700	13
32030	Sandvig	01-AUG-1966	30-NOV-1972	clima_man	33U	6127010	485840	144700	551700	12
32025	Hammeren Fyr	01-JAN-1880	31-JUL-1962	clima_man	33U	6126930	484770	144600	551700	77
32020	Hammer Odde Fyr	01-MAR-1953	30-JUN-1974	clima_man	33U	6128190	485630	144600	551800	7
32020	Hammer Odde Fyr	01-JUL-1974	30-JUN-1987	clima_man	33U	6128170	485710	144700	551800	11
6191	Christiansø Fyr	01-JAN-1961	31-MAR-2000	synop_dk	33U	6130820	511970	151100	551900	13
32080	Klemensker	01-OCT-1954	30-NOV-1971	clima_man	33U	6114630	487970	144900	551100	110
32080	Klemensker	01-SEP-1953	30-SEP-1954	precip_man	33U	6114630	487970	144900	551100	110
32080	Klemensker	01-OCT-1994	21-SEP-1998	precip_man	33U	6114674	488059	144900	551100	111
32080	Klemensker	22-SEP-1998	01-DEC-2004	precip_man	33U	6114671	488062	144900	551100	111
32080	Klemensker	02-DEC-2004	01-AUG-2010	precip_man	33U	6114234	488024	144900	551000	108
32080	Klemensker	01-DEC-2002	01-DEC-2004	snow_man	33U	6114671	488062	144900	551100	111
32080	Klemensker	02-DEC-2004	31-MAY-2010	snow_man	33U	6114234	488024	144900	551000	108
32175	Østerlars	15-MAY-1998	20-MAY-2008	precip_man	33U	6113107	498094	145800	551000	94
32175	Østerlars	21-MAY-2008	01-APR-2011	precip_man	33U	6113129	498051	145800	551000	94
32175	Østerlars	20-JAN-2005	20-MAY-2008	snow_man	33U	6113107	498094	145800	551000	94
32175	Østerlars	21-MAY-2008	30-JUN-2019	snow_man	33U	6113129	498051	145800	551000	94
32175	Østerlars	01-JUL-2019		snow_man	33U					
6193	Hammer Odde Fyr	05-OCT-1977	29-AUG-2001	synop_dk	33U	6128170	485710	144700	551800	11
6193	Hammer Odde Fyr	30-AUG-2001		synop_dk	33U	6128170	485579	144622	551755	8
6190	Bornholms Lufthavn	01-JAN-1959	31-MAY-1977	synop_dk	33U	6102830	483820	144500	550400	13
6190	Bornholms Lufthavn	01-JUN-1977		synop_dk	33U	6102556	484066	144500	550400	15
6199	Dueodde N Fyr	01-JAN-1959	30-SEP-1962	synop_dk	33U	6095230	504720	150400	550000	16
6199	Dueodde S Fyr	01-OCT-1962	30-JUN-1977	synop_dk	33U	6094150	504810	150500	550000	6

A supplementary station file contains digitised information on the rain gauge exposure.

The file name is: dk\_station\_ang.xlsx

This file contains the digitised information on the rain gauge exposure. The angles to the horizon in eight directions have been measured and a summarising angle index and the exposure class have been calculated. The information is only available for stations in recent decades.

The format of the angle index/rain gauge exposure file is:

Station number, Start data, End date, Angle index, Exposure class

Data are only to be used with proper reference to the accompanying report: Cappelen, J. (ed), 2021: Denmark - DMI Historical Climate Data Collection 1768-2020. DMI Report No. 21-02. Copenhagen.

The relation between angle index and exposure class used in this report can be seen in table 59.

**Table 59. Raingauge exposure class description.**

Exposure class	Description	Min. angle index	Max. angle index
A	Well sheltered	20	30
B	Moderately sheltered	6	19
C	Freely exposed, unsheltered	0	5
D	Overprotected, too well sheltered	>=31	

## 16 Appendix 2: Observational section - File Formats and metadata

The observation files included in this report contains blended mean sea level (msl) atmospheric pressure observations 1874-2020 from three (3) stations in Denmark; 6051 Vestervig, 6088 Nordby (Fanø) and 6193 Hammer Odde Fyr (Bornholm).

The file names are determined as follows:  
dk\_obs\_401\_<station number>\_<period>.csv

In this report three (3) ;-separated csv-files:

dk\_obs\_401\_6051\_1874\_2020.csv  
dk\_obs\_401\_6088\_1874\_2020.csv  
dk\_obs\_401\_6193\_1874\_2020.csv

There can be missing dates/records/values between the start and the end date.

Format and units of the atmospheric pressure observation file:

Station number\* (stat\_no); year (year); month (month); day (day); hour UTC (hour); atmospheric pressure reduced to msl (hPa) (elem\_val)

\*In the blended series set to either 6051, 6088 and 6193 from beginning to end

The element/parameter numbers and units can be seen in the data dictionary, table 6 in section 7.

Data are only to be used with proper reference to the accompanying report: Cappelen, J. (ed), 2021: Denmark - DMI Historical Climate Data Collection 1768-2020. DMI Report No. 21-02. Copenhagen.

Three (3) Danish data sets have long series of atmospheric pressure observations (at msl, mean sea level). Table 60 presents an overview of the blended station data series (identified by the station name and station number) resulting in the long data sets and how many observations the series contains in the different parts.

Additional metadata can be seen in DMI Technical Report 97-3: North Atlantic-European pressure observations 1868-1995 - WASA dataset version 1.0 [43].

**Table 60. The three Danish series of atmospheric pressure observations (at msl, mean sea level).**

Dataset/period	Station	Start	End	Obs. hours (utc)
<b>Vestervig 1874-2020</b>	21100 Vestervig	01 January 1874	31 July 1987	7,13,20
	6052 Thyborøn	01 August 1987	22 November 2000	0,3,6,9,12,15,18,21
	6052 Thyborøn	22 November 2000	31 December 2020	0 – 23 every hour
<b>Nordby/Fanø</b>	25140 Nordby/Fanø	01 January 1874	31 July 1987	7,13,20

Dataset/period	Station	Start	End	Obs. hours (utc)
<b>1874-2020</b>	6080 Esbjerg Airport	01 August 1987	10 September 2003	0,3,6,9,12,15,18,21
	6080 Esbjerg Airport	10 September 2003	31 December 2020	0 – 23 every hour
<b>Hammer Odde 1874-2020</b>	32030 Sandvig or	01 January 1874	31 May 1987	7,13,20
	32020 Hammer Odde Fyr	01 June 1987	30 August 2001	0,3,6,9,12,15,18,21
	6193 Hammer Odde Fyr	01 June 1987	30 August 2001	0,3,6,9,12,15,18,21
	6193 Hammer Odde Fyr	30 August 2001	31 December 2020	0 – 23 every hour

Table 60 note: The blended data set is a part of the observational section. Single station series are not a part of the observational section.

## 17 Appendix 3: Daily section – File formats and metadata

The daily files included in this report contain single and blended daily DMI data series 1872-2020 comprising different parameters for selected meteorological stations in Denmark.

The file names are determined as follows:

dk\_daily\_<element number>.xlsx

dk\_daily\_<station number>\_<element number>.csv

In this report six (6) Excel-files and sixty-two (62) ;-separated csv-files:

dk\_daily\_101.xlsx

dk\_daily\_112.xlsx

dk\_daily\_122.xlsx

dk\_daily\_401.xlsx

dk\_daily\_601.xlsx

dk\_daily\_801.xlsx

dk\_daily\_27080\_101.csv (period 1872-2003)

dk\_daily\_6132\_101.csv (period 2003-2020)

dk\_daily\_27080\_6132\_101.csv (period 1872-2020) (blend)

dk\_daily\_21100\_112.csv (period 1874-2003)

dk\_daily\_6051\_112.csv (period 2003-2020)

dk\_daily\_21100\_6051\_112.csv (period 1874-2020) (blend)

dk\_daily\_25140\_112.csv (period 1874-2003)

dk\_daily\_6088\_112.csv (period 2003-2020)

dk\_daily\_25140\_6088\_112.csv (period 1874-2020) (blend)

dk\_daily\_27080\_112.csv (period 1873-2003)

dk\_daily\_6132\_112.csv (period 2003-2020)

dk\_daily\_27080\_6132\_112.csv (period 1873-2020) (blend)

dk\_daily\_30380\_112.csv (period 1874-1997)

dk\_daily\_6186\_112.csv (period 1995-2020)

dk\_daily\_30380\_6186\_112.csv (period 1874-2020) (blend)

dk\_daily\_32030\_112.csv (period 1874-1970)

dk\_daily\_32020\_112.csv (period 1971-1987)

dk\_daily\_6193\_112.csv (period 1984-2020)

dk\_daily\_32030\_32020\_6193\_112.csv (period 1874-2020) (blend)

dk\_daily\_21100\_122.csv (period 1874-2003)

dk\_daily\_6051\_122.csv (period 2003-2020)

dk\_daily\_21100\_6051\_122.csv (period 1874-2020) (blend)

dk\_daily\_25140\_122.csv (period 1874-2003)  
dk\_daily\_6088\_122.csv (period 2003-2020)  
dk\_daily\_25140\_6088\_122.csv (period 1874-2020) (blend)  
dk\_daily\_27080\_122.csv (period 1872-2003)  
dk\_daily\_6132\_122.csv (period 2003-2020)  
dk\_daily\_27080\_6132\_122.csv (period 1872-2020) (blend)  
dk\_daily\_30380\_122.csv (period 1874-1997)  
dk\_daily\_6186\_122.csv (period 1995-2020)  
dk\_daily\_30380\_6186\_122.csv (period 1874-2020) (blend)  
dk\_daily\_32030\_122.csv (period 1874-1970)  
dk\_daily\_32020\_122.csv (period 1971-1987)  
dk\_daily\_6193\_122.csv (period 1984-2020)  
dk\_daily\_32030\_32020\_6193\_122.csv (period 1874-2020) (blend)

dk\_daily\_21100\_401.csv (period 1874-1987)  
dk\_daily\_6052\_401.csv (period 1962-2020)  
dk\_daily\_21100\_6952\_401.csv (period 1874-2020) (blend)  
dk\_daily\_25140\_401.csv (period 1874-1987)  
dk\_daily\_6080\_401.csv (period 1959-2020)  
dk\_daily\_25140\_6080\_401.csv (period 1874-2020) (blend)  
dk\_daily\_6193\_401.csv (period 1874-2020)

dk\_daily\_6051\_601.csv (period 1874-2020)  
dk\_daily\_5135\_601.csv (period 1874-2020)  
dk\_daily\_6088\_601.csv (period 1874-2020)  
dk\_daily\_26410\_601.csv (period 1920-1993)  
dk\_daily\_26409\_601.csv (period 1995-2006)  
dk\_daily\_6116\_601.csv (period 1987-2020)  
dk\_daily\_26410\_6116\_601.csv (period 1920-2020) (blend)  
dk\_daily\_27080\_601.csv (period 1872-2001)  
dk\_daily\_5165\_601.csv (period 2001-2020)  
dk\_daily\_27080\_5165\_601.csv (period 1872-2020) (blend)  
dk\_daily\_30380\_601.csv (period 1874-1996)  
dk\_daily\_30210\_1\_601.csv (period 1875-1922)  
dk\_daily\_30210\_2\_601.csv (period 1961-1984)  
dk\_daily\_5735\_601.csv (period 1961-2020)  
dk\_daily\_30380\_5735\_601.csv (period 1874-2020) (blend)  
dk\_daily\_32030\_601.csv (period 1874-1970)  
dk\_daily\_32020\_601.csv (period 1961-1987)  
dk\_daily\_6193\_601.csv (period 1984-2020)  
dk\_daily\_32030\_32020\_6193\_601.csv (period 1874-2020) (blend)

dk\_daily\_27080\_801.csv (period 1872-2000)

The general format is:

Station number (stat\_no); Year (year); Month (month); Day (day); Hour (hour); Element/Parameter value (elem\_val)

From 2011 and forward interpolated values can be included in the data series.

The element/parameter numbers and units can be seen in the data dictionary, table 14 in section 8.

Data are only to be used with proper reference to the accompanying report: Cappelen, J. (ed), 2021: DMI Historical Climate Data Collection 1768-2020, Denmark. DMI Report 21-02. Copenhagen.

Details about the air temperature at 14 hours DNT or 12 UTC data sets and station series: Two (2) Danish station series with a record of air temperatures measured at 14 hours DNT (old part of the series) or 12 UTC (= 13 hours DNT, newer part of the series) can be blended into one (1) long data set. The table 61 presents an overview of these station data series (identified by the station name and number) and the possible blended datasets making up the long series. Overlap periods have been included when available.

**Table 61. Air temperature at 14 hours DNT or 12 UTC (element number 101); data sets and station series.**

Dataset/period*	Station	Start	End
<b>Tranebjerg 1872-2020</b>	27080 Tranebjerg	1 December 1872	20 August 2003
	6132 Tranebjerg	21 August 2003	31 December 2020
	Blended:		
	27080 Tranebjerg	1 December 1872	20 August 2003
	6132 Tranebjerg	21 August 2003	31 December 2020

Table 61 general note: The single daily station series mostly consist of the values as observed. No DMI testing for homogeneity has been performed on these daily (hourly; 14 hours DNT/12 UTC) observations. They have however been carefully quality-tested and corrected, mainly based on visual tests.

Table 61 note: \*Possible blended full daily datasets using the single daily station series are also a part of this report. No DMI testing for homogeneity has been performed on the blended series. See also the European Climate Assessment & Dataset (ECA&D) project homepage: <http://www.ecad.eu/> for their "blend"/data handling and quality/homogeneity test. This site also contains the single Danish station series.

In the xlsx data file dk\_daily\_101.xlsx the sheets are named:

27080\_101 (period 1872-2003)  
6132\_101 (period 2003-2020)  
27080\_6132\_101 (period 1872-2020) (blend)

The data can also be found in separate csv-files:

dk\_daily\_27080\_101.csv (period 1872-2003)  
dk\_daily\_6132\_101.csv (period 2003-2020)  
dk\_daily\_27080\_6132\_101.csv (period 1872-2020) (blend)

The different sheets/files contain air temperature observed daily at 14 hours DNT or 12 UTC. There are no missing dates between the start and the end date. Any missing values are filled in by "null".

Format and units of air temperature 14 hours DNT/12 UTC file:

Station number (stat\_no); year (year); month (month); day (day); hour DNT or UTC (hour); air temperature 14 hours DNT/12 UTC in °C (elem\_val).

Details about the daily highest air temperature data sets and station series: Eleven (11) Danish station series with a record of daily highest air temperatures can be blended into five (5) long data sets. The table 62 presents an overview of these station data series (identified by the station name and number) and the possible blended datasets making up the long series. Overlap periods have been included when available.

