Danish Meteorological Institute

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Denmark - DMI Historical Climate Data Collection 1768-2019

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Colophon

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Important note:
This report is an comprehensive annual update (2019 data) of the “DMI daily, monthly, annual and country-wise Danish climate data collection” published for the first time in that form in 1) DMI Technical Report 08-05: DMI Daily Climate Data Collection 1873-2007, Denmark, The Faroe Islands and Greenland - including Air Pressure Observations 1874-2007 (WASA Data Sets). Copenhagen 2008 [14], 2) DMI Technical Report 04-03: DMI Daily Climate Data Collection 1873-2003, Denmark and Greenland. Copenhagen 2004 [37], 3) 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], 4) 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], 5) 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 6) DMI Teknisk Rapport 09-12: Storm og ekstrem vind i Danmark – opgørelser og analyser september 2009. København 2009 [15].

Front Page:
DMI automatic weather station. Measurements: Wind speed/-direction 10 m above ground, atmospheric pressure in the cabinet on the mast, radiation and temperature/humidity on the mast bar 2 m above ground and precipitation to the right in a weighting raingauge. Photo: DMI Technicians.

Danish Meteorological Institute

Content

Abstract

This report contains the available DMI historical data collection 1768-2019 for Denmark, including observations (atmospheric pressure), long daily, monthly and annual series of station based data, country-wise values and a list of storms.

Resumé

Denne rapport indeholder tilgængelige historiske DMI datasamlinger 1768-2019 for Danmark. Det drejer sig om observationer af lufttryk, lange daglige, månedlige og årlige stationsdataserier, landstal og en stormliste.

1. Preface

This report contains a DMI historical data collection 1768-2019 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.

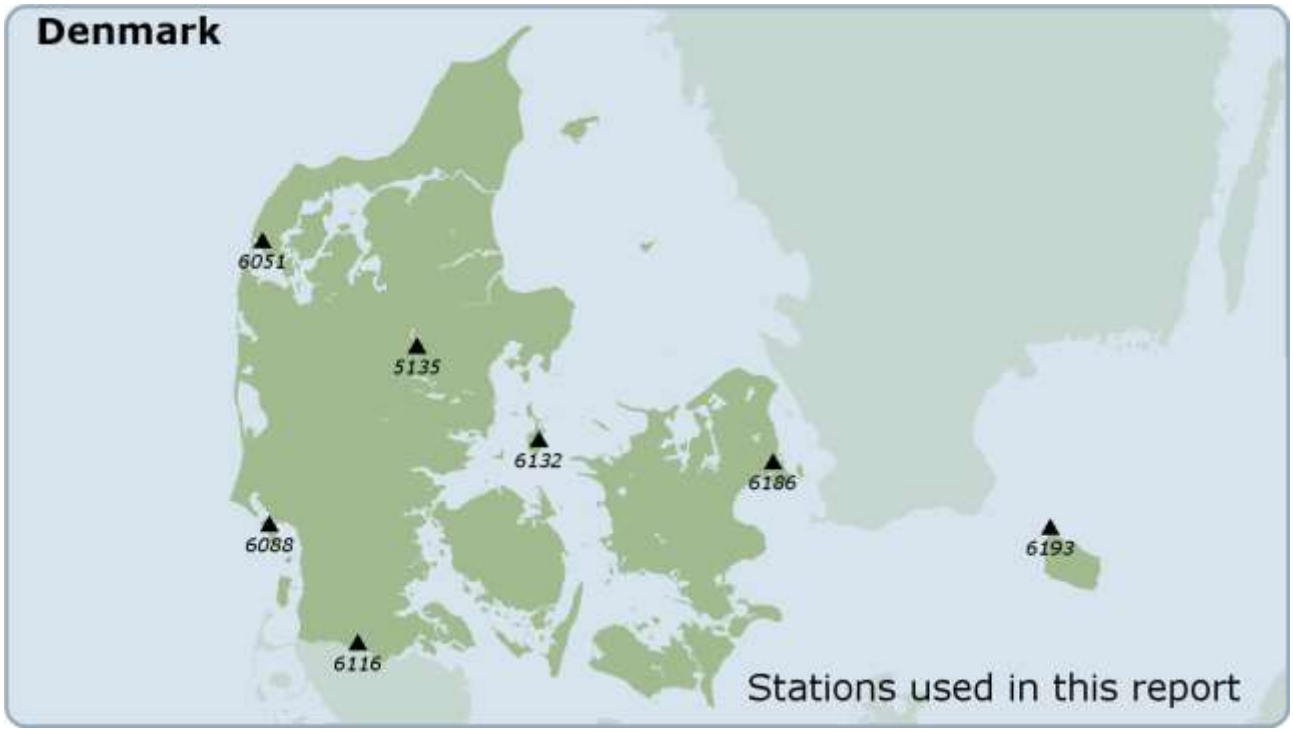
2. Overall data overview

Below is a quick 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 comes from.
- Description of the general weather and climate in Denmark.
- A survey and description of the different data collections and parameters.
- 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 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.

2.1. Stations



Station based data sets referred to in the report. 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.

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

**latest station number and name*

2.2. Data collections 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.

Type	Data Collections	Section, Page, Appendix
Observation	• **Atmospheric pressure (msl)** 3 data sets (blended): 6051 Vestervig (1874-2019) 6088 Nordby/Fanø (1874-2019) 6193 Hammer Odde Fyr (1874-2019)	**Sec 4.2.1., p 16, App 2**
Daily	• **Air temperature 12 UTC (13 DNT)** 2 data sets (single stations): 27080 Tranebjerg (1872-2003) 6132 Tranebjerg (2003-2019) 1 data set (blended): 6132 Tranebjerg (1872-2019) • **Highest air temperature** • **Lowest air temperature** 22 data sets (single stations): 21100 Vestervig (1874-2003) 6051 Vestervig (2003-2019) 25140 Nordby/Fanø (1874-2003) 6088 Nordby/Fanø (2003-2019) 27080 Tranebjerg (1872-2003) 6132 Tranebjerg (2003-2019) 30380 Landbohøjskolen (1874-1997) 6186 Landbohøjskolen (1995-2019) 32030 Sandvig (1874-1970) 32020 Hammer Odde Fyr (1971-1987) 6193 Hammer Odde (1984-2019) 10 data sets (blended): 6051 Vestervig (1874-2019) 6088 Nordby/Fanø (1874-2019) 5165 Tranebjerg (1872-2019) 6186 København (1874-2019) 6193 Hammer Odde (1874-2019) • **Average atmospheric pressure** 5 data sets (single stations): 21100 Vestervig (1874-1987) 6052 Thyborøn (1961-2019) 25140 Nordby/Fanø (1874-1987) 6080 Esbjerg Airport (1959-2019) 6193 Hammer Odde Fyr (1874-2019) 3 data sets (blended): 6051 Vestervig (1874-2019) 6088 Nordby/Fanø (1874-2019) 6193 Hammer Odde (1874-2019) • **Accumulated precipitation** 15 data sets (single stations): 6051(21100) Vestervig (1874-2019) 5135 (21430) Grønbæk (1874-2019)	**Sec 5.2.1.-5.2.6., p 20-23, App 3**

	6088 (25140) Nordby/Fanø (1874-2019) 26410 Broderup (1920-1993) 26409 Tinglev (1995-2006) 6116 (26400) Store Jyndevad (1987-2019) 27080 Tranebjerg (1872-2001) 6132 (27082) Tranebjerg Øst (2001-2019) 30380 Landbohøjskolen (1874-1996) 30210 Meteorologisk Institut (1875-1922) 30210 Meteorologisk Institut (1961-1984) 5735 (30370) Botanisk Have (1961-2019) 32030 Sandvig (1874-1970) 32020 Hammer Odde Fyr (1961-1987) 6193 Hammer Odde (1984-2019) 7 data sets (blended): 6051 Vestervig (1874-2019) 5135 Grønbæk (1874-2019) 6088 Nordby/Fanø (1874-2019) 5165 Tranebjerg (1872-2019) 6116 Store Jyndevad (1920-2019) 5735 København (1874-2019) 6193 Hammer Odde (1874-2019) • **Cloud Cover 8, 14 and 21 DNT** 1 dataset (single station): 6132 Tranebjerg (1872-2000)	
Monthly/ Annual	• **Average air temperature** • **Average daily minimum air temperature** • **Average daily maximum air temperature** • **Highest air temperature** • **Lowest air temperature** • **Average atmospheric pressure (msl)** • **Hours of bright sunshine** • **Accumulated precipitation** • **Highest 24-hour precipitation** • **No. of days with snow cover** • **Average cloud cover** 5 data sets (blended): 6051 Vestervig (1874-2019) 6088 Nordby/Fanø (1872-2019) 6132 Tranebjerg (1873-2019) 6186 København (1768-2019) 6193 Hammer Odde Fyr (1873-2019)	**Sec 6.2.1-6.2.11, p 27-30, App 4**
Country-wise/ Monthly/ Annual	• **Country-wise (Denmark) climate data 1874-2019; Average air temperature, Average of minimum and maximum air temperatures, highest/lowest air temperatures, accumulated precipitation, highest 24-hour precipitation and hours of bright sun-shine; tables** 2 data sets: All months/years 1891-2019 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.	**Sec 7.2.1-7.2.2, p 33-37, App 5**

	• **Country-wise (Denmark) climate data 1874-2019; Average air temperature, accumulated precipitation, and hours of bright sunshine** 4 data sets: Average air temperature; published (1873-2019) Average air temperature; corrected (1873-2019) Accumulated precipitation (1874-2019) Hours of bright sunshine (1920-2019)	
Graphics/ Annual	• **Average air temperature; graph** 7 data sets (blended): 6051 Vestervig (1874-2019) 6088 Nordby/Fanø (1872-2019) 6132 Tranebjerg (1873-2019) 6186 København (1768-2019) 6193 Hammer Odde Fyr (1873-2019) Country-wise; published (1873-2019) Country-wise; corrected (1873-2019) • **Accumulated hours of bright sunshine; graph** 2 data set (blended): 6186 København (1876-2019) Country-wise (1920-2019) • **Accumulated precipitation; graph** 6 data sets (blended): 6051 Vestervig (1874-2019) 6088 Nordby/Fanø (1872-2019) 6132 Tranebjerg (1873-2019) 6186 København (1821-2019) 6193 Hammer Odde Fyr (1873-2019) Country-wise (1874-2019)	**Sec 8.2., p 40-41, App 6**
Storm	• **List of storms 1891-2019 (Denmark); table** 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 9.2.1., p 51-56, App 7**

Important note: The cut-off data for the quality control of Danish 2019 data is February, 2019. 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 2019 minor changes can have been introduced for the same reason.

2.3 Data Dictionary

Elements/Parameters used in this report. 'Method' specifies whether the element is a sum, an average or an extreme. The units of the monthly values in the data files are specified in 'Unit'. The DMI system of element numbers contains more than the shown elements.

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	%

3. Climate and weather 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°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°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.

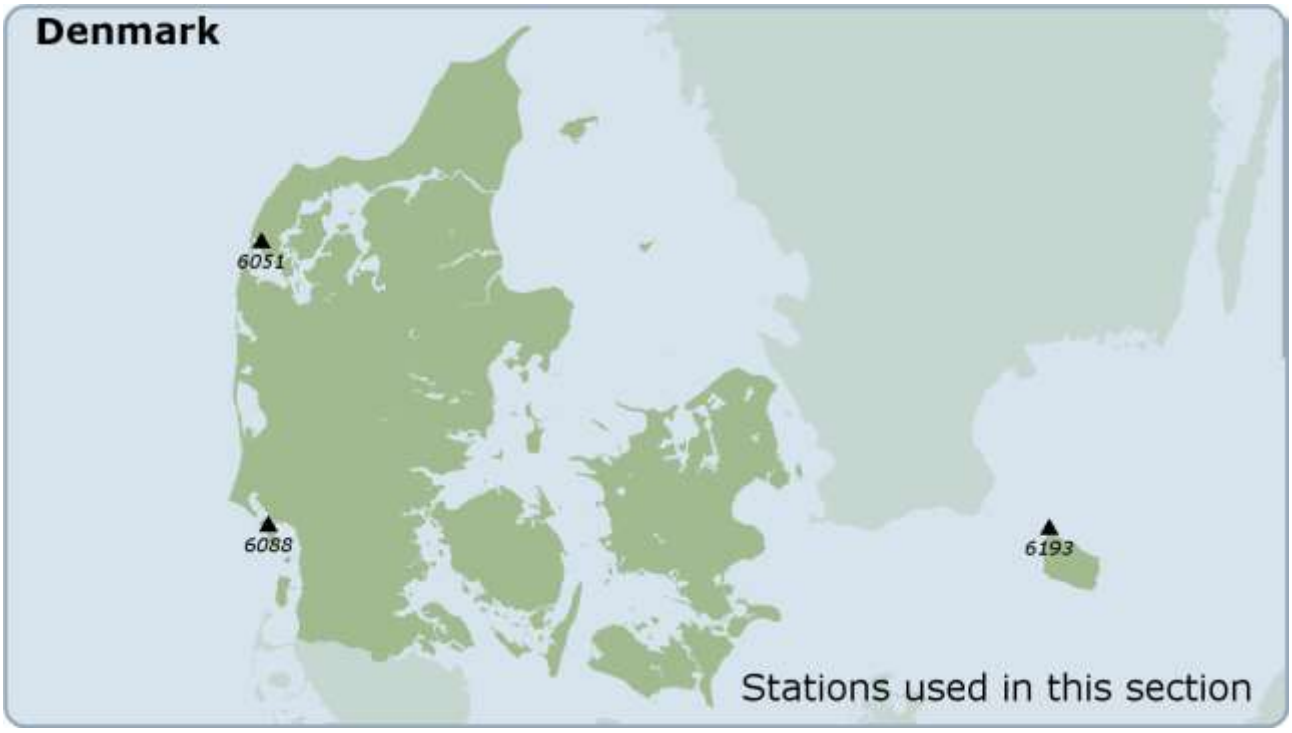
The easterly wind
In Denmark, the easterly wind is not as frequent as the westerly, as it is a sign of the inverse of the normal distribution of lows and highs, namely lows to the south and highs to the north. In this situation, the weather is subject to considerable continental influence, since the 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.

4. Observational Section: Historical DMI Data Collection

Type	Data Collections	Section, Page, Appendix
Observation	• **Atmospheric pressure (msl)** 3 data sets (blended): 6051 Vestervig (1874-2019) 6088 Nordby/Fanø (1874-2019) 6193 Hammer Odde Fyr (1874-2019)	**Sec 4.2.1., p 16, App 2**



Station based data sets referred to in this section. 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. "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 1.2 and 2.2).

Latest earlier report:
[21] Cappelen, J. (ed), 2019: Denmark - DMI Historical Climate Data Collection 1873-2018. DMI Report No. 19-02.

4.1. Introduction

The purpose of this section is to publish three Danish mean sea level atmospheric pressure data sets; Vestervig, Nordby/Fanø, Hammer Odde Fyr (*observations)* covering the period 1874-2019.

According to the intensions to update regularly, preferably every year, this particular report contains an update (2019 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 Faroes 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 4.1.1. Location of the stations that originally provided atmospheric pressure observations to the WASA pressure data set [43]. In this report three updated Danish series Hammer Odde Fyr, Nordby/Fanø and Vestervig are presented. The stations representing these sites are listed in the table 4.2.1. For station co-ordinates confer with the station position file in the data files included in this report (see Appendix 1). Pressure data sets from Tasiilaq/Ammassalik, Greenland and Tórshavn, The Faroe Islands are presented in the representative historical Climate Data Collection; DMI Report 20-04 [23] and DMI Report 20-05 [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 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.

During the WASA project the data have been homogenised. The updated series presented in this report have 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 mean sea level atmospheric pressure 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 2.

4.2. Observational data

4.2.1. Atmospheric pressure

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 4.2.1 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 4.2.1. Appendix 2.2 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 5.2.6 are constructed using the digitised material mentioned above only applying the formulas that can be seen in Appendix 3.3. Other adjustments (Appendix 3.4) 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 5.3.6 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 4.2.1. 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 1874-2019	Vestervig	dk_obs_401: 6051	1874-1987	Atmospheric pressure (msl)
	Thyborøn		1987-2019	Atmospheric pressure (msl)
Nordby/Fanø 1874-2019	Nordby/Fanø	dk_obs_401: 6088	1874-1987	Atmospheric pressure (msl)
	Esbjerg Airport		1987-2019	Atmospheric pressure (msl)
Hammer Odde Fyr 1874-2019	Sandvig or Hammer Odde Fyr	dk_obs_401: 6193	1874-1987	Atmospheric pressure (msl)
	Hammer Odde Fyr		1987-2019	Atmospheric pressure (msl)

**Blended data sets are a part of this observational section, see details in Appendix 2.2.*
***Single station series are not a part of this observational section.*

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

4.2.2. Data Dictionary

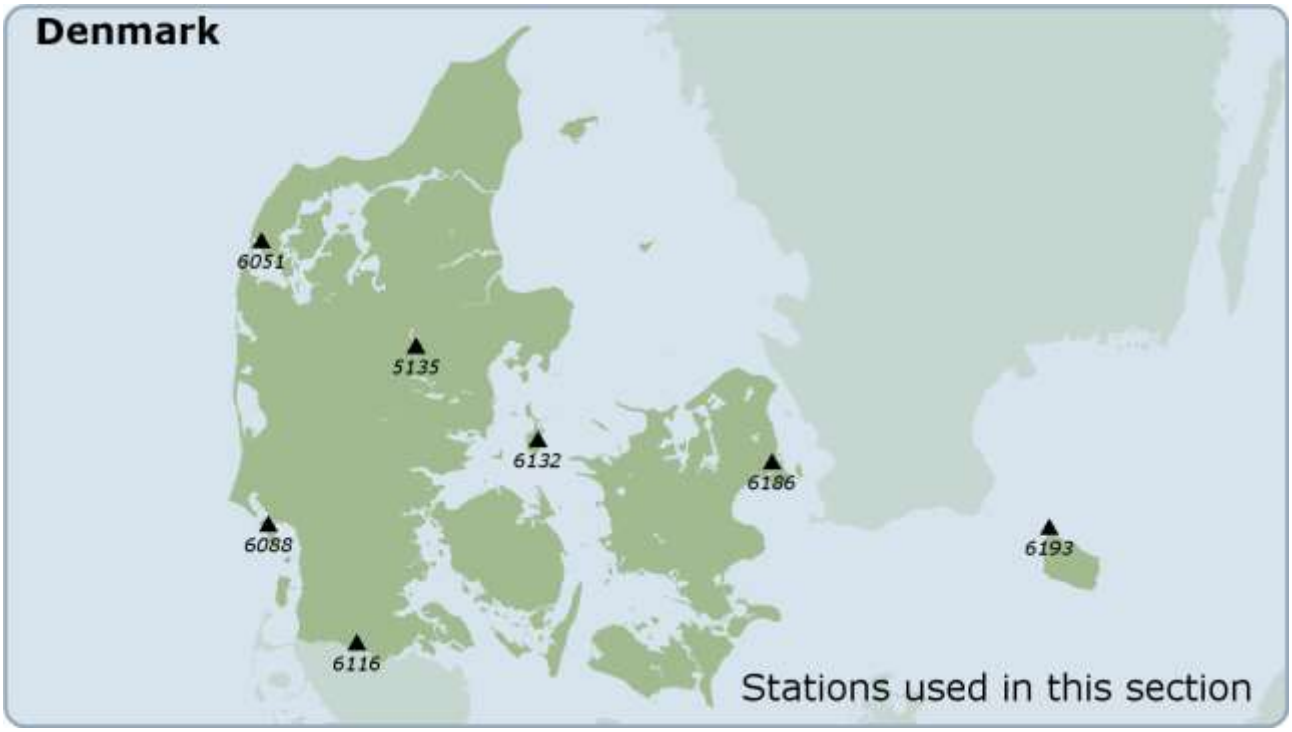
Table 4.2.2. Element/Parameter used in this section. 'Method' specifies that the parameter is an observation. The units of the observation values in the data files are specified in 'Unit'.

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

5. Daily Section: Historical DMI Data Collection

Type	Data Collections	Section, Page, Appendix
Daily	• **Air temperature 12 UTC (13 DNT)** 2 data sets (single stations): 27080 Tranebjerg (1872-2003) 6132 Tranebjerg (2003-2019) 1 data set (blended): 6132 Tranebjerg (1872-2019) • **Highest air temperature** • **Lowest air temperature** 22 data sets (single stations): 21100 Vestervig (1874-2003) 6051 Vestervig (2003-2019) 25140 Nordby/Fanø (1874-2003) 6088 Nordby/Fanø (2003-2019) 27080 Tranebjerg (1872-2003) 6132 Tranebjerg (2003-2019) 30380 Landbohøjskolen (1874-1997) 6186 Landbohøjskolen (1995-2019) 32030 Sandvig (1874-1970) 32020 Hammer Odde Fyr (1971-1987) 6193 Hammer Odde (1984-2019) 10 data sets (blended): 6051Vestervig (1874-2019) 6088 Nordby/Fanø (1874-2019) 5165 Tranebjerg (1872-2019) 6186 København (1874-2019) 6193 Hammer Odde (1874-2019) • **Average atmospheric pressure** 5 data sets (single stations): 21100 Vestervig (1874-1987) 6052 Thyborøn (1961-2019) 25140 Nordby/Fanø (1874-1987) 6080 Esbjerg Airport (1959-2019) 6193 Hammer Odde Fyr (1874-2019) 3 data sets (blended): 6051Vestervig (1874-2019) 6088 Nordby/Fanø (1874-2019) 6193 Hammer Odde (1874-2019) • **Accumulated precipitation** 15 data sets (single stations): 6051(21100) Vestervig (1874-2019) 5135 (21430) Grønbæk (1874-2019) 6088 (25140) Nordby/Fanø (1874-2019) 26410 Broderup (1920-1993) 26409 Tinglev (1995-2006) 6116 (26400) Store Jyndevad (1987-2019) 27080 Tranebjerg (1872-2001) 6132 (27082) Tranebjerg Øst (2001-2019) 30380 Landbohøjskolen (1874-1996) 30210 Meteorologisk Institut (1875-1922)	**Sec 5.2.1.-5.2.6., p 20-23, App 3**

	30210 Meteorologisk Institut (1961-1984) 5735 (30370) Botanisk Have (1961-2019) 32030 Sandvig (1874-1970) 32020 Hammer Odde Fyr (1961-1987) 6193 Hammer Odde (1984-2019) 7 data sets (blended): 6051Vestervig (1874-2019) 5135 Grønbæk (1874-2019) 6088 Nordby/Fanø (1874-2019) 5165 Tranebjerg (1872-2019) 6116 Store Jyndevad (1920-2019) 5735 København (1874-2019) 6193 Hammer Odde (1874-2019) • **Cloud Cover 8, 14 and 21 DNT** 1 dataset (single station): 6132 Tranebjerg (1872-2000)	



Station based data sets referred to in the report. 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 (see more details in Appendix 1 and 3).

Latest earlier report:
[21] Cappelen, J. (ed), 2019: Denmark - DMI Historical Climate Data Collection 1873-2018. DMI Report No. 19-02.

5.1. Introduction

The purpose of this section is to publish available long *daily* DMI data series 1873-2019 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 intensions to update regularly, preferably every year, this particular report contains an update (2019 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 6 and 7 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[1], ACCORD[2] project, NACD[3] project and the Danish CD-ROM "Vejr&Vind"[4] have all contributed regarding the data from Denmark together with a digitisation during spring 1999 funded by the Danish Climate Centre[5].

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)[6]. ECA&D was initiated by the European Climate Support Network (ECSN[7]) which is a project within the Network of European Meteorological Services (EUMETNET[8]).

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 3.6). For supplementary metadata see also DMI Technical Report 03-24 [35].

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.

[1] WASA: 'The impact of storms on waves and surges: Changing climate in the past 100 years and perpectives for the future'. See [43,44].
[2] EU project number ENV-4-CT97-0530: Atmospheric Circulation Classification and Regional Downscaling. [1]
[3] EU project number EV5V CT93-0277: North Atlantic Climatological Dataset. See [27].
[4] Vejr & Vind. CD-ROM. Munksgaard Multimedia, Copenhagen 1997 [39].
[5] The Danish Climate Centre (DKC) was established 1998 at DMI. DKC was closed 2014 in a reorganisation of DMI.
[6] Project homepage: http://www.ecad.eu/
[7] http://www.eumetnet.eu/ecsn
[8] http://www.eumetnet.eu/

5.2. Daily data

5.2.1. Air temperature at 14 hours DNT or 12 UTC

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 5.2.1 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 5.2.1. Data sets and station series; air temperature at 14 hours DNT/13 UTC (element number 101). 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. See details in Appendix 3.