**Table 62. Daily highest air temperature (element number 112); data sets and station series.**

Dataset/period*	Station	Start	End
<b>Vestervig 1874-2020</b>	21100 Vestervig	2 August 1874	10 September 2003
	6051 Vestervig	02 October 2003	31 December 2020

Dataset/period*	Station	Start	End
	Blended: 21100 Vestervig 6051 Vestervig	2 August 1874 02 October 2003	10 September 2003 31 December 2020
<b>Nordby/Fanø 1874-2020</b>	25140 Nordby/Fanø 6088 Nordby/Fanø	2 May 1874 25 July 2003	18 July 2003 31 December 2020
	Blended: 25140 Nordby/Fanø 6088 Nordby/Fanø	2 May 1874 25 July 2003	18 July 2003 31 December 2020
<b>Tranebjerg 1873-2020</b>	27080 Tranebjerg 6132 Tranebjerg	1 January 1873 21 August 2003	10 August 2003 31 December 2020
	Blended: 27080 Tranebjerg 6132 Tranebjerg	1 January 1873 21 August 2003	10 August 2003 31 December 2020
<b>København 1874-2020</b>	30380 Landbohøjskolen 6186 Landbohøjskolen	1 January 1874 1 December 1995	30 June 1997 31 December 2020
	Blended: 30380 Landbohøjskolen 6186 Landbohøjskolen	1 January 1874 1 December 1995	30 November 1995 31 December 2020
<b>Hammer Odde 1874-2020</b>	32030 Sandvig 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr	2 April 1874 1 January 1971 1 January 1984	31 December 1970 24 June 1987 31 December 2020
	Blended: 32030 Sandvig 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr	2 April 1874 1 January 1971 1 January 1984	31 December 1970 31 December 1983 31 December 2020

Table 62 general note: The single daily station series mostly consist of the values as observed. No DMI testing for homogeneity has been performed on these daily observations. They have however been carefully quality-tested and corrected, mainly based on visual tests.

Table 62 note: \*Possible blended full daily datasets using the single daily station series are a part of the daily section. No DMI testing for homogeneity has been performed on the blended series. See also the European Climate Assessment & Dataset (ECA&D) project homepage: <http://www.ecad.eu/> for their "blend"/data handling and quality/homogeneity test. This site also contains the single Danish station series.

Table 62 note: Important information regarding the manual climate stations 21100, 25140, 27080, 30380, 32020 and 32030: During the period 1 Jan 1913 - 1 Jan 1971 the highest air temperature is listed on the previous day (where it most often occurs). During the periods 1 Jan 1874 - 31 Dec 1912 and 2 Jan 1971 – present day the highest air temperature is listed on the date it has been read. This change in practice was only regarding the highest air temperature, not the lowest air temperature. Because of the change back and forth in practise the data files (and DMI annals) hold no highest air temperature for the 24-hours period starting in the morning 31 Dec 1912 and ending in the morning 1 Jan 1913. And conversely the highest air temperature of the 24-hours that starts in the morning 1 Jan 1971 and ends in the morning 2 Jan 1971 is listed TWO times in the data files: With time stamp 1 Jan 1971 at 8 hours AND with time stamp 2 Jan 1971 at 8 hours, just as the change of practice dictates for those dates.

In the xlsx data file dk\_daily\_112.xlsx the sheets are named:

21100\_112 (period 1874-2003)  
6051\_112 (period 2003-2020)  
21100\_6051\_112 (period 1874-2020) (blend)

25140\_112 (period 1874-2003)  
6088\_112 (period 2003-2020)  
25140\_6088\_112 (period 1874-2020) (blend)

27080\_112 (period 1873-2003)  
6132\_112 (period 2003-2020)  
27080\_6132\_112 (period 1873-2020) (blend)

30380\_112 (period 1874-1997)  
6186\_112 (period 1995-2020)  
30380\_6186\_112 (period 1874-2020) (blend)

32030\_112 (period 1874-1970)  
32020\_112 (period 1971-1987)  
6193\_112 (period 1984-2020)  
32030\_32020\_6193\_112 (period 1874-2020) (blend)

The data can also be found in separate csv-files:

dk\_daily\_21100\_112.csv (period 1874-2003)  
dk\_daily\_6051\_112.csv (period 2003-2020)  
dk\_daily\_21100\_6051\_112.csv (period 1874-2020) (blend)  
dk\_daily\_25140\_112.csv (period 1874-2003)  
dk\_daily\_6088\_112.csv (period 2003-2020)  
dk\_daily\_25140\_6088\_112.csv (period 1874-2020) (blend)  
dk\_daily\_27080\_112.csv (period 1873-2003)  
dk\_daily\_6132\_112.csv (period 2003-2020)  
dk\_daily\_27080\_6132\_112.csv (period 1873-2020) (blend)  
dk\_daily\_30380\_112.csv (period 1874-1997)  
dk\_daily\_6186\_112.csv (period 1995-2020)  
dk\_daily\_30380\_6186\_112.csv (period 1874-2020) (blend)  
dk\_daily\_32030\_112.csv (period 1874-1970)  
dk\_daily\_32020\_112.csv (period 1971-1987)  
dk\_daily\_6193\_112.csv (period 1984-2020)  
dk\_daily\_32030\_32020\_6193\_112.csv (period 1874-2020) (blend)

The different sheets/files contain daily highest air temperatures. There are no missing dates between the start and the end date. Any missing values are filled in by "null".

Format and units of daily highest air temperature file:

Station number (stat\_no); year (year); month (month); day (day); hour DNT or UTC (hour); highest air temperature in °C (elem\_val)

- UTC (since 2001 or if station number starts with 6).
- Highest air temperature (°C). The highest air temperature, covering the previous 24 hours, is read in the morning (the same as the lowest air temperature). For the manual climate stations (21100, 25140, 27080, 30380, 32020 and 32030) please note: During the period 1 Jan 1913 - 1 Jan 1971 the highest air temperature is listed on the previous day (where it most often occurs). During the periods 1 Jan 1874 - 31 Dec 1912 and 2 Jan 1971 - present day the highest air temperature is listed on the date it has been read.

This change in practice was only regarding the highest air temperature, not the lowest air temperature. Because of the change back and forth in practise the data files (and DMI annals) hold no highest air temperature for the 24-hours period starting in the morning 31 Dec 1912 and ending in the morning 1 Jan 1913. And conversely the highest air temperature of the 24-hours that starts in the morning 1 Jan 1971 and ends in the morning 2 Jan 1971 is listed TWO times in the data files: With time stamp 1 Jan 1971 at 8 hours AND with time stamp 2 Jan 1971 at 8 hours, just as the change of practice dictates for those dates.

- Please notice that the "hour" changed 1 Jan 2012 to 23 UTC (winter) and 22 UTC (summer). This reflects the wish to define the day as a "Calendar day".
- For that reason TWO 1 Jan 2012 are included. The first one covering the previous 24 hours up to 1 Jan 2012; 6 UTC, the second one covering the previous 24 hours up to 1 Jan 2012; 23 UTC. Please notice the time overlap here. For 6088 Nordby/Fanø that change took place 1 May 2011.

Details about the daily lowest air temperature data sets and station series: Eleven (11) Danish station series with a record of daily lowest air temperatures can be blended into five (5) long data sets. The table 63 presents an overview of these station data series (identified by the station name and number) and the possible blended datasets making up the long series (not in this report). Overlap periods have been included when available.

**Table 63. Daily lowest air temperature (element number 122); data sets and station series.**

Dataset/period*	Station	Start	End
<b>Vestervig 1874-2020</b>	21100 Vestervig 6051 Vestervig	19 June 1874 02 October 2003	10 September 2003 31 December 2020
	Blended: 21100 Vestervig 6051 Vestervig	19 June 1874 02 October 2003	10 September 2003 31 December 2020
<b>Nordby/Fanø 1874-2020</b>	25140 Nordby/Fanø 6088 Nordby/Fanø	1 May 1874 25 July 2003	18 July 2003 31 December 2020
	Blended: 25140 Nordby/Fanø 6088 Nordby/Fanø	1 May 1874 25 July 2003	18 July 2003 31 December 2020
<b>Tranebjerg 1872-2020</b>	27080 Tranebjerg 6132 Tranebjerg	1 December 1872 21 August 2003	10 August 2003 31 December 2020
	Blended: 27080 Tranebjerg 6132 Tranebjerg	1 December 1872 21 August 2003	10 August 2003
<b>København 1874-2020</b>	30380 Landbohøjskolen 6186 Landbohøjskolen	1 January 1874 1 December 1995	30 June 1997 31 December 2020
	Blended: 30380 Landbohøjskolen 6186 Landbohøjskolen	1 January 1874 1 December 1995	30 November 1995 31 December 2020
<b>Hammer Odde 1874-2020</b>	32030 Sandvig 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr	1 January 1874 1 January 1971 1 January 1984	31 December 1970 24 June 1987 31 December 2020
	Blended:		



Dataset/period*	Station	Start	End
	32030 Sandvig	1 January 1874	31 December 1970
	32020 Hammer Odde Fyr	1 January 1971	31 December 1983
	6193 Hammer Odde Fyr	1 January 1984	31 December 2020

Table 63 general note: The single daily station series mostly consist of the values as observed. No DMI testing for homogeneity has been performed on these daily observations. They have however been carefully quality-tested and corrected, mainly based on visual tests.

Table 63 note: \*Possible blended full daily datasets using the single daily station series are a part of the daily section. No DMI testing for homogeneity has been performed on the blended series. See also the European Climate Assessment & Dataset (ECA&D) project homepage: <http://www.ecad.eu/> for their "blend"/data handling and quality/homogeneity test. This site also contains the single Danish station series.

In the xlsx data file dk\_daily\_122.xlsx the sheets are named:

21100\_122 (period 1874-2003)  
6051\_122 (period 2003-2020)  
21100\_6051\_122 (period 1874-2020) (blend)

25140\_122 (period 1874-2003)  
6088\_122 (period 2003-2020)  
25140\_6088\_122 (period 1874-2020) (blend)

27080\_122 (period 1872-2003)  
6132\_122 (period 2003-2020)  
27080\_6132\_122 (period 1872-2020) (blend)

30380\_122 (period 1874-1997)  
6186\_122 (period 1995-2020)  
30380\_6186\_122 (period 1874-2020) (blend)

32030\_122 (period 1874-1970)  
32020\_122 (period 1971-1987)  
6193\_122 (period 1984-2020)  
32030\_32020\_6193\_122 (period 1874-2020) (blend)

The data can also be found in separate csv-files:

dk\_daily\_21100\_122.csv (period 1874-2003)  
dk\_daily\_6051\_122.csv (period 2003-2020)  
dk\_daily\_21100\_6051\_122.csv (period 1874-2020) (blend)  
dk\_daily\_25140\_122.csv (period 1874-2003)  
dk\_daily\_6088\_122.csv (period 2003-2020)  
dk\_daily\_25140\_6088\_122.csv (period 1874-2020) (blend)  
dk\_daily\_27080\_122.csv (period 1872-2003)  
dk\_daily\_6132\_122.csv (period 2003-2020)  
dk\_daily\_27080\_6132\_122.csv (period 1872-2020) (blend)  
dk\_daily\_30380\_122.csv (period 1874-1997)  
dk\_daily\_6186\_122.csv (period 1995-2020)  
dk\_daily\_30380\_6186\_122.csv (period 1874-2020) (blend)  
dk\_daily\_32030\_122.csv (period 1874-1970)  
dk\_daily\_32020\_122.csv (period 1971-1987)  
dk\_daily\_6193\_122.csv (period 1984-2020)  
dk\_daily\_32030\_32020\_6193\_122.csv (period 1874-2020) (blend)

The different sheets/files contain daily lowest air temperatures. There are no missing dates between the start and the end date. Any missing observations are filled in by "null".

Format and units of lowest air temperature files:

Station number (stat\_no); year (year); month (month); day (day); hour DNT or UTC (hour); lowest air temperature in °C (elem\_val)

- UTC (since 2001 or if station number starts with 6).
- Lowest air temperature previous 24 hours (°C).
- Please notice that the "hour" changed 1 Jan 2012 to 23 UTC (winter) and 22 UTC (summer). This reflects the wish to define the day as a "Calendar day".
- For that reason TWO 1 Jan 2012 are included. The first one covering the previous 24 hours up to 1 Jan 2012; 6 UTC, the second one covering the previous 24 hours up to 1 Jan 2012; 23 UTC. Please notice the time overlap here. For 6088 Nordby/Fanø that change took place 1 May 2011.

Details about the daily average atmospheric pressure data sets and station series: Five (5) Danish station series with a record of average daily atmospheric pressure data can be blended into three (3) long data sets. The table 64 presents an overview of these station data series (identified by the station name and number) and the possible blended datasets making up the long series. Overlap periods have been included when available.

**Table 64. Daily average atmospheric pressure (element number 401); data sets and station series.**

Dataset/period*	Station	Start	End
<b>Vestervig 1874-2020</b>	21100 Vestervig 6052 Thyborøn	01 January 1874 02 March 1962	01 August 1987 31 December 2020
	Blended: 21100 Vestervig 6052 Thyborøn	01 January 1874 02 March 1962	01 March 1962 31 December 2020
<b>Nordby/Fanø 1874-2020</b>	25140 Nordby/Fanø 6080 Esbjerg Airport	01 January 1874 29 March 1959	01 August 1987 31 December 2020
	Blended: 25140 Nordby/Fanø 6080 Esbjerg Airport	01 January 1874 29 March 1959	28 March 1959 31 December 2020
<b>Hammer Odde 1874-2020</b>	32030 Sandvig or 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr	01 January 1874 - 02 June 1987	- 1 June 1987 31 December 2020
	Blended: 32030 Sandvig or 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr	01 January 1874 02 June 1987	1 June 1987 31 December 2020

Table 64 general note: The single daily station series mostly consist of the values as observed. No DMI testing for homogeneity has been performed on these daily observations. They have however been carefully quality-tested and corrected, mainly based on visual tests.

Table 64 note: \*Possible blended full daily datasets using the single daily station series are a part of the daily section. No DMI testing for homogeneity has been performed on the blended series. See also the European

Climate Assessment & Dataset (ECA&D) project homepage: <http://www.ecad.eu/> for their “blend”/data handling and quality/homogeneity test. This site also contains the single Danish station series.

In the xlsx data file dk\_daily\_401.xlsx the sheets are named:

21100\_401 (period 1874-1987)  
6052\_401 (period 1962-2020)  
21100\_6052\_401 (period 1874-2020) (blend)

25140\_401 (period 1874-1987)  
6080\_401 (period 1959-2020)  
25140\_6080\_401 (period 1874-2020) (blend)

6193\_401 (period 1874-2020)

The data can also be found in separate csv-files:

dk\_daily\_21100\_401.csv (period 1874-1987)  
dk\_daily\_6052\_401.csv (period 1962-2020)  
dk\_daily\_21100\_6952\_401.csv (period 1874-2020) (blend)  
dk\_daily\_25140\_401.csv (period 1874-1987)  
dk\_daily\_6080\_401.csv (period 1959-2020)  
dk\_daily\_25140\_6080\_401.csv (period 1874-2020) (blend)  
dk\_daily\_6193\_401.csv (period 1874-2020)

The different sheets/files contain daily average atmospheric pressure (msl). There are no missing dates between the start and the end date. Any missing observations are filled in by “null”.