Dataset*	Station series	Dataset id	Period	Parameter
Tranebjerg 1872-2019	Tranebjerg	dk_daily_101: 27080	1872-2003	Air temperature 14DNT/13UTC
	Tranebjerg Øst	dk_daily_101: 6132	2003-2019	Air temperature 13DNT/12UTC

Important 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.

**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 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.

5.2.2. Highest air temperature

Eleven (11) Danish station series with a record of daily highest air temperatures can be blended into five (5) long datasets. Table 5.2.2 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 5.2.2. Data sets and station series; daily highest air temperature (element number 112). See details in Appendix 3.

Dataset*	Station series	Dataset id	Period	Parameter
Vestervig 1874-2019	Vestervig	dk_daily_112: 21100	1874-2003	Highest temperature
	Vestervig	dk_daily_112: 6051	2003-2019	Highest temperature
Nordby/Fanø 1874-2019	Nordby/Fanø	dk_daily_112: 25140	1874-2003	Highest temperature
	Nordby/Fanø	dk_daily_112: 6088	2003-2019	Highest temperature
Tranebjerg 1873-2019	Tranebjerg	dk_daily_112: 27080	1873-2003	Highest temperature
	Tranebjerg Øst	dk_daily_112: 6132	2003-2019	Highest temperature
København 1874-2019	Landbohøjskolen	dk_daily_112: 30380	1874-1997	Highest temperature
	Landbohøjskolen	dk_daily_112: 6186	1995-2019	Highest temperature
Hammer Odde Fyr 1874-2019	Sandvig	dk_daily_112: 32030	1874-1970	Highest temperature
	Hammer Odde Fyr	dk_daily_112: 32020	1971-1987	Highest temperature
	Hammer Odde Fyr	dk_daily_112: 6193	1984-2019	Highest temperature

Important 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.

**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 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.

5.2.3. Lowest air temperature

Eleven (11) Danish station series with a record of daily lowest air temperatures can be blended into five (5) long datasets. Table 5.2.3 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 5.2.3. Data sets and station series; daily lowest air temperature (element number 122). See details in Appendix 3.

Dataset*	Station series	Dataset id	Period	Parameter
Vestervig 1874-2019	Vestervig	dk_daily_122: 21100	1874-2003	Lowest temperature
	Vestervig	dk_daily_122: 6051	2003-2019	Lowest temperature
Nordby/Fanø 1874-2019	Nordby/Fanø	dk_daily_122: 25140	1874-2003	Lowest temperature
	Nordby/Fanø	dk_daily_122: 6088	2003-2019	Lowest temperature
Tranebjerg 1872-2019	Tranebjerg	dk_daily_122: 27080	1872-2003	Lowest temperature
	Tranebjerg Øst	dk_daily_122: 6132	2003-2019	Lowest temperature
København 1874-2019	Landbohøjskolen	dk_daily_122: 30380	1874-1997	Lowest temperature
	Landbohøjskolen	dk_daily_122: 6186	1995-2019	Lowest temperature
Hammer Odde Fyr 1874-2019	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	1984-2019	Lowest temperature

Important 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.

**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 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.

5.2.4. Average atmospheric pressure

Five (5) Danish station series with a record of average daily atmospheric pressure data can be blended into three (3) long datasets. Table 5.2.4 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, 1874-2019.

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 4.

Table 5.2.4. Data sets/station series; daily atm. pressure (at msl, mean sea level; element number 401). The Hammer Odde series is presented with station number 6193, 1874-2019. See details in Appendix 3.

Dataset*	Station series	Dataset id	Period	Parameter
Vestervig 1874-2019	Vestervig	dk_daily_401: 21100	1874-1987	Average atm. pressure (msl)
	Thyborøn	dk_daily_401: 6052	1962-2019	Average atm. pressure (msl)
Nordby/Fanø 1874-2019	Nordby/Fanø	dk_daily_401: 25140	1874-1987	Average atm. pressure (msl)
	Esbjerg Airport	dk_daily_401: 6088	1959-2019	Average atm. pressure (msl)
Hammer Odde Fyr 1874-2019	Sandvig **or** Hammer Odde Fyr	dk_daily_401: 32030	1874-1987	Average atm. pressure (msl)
		dk_daily_401: 32020		Average atm. pressure (msl)
	Hammer Odde Fyr	dk_daily_401: 6193	1987-2019	Average atm. pressure (msl)

Important 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.

**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 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.

5.2.5. Accumulated precipitation

Fifteen (15) Danish station series with a record of daily accumulated precipitation can be blended into seven (7) long datasets. Table 5.2.5 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 5.2.5. Data sets/station series; daily acc. precipitation (element number 601). See details Appendix 3.

Dataset*	Station series	Dataset id	Period	Parameter
Vestervig 1874-2019	Vestervig	dk_daily_601: 6051 (21100)	1874-2019	Acc. prec.
Grønbæk 1874-2019	Grønbæk	dk_daily_601: 5135 (21430)	1874-2019	Acc. prec.
Nordby/Fanø 1874-2019	Nordby/Fanø	dk_daily_601: 6088 (25140)	1874-2019	Acc. prec.
Store Jyndevad 1920-2019	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)	1987-2019	Acc. prec.
Tranebjerg 1872-2019	Tranebjerg	dk_daily_601: 27080	1872-2001	Acc. prec.
	Tranebjerg Øst	dk_daily_601: 5165 (27082)	2001-2019	Acc. prec.
København 1874-2019	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)	1961-2019	Acc. prec.
Hammer Odde Fyr 1874-2019	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	1984-2019	Acc. prec.

Important 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.

**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 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.

5.2.6. Cloud cover at 8, 14 and 21 hours DNT

One Danish station series with a long record of cloud cover at 8, 14 and 21 hours DNT exists. Table 5.2.6 presents an overview of this station data series (identified by the station name and number).

Table 5.2.6. Data set and station series; cloud cover at 8, 14 and 21 hours DNT (element number 801). 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. 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

Important 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.

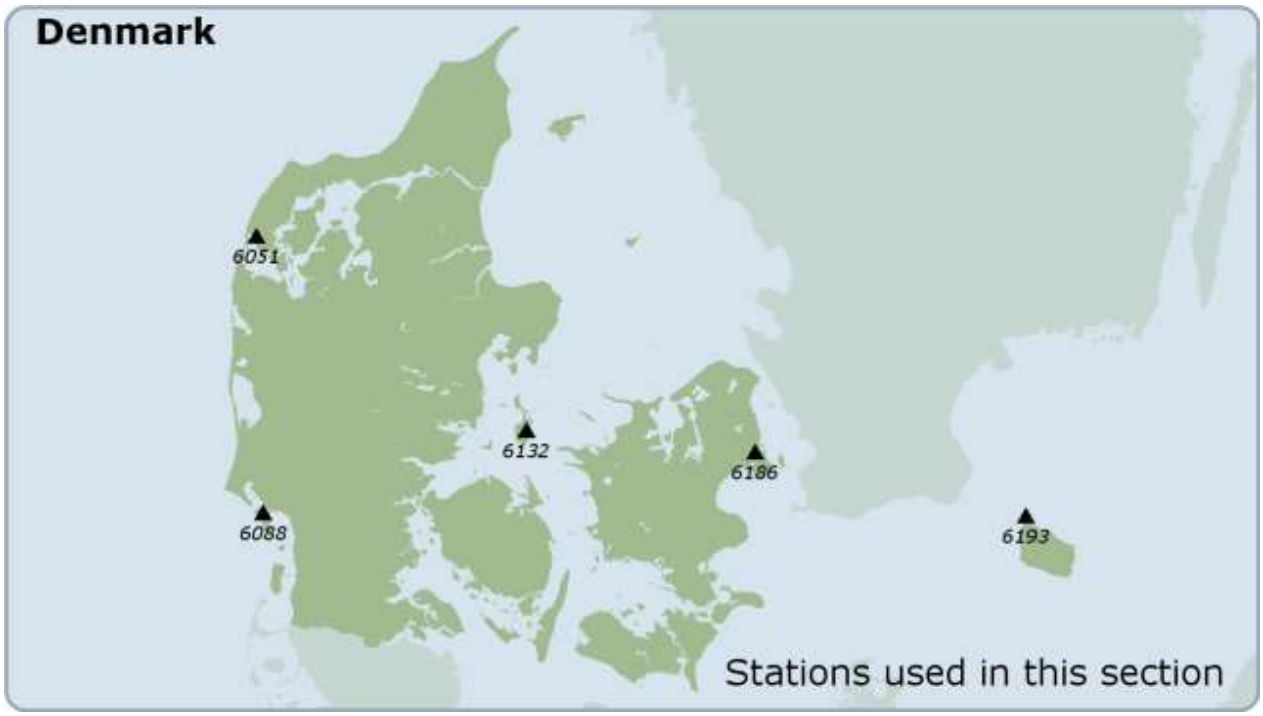
5.2.7. Data Dictionary

Table 5.2.7. Elements/Parameters used in this section. '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'.

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

6. Monthly/Annual Section: Historical DMI Data Collection

Type	Data Collections	Section, Page, Appendix
Monthly/ Annual	• **Average air temperature** • **Average daily minimum air temperature** • **Average daily maximum air temperature** • **Highest air temperature** • **Lowest air temperature** • **Average atmospheric pressure (msl)** • **Hours of bright sunshine** • **Accumulated precipitation** • **Highest 24-hour precipitation** • **No. of days with snow cover** • **Average cloud cover** 5 data sets (blended): 6051 Vestervig (1874-2019) 6088 Nordby/Fanø (1872-2019) 6132 Tranebjerg (1873-2019) 6186 København (1768-2019) 6193 Hammer Odde Fyr (1873-2019)	**Sec 6.2.1-6.2.11, p 27-30, App 4**



Station based data sets referred to in the section. 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).

Latest earlier report: [21] Cappelen, J. (ed), 2019: Denmark - DMI Historical Climate Data Collection 1873-2018. DMI Report No. 19-02.

6.1. Introduction

The purpose of this section is to publish available long *monthly* and *annual* DMI data series 1768-2019 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 intensions to update regularly, preferably every year, this particular report contains an update (2019 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 5 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.

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 4.2, 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.

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.

6.2. Monthly/annual data

6.2.1. Average air temperature

Table 6.2.1. Data sets and station series; monthly/annual average air temperature (element number 101). See details in Appendix 4. This counts for all the following tables.

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1874-2019	Vestervig	dk_monthly_all_ 1768_2019: 6051	1874-2019	Average temperature
Nordby/Fanø 1872-2019	Nordby/Fanø	dk_monthly_all_ 1768_2019: 6088	1872-2019	Average temperature
Tranebjerg 1873-2019	Tranebjerg	dk_monthly_all_ 1768_2019: 6132	1873-2003	Average temperature
	Tranebjerg Øst		2003-2019	
København 1768-2019	Rundetårn	dk_monthly_all_ 1768_2019: 6186	1768-1819	Average temperature
	Gl. Botanisk Have		1820-1859	
	Landbohøjskolen		1860-2019	
Hammer Odde Fyr 1873-2019	Sandvig	dk_monthly_all_ 1768_2019: 6193	1873-1953	Average temperature
	Sandvig/Hammer Odde		1953-1960	
	Hammer Odde Fyr		1961-2019	

**Blended monthly data sets part of this monthly/annual section. Count also for the following tables.*
***Single station series are not a part of this monthly/annual section. Count also for the following tables.*

6.2.2. Average daily maximum air temperature

Table 6.2.2. Data sets and station series; monthly/annual average daily max.air temp. (element number 111).

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1875-2019	Vestervig	dk_monthly_all_ 1768_2019: 6051	1875-2019	Average daily max temperature
Nordby/Fanø 1875-2019	Nordby/Fanø	dk_monthly_all_ 1768_2019: 6088	1875-2019	Average daily max temperature
Tranebjerg 1873-2019	Tranebjerg	dk_monthly_all_ 1768_2019: 6132	1873-2003	Average daily max temperature
	Tranebjerg Øst		2003-2019	
København 1861-2019	Landbohøjskolen	dk_monthly_all_ 1768_2019: 6186	1861-2019	Average daily max temperature
Hammer Odde Fyr 1875-2019	Sandvig	dk_monthly_all_ 1768_2019: 6193	1875-1953	Average daily max temperature
	Sandvig/Hammer Odde		1953-1960	
	Hammer Odde Fyr		1961-2019	

6.2.3. Highest air temperature

Table 6.2.3. Data sets and station series; monthly/annual highest air temperature (element number 112).

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1875-2019	Vestervig	dk_monthly_all_ 1768_2019: 6051	1875-2019	Highest temperature
Nordby/Fanø 1874-2019	Nordby/Fanø	dk_monthly_all_ 1768_2019: 6088	1874-2019	Highest temperature
Tranebjerg 1874-2019	Tranebjerg	dk_monthly_all_ 1768_2019: 6132	1874-2003	Highest temperature
	Tranebjerg Øst		2003-2019	
København 1861-2019	Landbohøjskolen	dk_monthly_all_ 1768_2019: 6186	1861-2019	Highest temperature
Hammer Odde Fyr 1874-2019	Sandvig	dk_monthly_all_ 1768_2019: 6193	1874-1953	Highest temperature
	Sandvig/Hammer Odde		1953-1960	
	Hammer Odde Fyr		1961-2019	

6.2.4. Average daily minimum air temperature

Table 6.2.4. Data sets and station series; monthly/annual average daily minimum air temperature (element number 121).

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1875-2019	Vestervig	dk_monthly_all_ 1768_2019: 6051	1875-2019	Average daily min temperature
Nordby/Fanø 1875-2019	Nordby/Fanø	dk_monthly_all_ 1768_2019: 6088	1875-2019	Average daily min temperature
Tranebjerg 1873-2019	Tranebjerg	dk_monthly_all_ 1768_2019: 6132	1873-2003	Average daily min temperature
	Tranebjerg Øst		2003-2019	
København 1861-2019	Landbohøjskolen	dk_monthly_all_ 1768_2019: 6186	1861-2019	Average daily min temperature
Hammer Odde Fyr 1873-2019	Sandvig	dk_monthly_all_ 1768_2019: 6193	1873-1953	Average daily min temperature
	Sandvig/Hammer Odde		1953-1960	
	Hammer Odde Fyr		1961-2019	

6.2.5. Lowest air temperature

Table 6.2.5. Data sets and station series; monthly/annual lowest air temperature (element number 122).

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1875-2019	Vestervig	dk_monthly_all_ 1768_2019: 6051	1875-2019	Lowest temperature
Nordby/Fanø 1875-2019	Nordby/Fanø	dk_monthly_all_ 1768_2019: 6088	1875-2019	Lowest temperature
Tranebjerg 1873-2019	Tranebjerg	dk_monthly_all_ 1768_2019: 6132	1873-2003	Lowest temperature
	Tranebjerg Øst		2003-2019	
København 1861-2019	Landbohøjskolen	dk_monthly_all_ 1768_2019: 6186	1861-2019	Lowest temperature
Hammer Odde Fyr 1873-2019	Sandvig	dk_monthly_all_ 1768_2019: 6193	1873-1953	Lowest temperature
	Sandvig/Hammer Odde		1953-1960	
	Hammer Odde Fyr		1961-2019	

6.2.6. Average atmospheric pressure

Table 6.2.6 Data sets and station series; monthly/annual average atmospheric pressure (element number 401).

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1874-2019	Vestervig	dk_monthly_all_ 1768_2019: 6051	1874-1987	Average atmospheric pressure
	Thyborøn		1987-2019	
Nordby/Fanø 1874-2019	Nordby/Fanø	dk_monthly_all_ 1768_2019: 6088	1874-1987	Average atmospheric pressure
	Esbjerg/Blåvand/Rømø		1987-2019	
Tranebjerg 1872-2019	Tranebjerg	dk_monthly_all_ 1768_2019: 6132	1872-1987	Average atmospheric pressure
	Røsnæs Fyr		1987-2019	
København 1923-2019	Landbohøjskolen	dk_monthly_all_ 1768_2019: 6186	1923-1987	Average atmospheric pressure
	Københavns Lufthavn		1987-2019	
Hammer Odde Fyr 1873-2019	Sandvig	dk_monthly_all_ 1768_2019: 6193	1873-1970	Average atmospheric pressure
	Hammer Odde Fyr		1971-1987	
	Hammer Odde Fyr		1987-2019	

6.2.7. Hours of bright sunshine (Star level)

Table 6.2.7 Data sets and station series; monthly/annual hours of bright sunshine (Star level) (element number 504).

Dataset*	Station series**	Dataset id	Period	Parameter
København 1876-2019	Landbohøjskolen (visual obs)	dk_monthly_all_ 1768_2019: 6186	1876-1887	Hours of bright sunshine
	Københavns Toldbod (Campbell-Stokes)		1887-2004	
	Københavns Toldbod (Star)		2005-2019	

6.2.8. Accumulated precipitation

Table 6.2.8. Data sets and station series; monthly/annual accumulated precipitation (element number 601).

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1874-2019	Vestervig	dk_monthly_all_ 1768_2019: 6051	1874-2019	Accumulated precipitation
Nordby/Fanø 1872-2019	Nordby/Fanø	dk_monthly_all_ 1768_2019: 6088	1872-2019	Accumulated precipitation
Tranebjerg 1873-2019	Tranebjerg	dk_monthly_all_ 1768_2019: 6132	1873-2001	Accumulated precipitation
	Tranebjerg Øst		2001-2019	
København 1821-2019	Gl. Botanisk Have	dk_monthly_all_ 1768_2019: 6186	1821-1859	Accumulated precipitation
	Landbohøjskolen		1860-1995	
	Botanisk Have/ Livgardens Kaserne		1996-2019	
Hammer Odde Fyr 1873-2019	Sandvig	dk_monthly_all_ 1768_2019: 6193	1873-1971	Accumulated precipitation
	Hammer Odde Fyr		1971-2019	

6.2.9. Highest 24-hour precipitation

Table 6.2.9. Data sets and station series; highest monthly/annual 24-hour precipitation (element number 602).

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1874-2019	Vestervig	dk_monthly_all_ 1768_2019: 6051	1874-2019	Highest 24-hour precipitation
Nordby/Fanø 1872-2019	Nordby/Fanø	dk_monthly_all_ 1768_2019: 6088	1872-2019	Highest 24-hour precipitation
Tranebjerg 1873-2019	Tranebjerg	dk_monthly_all_ 1768_2019: 6132	1873-2001	Highest 24-hour precipitation
	Tranebjerg Øst		2001-2019	
København 1843-2019	Gl. Botanisk Have	dk_monthly_all_ 1768_2019: 6186	1843-1859	Highest 24-hour precipitation
	Landbohøjskolen		1860-1995	
	Botanisk Have/ Livgardens Kaserne		1996-2019	
Hammer Odde Fyr 1873-2019	Sandvig	dk_monthly_all_ 1768_2019: 6193	1873-1971	Highest 24-hour precipitation
	Hammer Odde Fyr		1971-2019	

6.2.10. Number of days with snow cover

Table 6.2.10. Data sets and station series; monthly/annual number of days with snow cover (element number 701).

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1939-2019	Vestervig	dk_monthly_all_ 1768_2019: 6051	1939-2019	No. of days with snow cover
Nordby/Fanø 1957-2019	Nordby/Fanø	dk_monthly_all_ 1768_2019: 6088	1957-2001	No. of days with snow cover
	Esbjerg Lufthavn		2001-2006	
	Outrup		2007-2019	

Tranebjerg 1949-2019	Tranebjerg	dk_monthly_all_ 1768_2019: 6132	1949-2000	No. of days with snow cover
	Tranebjerg Øst		2004-2019	
København 1938-2019	Landbohøjskolen	dk_monthly_all_ 1768_2019: 6186	1938-1996	No. of days with snow cover
	Københavns Lufthavn		1997-2009	
	Botanisk Have		2010-2018	
	Meteorologisk Institut		2018-2019	
Hammer Odde Fyr 1939-2019	Sandvig/Hammer Odde	dk_monthly_all_ 1768_2019: 6193	1939-2002	No. of days with snow cover
	Klemensker		2002-2010	
	Østerlars		2010-2019	

6.2.11. Cloud cover

Table 6.2.11. Data sets and station series; monthly/annual average cloud cover (element number 801).

Dataset*	Station series**	Dataset id	Period	Parameter
Vestervig 1874-2019	Vestervig	dk_monthly_all_ 1768_2019: 6051	1874-1995	Average cloud cover
	Thyborøn		1996-2019	
Nordby/Fanø 1872-2019	Nordby/Fanø	dk_monthly_all_ 1768_2019: 6088	1872-1999	Average cloud cover
	Esbjerg Lufthavn		2000	
	Rømø		2000-2019	
Tranebjerg 1874-2001	Tranebjerg	dk_monthly_all_ 1768_2019: 6132	1872-2000	Average cloud cover
	Røsnæs Fyr		2000-2001	
København 1876-2019	Landbohøjskolen	dk_monthly_all_ 1768_2019: 6186	1923-1995	Average cloud cover
	Københavns Lufthavn		1996-2019	
Hammer Odde Fyr 1873-2019	Sandvig	dk_monthly_all_ 1768_2019: 6183	1873-1889	Average cloud cover
	Sandvig/Hammer Odde		1890-1995	
	Hammer Odde Fyr		1996-2019	

6.2.12. Data Dictionary

Table 6.2.12. Elements/Parameters used in this section. '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'.

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	%

7. Country-wise Section: Historical DMI Data Collection

Type	Data Collections	Section, Page, Appendix
Country-wise Monthly/annual	• **Country-wise (Denmark) climate data 1874-2019; 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** 2 data sets: All months/years 1891-2019 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. • **Country-wise (Denmark) climate data 1874-2019; Average air temperature, accumulated precipitation, and hours of bright sunshine** 4 data sets: Average air temperature; published (1873-2019) Average air temperature; corrected (1873-2019) Accumulated precipitation (1874-2019) Hours of bright sunshine (1920-2019)	**Sec 7.2.1.- 7.2.2, p 33-37, App 5**

Latest earlier report:
[21] Cappelen, J. (ed), 2019: Denmark - DMI Historical Climate Data Collection 1873-2018. DMI Report No. 19-02.

7.1. Introduction

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

- 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. In addition every month and year in the period 1891-2019 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.
- Climate extremes from the above material separately.

Country-wise values also regularly form part (graphical) of the yearly publication “Danmarks Klima”. The newest one published in 2019 is DMI Rapport 19-01: Danmarks klima 2019 – with English Summary. København 2019 [22].

According to the intensions to update regularly, preferably every year, this particular section contains an annual update (2019 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 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 8.

7.2. Country-wise data

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, calculated using a selection of stations. In this section country-wise monthly and annual values for Denmark for the period 1874–2019 and for the parameters mentioned in table 7.2.1.2, table 7.2.1.4 and table 7.2.2.1 are described.

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 2019. Those the whole period from 1874 – 2019 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.

7.2.1. Tables; country-wise monthly/annual climate data

Table 7.2.1.1. Table product; country-wise monthly/annual climate data in table. Details in Appendix 5.

Product*	Dataset id	Period	Parameters
Table; Country-wise climate data 1874-2019	dk_country_table	1874-2019	See table 7.2.1.2

**Blended datasets. Only in Danish*

Table 7.2.1.2. Elements/Parameters and units used in the dataset described in table 7.2.1.1. Method' specifies whether the element is a sum, an average or an extreme. The units of the monthly/annual values in the data file are specified in 'Unit'. Year of first appearance is also added.

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 og daily minimum air temperature	average	°C	1953
122	Lowest air temperature	min	°C	1874
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

Figure 7.2.1.1. Example (2011 data) of the country-wise monthly and annual climate data 1874-2019 in table which contain values of air temperature, precipitation and hours of bright sunshine, weather describing text and weather records. The figures can be compared with the Standard Normal values from the period 1961-90 (latest WMO recommended), average 2001-10 and average 2006-15 by moving the cursor to the figure. Every month and year in the period 1891-2019 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. (only in Danish).