Format and units of daily atmospheric pressure files:

Station number (stat\_no); year (year); month (month); day (day); UTC (hour); average atmospheric pressure in hPa (elem\_val), No. of observations in daily average (no\_obs)

- Atmospheric pressure reduced to msl (hPa)
- Please notice that the “hour” changed 1 Jan 2012 to 23 UTC (winter) and 22 UTC (summer). This reflects the wish to define the day as a “Calendar day”. For that reason TWO 1 Jan 2012 are included.
- No. of observations in daily average are 3 in older parts of the series. 14 and 21 hours DNT the previous day and 8 hours DNT on the actual day (or at least two observations). In newer parts of the series this number is not stated (“null”), but ideally 8 (every 3 hours; or at least 4 observations) starting 3-4 decades ago. 24 observations (every hour) in recent years.

Additional information concerning daily averages and atmospheric pressure: At DMI daily averages on observations are made (as a principle) for the meteorological day from (but not including) the previous day at 6 hours UTC until and including the actual day at 6 hours UTC and the meteorological day is given the date of the day it ends. The observation hours and observation frequencies varies for the station types used, therefore details on the number of observations forming part of the daily values are included below.

21100 Vestervig and 25140 Nordby/Fanø (manually operated climate station, observing 8, 14 and 21 hours DNT): The daily average (approximating the “6 hours UTC to 6 hours UTC” definition) is made from three measurements: 14 and 21 hours DNT the previous day and 8 hours DNT on the actual day (or at least two observations). The date of the daily value is the date of the day it ends. The observations were station level data and were reduced to MSL following the formulas described in the subsection ‘Concerning reduction to MSL’ below.

DNT refers to Danish normal time, which is the time in a given time zone in contrast to summer time, where 1 hour is added. In Denmark the normal time is UTC+1. UTC is "Universal Time Coordinated" - a global

indication of time, which refers to the mean solar time on the meridian of Greenwich, England, which is the conventional 0-meridian for geographic longitude.

6052 Thyborøn (synoptical station at least observing 0,3,6,9,12,15,18 and 21 hours UTC): The data are averaged over the meteorological day (6 to 6 hours UTC). The average was made from the available measurements at 9, 12, 15, 18, 21, 0, 3 and 6 hours UTC if at least four of these measurements were available. The data are MSL pressure.

6080 Esbjerg Airport (synoptical station at least observing 0,3,6,9,12,15,18 and 21 hours UTC): The data are averaged over the meteorological day (6 to 6 hours UTC). The average was made from the available measurements at 9, 12, 15, 18, 21, 0, 3 and 6 hours UTC if at least four of these measurements were available. The data are MSL pressure. During the period 1964-1971 the station in the winter only has measurements during daytime and consequently many daily averages are missing during that period.

6193 Hammer Odde Fyr (synoptical station at least observing 0,3,6,9,12,15,18 and 21 hours UTC) and 32030 Sandvig/ 32020 Hammer Odde Fyr (manually operated climate station, observing 8, 14 and 21 hours DNT): 1 January 1874 – 1 June 1987 the data are from the climate stations 32030 Sandvig and 32020 Hammer Odde Fyr and the averaging follows that of 21100 Vestervig and 25140 Nordby/Fanø (see above). The observations were station level data and were reduced to MSL following the formulas described in the subsection 'reduction to MSL' below. 2 June 1987 – 31 December 2020 the data are from 6193 Hammer Odde Fyr and the averaging follows that of 6052 Thyborøn.

Important note concerning reduction to Mean Sea Level (MSL): As part of the WASA project [43], selected DMI series of atmospheric pressure observations 1874-1970 were digitised. The atmospheric pressure observations were digitised from the meteorological yearbooks, which means that the observations were station level data corrected for index error, air temperature and, since 1893, gravity.

For the present daily atmospheric pressure data set, the atmospheric pressure data from these "old" manually operated climate stations were reduced to mean sea level applying the formulas that can be seen below in tables 65-68 (see [9] and [43]). Other adjustments (see tables 72 and 73 below) have not been applied to the daily value dataset. This is the explanation for small differences between the daily series presented in section 8 and the daily series that can be calculated using the homogenized atmospheric pressure observations presented in section 7. It is advised for the reader to take this probable need of adjustment into account when using the daily value data set.

**Table 65. Formulas to obtain mean sea level atmospheric pressure for station 21100 Vestervig from the data in the internal DMI database 'wasa' (1874-1970) and 'clima\_man' (1971-1987).**

Station 21100 Vestervig Reduction to mean sea level		
First (yyyy.mm)	Last (yyyy.mm)	Pressure reduced to mean sea level (0.1 hPa) =
.	1879.06	$P * ( 1 - 0.00259 * \cos( 2 * 56.75 * 3.14/180 ) ) * ( 1 + 9.82/287.04 * 47.4/(T/10+273.15 ) )$
1879.07	1883.09	$P * ( 1 - 0.00259 * \cos( 2 * 56.75 * 3.14/180 ) ) * ( 1 + 9.82/287.04 * 25.7/(T/10+273.15 ) )$
1883.10	1892.12	$P * ( 1 - 0.00259 * \cos( 2 * 56.75 * 3.14/180 ) ) * ( 1 + 9.82/287.04 * 25.0/(T/10+273.15 ) )$
1893.01	1924.06	$P * ( 1 + 9.82/287.04 * 25.0/(T/10+273.15 ) )$
1924.07	1937.03	$P * ( 1 + 9.82/287.04 * 19.3/(T/10+273.15 ) )$
1937.04	1946.03	$P * ( 1 + 9.82/287.04 * 27.0/(T/10+273.15 ) )$
1946.04	1946.04	$P * ( 1 + 9.82/287.04 * 19.0/(T/10+273.15 ) )$
1946.05	.	$P * ( 1 + 9.82/287.04 * 19.6/(T/10+273.15 ) )$

Table 65 note: Until and including 1892 the formulas are also correcting the atmospheric pressure for gravity. The formulas are stored in the database 'wasa\_formula'. 'P' is the station level atmospheric pressure (0.1 hPa) and 'T' is the air temperature at station level (0.1°C).

**Table 66. Formulas to obtain mean sea level atmospheric pressure for station 25140 Nordby/Fanø from the data in the internal DMI database 'wasa' (1874-1970) and 'clima\_man' (1971-1987).**

Station 25140 Nordby/Fanø Reduction to mean sea level		
First (yyyy.mm)	Last (yyyy.mm)	Pressure reduced to mean sea level (0.1 hPa) =
.	1892.04	$P * ( 1 - 0.00259 * \cos( 2 * 55.5 * 3.14/180 ) ) * ( 1 + 9.82/287.04 * 5.5/(T/10+273.15 ) )$
1892.05	1892.12	$P * ( 1 - 0.00259 * \cos( 2 * 55.5 * 3.14/180 ) ) * ( 1 + 9.82/287.04 * 8.0/(T/10+273.15 ) )$
1893.01	1899.11	$P * ( 1 + 9.82/287.04 * 8.0/(T/10+273.15 ) )$
1899.12	1928.07	$P * ( 1 + 9.82/287.04 * 5.5/(T/10+273.15 ) )$
1928.08	1936.03	$P * ( 1 + 9.82/287.04 * 10.5/(T/10+273.15 ) )$
1936.04	1944.11	$P * ( 1 + 9.82/287.04 * 6.9/(T/10+273.15 ) )$
1944.12	1945.05	$P * ( 1 + 9.82/287.04 * 7.0/(T/10+273.15 ) )$
1945.06	1955.11	$P * ( 1 + 9.82/287.04 * 3.0/(T/10+273.15 ) )$
1955.12	1960.08	$P * ( 1 + 9.82/287.04 * 9.7/(T/10+273.15 ) )$
1960.09	.	$P * ( 1 + 9.82/287.04 * 6.7/(T/10+273.15 ) )$

Table 66 note: Until and including 1892 the formulas are also correcting the atmospheric pressure for gravity. The formulas are stored in the database 'wasa\_formula'. 'P' is the station level atmospheric pressure (0.1 hPa) and 'T' is the air temperature at station level (0.1°C).

**Table 67. Formulas to obtain mean sea level atmospheric pressure for station 32030 Sandvig, Bornholm from the data in the internal DMI database 'wasa' (1874-1970) listed as '6193'.**

Station 32030 Sandvig/Bornholm Reduction of atmospheric pressure to mean sea level		
First (yyyy.mm)	Last (yyyy.mm)	Pressure reduced to mean sea level (0.1 hPa) =
-	1892.12	$P * ( 1 - 0.00259 * \cos( 2 * 55.25 * 3.14/180 ) ) * ( 1 + 9.82/287.04 * 15.1/(T/10+273.15) )$
1893.01	1942.08	$P * ( 1 + 9.82/287.04 * 15.1/(T/10+273.15 ) )$
1942.09	1966.08	$P * ( 1 + 9.82/287.04 * 11.0/(T/10+273.15 ) )$
1966.09	1969.12	$P * ( 1 + 9.82/287.04 * 21.7/(T/10+273.15 ) )$

Table 67 note: Until and including 1892 the formulas are also correcting the atmospheric pressure for gravity. The formulas are stored in the database 'wasa\_formula'. 'P' is the station level atmospheric pressure (0.1 hPa) and 'T' is the air temperature at station level (0.1°C). The data from 1970 was already reduced to msl.

**Table 68. Formulas to obtain mean sea level atmospheric pressure for station 32020 Hammer Odde Fyr, Bornholm from the data in the internal DMI database 'wasa' (1970) listed as '6193' and 'clima\_man' (1971-1987).**

Station 32020 Hammer Odde Fyr (Lighthouse)/Bornholm Reduction of atmospheric pressure to mean sea level		
First (yyyy.mm)	Last (yyyy.mm)	Pressure reduced to mean sea level (0.1 hPa) =
1971.01	-	$P * ( 1 + 9.82/287.04 * 10.9/(T/10+273.15 ) )$

Table 68 note: The formulas are stored in the database 'wasa\_formula'. 'P' is the station level atmospheric pressure (0.1 hPa) and 'T' is the air temperature at station level (0.1°C). The data from 1970 was already reduced to msl.

More information concerning the series of atmospheric pressure: The reduction formulas of tables 65-68 make use of the barometer heights listed in tables 69-73 below.

To homogenize the 21100 Vestervig atmospheric pressure and the 25140 Nordby/Fanø atmospheric pressure observation series of the WASA dataset were additionally added the adjustments (units 0.1 hPa) listed in tables 72 and 73 (look for type '11' and '12'). These adjustments have not been applied to the present daily value dataset, but available information on the adjustments is included in tables 72 and 73. It is advised for the reader to take this probable need of adjustment into account when using the data.

**Table 69. Meta data regarding atmospheric pressure measurements at station 32030 Sandvig, Bornholm (used in the Hammer Odde atmospheric pressure series).**

Station 32030 Sandvig/Bornholm metadata			
Start	End	Type	Description
18721111	19660901	1	55 17'N 14 47'E
19660901	-	1	15 17'N 14 46'E (Strandgade 17)
18721111	19660901	2	H = 14 m
19660901	19660901	2	Hs = 12 m
19110112	19110112	2	Hb = 15.1 m
19420824	19420824	2	Hb = 15.1 m
19420825	19560101	2	Hb = 11 m
19560101	19620101	2	Hb = 22.0 m (but same observer)
19620101	19660914	2	Hb = 21.7 m (but same observer)
19660914	-	2	Hb = 11.7 m (Strandgade 17)
18721204	18880817	5	Kapplersk barometer no. 9
18880817	18971106	5	Bar. no. 2094
18971106	-	5	Bar. no. 1381
18730101	-	6	0.1 mm Hg – 7000
18730101	18930101	7	$P = (p_8 + p_{14} + p_{21})/3$
18930101	19550601	7	$P = (p_8 + p_{14} + p_{21})/3 + \text{corr. } 45 \text{ N}$
19550601	-	7	$P = (p_8 + p_{14} + p_{21})/3 + \text{corr. } 45 \text{ N} + \text{red. sea level}$
18730101	18930101	10	$P = 4/3 * (7000 + p) * (1 - k_1 * \cos(2 * \varnothing)) * (1 + H_b/k_2 / (k_3 + t))$
18930101	19560101	10	$P = 4/3 * (7000 + p) * (1 + H_b/k_2 / (k_3 + t))$ in 0.1 hPa
19560101	-	10	$P = 4/3 * (7000 + p)$ in 0.1 hPa
-	18921200	10	$P * (1 - 0.00259 * \cos(2 * 55.25 * 3.14/180)) * (1 + 9.82/287.04 * 15.1 / (T/10 + 273.15))$
18930100	19420800	10	$P * (1 + 9.82/287.04 * 15.1 / (T/10 + 273.15))$
19420900	19530800	10	$P * (1 + 9.82/287.04 * 11.0 / (T/10 + 273.15))$
19530900	19550500	10	$P * (1 + 9.82/287.04 * 21.7 / (T/10 + 273.15))$

Table 69 note: The information is from NACD and WASA projects. See also list of references.

Table 69 note: Description type number: 2=regarding vertical position. 5=regarding the instrument. 6=units of original measurements and later changes. 7=Formula for calculating originally published monthly values. 8=environment. 9=Time series forming part of primary time series. 10= Formula. Calculations made after original publication, e.g. reduction of atmospheric pressure. 11= Test procedure, most important results by comparison with neighbouring stations. 12= Adjustment made after test, given as 12 monthly values (0.1 hPa).

**Table 70. Meta data regarding atmospheric pressure measurements at station 32020 Hammer Odde Fyr, Bornholm (used in the Hammer Odde pressure series).**

Station 32020 Hammer Odde Fyr (lighthouse)/Bornholm metadata			
Start	End	Type	Description
19530301	19740701	1	55 18' N 14 46' E
19740701	-	1	55 18' N 14 47' E
19530301	19740701	2	Hs = 7 m
19740701	19800101	2	Hs = 11 m
19800101	19800101	2	Hs = 11.0 m
19530308	19550501	3	M.P. J.... (signature illegible)
19550501	19550601	3	J. Jensen
19550601	19661101	3	E. Due
19661101	19670301	3	J. Kyhn-Madsen
19670301	19700801	3	E. Due
19700801	19701001	3	Mogens Christensen
19701001	-	3	Pedersen
19530301	19530308	4	8, 14, 21 C.E.T.
19530308	-	4	8, 14, 21 C.E.T.
19530301	19720101	8	Source of data: Station book.
19720101	19740701	8	source of data: klima_man.
19740701	-	8	Therm. Screen and prec. gauge moved
19540701	19800101	2	Hb = 11 m
19800101	19800101	2	Hb = 10.9 m
19540701	19620103	5	Barometer no.?
19620103	-	5	Adie no. 2179
19540701	19710101	7	$P = (p_8 + p_{14} + p_{21})/3 + \text{corr } 45 \text{ N} + \text{red. sea level}$
19710101	-	7	$P = (p_8 + p_{14} + p_{21})/3 + \text{corr. } 45\text{N}$
19540701	-	10	$P = 4/3 * (7000 + p)$
19710100	-	10	$P * ( 1 + 9.82/287.04 * 10.9/(T/10+273.15 ) )$

Table 70 note: The information is from NACD and WASA projects. See also list of references.

Table 70 note: Description type number: 2=regarding vertical position. 5=regarding the instrument. 6=units of original measurements and later changes. 7=Formula for calculating originally published monthly values. 8=environment. 9=Time series forming part of primary time series. 10= Formula. Calculations made after original publication, e.g. reduction of atmospheric pressure. 11= Test procedure, most important results by comparison with neighbouring stations. 12= Adjustment made after test, given as 12 monthly values (0.1 hPa).

**Table 71. Meta data regarding atmospheric pressure measurements at station 32025 Hammeren Fyr, Bornholm (used in the Hammer Odde pressure series).**

Station 32025 Hammeren Fyr (Lighthouse)/Bornholm metadata			
Start	End	Type	Description
18800121	-	1	55 17'N 14 47'E 33U 6126.930 484.770
18800121	-	2	Hs = 77.4 m
19441130	19441130	8	Lighthouse evacuated
18880821	19110501	2	Hb = 80 m
19110501	19110501	2	Hb = 88 m
19550701	19550701	2	Hb = 76.51 m
18880821	19040806	5	Aneroidbarometer no. 16
19040806	19110501	5	Bar. no. 2571

Station 32025 Hammeren Fyr (Lighthouse)/Bornholm metadata			
Start	End	Type	Description
19110501	19110501	5	Bar. no. 2571
19590601	19590601	5	Bar. no. 2571
19120101	-	6	0.1 mm Hg – 7000
19120101	-	7	$P = (p_8+p_{14}+p_{21})/3 + \text{corr. } 45 \text{ N}$
18880821	19120101	8	No NACD-data until 1912
19120101	19170101	8	NACD-data from 1912 to 1916 except 1914
19170101	19530101	8	No NACD-data from 1917 to 1953
19530101	19530101	8	Data from 1953 not reduced to sea level
19120101	-	10	$P=4/3*(7000+p)*(1+Hb/k2/(k3+t))$ in 0.1 hPa
-	-	10	$P * ( 1 + 9.82/287.04 * 76.5/(T/10+273.15) )$

Table 71 note: The information is from NACD and WASA projects. See also list of references.

Table 71 note: Description type number: 2=regarding vertical position. 5=regarding the instrument. 6=units of original measurements and later changes. 7=Formula for calculating originally published monthly values. 8=environment. 9=Time series forming part of primary time series. 10= Formula. Calculations made after original publication, e.g. reduction of atmospheric pressure. 11= Test procedure, most important results by comparison with neighbouring stations. 12= Adjustment made after test, given as 12 monthly values (0.1 hPa).

**Table 72. Meta data regarding atmospheric pressure measurements at station 21100 Vestervig (used in the Vestevig pressure series).**

Station 21100 Vestervig metadata			
Start	End	Type	Description
18730603	18790701	2	Hb = 47.4 m (Hurupvej 34)
18790701	18831001	2	Hb = 25.7 m (Lindalsminde skole)
18831001	18920816	2	Hs=18-19 m on map: Hb=25.0 m, disputed point!
18920816	19240630	2	Hs=22 m on map, Hb=25.0 m, matter of dispute!
19240630	19370413	2	Hb = 19.3 m (Vestergade 45)
19370413	19460401	2	Hb = 27.0 m (Margrethevej 6)
19460401	19810101	2	Hb = 19.6 m (Klostergade 20)
19810101	19810101	2	Hb = 19.6 m
18730603	18760722	5	Barometer (Kappler) no. 1188
18760722	18800324	5	no. 6
18800324	18800324	5	Barometer cleaned. Reduction changed.
18831001	18831001	5	Bar. No. 6
18920725	18930510	5	Barometer new. No number.
18930510	18930907	5	Bar. No. 2233
18930907	18970917	5	Bar. No. 2177
18970917	-	5	Bar. No. 2364
18731201	-	6	0.1 mm Hg – 7000
18731201	18930101	7	$P = (p_8+p_{14}+p_{21})/3$
18930101	19530101	7	$P=(p_8+p_{14}+p_{21})/3 + \text{corr. } 45 \text{ N}$
19530101	19710101	7	$P=(p_8+p_{14}+p_{21})/3 + \text{corr. } 45 \text{ N} + \text{red. sea level}$
19710101	-	7	$P=(p_8+p_{14}+p_{21})/3 + \text{corr. } 45 \text{ N}$
18870819	18870819	8	New reduction table
18731201	18930101	10	$P=4/3*(7000+p)*(1-k1*\cos(2*\emptyset))*(1+Hb/k2/(k3+t))$
18930101	19530101	10	$P=4/3*(7000+p)*(1+Hb/k2/(k3+t))$ in 0.1 hPa
19530101	19710101	10	$P=4/3*(7000+p)$ in 0.1 hPa
19710101	-	10	$P=4/3*(7000+p)*(1+Hb/k2/(k3+t))$ in 0.1 hPa



Station 21100 Vestervig metadata			
Start	End	Type	Description
19870800	-	9	6052
-	18790600	10	$P * ( 1 - 0.00259 * \cos( 2 * 56.75 * 3.14/180 ) ) * ( 1 + 9.82/287.04 * 47.4/(T/10+273.15 ) )$
18790700	18830900	10	$P * ( 1 - 0.00259 * \cos( 2 * 56.75 * 3.14/180 ) ) * ( 1 + 9.82/287.04 * 25.7/(T/10+273.15 ) )$
18831000	18921200	10	$P * ( 1 - 0.00259 * \cos( 2 * 56.75 * 3.14/180 ) ) * ( 1 + 9.82/287.04 * 25.0/(T/10+273.15 ) )$
18930100	19240600	10	$P * ( 1 + 9.82/287.04 * 25.0/(T/10+273.15 ) )$
19240700	19370300	10	$P * ( 1 + 9.82/287.04 * 19.3/(T/10+273.15 ) )$
19370400	19460300	10	$P * ( 1 + 9.82/287.04 * 27.0/(T/10+273.15 ) )$
19460400	19460400	10	$P * ( 1 + 9.82/287.04 * 19.0/(T/10+273.15 ) )$
19460500	19521200	10	$P * ( 1 + 9.82/287.04 * 19.6/(T/10+273.15 ) )$
19710100	-	10	$P * ( 1 + 9.82/287.04 * 19.6/(T/10+273.15 ) )$
-	19240600	11	97.5% significant break, station moved
-	18920800	11	97,5% significant break, station moved
-	19671200	11	97.5% significant break, not supported in meta data
-	19240600	12	-4.0-4.0-4.0-4.0-4.0-4.0-4.0-4.0-4.0-4.0-4.0-4.0
-	18920800	12	4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0
-	19671200	12	7.0 7.0 7.0 7.0 7.0 7.0 7.0 7.0 7.0 7.0 7.0 7.0

Table 72 note: The information is from NACD and WASA projects. See also list of references.

Table 72 note. Description type number: 2=regarding vertical position. 5=regarding the instrument. 6=units of original measurements and later changes. 7=Formula for calculating originally published monthly values. 8=environment. 9=Time series forming part of primary time series. 10= Formula. Calculations made after original publication, e.g. reduction of atmospheric pressure. 11= Test procedure, most important results by comparison with neighbouring stations. 12= Adjustment made after test, given as 12 monthly values (0.1 hPa) to be added.

**Table 73. Meta data regarding atmospheric pressure measurements at station 25140 Nordby/Fanø (used in the Nordby/Fanø pressure series).**

Station 25140 Nordby/Fanø metadata			
Start	End	Type	Description
-	19940114	2	No barometer on this station
18711201	18740101	2	Hb = 5.5 m (Hovedgaden 101)
18740101	18740101	2	Hb = 5.5 m (Hovedgaden 101)
18920501	18991201	2	Hb = 8.0 m. (Nordby Realskole)
18991201	19030101	2	Hb = 5.5 m (Hovedgaden 101)
19030101	19030101	2	Hb = 5.5 m (Hovedgaden 101)
19050101	19050101	2	Hb= 5.5 m (Hovedgaden 103?)
19130101	19130101	2	Hb = 5.5 m (Hovedgaden 103)
19280806	19360405	2	Hb = 10.5 m (Vestervejen 43)
19360405	19441216	2	Hb = 6.9 m (Kallesbjergvej 1)
19441216	19450615	2	Hb = 7 m? (situated on first floor?)
19450615	19551121	2	Hb = 3.0 m (moved to ground floor?)
19551121	19600822	2	Hb = 9.7 m Navigationsskolen, Vestervejen 1
19600822	19940114	2	Hb = 6.7 m (Bavnebjerg Toft 1)
-	19940114	5	No barometer
-	19420620	5	Barometer broken
18710723	18730601	5	Siphon barometer
18730601	18770326	5	Kappler mercury (cistern) barometer no. 4
18770326	18770627	5	Bar. no. 14
18770627	18780501	5	Bar. no. 12

Station 25140 Nordby/Fanø metadata			
Start	End	Type	Description
18780501	18780501	5	Bar. no.?
18801227	18801227	5	New reduction table
18870501	18870501	5	Barometer needs cleaning
18870721	18870721	5	Barometer cleaned?
18870820	18950721	5	Bar. no. 2015
18950721	18950816	5	Bar. no. 3021
18950816	18950816	5	Some data unreliable
18980929	19001218	5	Bar. no. 2177
19001218	19360405	5	Bar. no. 2439
19360405	19361220	5	Barometer moved
19361220	19420620	5	Bar. no. 115521
19420929	19490510	5	Bar. no. 194704
19490510	19490510	5	Barometer no.?
18720101	-	6	0.1 mm Hg – 7000
18720101	18930101	7	$P=(p8+p14+p22)/3$
18930101	19280806	7	$P=(p8+p14+p22)/3 + \text{corr. } 45 \text{ N}$
19280806	-	7	$P = (p8+p14+p21)/3 + \text{corr. } 45 \text{ N}$
19280801	19360405	8	Station moved to Vestervej 23
19360405	19441216	8	Station moved to Kallesbjergvej 1
19441216	19530101	8	Station moved to Sparekassen, Hovedgaden?
19530101	19530101	8	From 1953: data not reduced to sea level
18720101	18930101	10	$P=4/3*(7000+p)*(1-k1*\cos(2*\varnothing))*(1+Hb/k2/(k3+t))$
18930101	-	10	$P=4/3*(7000+p)*(1+Hb/k2/(k3+t))$ in 0.1 hPa
19420600	19420900	9	25100
19520900	19520900	9	25150
19521100	19521100	9	25150
19870800	-	9	6080
-	18920400	10	$P * ( 1 - 0.00259 * \cos( 2 * 55.5 * 3.14/180 ) ) * ( 1 + 9.82/287.04 * 5.5/(T/10+273.15) )$
18920500	18921200	10	$P * ( 1 - 0.00259 * \cos( 2 * 55.5 * 3.14/180 ) ) * ( 1 + 9.82/287.04 * 8.0/(T/10+273.15) )$
18930100	18991100	10	$P * ( 1 + 9.82/287.04 * 8.0/(T/10+273.15) )$
18991200	19280700	10	$P * ( 1 + 9.82/287.04 * 5.5/(T/10+273.15) )$
			table continues.....
			.....table continued
19280800	19360300	10	$P * ( 1 + 9.82/287.04 * 10.5/(T/10+273.15) )$
19360400	19441100	10	$P * ( 1 + 9.82/287.04 * 6.9/(T/10+273.15) )$
19441200	19450500	10	$P * ( 1 + 9.82/287.04 * 7.0/(T/10+273.15) )$
19450600	19551100	10	$P * ( 1 + 9.82/287.04 * 3.0/(T/10+273.15) )$
19551200	19600800	10	$P * ( 1 + 9.82/287.04 * 9.7/(T/10+273.15) )$
19600900	-	10	$P * ( 1 + 9.82/287.04 * 6.7/(T/10+273.15) )$
-	19420900	11	97,5% significant break, barometer broken
-	19360400	11	97,5% significant break, station moved
-	19661200	11	97,5% significant break, not supported in meta data
-	19040200	11	97,5% significant break, station moved
-	19441200	11	97,5% significant break, station moved
-	19420900	12	12.012.012.012.012.012.012.012.012.012.0
-	19360400	12	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0
-	19661200	12	6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0

Station 25140 Nordby/Fanø metadata			
Start	End	Type	Description
-	19040200	12	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0
-	19441200	12	-21 -21 -21 -21 -21 -21 -21 -21 -21 -21 -21 -21

Table 73 note: The information is from NACD and WASA projects. See also list of references.

Table 73 note: Description type number: 2=regarding vertical position. 5=regarding the instrument. 6=units of original measurements and later changes. 7=Formula for calculating originally published monthly values. 8=environment. 9=Time series forming part of primary time series. 10= Formula. Calculations made after original publication, e.g. reduction of atmospheric pressure. 11= Test procedure, most important results by comparison with neighbouring stations. 12= Adjustment made after test, given as 12 monthly values (0.1 hPa) to be added.

Details about the daily accumulated precipitation data sets and station series: Fifteen (15) Danish station series with a record of daily accumulated precipitation can be blended into seven (7) long data sets. The table 74 presents an overview of these single station data series (identified by the station name and number) and the possible blended datasets making up the long series. Overlap periods have been included when available.

**Table 74. Daily accumulated precipitation (element number 601); data sets and station series.**

Dataset/period*	Station	Start	End
<b>Vestervig 1874-2020</b>	6051/21100 Vestervig	1 January 1874	31 December 2020
	Blended: 6051/21100 Vestervig	1 January 1874	31 December 2020
<b>Grønbæk 1874-2020</b>	5135/21430 Grønbæk/ Allingskovgård	1 September 1874	31 December 2020
	Blended: 5135/21430 Grønbæk/ Allingskovgård	1 September 1874	31 December 2020
<b>Nordby/Fanø 1874-2020</b>	6088/25140 Nordby/Fanø	1 January 1874	31 December 2020
	Blended: 6088/25140 Nordby/Fanø	1 January 1874	31 December 2020
<b>Store Jyndevad 1920-2020</b>	26410 Broderup/Bajstrup/ Gårdeby/Rødebæk/Broderu p Mark	1 July 1920	30 June 1993
	26409 Tinglev	1 June 1995	31 December 2006
	6116/26400 Store Jyndevad	1 July 1987	31 December 2020
	Blended: 26410 Broderup/Bajstrup/ Gårdeby/Rødebæk/Broderu p Mark	1 July 1920	30 June 1987
	6116/26400 Store Jyndevad	1 July 1987	31 December 2020

Dataset/period*	Station	Start	End	
<b>Tranebjerg 1872-2020</b>	27080 Tranebjerg 5165/27082 Tranebjerg Øst	1 December 1872 02 August 2001	01 August 2001 31 December 2020	
	Blended: 27080 Tranebjerg 5165/27082 Tranebjerg Øst	1 December 1872 02 August 2001	01 August 2001 31 December 2020	
<b>København 1874-2020</b>	30380 Landbohøjskolen	1 January 1874	1 October 1996	
	30210 Meteorologisk Institut	1 January 1875	30 June 1922	
	30210 Meteorologisk Institut	1 January 1961	31 December 1984	
	5735/30370 Botanisk Have	1 January 1961	31 December 2020	
Blended:	30380 Landbohøjskolen 5735/30370 Botanisk Have/Livgardens Kaserne	1 January 1874 2 October 1996	1 October 1996 31 December 2020	
<b>Hammer Odde 1874-2020</b>	32030 Sandvig	1 January 1874	31 December 1970	
	32020 Hammer Odde Fyr	1 January 1961	30 June 1987	
	6193 Hammer Odde Fyr	1 January 1984	31 December 2020	
	Blended:	32030 Sandvig	1 January 1874	31 December 1970
	32020 Hammer Odde Fyr 6193 Hammer Odde Fyr	1 January 1971 1 January 1984	31 December 1983 31 December 2020	

Table 74 general note: The single daily station series mostly consist of the values as observed. No DMI testing for homogeneity has been performed on these daily observations. They have however been carefully quality-tested and corrected, mainly based on visual tests.