2011	**Året**		**Varmt og solrigt med overskud af nedbør. Rekordvarm april og rekordhøj maksimum temperatur i oktober. Tør april og november og andenvådeste sommer.**	**9,0**	**28,2**	**-16,5**	**12,1**	**5,8**	**779**	**135,4**	**1683**			
2011	**Januar**		Solrig med underskud af nedbør og lidt over normal temperatur.	0,3	9,8	-12,4	2,4	-2,1	46	16,8	72			
2011	**Februar**		Solunderskud, ellers normal.	-0,1	9,6	-16,5	1,6	-2,2	40	20,2	52			
2011	**Marts**		Varm, tør og solrig.	3,1	15,3	-7,6	6,1	0,2	31	16,4	143			
2011	**April**	R	Rekordvarm, meget solrig og tør.	▲9,9	22,5	-1,6	14,5	5,5	16	25,8	253	**Påsken**	21.-25.	Solrig, varm og tør. Middeltemp.: 13,6 °C. Soltimer: 63.
2011	**Maj**		Frost, sommer og sol.	11,4	26,2	-3,2	15,6	7,3	54	26,9	239			
2011	**Juni**		Varm med overskud af nedbør og sol.	15,1	28,2	2,6	19,2	11,1	76	89,6	252	**Sct. Hans**		Svag til let vind, for det meste tørt, få spredte småbyger, 10-15°C
2011	**Juli**		Syvende vådeste med overskud af varme og underskud af sol.	16,4	27,1	6,2	20,1	13,0	113	135,4	171			
2011	**August**		Meget våd og solfattig med overskud af varme.	16,1	27,6	4,9	19,8	12,9	132	74,8	150			
2011	**September**		Lun og våd.	14,1	25,9	3,8	17,5	10,8	92	54,2	135			
2011	**Oktober**	R	Varm og meget solrig med underskud af nedbør.	9,8	▲26,9	-2,6	13,0	6,2	61	29,4	130			Rekord den 1. i St. Jyndevad
2011	**November**		Meget tør, mild og grå.	6,7	14,6	-3,9	8,5	4,6	18	13,8	37			
2011	**December**		Varm og våd.	4,2	11,3	-5,1	6,1	1,9	99	32,4	50	**Julen**		Meget lunt ca. 5-10°C, blæsende fra sydvest med lidt sol og nedbør

The country-wise climate extremes from the above material are published separately. See table 7.2.1.3 for the data set and table 7.2.1.4 for the parameters.

Table 7.2.1.3. Table product; country-wise monthly/annual climate extremes. See details in Appendix 5.

Product*	Dataset id	Period	Parameters
Table; Country-wise climate extremes 1874-2019	dk_country_extremes	1874-2019	See table 7.2.1.4

**only in Danish*

Table 7.2.1.4. Elements/Parameters and units used in the dataset described in table 7.2.1.3. Method' specifies whether the element is a sum, an average or an extreme. The units of the monthly/annual values in the data file are specified in 'Unit'. Year of first appearance is also added.

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

Figure 7.2.1.2. Country-wise climate extremes 1874-2019. (only in Danish)

Rekorder siden 1874 (solskinstimer siden 1920).

	Jan	Feb	Mar	Apr	Maj	Jun	Jul	Aug	Sep	Okt	Nov	Dec	År
Absolut højeste temperatur													
°C	12,4	15,8	22,2	28,6	32,8	35,5	35,3	36,4	32,3	26,9	18,5	14,5	
år	2005	1990/2019	1990	1993	1892	1947	1941	1975	1906	2011	1968	1953	
sted	Sønderborg	København/ Tirstrup	Karup	Holbæk	Herning	Hillerød	Ersley (Mors) Studsgård v/Herning	Holstebro	Randers	St. Jyndevad	Faksinge v/Præstø	Nordby	
Absolut laveste temperatur													
°C	-31,2	-29,0	-27,0	-19,0	-8,0	-3,5	-0,9	-2,0	-5,6	-11,9	-21,3	-25,6	
år	1982	1942	1888	1922	1900	1936	1903	1885	1886	1880	1973	1981	
sted	Hørsted i Thy	Brande	Søndersted v/Holbæk	St. Vildmose	Gludsted Plantage	Klosterhede Plantage	Gludsted Plantage	Varde	Aalborg	Torstedlund v/Rold Skov	Egvad v/Tarm	Døvling	
Højeste middeltemperatur måned/år													
°C	5,0	5,5	6,1	9,9	15,0	18,2	19,8	20,4	16,2	12,2	8,1	7,0	10,0
år	2007	1990	1990/2007	2011	2018	1889	2006	1997	1999/2006 /2016	2006	2006	2006	2014
Laveste middeltemperatur måned/år													
°C	-6,6	-7,1	-3,5	2,5	8,1	10,7	13,6	12,8	10,0	5,2	0,7	-4,0	5,9
år	1942	1947	1942	1888	1902	1923	1979	1902	1877	1905	1919	1981	1879
Flest solskinstimer måned/år													
timer	100	140	200	273,7	363,3	303	338,5	291	201/200,7	162	88	81	1905,0
år	1963	1932	1943	2019	2018	1940	2018	1947	2002/2016	2005	1989	2010	2018
Færrest solskinstimer måned/år													
timer	14	12	50	84	103	107	137	113	74	26	19	8	1287
år	1969	1926	1963	1937	1983	1987	1922	1980	1998	1976	1993	1959	1987
Største nedbørmængde måned/år													
mm	123	109	106,5	98	138	124	140	167	162	177	155	140	905/905,3
år	2007	2002	2019	1936	1983	2007	1931	1891	1994	1967	1969	1985	1999/2019
Mindste nedbørmængde måned/år													
mm	6	2	7	3	9	1	15	10	18	12	13	7	466
år	1996/1997	1932	1918/1969	1893/1974	1959	1992	1904/1983 1994	1947	1933	1922	1902	1890	1947
Største 24 timers nedbør på én lokalitet													
mm	50,0	61,8	54,8	66,5	94,0	153,1	168,9	151,2	132,7	100,8	62,3	74,6	
år	1886	1881	1970	1969	2007	1880	1931	1959	1968	1982	1981	2010	

Samtlige rekorder er relateret til DMI målestationer.

Opdateret 21. januar 2020. © DMI, Danmarks Meteorologiske Institut

When compared to earlier published key country-wise values minor changes can been 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 the table 7.2.1.5). 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 7.2.1.5. Correction factors (in degrees Celsius), which can be added to the average air temperatures for Denmark in the period 1873-1956.

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

7.2.2. Data series; country-wise monthly/annual climate data

Table 7.2.2.1 describes the monthly and annual data set where country-wise values of published/corrected air temperature, accumulated precipitation and hours of bright sunshine are included.

Table 7.2.2.1. Data set; country-wise monthly/annual climate data series. See details in Appendix 5.

Dataset*	Dataset id	Period	Parameters
Country-wise climate data 1873-2019	dk_country_dataseries_tps	1873-2019	See table 7.2.2.1

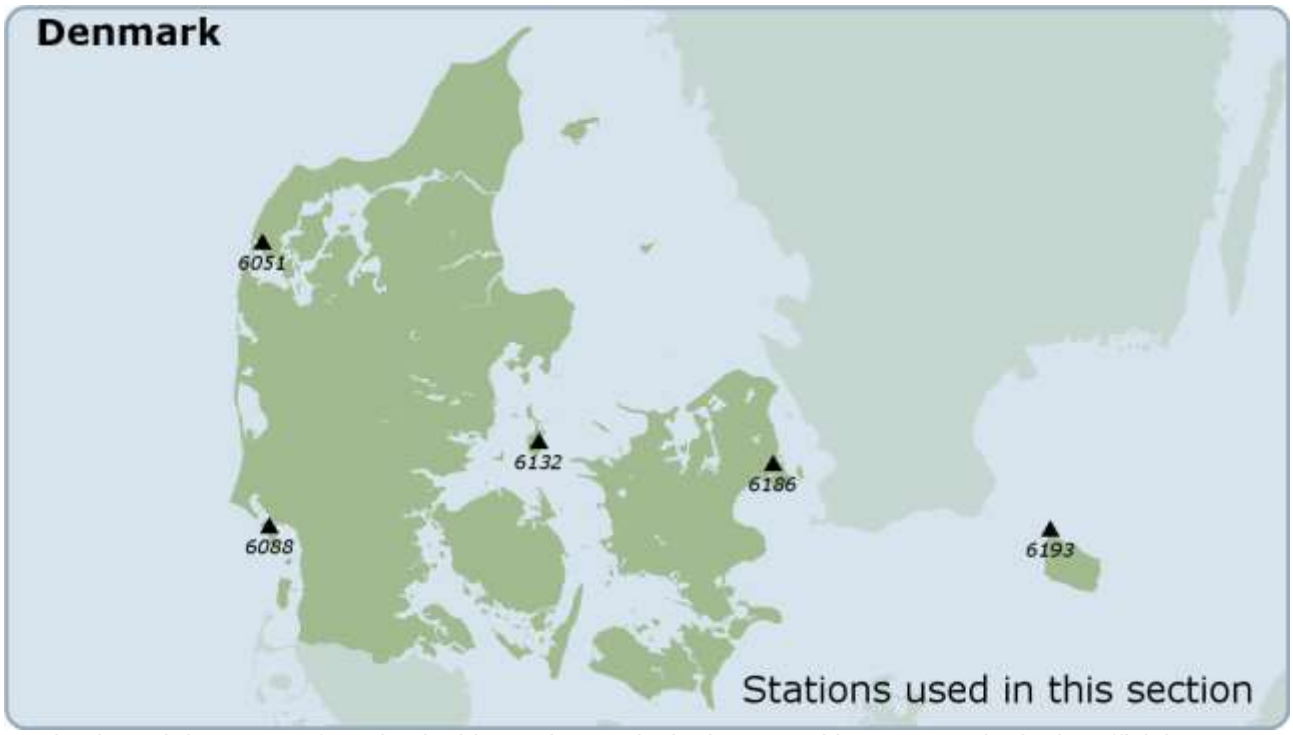
**Blended datasets.*

Table 7.2.2.1. Elements/Parameters and units used in the dataset described in table 7.2.2.1. Method' specifies whether the element is a sum or an average. The units of the monthly/annual values in the data file are specified in 'Unit'. Year of first appearance is also added.

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

8. Graphics Section: Historical DMI Data Collection

Type	Data Collections	Section, Page, Appendix
Graphics/ Annual	• **Average air temperature; graph** 7 data sets (blended): 6051 Vestervig (1874-2019) 6088 Nordby/Fanø (1872-2019) 6132 Tranebjerg (1873-2019) 6186 København (1768-2019) 6193 Hammer Odde Fyr (1873-2019) Country-wise; published (1873-2019) Country-wise; corrected (1873-2019) • **Accumulated hours of bright sunshine; graph** 2 data set (blended): 6186 København (1876-2019) Country-wise (1920-2019) • **Accumulated precipitation; graph** 6 data sets (blended): 6051 Vestervig (1874-2019) 6088 Nordby/Fanø (1872-2019) 6132 Tranebjerg (1873-2019) 6186 København (1821-2019) 6193 Hammer Odde Fyr (1873-2019) Country-wise (1874-2019)	**Sec 8.2., p 40-41, App 6**



Station based data sets referred to in this section. 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).

Latest earlier report:
[21] Cappelen, J. (ed), 2020: Denmark - DMI Historical Climate Data Collection 1873-2019. DMI Report No. 20-02.

8.1. Introduction

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 1784-2019 for Denmark.

According to the intensions to update regularly, preferably every year, this particular report contains an update (2019 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 data collection in section 6.
- The regularly publication of climatological yearbooks back in time.

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

8.2. Annual graphics

Annual graphics are available for three (3) parameters; average air temperature, accumulated precipitation and hours of bright sunshine within the period 1768-2019 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. The graphs are available in an English version.

Table 8.2.1. Graphical products; country-wise annual average air temperature (element number 101), accumulated precipitation (element number 601) and hours of bright sunshine (element number 504). See details in Appendix 6.

Product*	Graph id	Period	Parameter
Graph; country-wise (temperature; published) 1873-2019	dk_graph_annual_pub temperature_country	1873-2019	Average temperature
Graph; country-wise (temperature; corrected) 1873-2019	dk_graph_annual_corr temperature_country	1873-2019	Average temperature
Graph; country-wise (precipitation) 1873-2019	dk_graph_annual_ precipitation_country	1873-2019	Accumulated precipitation
Graph; country-wise (sunshine) 1920-2019	dk_graph_annual_ sunshine_country	1920-2019	Acc. hours of bright sunshine

** Blended datasets. Graph (English version).*

Table 8.2.2. Graphical products; annual average air temperatures (element number 101). See details in Appendix 6.