Table 74 note: \*Possible blended full daily datasets using the single daily station series are a part of the daily section. No DMI testing for homogeneity has been performed on the blended series. See also the European Climate Assessment & Dataset (ECA&D) project homepage: <http://www.ecad.eu/> for their "blend"/data handling and quality/homogeneity test. This site also contains the single Danish station series.

In the xlsx data file dk\_daily\_601.xlsx the sheets are named:  
6051\_601 (period 1874-2020)

5135\_601 (period 1874-2020)

6088\_601 (period 1874-2020)

26410\_601 (period 1920-1993)

26409\_601 (period 1995-2006)

6116\_601 (period 1987-2020)

26410\_6116\_601 (period 1920-2020) (blend)

27080\_601 (period 1872-2001)

5165\_601 (period 2001-2020)

27080\_5165\_601 (period 1872-2020) (blend)

30380\_601 (period 1874-1996)  
 30210\_1\_601 (period 1875-1922)  
 30210\_2\_601 (period 1961-1984)  
 5735\_601 (period 1961-2020)  
 30380\_5735\_601 (period 1874-2020) (blend)

32030\_601 (period 1874-1970)  
 32020\_601 (period 1961-1987)  
 6193\_601 (period 1984-2020)  
 32030\_32020\_6193\_601 (period 1874-2020) (blend)

The data can also be found in separate csv-files:

dk\_daily\_6051\_601.csv (period 1874-2020)  
 dk\_daily\_5135\_601.csv (period 1874-2020)  
 dk\_daily\_6088\_601.csv (period 1874-2020)  
 dk\_daily\_26410\_601.csv (period 1920-1993)  
 dk\_daily\_26409\_601.csv (period 1995-2006)  
 dk\_daily\_6116\_601.csv (period 1987-2020)  
 dk\_daily\_26410\_6116\_601.csv (period 1920-2020) (blend)  
 dk\_daily\_27080\_601.csv (period 1872-2001)  
 dk\_daily\_5165\_601.csv (period 2001-2020)  
 dk\_daily\_27080\_5165\_601.csv (period 1872-2020) (blend)  
 dk\_daily\_30380\_601.csv (period 1874-1996)  
 dk\_daily\_30210\_1\_601.csv (period 1875-1922)  
 dk\_daily\_30210\_2\_601.csv (period 1961-1984)  
 dk\_daily\_5735\_601.csv (period 1961-2020)  
 dk\_daily\_30380\_5735\_601.csv (period 1874-2020) (blend)  
 dk\_daily\_32030\_601.csv (period 1874-1970)  
 dk\_daily\_32020\_601.csv (period 1961-1987)  
 dk\_daily\_6193\_601.csv (period 1984-2020)  
 dk\_daily\_32030\_32020\_6193\_601.csv (period 1874-2020) (blend)

The different sheets/files contain daily accumulated precipitation. There are no missing dates between the start and the end date. Any missing observations are filled in by "null".

Format and units of daily precipitation file:

Station number (stat\_no); year (year); month (month); day (day); hour local time or UTC (hour); accumulated precipitation in mm (elem\_val)

- UTC (since 2001 or if station number starts with 6 (station 6193, whole period)).
- Accumulated precipitation (mm) previous 24 hours. -1 means more than 0 mm, but less than 0.1 mm, -2 means accumulation for several days up to the day where precipitation differs from 0. Please note: Before 1931 the 'daily precipitation' for station 21430 may in some cases be the precipitation accumulated for several days or for the whole month.
- Please notice that the "hour" changed 1 Jan 2012 to 23 UTC (winter) and 22 UTC (summer). This reflects the wish to define the day as a "Calendar day". For that reason TWO 1 Jan 2012 are included. The first one covering the previous 24 hours up to 1 Jan 2012; 6 UTC, the second one covering the previous 24 hours up to 1 Jan 2012; 23 UTC. Please notice the time overlap here.

Additional notes regarding the introduction of the Hellmann rain gauge and Stevenson screens: Some events like replacement of rain gauges and thermometer screens can sometimes cause serious "break points" in the time series. In table 75 is listed relevant information on dates (it took place from app. 1910-1925) for introduction of the Hellmann rain gauge and for introduction of Stevenson screens concerning the stations in this report. The information originates from DMI Technical Report 94-20 [8].

**Table 75. Metadata - Introduction of the Hellmann rain gauge and Stevenson screens.**

Station No.	Name	Fjord gauge replaced by Hellmann	Stevenson screen mounted
21100	Vestervig	~1915	1924.07
21430	Grønbæk/Allingskovgård	N/A	
25140	Nordby, Fanø	~1913	1928.08
26410	Broderup/Bajstrup/Gårdeby /Rødebæk/Broderup Mark	N/A	
27080	Tranebjerg, Samsø	1911.09	1919.08
30210	Meteorologisk Institut	N/A	
30380	Landbohøjskolen	Before 1922	1919.09
32030	Sandvig, Bornholm	1911.09	1913.09

Table 75 note: Information on station instrumentation concerning rain gauge and Stevenson screen (thermometer screen). From 'table 6' in [8].

Details about the data sets and station series concerning daily cloud cover at 8, 14 and 21 hours DNT: One (1) Danish station series with a long record of cloud cover at 8, 14 and 21 hours DNT exists. The table 76 presents an overview of this station data series (identified by the station name and number).

**Table 76. Cloud cover at 8, 14 and 21 hours DNT (element number 801); data sets and station series.**

Dataset/period	Station	Start	End
<b>Tranebjerg 1872-2000</b>	27080 Tranebjerg	1 December 1872	31 January 2000

Table 76 general note: The single daily station series mostly consist of the values as observed. No DMI testing for homogeneity has been performed on these daily (hourly; 8, 14 and 21 hours DNT) observations. They have however been carefully quality-tested and corrected, mainly based on visual tests. See the European Climate Assessment & Dataset (ECA&D) project homepage: <http://www.ecad.eu/> for their data handling and quality/homogeneity test.

In the xlsx data file dk\_daily\_801.xlsx the sheet are named:  
27080\_801 (period 1872-2000)

The data can also be found in a separate csv-file:  
dk\_daily\_27080\_801.csv (period 1872-2000)

The sheet/file contains cloud cover observed daily at 8, 14 and 21 hours DNT. There are no missing dates between the start and the end date. Any missing observations are filled in by "null".

Format and units of cloud cover file:

Station number (stat\_no); year (year); month (month); day (day); cloud cover at 8 hours DNT (N8), cloud cover at 14 hours DNT (N14), cloud cover at 21 hours DNT (N21); cloud cover at 8 hours DNT in octas (N8 (octas)); cloud cover at 14 hours DNT in octas (N14 (octas)); cloud cover at 21 hours DNT in octas (N21 (octas)); Average of N8 (octas), N14 (octas) and N21 (octas) (averageN)

Cloud cover units at 8, 14 and 21 hours DNT have been changed during time:

- 1 Dec 1872 - 31 Dec 1873: 0-4 (0= cloudless, 1= 1/4 part clouded, ..., 4= overcast)
- 1 Jan 1874 - 31 Dec 1951: 0-10 (0= cloudless, 1= 1/10 part clouded, ..., 10= overcast)
- Since 1 Jan 1952: 0-8 (0= cloudless, 1= 1/8 part clouded, ..., 8 = overcast) (octas)
- Cloud cover at 8,14 and 21 DNT back to start of the series have all been converted to octas, see N8 (octas), N14 (octas) and N21 (octas).

Additional general information about the homogeneity of the daily series and corresponding monthly series: No test for homogeneity has been performed on the series of daily observations presented in this report. But as part of the NACD project (see section 9) the corresponding monthly series for some of the stations and elements were tested, adjusted and published in [27]. The quality codes of these series of monthly data are shown in table 77 together with comments on the adjustments made. Element numbers and quality codes are explained in tables 78 and 79.

**Table 77. Quality of series of monthly values published in [27].**

Station No.	Element No.	Period	Quality	Comments
21100	101	1890.01-1995.12	H	No adjustments made
21100	111	1890.01-1995.12	T	Adjusted 1890.01-1953.12 due to new observation procedure
21100	112	1890.01-1995.12	T	Adjusted 1890.01-1953.12 due to new observation procedure
21100	121	1890.01-1995.12	T	Adjusted 1890.01-1924.03 due to introduction of Stevenson screen 01 Apr. 1924. Adjusted 1890.01-1946.03 due to relocation of screen 01 Apr. 1946
21100	122	1890.01-1995.12	T	Adjusted 1890.01-1924.03 due to introduction of Stevenson screen 01 Apr. 1924. Adjusted 1890.01-1946.03 due to relocation of screen 01 Apr. 1946
21100	601	1873.10-1995.12	H	No adjustments made
21430	601	1862.08-1994.12	N	No adjustments made
25140	101	1890.01-1995.12	H	No adjustments made. Values from station 25150 inserted 1942.06-1942.09, 1952.09 and 1952.11
25140	111	1890.01-1995.12	T	Adjusted 1890.01-1899.11 due to relocation of screen 1 Dec. 1899. Adjusted 1890.01-1928.07 due to introduction of Stevenson screen August 1928
25140	112	1890.01-1995.12	T	Adjusted 1890.01-1899.11 due to relocation of screen 1 Dec. 1899. Adjusted 1890.01-1928.07 due to introduction of Stevenson screen August 1928. Adjusted 1914.12-1928.07 cause of break unknown
25140	121	1890.01-1995.12	T	Adjusted 1890.01-1904.03 due to relocation of screen 7 Apr. 1904 and new screen. Adjusted 1890.01-1995.12 due to introduction of Stevenson screen 6 Aug. 1928. Adjusted 1890.01-1936.03 due to relocation of screen 5 Apr. 1936. Adjusted 1890.01-1944.12 due to relocation of screen 16 Dec. 1944. Adjusted 1890.01-1960.08 due to relocation of screen 22 Aug. 1960
25140	122	1890.01-1995.12	T	Adjusted 1890.01-1928.07 due to introduction of Stevenson screen 6 Aug. 1928. Adjusted 1890.01-1944.12 due to relocation of screen 16 Dec 1944. Adjusted 1936.03-1958.07 due to relocation of screen 5 Apr. 1936 and painting of screen 2 Aug. 1958
25140	601	1871.12-1995.12	H	No adjustments made
26410	601	1894.11-1990.12	N	No adjustments made
27080	101	1890.01-1994.12	H	No adjustments made
27080	111	1890.01-1995.12	T	Adjusted 1890.01-1918.05 due to relocation and new Stevenson screen 01 Jun. 1918. Adjusted 1890.01-1972.11 due to relocation 16 Nov. 1972
27080	121	1890.01-1995.12	T	No adjustments made
27080	601	1872.12-1995.12	H	No adjustments made

Station No.	Element No.	Period	Quality	Comments
27080	801	1890.01-1995.12	H	Adjusted 1890.01-1918.08 due to new observer Adjusted 1890.01-1963.08 due to new observer
30380	101	1751.01-1889.12	T	No adjustments made
30380	101	1890.01-1997.03	E	No adjustments made
30380	111	1896.01-1995.12	T	Adjusted 1896.01-1919.08 due to new Stevenson screen 1919/08/20. Adjusted 1894.01-1984.12 due to urban warming
30380	112	1890.01-1995.12	T	Adjusted 1890.01-1919.08 due to new Stevenson screen 1919/08/20. Adjusted 1890.01-1977.12 due to urban warming.
30380	601	1861.01-1995.12	H	No adjustments made
6193	101	1890.01-1995.12	H	Series consists of stations 32030, 32020 and 6193. No adjustments made
6193	111	1890.01-1995.12	T	Series consists of stations 32030, 32020 and 6193. Adjusted 1890.01-1913.09 due to introduction of Stevenson screen. Adjusted 1890.01-1953.08 due to relocation of screen
6193	112	1890.01-1995.12	T	Series consists of stations 32030, 32020 and 6193. Adjusted 1890.01-1913.09 due to introduction of Stevenson screen
6193	121	1890.01-1995.12	T	Series consists of stations 32030, 32020 and 6193. Adjusted 1890.01-1913.09 due to installation of Stevenson screen 17 Sep. 1913
6193	122	1890.01-1995.12	T	Series consists of stations 32030, 32020 and 6193. Adjusted 1890.01-1970.12 due to relocation 31 Dec. 1970
6193	601	1890.01-1995.12	H	Series consists of stations 32030, 32020 and 6193. No adjustments made

**Table 78. Explanation of element numbers used in table table 77.**

Element no.	Description	Unit	Method
101	Average air temperature	0.1 °C	Average
111	Average maximum air temperature	0.1 °C	Average
112	Absolute maximum air temperature	0.1 °C	Max
121	Average minimum air temperature	0.1 °C	Average
122	Absolute minimum air temperature	0.1 °C	Min
601	Precipitation sum	0.1 mm	Sum
801	Average cloud cover	%	Average

**Table 79. Explanation of quality codes used in table 77.**

Quality code	Description
H	Homogeneous, rigorously tested and possibly adjusted
T	Tested, possibly adjusted but not perfectly homogeneous
E	Environmental changes prevent climatic change studies
I	Inhomogeneous series which is presently not adjustable
N	Not tested, but not necessarily inhomogeneous



## 18 Appendix 4: Monthly/annual section - File Formats and metadata

The monthly/annual files included in this report contain monthly and annual DMI blended data series within the period 1768-2020 comprising different parameters from five (5) stations in Denmark.

The file name is determined as follows: `dk_monthly_all_<period>.csv`  
In this report one (1) ;-separated csv file: `dk_monthly_all_1768_2020.csv`

Format of the monthly/annual file: Station number (`stat_no`); element number (`elem_no`); year (`year`); January value (`jan`); February value (`feb`); March value (`mar`); April value (`apr`); May value (`may`); June value (`jun`); July value (`jul`); August value (`aug`); September value (`sep`); October value (`oct`); November value (`nov`); December value (`dec`); Annual value (`annual`); country code (DK= Denmark) (`co_code`)  
The element/parameter numbers and units can be seen in the data dictionary, table 27 in section 9.