Product*	Station series	Graph id	Period	Parameter
Graph; Vestervig 1874-2019	Vestervig	dk_graph_annual_ temperature_6051	1874-2019	Average temperature
Graph; Nordby (Fanø) 1872-2019	Nordby (Fanø)	dk_graph_annual_ temperature_6088	1872-2019	Average temperature
Graph; Tranebjerg (Samsø) 1873-2019	Tranebjerg (Samsø)	dk_graph_annual_ temperature_6132	1873-2019	Average temperature
Graph; København 1768-2019	København	dk_graph_annual_ temperature_6186	1768-2019	Average temperature
Graph; Hammer Odde Fyr 1873-2019	Hammer Odde Fyr (Bornholm)	dk_graph_annual_ temperature_6193	1873-2019	Average temperature

**Graph (English version).*

Table 8.2.3. Graphical products; hours of bright sunshine (element number 504). See details in Appendix 6.

Dataset*	Station series	Dataset id	Period	Parameter
Graph; København 1876-2019	Københavns toldbod	dk_graph_annual_ sunshine_6186	1876-2019	Acc. hours of bright sunshine hours

**Graph (English version).*

Table 8.2.4. Graphical products; annual accumulated precipitation (element number 601). See details in Appendix 6.

Product*	Station series	Graph id	Period	Parameter
Graph; Vestervig 1874-2019	Vestervig	dk_graph_annual_ precipitation _6051	1874-2019	Accumulated precipitation
Graph; Nordby (Fanø) 1872-2019	Nordby (Fanø)	dk_graph_annual_ precipitation _6088	1872-2019	Accumulated precipitation
Graph; Tranebjerg (Samsø) 1873-2019	Tranebjerg (Samsø)	dk_graph_annual_ precipitation _6132	1873-2019	Accumulated precipitation
Graph; København 1821-2019	København	dk_graph_annual_ precipitation _6186	1821-2019	Accumulated precipitation
Graph; Hammer Odde Fyr 1873-2019	Hammer Odde Fyr (Bornholm)	dk_graph_annual_ precipitation _6193	1873-2019	Accumulated precipitation

**Graph (English version).*

The annual data behind the graphics are described in section 6 and 7 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.

8.3. Data Dictionary

Table 8.3.1. Elements/Parameters used in this section. 'Method' specifies whether the element is a sum or an average. The units of the annual values in the graphics are specified in 'Unit'.

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

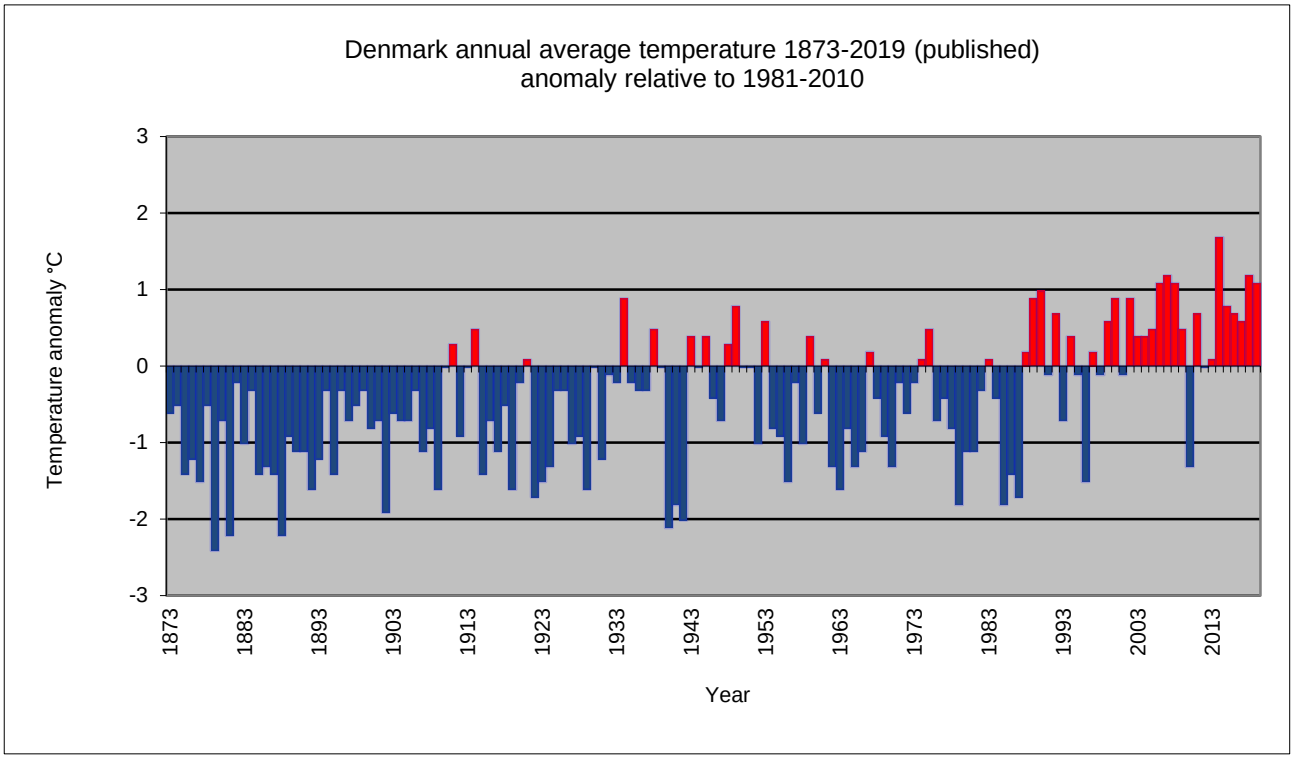


Figure 8.2.1. Annual average air temperature (published values), Denmark 1873-2019, anomaly relative to 1981-2010.

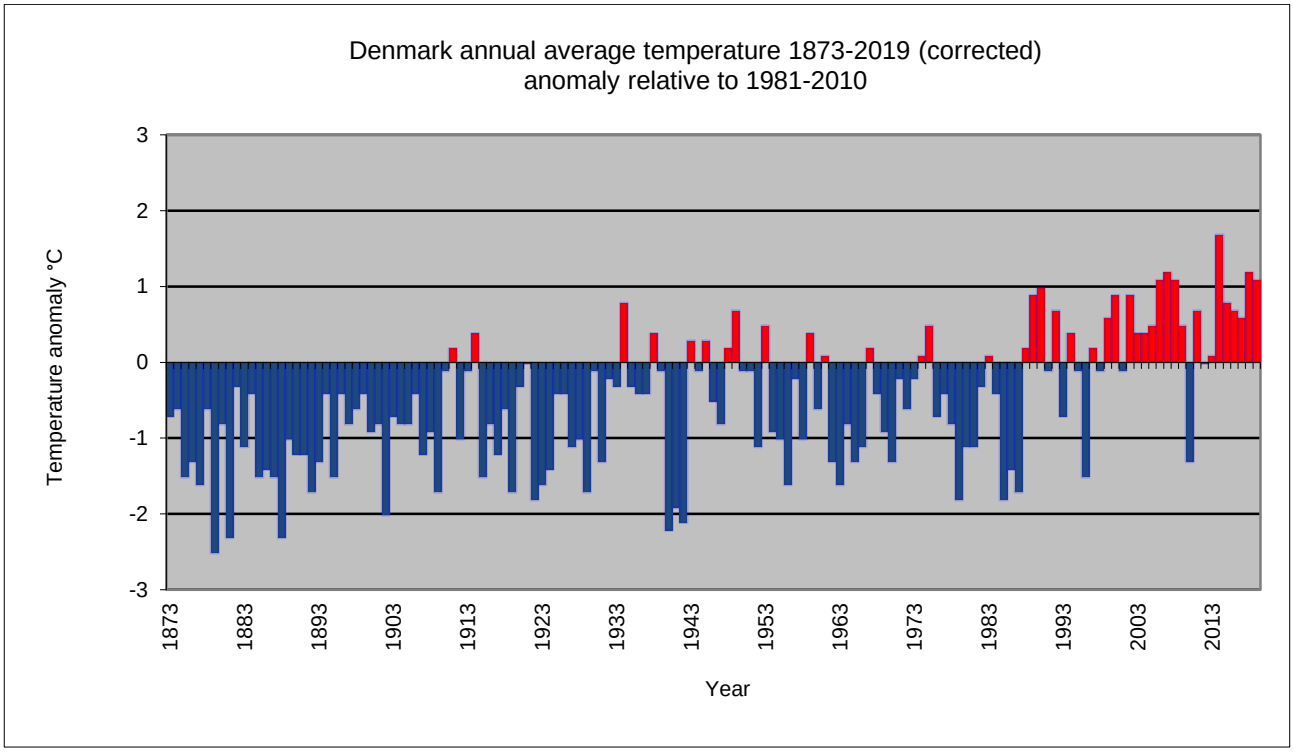


Figure 8.2.2. Annual average air temperature (corrected values), Denmark 1873-2019, anomaly relative to 1981-2010.

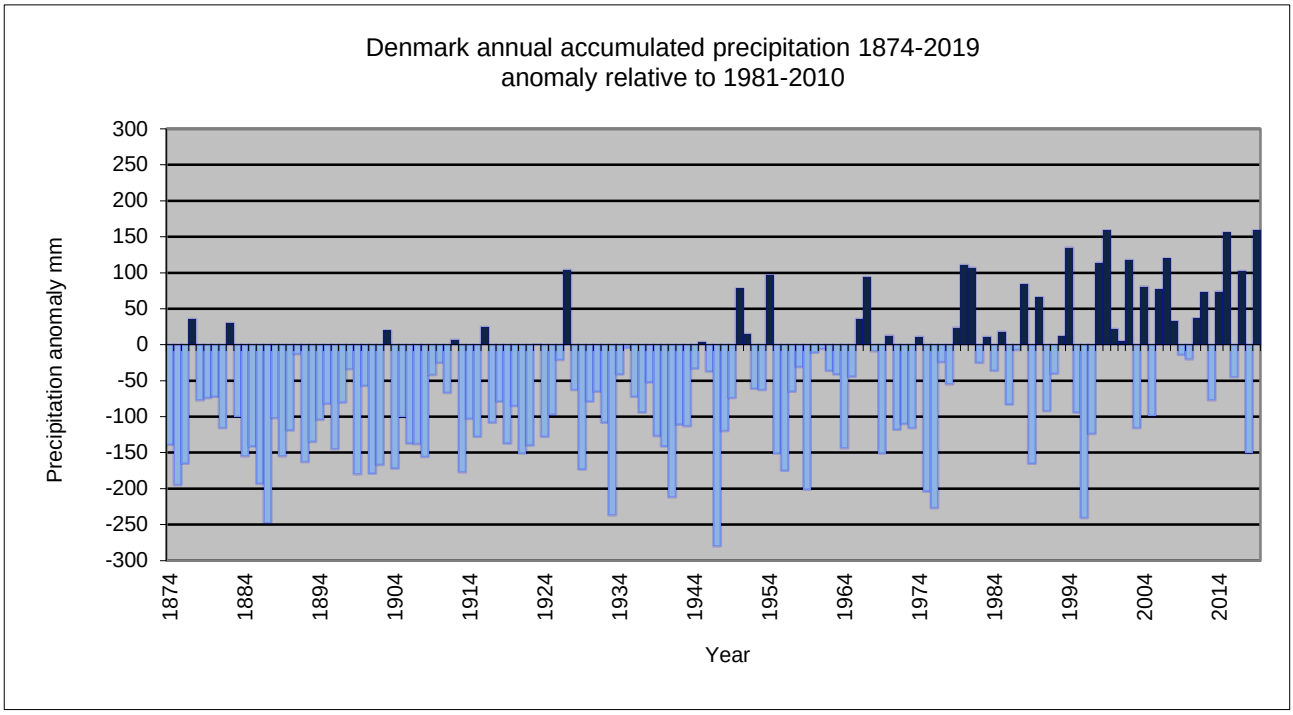


Figure 8.2.3. Annual accumulated precipitation, Denmark 1873-2019, anomaly relative to 1981-2010.