In the file `dk_monthly_all_1768_2020.csv` data are sorted according to element and station number. Furthermore all missing values are filled with "null". An annual value and a country code have been included.

Data are only to be used with proper reference to the accompanying report:  
Cappelen, J. (ed), 2021: Denmark - DMI Historical Climate Data Collection 1768-2020. DMI Report No. 21-02. Copenhagen.

### Special remarks:

The annual values 2014-2020 are calculated directly on hourly values. The annual values before 2014 are calculated on the monthly values mentioned in section 9.

In the tables 80-89 the reference "NARP1" refers to the "NARP dataset version 1", see [29].

The monthly data sets referred to in this report have been constructed by a number of persons. Their names and initials/abbreviations are: Poul Frich (PF), John Cappelen (JC), Ellen Vaarby Laursen (EVL), Rikke Sjølin Thomsen (RST), Bent Vraae Jørgensen (BVJ) and Lotte Sligting Stannius (LSS).

The monthly data sets are referred to by their creator (abbreviations seen above) and the number they have in the internal DMI data set classification.

Therefore, monthly data set "JC-TS1220" means a data set (time series TS) created by John Cappelen with number 1220 in the data set classification.

"Monthly\_db" refers to an internal DMI monthly database Ingres klimadb/postgreSQL ClimaDB with monthly values of various weather parameters.

The reference "TR" refers to DMI Technical Reports. Therefore, "TR99-5" as an example means DMI Technical Report 99-5 [31]. This publication can be downloaded from the publication part of DMI's web site.

In this report months are referred to by year/month number (ex. 2000/03 = March 2000) and the minimum criteria used here for calculating a valid monthly value is that measurements from more than at least 21 days are present in that month, so the number of daily values are ranging 22-31. Additionally a subjective validation has been performed.

**Table 80. Metadata - Description of monthly/annual data sets; 6051 Vestervig. Element 101-122.**

**Vestervig (VEST) – 6051; 1874-2020**

<b>Element No.101 (Average Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1874 – 2020	Monthly-db VEST 21100/6051 + TR99-5	1764	0
Details: Created using monthly-db VEST 21100: 1874-1960, TR99-5: 1961-1990, monthly-db VEST 21100: 1991-2003/8, monthly-db VEST 6051: 2003/10-2020. Three months (2000/1+2, 2003/9) were filled using monthly-based regression with 6052 Thyborøn: Jan. 2000: $st21100 = 1.0718*st6052-9.417$ ( $r^2=0.988$ ), Feb. 2000: $st21100 = 1.0474*st6052-6.970$ ( $r^2=0.995$ ), Sept. 2003: $st21100 = 1.003*st6052-9.573$ ( $r^2=0.954$ ). Two months (2008/7+8) were filled using monthly-based regression with an average of 6052 Thyborøn and 6019 Silstrup: July 2008: $st6051 = 0.984*(st6052+st6019)/2-9.417$ ( $r^2=0.99$ ), Aug. 2008: $st6051 = 1.015*(st6052+st6019)/2-5.084$ ( $r^2=0.96$ ).				

<b>Element No.111 (Average of Daily Maximum Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1875 – 2020	Monthly-db VEST 21100/6051 + TR99-5	1752	1
Details: Created using monthly-db VEST 21100: 1875-1960, TR99-5: 1961-1990, monthly-db VEST 21100: 1991-2003/8, monthly-db VEST 6051: 2003/10-2020. 3 months (1970/12, 2000/1+2) were filled using data from 6052 Thyborøn. 1 month (2003/9) was filled using monthly-based regression with 6052: Sept. 2003: $st21100 = 1.014*st6052+0.64$ ( $r^2=0.932$ ). 2 months (2008/7+8) were filled using monthly-based regression with an average of 6052 Thyborøn and 6019 Silstrup: Jul. 2008: $st6051 = 0.946*(st6052+st6019)/2+15.581$ ( $r^2=0.98$ ), Aug. 2008: $st6051 = 1.351*(st6052+st6019)/2-66.992$ ( $r^2=0.98$ ). 1924/5 could not be filled, no data available.				

<b>Element No.112 (Highest Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1875 – 2020	Monthly-db VEST 21100/6051 + TR99-5	1752	0
Details: Created using monthly-db VEST 21100: 1875-1960, TR99-5: 1961-1990, monthly-db VEST 21100: 1991-2003/9, monthly-db VEST 6051: 2003/10-2020. 4 months (1962/6, 1970/12, 2000/1+2) were filled using data from 6052 Thyborøn. 2003/9 for station VEST 21100 is not complete, but the highest air temperature in Sept. 2003 occurred in the existing part of the series. Two months (2008/7+8) were filled using data from 6019 Silstrup.				

<b>Element No.121 (Average of Daily Minimum Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1875 – 2020	Monthly-db VEST 21100/6051 + TR99-5	1752	0
Details: Created using monthly-db VEST 21100: 1875-1960, TR99-5: 1961-1990, monthly-db VEST 21100: 1991-2003/8, monthly-db VEST 6051: 2003/10-2020. 4 months (1962/6, 1970/12, 2000/1+2) were filled using data from 6052 Thyborøn. 1 month (2003/9) was filled using monthly-based regression with 6052: Sept. 2003: $st21100 = 1.03*st6052-21.94$ ( $r^2=0.829$ ). 2 months (2008/7+8) were filled using monthly-based regression with an average of 6052 Thyborøn and 6019 Silstrup: Jul. 2008: $st6051 = 0.975*(st6052+st6019)/2-1.092$ ( $r^2=1.0$ ), Aug. 2008: $st6051 = 0.644*(st6052+st6019)/2+43.569$ ( $r^2=0.82$ ).				

<b>Element No.122 (Lowest Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1875 – 2020	Monthly-db VEST 21100/6051 + TR99-5	1752	0
Details: Created using monthly-db VEST 21100: 1875-1960, TR99-5: 1961-1990, monthly-db VEST 21100: 1991-2003/9, monthly-db VEST 6051: 2003/10-2020. Four months (1962/6, 1970/12, 2000/1+2) were filled using data from 6052 Thyborøn. 2003/9 for station VEST 21100 is not complete, but the lowest air temperature in September 2003 occurred in the existing part of the series.				

**Table 81. Metadata - Description of monthly/annual data sets; 6051 Vestevig. Element 401-801.**

Vestervig (VEST) – 6051 (continued)

<b>Element No.401 (Average Atmospheric Pressure)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1874 – 2020	Monthly-db VEST 21100 + 6052	1764	0
Details: Created using monthly-db VEST 21100: 1874-1987/7 reduced to mean sea level (see appendix), monthly-db 6052 Thyborøn: 1987/8-2020. Missing (2011/7-8) filled using 6058 Hvide Sande.				

<b>Element No.601 (Accumulated Precipitation) – Not necessarily homogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1874 – 2020	Monthly-db VEST 21100/6051	1764	0
Details: Created using monthly-db VEST 21100/6051: 1874-2020. November 16, 2010 an automatic raingauge was installed at 6051 Vestervig. Not necessarily homogenous, because of new ways of detection from 2010.				

<b>Element No.602 (Highest 24-hour Precipitation) – Not necessarily homogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1874 – 2020	Monthly-db VEST 21100/6051	1764	0
Details: Created using monthly-db VEST 21100/6051: 1874-2020. Missing (1950/1+4, 1954/1) filled using the average of 24020 Bovbjerg Fyr and 21120 Erslev. November 16, 2010 an automatic raingauge was installed at 6051 Vestervig. Not necessarily homogenous, because of new ways of detection from 2010.				

<b>Element No.701 (Number of Days with Snow Cover)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1939 – 2020	Monthly-db VEST 21100 + TR99-5	984	0
Details: Created using monthly-db VEST 21100: 1939-1960, TR99-5 VEST 21100: 1961-1990, monthly-db VEST 21100: 1991-2020. VEST 21100 stopped 701 observations in August 2001 and started again January 2004. September 2001- December 2003 were filled using the average of 6030 FSN Aalborg and 6060 FSN Karup. 2004/6-2004/9 had problems, but were filled with zero. The many missing month are missing zero's for June-September months from 1970-1990. These zero's were inserted. After this, two months were missing (1955/3 and 1970/12). 1970/12 was filled using 6052 while 1955/3 was filled using the average of 6030 FSN Aalborg, 6041 Skagen Fyr and 6060 FSN Karup.				

<b>Element No.801 (Average Cloud Cover) - Inhomogenous based on a visual test</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1874 – 2020	PF-TS110 + Monthly-db VEST 21100 + 6052	1764	5
Details: Created using monthly-db VEST 21100: 1874-1889, PF-TS110 1890-1995 and monthly_db 6052 Thyborøn: 1996-2020. VEST 21100 stops cloud cover observations in December 1999. 6052 values were used for the period 2000-2005 + for filling values in 1962/5+6. Eight months (2010/1-5, 2010/12 and 2011/7-8) were filled using data from 6058 Hvide Sande. Five months 2017/3-4 and 2018/6-8 are missing. November 22, 2000 a ceilometer for automatic detection of cloud cover was installed at 6052 Thyborøn. Inhomogenous based on a visual test, possible several breaks. New ways of detection from 2000.				

**Table 82. Metadata - Description of monthly/annual data sets; 6088 Nordby. Element 101-122.**

**Nordby/Fanø (NORD) – 6088; 1872-2020**

<b>Element No.101 (Average Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1872 – 2020	Monthly-db NORD 25140/6088 + TR99-5	1788	0
Details: Created using monthly-db NORD 25140: 1872-1960, TR99-5 25140: 1961-1990, monthly-db NORD 25140: 1991-2003/6, monthly-db NORD 6088: 2003/8-2011/4 and 2020/6-2020/12, ObsDB (calc) 0-23utc NORD 6088: 2011/5-2020/5. 4 months (1993/12, 1994/1, 2000/1, 2002/6) were filled using average values from stations 6080 Esbjerg Lufthavn, 6081 Blåvandshuk Fyr and 25348 Vester Vedsted. 2003/7 was filled using an average value from stations 6080 Esbjerg Lufthavn, 6081 Blåvandshuk Fyr, 6096 Rømø/Juvre and 25348 Vester Vedsted. 2005/4, 2007/8, 2007/9 were filled using average values from stations 6080 Esbjerg Lufthavn, 6096 Rømø/Juvre and 6093 Vester Vedsted. 2016/1 was interpolated using surrounding stations.				

<b>Element No.111 (Average of Daily Maximum Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1875 – 2020	Monthly-db NORD 25140/6088 + TR99-5	1752	0
Details: Created using monthly-db NORD 25140: 1875-1960, TR99-5 25140: 1961-1990, monthly-db NORD 25140: 1991-2003/6, monthly-db NORD 6088: 2003/8-2011/4 and 2020/6-2020/12, ObsDB (calc) 0-23utc NORD 6088: 2011/5-2020/5. 4 months (1993/12, 1994/1, 2000/1, 2002/6) were filled using average values from stations 6080, 6081 and 25348. 2003/7 was filled using an average value from stations 6080, 6081, 6096 and 25348. 2005/4, 2007/8, 2007/9 were filled using average values from stations 6080 Esbjerg Lufthavn, 6096 Rømø/Juvre and 6093 Vester Vedsted. 2016/1 was interpolated using surrounding stations.				

<b>Element No.112 (Highest Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1874 – 2020	Monthly-db NORD 25140/6088 + TR99-5	1764	0
Details: Created using monthly-db NORD 25140: 1874-1960, TR99-5 25140: 1961-1990, monthly-db NORD 6088: 1991-2011/4 and 2020/6-2020/12, ObsDB (calc) 0-23utc NORD 6088: 2011/5-2020/5. 4 months (1993/12, 1994/1, 2000/1, 2002/6) were filled using average values from stations 6080, 6081 and 25348. 2005/4 was filled using an average value from stations 6080 Esbjerg Lufthavn, 6096 Rømø/Juvre and 6093 Vester Vedsted. 2016/1 was interpolated using surrounding stations.				

<b>Element No.121 (Average of Daily Minimum Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1875 – 2020	Monthly-db NORD 25140/6088 + TR99-5	1752	0
Details: Created using monthly-db NORD 25140: 1875-1960, TR99-5 25140: 1961-1990, monthly-db NORD 25140: 1991-2003/6, monthly-db NORD 6088: 2003/8-2011/4 and 2020/6-2020/12, ObsDB (calc) 0-23utc NORD 6088: 2011/5-2020/5. 4 months (1993/12, 1994/1, 2000/1, 2002/6) were filled using average values from stations 6080, 6081 and 25348. 2003/7 was filled using an average value from stations 6080, 6081, 6096 and 25348. 2005/4, 2007/8, 2007/9 were filled using average values from stations 6080 Esbjerg Lufthavn, 6081 Blåvandshuk Fyr, 6096 Rømø/Juvre and 6093 Vester Vedsted. 2016/1 was interpolated using surrounding stations.				

<b>Element No.122 (Lowest Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1875 – 2020	Monthly-db NORD 25140/6088 + TR99-5	1752	0
Details: Created using monthly-db NORD 25140: 1875-1960, TR99-5 25140: 1961-1990, monthly-db 6088: 1991-2011/4 and 2020/6-2020/12, ObsDB (calc) 0-23utc NORD 6088: 2011/5-2020/5. 4 months (1993/12, 1994/1, 2000/1, 2002/6) were filled using average values from stations 6080, 6081 and 25348. 2005/4 and 2007/8 were filled using average values from stations 6080 Esbjerg Lufthavn, 6081 Blåvandshuk Fyr, 6096 Rømø/Juvre and 6093 Vester Vedsted. 2016/1 was interpolated using surrounding stations.				

**Table 83. Metadata - Description of monthly/annual data sets; 6088 Nordby. Element 401-801.**

Nordby/Fanø (NORD) – 6088 (continued)

<b>Element No.401 (Average Atmospheric Pressure)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1872 – 2020	Monthly-db NORD 25140 + 6080/6081/6096	1788	5
Details: Created using monthly-db NORD 25140: 1872-1987/7 reduced to mean sea level (see appendix). Extended using the average of 6080, 6081 and 6096 for the period 1987/7 – 2020. Five months 1942/6 – 1942/9 and 1952/11 are missing.				

<b>Element No.601 (Accumulated Precipitation) – Not necessarily homogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1872 – 2020	Monthly-db NORD 25140/6088	1788	0
Details: Created using monthly-db NORD 25140/6088: 1872-2020. 1 month (1993/12) was filled using the average from 4 nearby manual stations (25135 Langli, 25145 Sønderho, 25171 Esbjerg Renseanlæg Vest and 25172 Hjerting). In the period 2 January – 13 June 2009 the daily acc. precipitation are interpolated values. June 11, 2009 an automatic raingauge was installed at 6088 Nordby. Not necessarily homogenous, because of new ways of detection from 2009.				