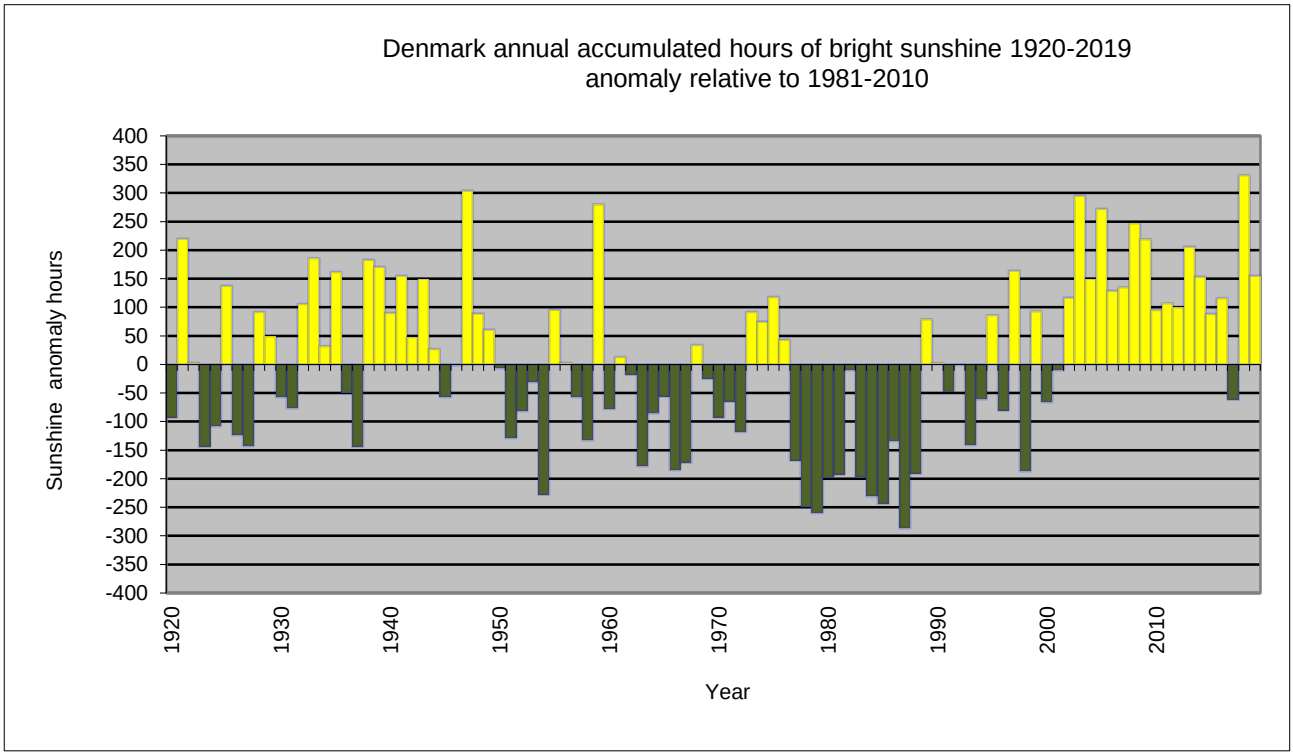


Figure 8.2.4. Annual accumulated hours of bright sunshine, Denmark 1920-2019, anomaly relative to 1981-2010. OBS! DMI has since 2002 observed the hours of bright sunshine using measurements of global radiation instead of measurements from a traditional Campbell-Stokes sunshine recorder. For that reason "new" and "old" 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].

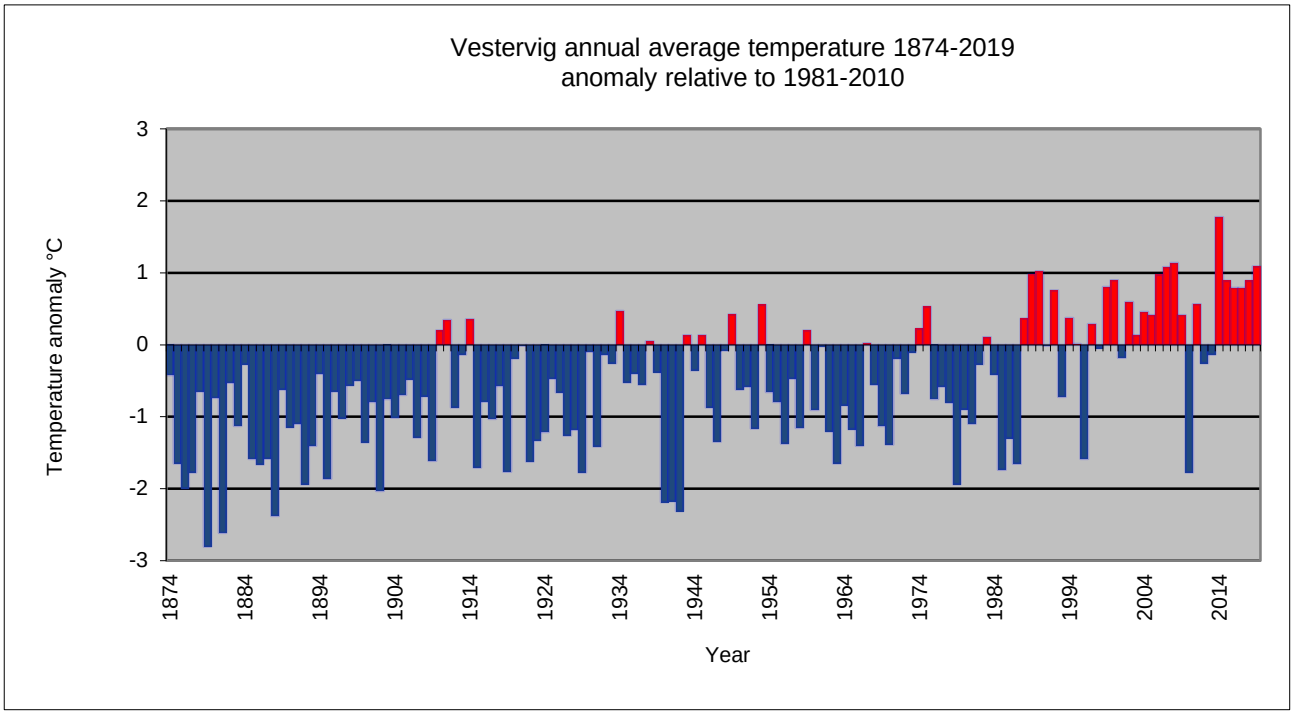


Figure 8.2.5. Annual average air temperature, Vestervig 1874-2019, anomaly relative to 1981-2010.

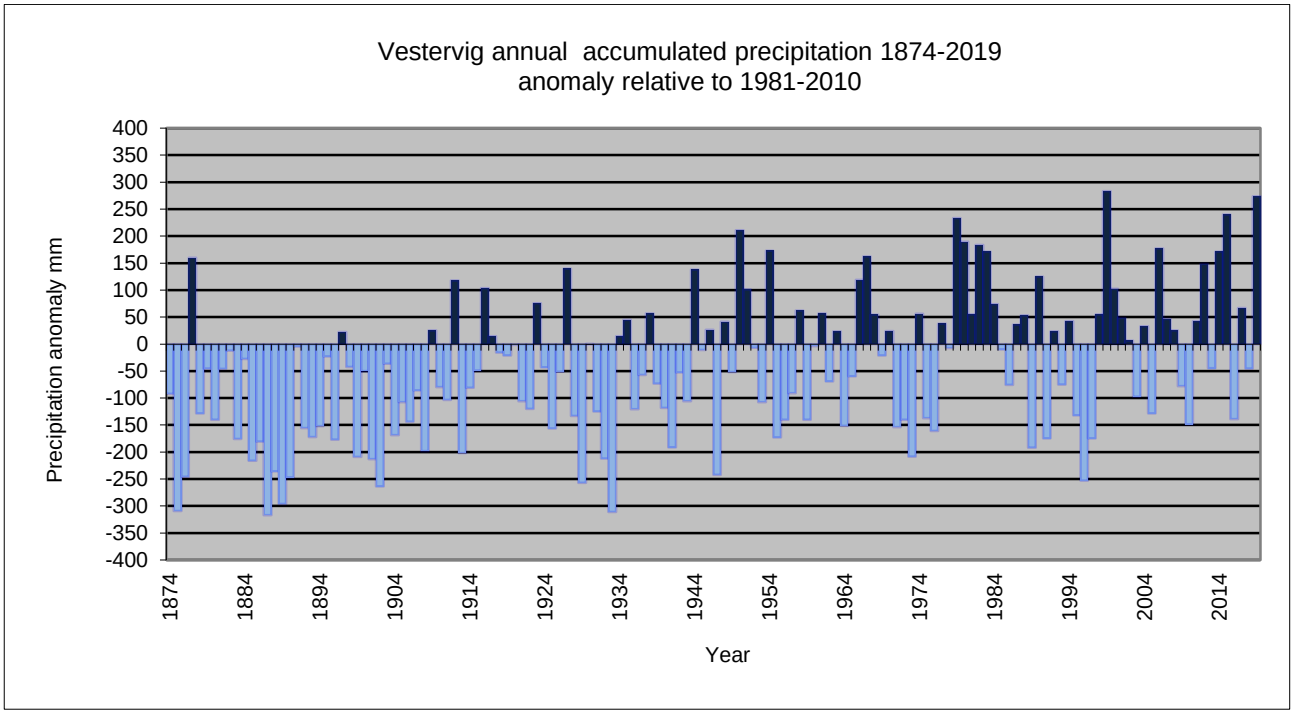


Figure 8.2.6. Annual accumulated precipitation, Vestervig 1874-2019, anomaly relative to 1981-2010.

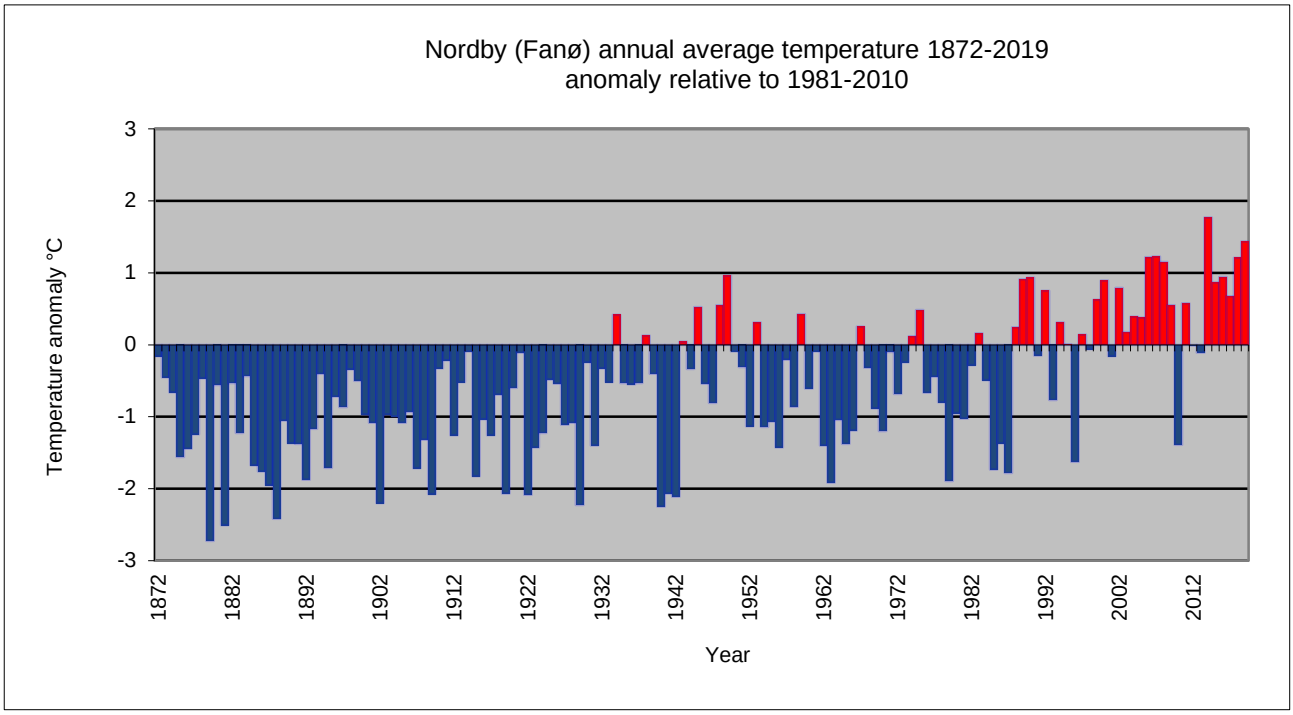


Figure 8.2.7. Annual average air temperature, Nordby (Fanø), 1872-2019, anomaly relative to 1981-2010.