<b>Element No.602 (Highest 24-hour Precipitation) – Not necessarily homogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1872 – 2020	Monthly-db NORD 25140/6088	1788	0
Details: Created using monthly-db NORD 25140/6088: 1872-2020. 1 month (1993/12) was filled using the average from 3 nearby manual stations (25135 Langli, 25171 Esbjerg Renseanlæg Vest and 25172 Hjerting). In the period 2 January – 13 June 2009 the precipitation are interpolated values. June 11, 2009 an automatic raingauge was installed at 6088 Nordby. Not necessarily homogenous, because of new ways of detection from 2009.				

<b>Element No.701 (Number of Days with Snow Cover) – Not necessarily homogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1957 – 2020	Monthly-db NORD 25140 + 6080 + 25045 +TR99-5	768	0
Details: Created using monthly-db NORD 25140: 1957-1960, TR99-5 NORD 25140: 1961-1990, monthly-db NORD 25140: 1991-2001/8, 6080: 2001/9-2006, 25045: 2007-2020. Jun – Sept. months 1970-1990 had missing zero's which were inserted. 2 missing months (1993/12 and 1994/1) were filled using values from 6080. Not necessarily homogenous, different locations involved.				

<b>Element No.801 (Average Cloud Cover) - Inhomogenous based on a visual test</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1872 – 2020	Monthly-db NORD 25140 + PF-TS126 + 6080 + 6096	1788	5
Details: Created using monthly-db NORD 25140: 1872-1889, PF-TS126 1890-1995 and monthly-db 25140: 1996-1999. 6080 are used for 2000/1- 2000/3 and 6096 for the remaining period 2000/4 – 2020. 6096 are used because 6080 Esbjerg Lufthavn has an unstable number of observations per month. 1959/10 was filled using a value from 6081 Blåvandshuk, 1993/12 + 1994/1 were filled using values from 6080. 2006/1, 2008/2, 2008/3, 2008/8+10, 2010/4+5+6, 2011/10 and 2013/10 were filled using values from 6058 Hvide Sande. 2005/8-9, 2017/2 and 2018/7-8 are missing. April 7, 2000 a ceilometer for automatic detection of cloud cover was installed at 6096 Rømø/Juvre. Inhomogenous based on a visual test, possible several breaks. New ways of detection from 2000.				

**Table 84. Metadata - Description of monthly/annual data sets; 6132 Tranebjerg. Element 101-122.**

**Tranebjerg/Samsø (TRAN) – 6132; 1872-2020**

<b>Element No.101 (Average Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db TRAN 27080/6132 + TR99-5	1776	0
Details: Created using monthly-db TRAN 27080: 1873-1960, TR99-5 27080: 1961-1990, monthly-db TRAN 27080: 1991-2003/7, monthly-db TRAN 6132: 2003/9-2020. 1995/2, 2000/2, 2003/4-5, 2003/8, 2005/1 and 2009/5 were filled using values from 6159 Røsnæs Fyr, the closest station outside Samsø.				

<b>Element No.111 (Average of Daily Maximum Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db TRAN 27080/6132 + TR99-5	1776	4
Details: Created using monthly-db TRAN 27080: 1875-1960, TR99-5 27080: 1961-1990, monthly-db TRAN 27080: 1991-2003/7, monthly-db TRAN 6132: 2003/9-2020. 1873/12, 1925/10, 1947/11 and 1949/3 could not be filled, while 1995/2, 2000/2, 2005/1 and 2009/5 were filled using values from 6159 Røsnæs Fyr.				

<b>Element No.112 (Highest Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db TRAN 27080/6132 + TR99-5	1776	3
Details: Created using monthly-db TRAN 27080: 1873-1960, TR99-5 27080: 1961-1990, monthly-db TRAN 27080: 1991-2003/7, monthly-db TRAN 6132: 2003/9-2020. 1925/10, 1947/11 and 1949/3 could not be filled, while 1995/2, 2000/2, 2003/4 and 2009/5 were filled using values from 6159 Røsnæs Fyr.				

<b>Element No.121 (Average of Daily Minimum Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db TRAN 27080/6132 + TR99-5	1776	2
Details: Created using monthly-db TRAN 27080: 1873-1960, TR99-5 27080: 1961-1990, monthly-db TRAN 27080: 1991-2003/7, monthly-db TRAN 6132: 2003/9-2020. 1947/11 and 1949/3 could not be filled, while 1995/2, 2000/2, 2003/4-5, 2003/8, 2005/1 and 2009/5 were filled using values from 6159 Røsnæs Fyr.				

<b>Element No.122 (Lowest Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db TRAN 27080/6132 + TR99-5	1776	2
Details: Created using monthly-db TRAN 27080: 1873-1960, TR99-5 27080: 1961-1990, monthly-db TRAN 27080: 1991-2003/7, monthly-db TRAN 6132: 2003/8-2020. 1947/11 and 1949/3 could not be filled, while 1995/2, 2000/2 and 2003/4 were filled using values from 6159 Røsnæs Fyr.				

**Table 85. Metadata - Description of monthly/annual data sets; 6132 Tranebjerg. Element 401-801.**

Tranebjerg/Samsø (TRAN) – 6132 (continued)

<b>Element No.401 (Average Atmospheric Pressure)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1872 – 2020	Monthly-db TRAN 27080 + 6159	1777	12
Details: Created using monthly-db TRAN 27080: 1872/12-1987/7 reduced to mean sea level (see appendix). Extended using 6159 Røsnæs Fyr for the period 1987/8 – 2020. One month (2009/2) was filled using an average of 6073 Sletter Hage Fyr, 6169 Griben, 6120 Odense Airport. 2011/9 was filled using 6169 Griben. Twelve months are missing: 1911/5-8, 1924/8, 1925/1, 1945/11, 1946/9, 1947/11, 1949/3, 1972/10-11.				

<b>Element No.601 (Accumulated Precipitation) - Not necessarily homogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db TRAN 27080 + 27082 + 5165	1776	0
Details: Created using monthly-db TRAN 27080: 1873-2001/7, 27082: 2001/8 – 2011/3, /4, monthly-db TRAN 5165: 2011/4-2020. Months 1972/10+11 and 1995/2 were filled using average values from stations 27070 Langør and 27090 Brattingsborg. November 18, 2010 an automatic raingauge was installed at 5165 Tranebjerg Øst. Not necessarily homogenous, because of new ways of detection from 2010.				

<b>Element No.602 (Highest 24-hour Precipitation) - Not necessarily homogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db TRAN 27080 + 27082 + 5165	1776	0
Details: Created using monthly-db TRAN 27080: 1873-2001/7, 27082: 2001/8-2011/3, monthly-db TRAN 5165: 2011/4-2020. Months 1972/10+11 and 1995/2 were filled using average values from stations 27070 Langør and 27090 Brattingsborg. November 18, 2010 an automatic raingauge was installed at 5165 Tranebjerg Øst. Not necessarily homogenous, because of new ways of detection from 2010.				

<b>Element No.701 (Number of days with Snow Cover)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1949 – 2020	Monthly-db TRAN 27080 + TR99-5 + 27082	864	44
Details: Created using monthly-db TRAN 27080: 1949-1960, TR99-5: 1961-1990, monthly-db TRAN 27080: 1991- 2000, 27082: 2004/9 - 2020. Months 1949/3, 1955/1+2 were filled using values from 28180 Blangstedgaard. 44 months are missing: 2001/1 -2004/8. This series was continued from 2004/9 using data from 27082 Tranebjerg Øst.				

<b>Element No.801 (Cloud Cover)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1874 – 2001	Monthly-db TRAN 27080 + 6159 + TR99-5	1546	0
Details: Created using monthly-db TRAN 27080: 1874-1960, TR99-5: 1961-1990, monthly-db TRAN 27080: 1991- 2000/1, monthly-db 6159 2000/2 – 2001/10. Months 1947/4+11, 1948/1+11 were filled using values from 28180 Blangstedgaard. Months 1949/3, 1972/10+11, 1995/2 were filled using values from 6159 Røsnæs Fyr. This series could not without severe problems be extended using data from a station on the islands Fyn or Sjælland i.e. 6159 Røsnæs Fyr, so this is not done.				

**Table 86. Metadata - Description of monthly/annual data sets; 6186 København. Element 101-122.**

**København (KOEB) – 6186; 1768-2020**

<b>Element No.101 (Average Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1768 – 2020	Monthly-db KOEB 6186/30380+ Rundetårn+old Botanical Garden	3036	168
Details: Created using monthly-db KOEB 6186/30380: 1860-2020, and keyed in data from Rundetårn: 1768-1819 and the old Botanical Garden: 1820-1859 (Willaume-Jantzen, V. (1896) [45]). 168 missing months: 1777/1-1781/12 and 1789/1-1797/12.				

<b>Element No. 111 (Average of Daily Maximum Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1861 – 2020	Monthly-db KOEB 6186/30380	1920	0
Details: Created using monthly-db KOEB 6186/30380: 1861-2020. 1970/12 was filled using a value from station 6180 Københavns Lufthavn.				

<b>Element No. 112 (Highest Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1861 – 2020	Monthly-db KOEB 6186/30380	1920	0
Details: Created using monthly-db KOEB 6186/30380: 1861-2020. 1970/12 was filled using a value from station 6180 Københavns Lufthavn.				

<b>Element No. 121 (Average of Daily Minimum Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1861 – 2020	Monthly-db KOEB 6186/30380	1920	0
Details: Created using monthly-db KOEB 6186/30380: 1861-2020. 1970/12 was filled using a value from station 6180 Københavns Lufthavn.				

<b>Element No. 122 (Lowest Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1861 – 2020	Monthly-db KOEB 6186/30380	1920	0
Details: Created using monthly-db KOEB 6186/30380: 1861-2020. 1970/12 was filled using station 6180 Københavns Lufthavn.				



**Table 87. Metadata - Description of monthly/annual data sets; 6186 København. Element 401-801.**

København (KOEB) – 6186 (continued)

<b>Element No.401 (Average Atmospheric Pressure)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1923 – 2020	Monthly-db KOEB 30380 + 6180	1176	1
Details: Created using monthly-db KOEB 30380: 1923/1-1987/7 reduced to mean sea level (see appendix). Extended using 6180 Kbh Lufthavn for the period 1987/8 – 2020. One month is missing: 1957/10. In monthly-db there are also data from 30380 in the period 1860/1- 1875/12 reduced to mean sea level, but these data are not part of this publication.				

<b>Element No. 504 (Hours of bright sunshine)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1876 – 2020	EVL-TS276+Monthly-db KOEB30380/30340/30341/6187	1740	0
Details: Created using EVL-TS276 1876-1997 (see also [30]), monthly-db 30340 Kbh Toldbod: 1998-2004, monthly_db 30341 Kbh Toldbod: 2005-2011 and 6187 Kbh Toldbod: 2012-2020. The EVL-TS276 + 30340 from 1998-2004 series was converted from casella to star level by JC using following monthly conversion factors: (1,05;0,98;0,94;0,91;0,87;0,84;0,83;0,83;0,84;0,88;0,96;1,10) [33].				

<b>Element No. 601 (Accumulated Precipitation) - Not necessarily homogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1821 – 2020	Monthly-db KOEB 6186/30380+30370+5735+old botanical garden	2400	19
Details: Created using monthly-db KOEB 6186/30380: 1860-1995, 30370: 1996-2011/3, monthly-db 5735: 2011/4-2020 plus keyed in data from the old Botanical Garden 1821-1859 (Willaume-Jantzen, V. (1896) [45]). The 19 missing months are in 1825, 1926/1-1926/4 and 1926/9-1926/11. The former published series (latest 1821-2004 and earlier) has been changed, because the use of the station 30381 in that series for the period 1996/1-2004/12 wasn't appropriate. 14 January 2010 an automatic raingauge was installed at 5735 Botanisk Have. Not necessarily homogenous, because of new ways of detection from 2010.				

<b>Element No. 602 (Highest 24-hour Precipitation) - Not necessarily homogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1843 – 2020	Monthly-db KOEB 6186/30380+30370+5735+old botanical garden	2136	0
Details: Created using monthly-db KOEB 6186/30380: 1860-1995, 30370: 1996-2011/3, monthly-db 5735: 2011/4-2020 plus keyed in data from the old Botanical Garden 1843-1859 (Willaume-Jantzen, V. (1896) [45]). For 1974/4 a value from 6180 was used. The former published series (latest 1843-2004 and earlier) has been changed, because the use of the station 30381 in that series for the period 1996/1-2004/12 wasn't appropriate. 14 Jan 2010 an automatic raingauge was installed at 5735 Botanisk Have. Not necessarily homogenous, because of new ways of detection from 2010.				

<b>Element No. 701 (Number of Days with Snow Cover)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1938 – 2020	Monthly-db KOEB 6186/30380+6180+30370+30187+30215	996	0
Details: Created using monthly-db KOEB 6186/30380:1938-1996, 6180:1997-2009, 30370:2010-2017/9, 30187:2017/10-2018/2 and 30215:2018/3-2020. Jun-Sep months 1970-1990 had missing data, zero's were inserted. 1970/12 was filled using a values from 6180.				

<b>Element No. 801 (Cloud Cover) - Inhomogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1876 – 2020	PF-TS153 + Monthly-db KOEB 6186/30380 + 6180	1740	0
Details: Created using monthly-db KOEB 6186/30380: 1876-1889, PF-TS153 1890-1995 and monthly-db 6180: 1996-2020. 1937/1 was filled using 6183, which was the only possibility. From January 2011 observations from a ceilometer for automatic detection of cloud cover are used at some hours at 6180 Kbh Lufthavn. Inhomogenous, because of new ways of detection from 2011.				

**Table 88. Metadata - Description of monthly/annual data sets; 6193 Hammer Odde Fyr. Element 101-122.**

**Hammer Odde Fyr (HAMM) – 6193; 1873-2020**

<b>Element No.101 (Average Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db HAMM 6193/32020 + 32030 + TR99-5	1776	0
Details: Created using monthly-db 1873-1953: 32030 Sandvig, 1953-1960: Average of 32030 and 32020 Hammer Odde Fyr /6193 Hammer Odde Fyr, 1961-1990: TR99-5 6193 Hammer Odde Fyr, 1991-2020: 6193 Hammer Odde Fyr.				

<b>Element No.111 (Average of Daily Maximum Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1875 – 2020	Monthly-db HAMM 6193/32020 + 32030 + TR99-5	1752	0
Details: Created using monthly-db 1875-1953: 32030 Sandvig, 1953-1960: Average of 32030 and 32020/6193, 1961-1990: TR99-5 6193, 1991-2020: 6193 Hammer Odde Fyr. Missing values for 1951/9+10 were filled using 32025 Hammeren Fyr.				

<b>Element No.112 (Highest Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1874 – 2020	Monthly-db HAMM 6193/32020 + 32030 + TR99-5	1764	2
Details : Created using monthly-db 1874-1953: 32030-Sandvig, 1953-1960: Average of 32030 and 32020/6193, 1961-1990: TR99-5 6193, 1991-2020: 6193 Hammer Odde Fyr. Missing 1874/3 and 1874/5. Missing values for 1951/9+10 were filled using 32025 Hammeren Fyr.				

<b>Element No.121 (Average of Daily Minimum Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db HAMM 6193/32020 + 32030 + TR99-5	1776	0
Details: Created using monthly-db 1873-1953: 32030-Sandvig, 1953-1960: Average of 32030 and 32020/6193, 1961-1990: TR99-5 6193, 1991-2020: 6193 Hammer Odde Fyr.				

<b>Element No.122 (Lowest Air Temperature)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db HAMM 6193/32020 + 32030 + TR99-5	1776	0
Details: Created using monthly-db 1873-1953: 32030-Sandvig, 1953-1960: Average of 32030 and 32020/6193, 1961-1990: TR99-5 6193, 1991-2020: 6193 Hammer Odde Fyr.				

**Table 89. Metadata - Description of monthly/annual data sets; 6193 Hammer Odde Fyr. Element 401-801.**

Hammer Odde Fyr (HAMM) – 6193 (continued)

<b>Element No.401 (Average Atmospheric Pressure)</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db HAMM 6193/32020 + 32030	1776	0
Details: Created using monthly-db 1873-1970: 32030-Sandvig reduced to mean sea level (see appendix), 1971-1987/06: 32020 Hammer Odde Fyr/Lighthouse reduced to mean sea level (see appendix) and 1987/07-2020: 6193 Hammer Odde Fyr/Lighthouse. Missing value 1966/07 filled with 32020 reduced to mean sea level.				

<b>Element No.601 (Accumulated Precipitation) - Not necessarily homogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db HAMM 6193/32020 + 32030	1776	0
Details: Created using monthly-db 1873-1953: 32030-Sandvig, 1953-1971: Average of 32030 and 32020/6193, 1971-2020: 6193/32020-Hammer Odde Fyr. The value for 2009/3 is added 3,0 mm (missing values have been replaced by interpolated values 4-9/3). The value for 2011/9 is added 0,4 mm (missing values have been replaced by interpolated values 1/10) and 2011/10 is added 21,6 mm (missing values have been replaced by interpolated values 2-14/10). August 30, 2001 an automatic raingauge was installed at 6193 Hammer Odde Fyr. Not necessarily homogenous, because of new ways of detection from 2001.				

<b>Element No.602 (Highest 24-hour Precipitation) - Not necessarily homogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	Monthly-db HAMM 6193/32020 + 32030	1776	0
Details: Created using monthly-db 1873-1953: 32030-Sandvig, 1953-1971: Average of 32030 and 32020/6193, 1971-2020: 6193/32020-Hammer Odde Fyr. Missing values (1948/3, 1951/7 and 1952/12) were filled using values from 32025 Hammeren Fyr. August 30, 2001 an automatic raingauge was installed at 6193 Hammer Odde Fyr. Not necessarily homogenous, because of new ways of detection from 2001.				

<b>Element No.701 (Number of days with Snow Cover) – Not necessarily homogenous</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1939 – 2020	Monthly-db HAMM 6193/32020+32030+6190+32080 +32175	984	10
Details: Created using monthly-db Average of 32030-Sandvig 1939-1971, 6193/32020 Hammer Odde Fyr, 6190 1953-2002, Bornholms Lufthavn 32080 Klemensker 2002-2010/7 and 32175 Østerlars 2010/8-2020. Period 2001/9-2002/12 taken from 6190 because 6193 had stopped these observations. 2004/1-2005/12 taken from 32080 Klemensker because 6190 had stopped these observations. Out of the 46 missing values, the the months 6, 7, 8 and 9 in the period 1971-77 and 2003 were set to zero. After this, 11 missing months are left. One (1955/1) was filled using 32025 Hammeren Fyr. The remaining ten (1952/1, 1953/5, 2003/1-5 and 2003/9-12) are missing, since there are no observations of element 701 on Bornholm for these months. Not necessarily homogenous, many different locations involved.				

<b>Element No.801 (Average Cloud Cover) - Inhomogenous based on a visual test</b>				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	PF-TS97 + Monthly-db HAMM 6193/32020 + 32030	1776	17
Details: Created using monthly-db 32030: 1873-1889, PF-TS97 1890-1995 and monthly-db 6193: 1996-2020. 14 months missing from PF-TS97: 1911/1,1953/5,1966/7,1973/3+7,1974/3+7+12,1987/7-12. 1953/5 and 1966/7 were filled with 32020. 1973/3+7 and 1974/3+7 were filled using values from 6190. 1974/12 by an average of 6191 Christianø Fyr and 6199 Dueodde Fyr. 1987/7-12 were filled with 6193. Missing 1911/1, 2009/1-4, 2010/7-2011/6 and 2018/8. August 30, 2001 a ceilometer for automatic detection of cloud cover was installed at 6193 Hammer Odde Fyr. Inhomogenous based on a visual test, possible several breaks. New ways of detection from 2001.				

Additional general note on regarding monthly data of atmospheric pressure: The reading of a mercury barometer is proportional to the length of a mercury column in the barometer, which is balanced against the weight of the entire atmospheric column of air above the open surface of the mercury. The mercury barometer was therefore calibrated to "standard conditions" (0°C and a certain standard gravity). At other conditions corrections must be used.

The formula used to correct old barometer readings for the stations presented in this publication is given below. The formula simply corrects for gravity (part 1) and reduces the pressure to mean sea level (part 2):

$$P * (1 - 0,00259 * \cos (2 * \varphi * \pi / 180)) * (1 + 9.82 / 287.04 * h / (T / 10 + 273.15))$$

P is atmospheric pressure (0.1 hPa) at station level,  $\varphi$  is the latitude in degrees, h is the height of the barometer in meters above sea level and T is the air temperature at station level (0.1 °C)

For the calculation are used monthly means of P and T. This introduces an error compared to a reduction performed on the actual observations. The error is proportional to the difference between 'the average P to T ratio' and 'the ratio of average P to average T' (T in Kelvin). This means the error is zero if T is constant within the period. Within a month the maximum T-range would normally be within 30 degrees. And a numerical variation of 30 is small when compared to the air temperature in Kelvin and the atmospheric pressure in 0.1 hPa. Therefore the error introduced by using monthly values may be considered small.

The different station specific corrections, which have been used in the construction of the pressure series in this report can be seen in the tables 65-73. The information can also be collected in the DMI publication: DMI Technical Report 03-24: Metadata, selected climatological and synoptic stations, 1750-1996, Copenhagen 2003 [35], which can be downloaded from the publication part of DMI's web site.

## 19 Appendix 5: Country-wise section - File Formats and metadata

Monthly and annual country-wise Danish climate data 1874-2020 arranged in a table are included in this report as an Excel file. The table contain values of air temperature, precipitation and hours of bright sunshine, weather describing text and weather records from Denmark as a whole since 1874. The figures can be compared with the Standard Normal values from the period 1961-90 (latest WMO recommended), the average 2001-2010 and the average 2006-2015 by moving the cursor to the figure. Every month and year in the period 1891-2020 are characterised by a short text as well as the weather during Easter, Christmas and Midsummer Day. The different record breaking months and years are also marked.

The file name is determined as follows: dk\_country\_table\_<period>.xlsx  
In this report one (1) Excel-file: dk\_country\_table\_1874\_2020.xlsx

Format of the country-wise monthly/annual table file:

For every month and year the file contains one line in the following format:

1. Year
2. Month
3. Eventually a mark indicating a weather record "R", or an equal weather record "Rt".
4. General description of the weather in text (Danish only) 1891-2020
5. Average air temperature 1874-2020
6. Highest air temperature 1874-2020
7. Lowest air temperature 1874-2020
8. Average of daily maximum air temperature 1953-2020
9. Average of daily minimum air temperature 1953-2020

10. Accumulated precipitation 1874-2020
11. Highest 24-hour precipitation at a single station 1874-2020
12. Accumulated hours of bright sunshine 1920-2020
13. The weather during Easter, Christmas and Midsummer Day are stated in "Særlige begivenheder"(special events) with matching dates (Danish only) 1891-2020

The element/parameter numbers and units can be seen in the data dictionary, table 30 in section 10.

The country-wise Danish climate extremes are separately included (table) as an Excel file.

The file name is determined as follows: dk\_country\_table\_extremes\_<period>.xlsx  
In this report one (1) Excel-file: dk\_country\_table\_extremes\_1874\_2020.xlsx

Format of the country-wise monthly/annual extreme table file:

For the twelve months and the year the file contains an extreme for the following parameters in the the specified order:

1. Month and Year
2. Highest air temperature 1874-2020
3. Lowest air temperature 1874-2020
4. Highest average air temperature 1874-2020
5. Lowest average air temperature 1874-2020
6. Highest accumulated hours of bright sunshine 1920-2020
7. Lowest accumulated hours of bright sunshine 1920-2020
8. Highest accumulated precipitation 1874-2020
9. Lowest accumulated precipitation 1874-2020
10. Highest 24-hour precipitation at a single station 1874-2020

The element/parameter numbers and units can be seen in the data dictionary, table 32 in section 10.

Monthly/annual country-wise data series of annual average air temperature, accumulated precipitation and hours of bright sunshine within the period 1873-2020 for Denmark as a whole are also included as an Excel file.

The file name is determined as follows: dk\_country\_dataserie\_tps\_<period>.xlsx  
In this report one (1) Excel-file: dk\_country\_dataserie\_tps\_1873\_2020.xlsx

Four (4) different sheets contain the four (4) elements/parameters: monthly/annual published/corrected average air temperature, accumulated precipitation and hours of bright sunshine. Any missing values are filled with "null".

Format of the country-wise monthly/annual data series:

For the twelve months and the year the file contains values in separate sheets for the following parameters in the specified order:

1. Average air temperature (published) 1873-2020
2. Average air temperature (corrected) 1873-2020
3. Hours of bright sunshine 1920-2020
4. Accumulated precipitation 1874-2020

The format is:

Station number; "DK" for Denmark/country-wise (stat\_no); element number (elem\_no); year (year); January value (jan); February value (feb); March value (mar); April value (apr); May value (may); June value (jun);

July value (jul); August value (aug); September value (sep); October value (oct); November value (nov);  
December value (dec); Annual value (annual)

The element/parameter numbers and units can be seen in the data dictionary, table 35 in section 10.

Data are only to be used with proper reference to the accompanying report: Cappelen, J. (ed), 2021:  
Denmark - DMI Historical Climate Data Collection 1768-2020. DMI Report No. 21-02. Copenhagen.

## 20 Appendix 6: Graphics section - File Formats and metadata

The graphics included in this report contain annual average air temperatures (5 station/2 country-wise data sets), annual accumulated precipitation (5 station/1 country-wise data sets), annual accumulated hours of bright sunshine (1 station/1 country-wise data set) and number of hurri-canes/strong storms (1 country-wise data set) within the period 1768-2020.

The file names are determined as follows:

dk\_graph\_annual\_pubtemperature\_country\_<period>.png  
dk\_graph\_annual\_corrtemperature\_country\_<period>.png  
dk\_graph\_annual\_precipitation\_country\_<period>.png  
dk\_graph\_annual\_sunshine\_country\_<period>.png  
dk\_graph\_annual\_temperature\_<station number>\_<period>.png  
dk\_graph\_annual\_precipitation\_<station number>\_<period>.png  
dk\_graph\_sunshine\_<station number>\_<period>.png  
dk\_graph\_storm\_<period>.png

In this report sixteen (16) png-files:

dk\_graph\_annual\_pubtemperature\_country\_1873\_2020.png  
Annual average air temperatures 1873-2020 (published); anomaly relative to 1981-2010. Country-wise, Denmark. (English version)

dk\_graph\_annual\_corrtemperature\_country\_1873\_2020.png  
Annual average air temperatures 1873-2020 (corrected); anomaly relative to 1981-2010. Country-wise, Denmark. (English version)

dk\_graph\_annual\_precipitation\_country\_1874\_2020.png  
Annual accumulated precipitation 1874-2020; anomaly relative to 1981-2010. Country-wise, Denmark. (English version)

dk\_graph\_annual\_sunshine\_country\_1920\_2020.png  
Annual accumulated hours of bright sunshine 1920-2020; anomaly relative to 1981-2010. Country-wise, Denmark. (English version)

dk\_graph\_annual\_temperature\_6051\_1874\_2020.png  
Annual average air temperatures 1873-2020; anomaly relative to 1981-2010. Vestervig, Denmark. (English version)

dk\_graph\_annual\_precipitation\_6051\_1874\_2020.png  
Annual accumulated precipitation 1874-2020; anomaly relative to 1981-2010. Vestervig, Denmark. (English version)

dk\_graph\_annual\_temperature\_6088\_1872\_2020.png

Annual average air temperatures 1872-2020; anomaly relative to 1981-2010. Nordby (Fanø), Denmark. (English version)

dk\_graph\_annual\_precipitation\_6088\_1872\_2020.png  
Annual accumulated precipitation 1872-2020; anomaly relative to 1981-2010. Nordby (Fanø), Denmark. (English version)

dk\_graph\_annual\_temperature\_6132\_1873\_2020.png  
Annual average air temperatures 1873-2020; anomaly relative to 1981-2010. Tranebjerg (Samsø), Denmark. (English version)

dk\_graph\_annual\_precipitation\_6132\_1873\_2020.png  
Annual accumulated precipitation 1873-2020; anomaly relative to 1981-2010. Tranebjerg (Samsø), Denmark. (English version)

dk\_graph\_annual\_temperature\_6186\_1768\_2020.png  
Annual average air temperatures 1768-2020; anomaly relative to 1981-2010. København, Denmark. (English version)

dk\_graph\_annual\_precipitation\_6186\_1821\_2020.png  
Annual accumulated precipitation 1821-2020; anomaly relative to 1981-2010. København, Denmark. (English version)

dk\_graph\_annual\_sunshine\_6186\_1876\_2020.png  
Annual accumulated hours of bright sunshine 1876-2020; anomaly relative to 1981-2010. København, Denmark. (English version)

dk\_graph\_annual\_temperature\_6193\_1873\_2020.png  
Annual average air temperatures 1873-2020; anomaly relative to 1981-2010. Hammer Odde Fyr (Bornholm), Denmark. (English version)

dk\_graph\_annual\_precipitation\_6193\_1873\_2020.png  
Annual accumulated precipitation 1873-2020; anomaly relative to 1981-2010. Hammer Odde Fyr (Bornholm), Denmark. (English version)

dk\_graph\_storm\_1891\_2020.png  
Hurricanes and strong storms 1891-2020, Denmark; 5-year groups. Denmark. (English version)

Data are only to be used with proper reference to the accompanying report: Cappelen, J. (ed), 2021: Denmark - DMI Historical Climate Data Collection 1768-2020. DMI Report No. 21-02. Copenhagen.

## 21 Appendix 7: Storm section - File Formats and metadata

A list of storms included in this report contains all classified storms in Denmark 1891-2020.

The file name is determined as follows: dk\_table\_storm\_<period>.pdf  
In this report one (1) pdf-file: dk\_table\_storm\_1891\_2020.pdf

For every classified storm the format is as follows:

1. Period - Days.
2. Period - Year.
3. Remarks.

4. Classification - Date.
5. Classification - Index.

Data are only to be used with proper reference to the accompanying report: Cappelen, J. (ed), 2021: Denmark - DMI Historical Climate Data Collection 1768-2020. DMI Report No. 21-02. Copenhagen.