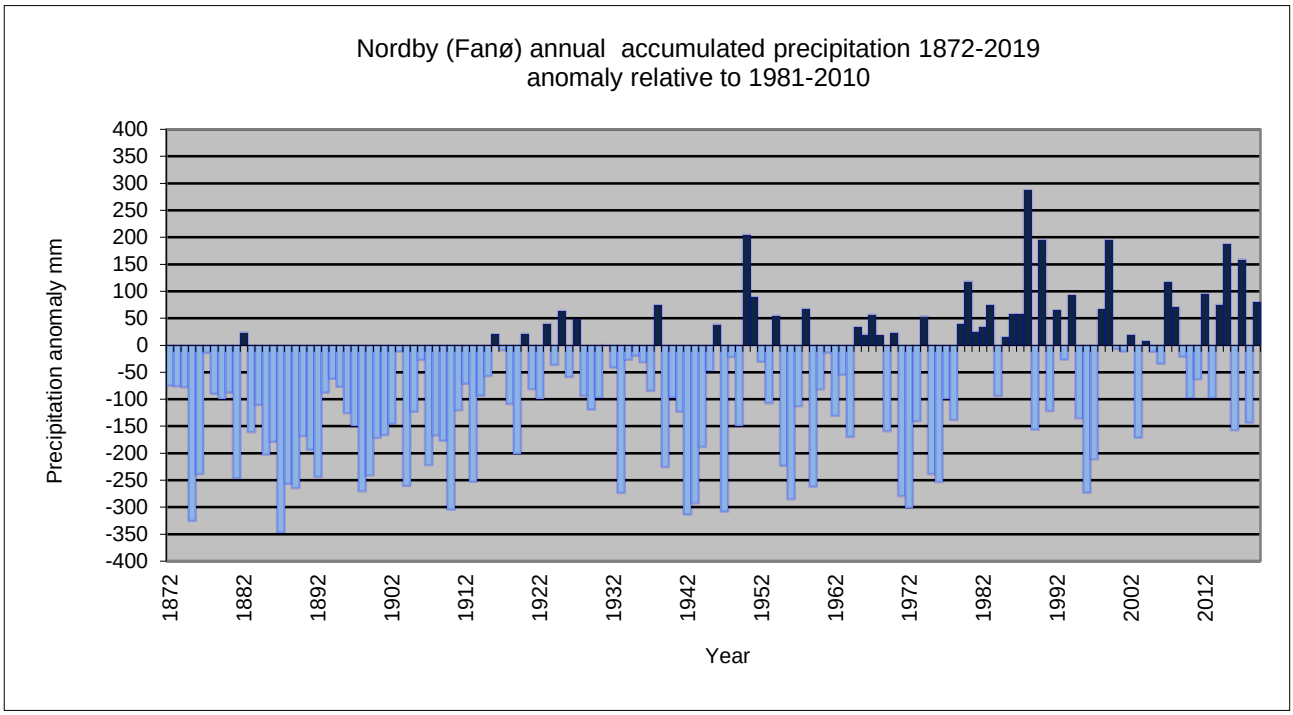


Figure 8.2.8. Annual accumulated precipitation, Nordby (Fanø), 1872-2019, anomaly relative to 1981-2010.

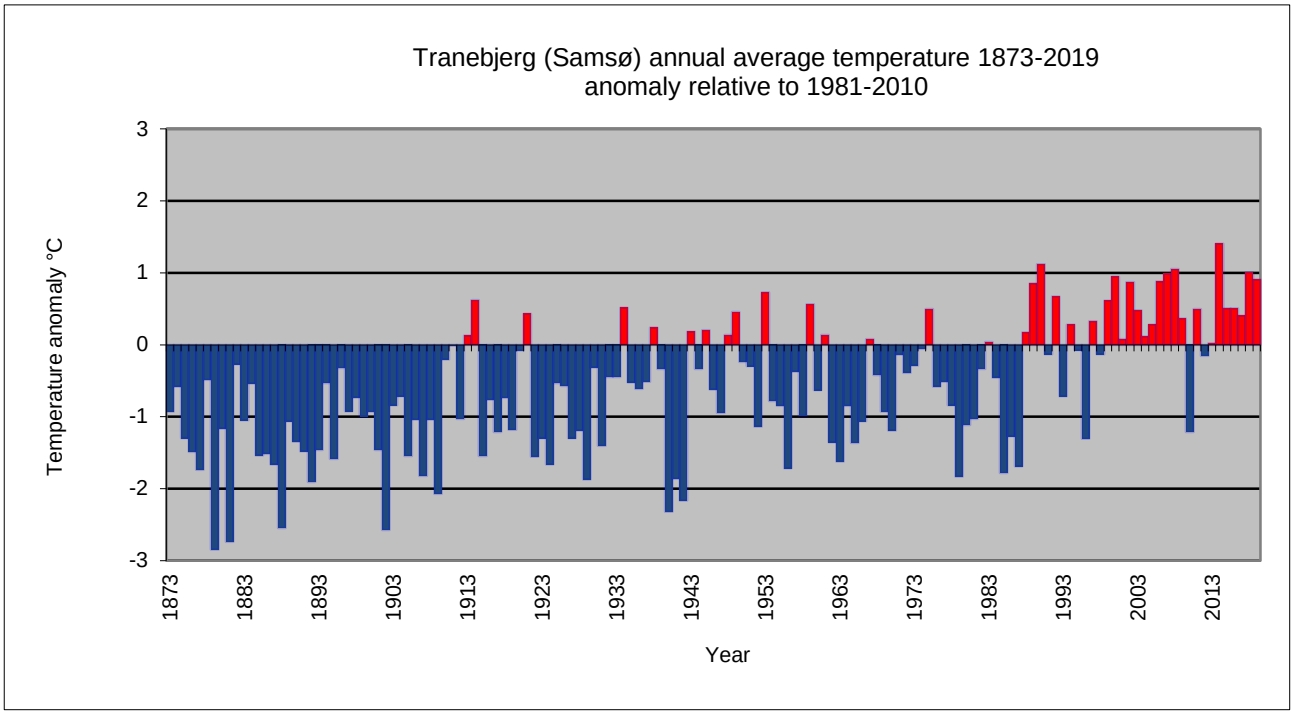


Figure 8.2.9. Annual average air temperature, Tranebjerg (Samsø), 1873-2019, anomaly relative to 1981-2010.

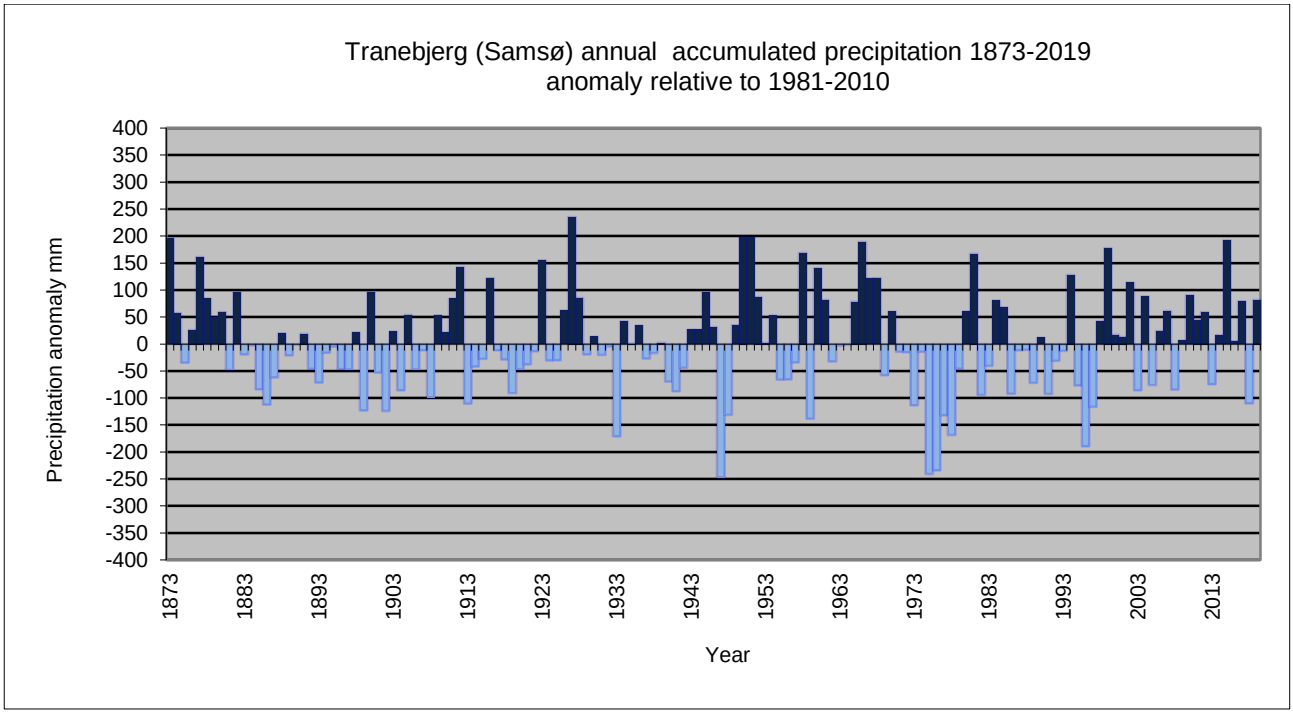


Figure 8.2.10. Annual accumulated precipitation, Tranebjerg (Samsø), 1873-2019, anomaly relative to 1981-2010.

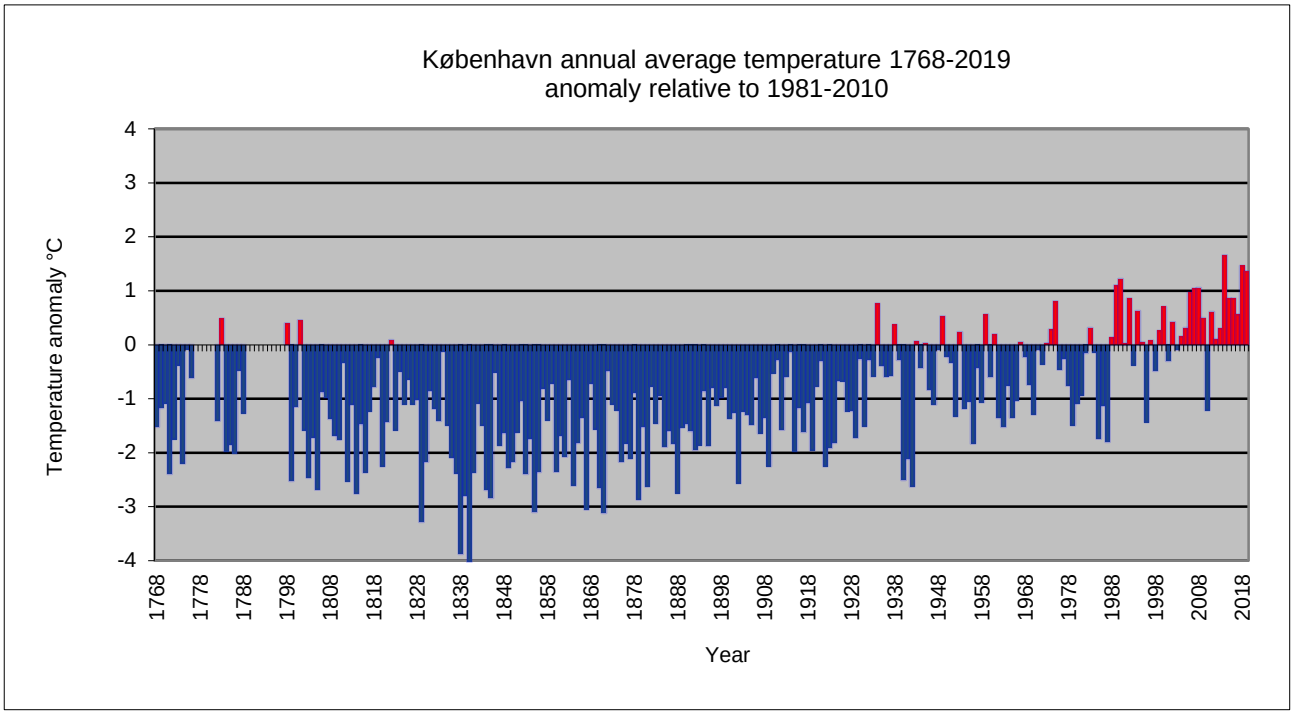


Figure 8.2.11. Annual average air temperature, København, 1768-2019, anomaly relative to 1981-2010. There are missing values for some early years 1777-1781 and 1789-1797.

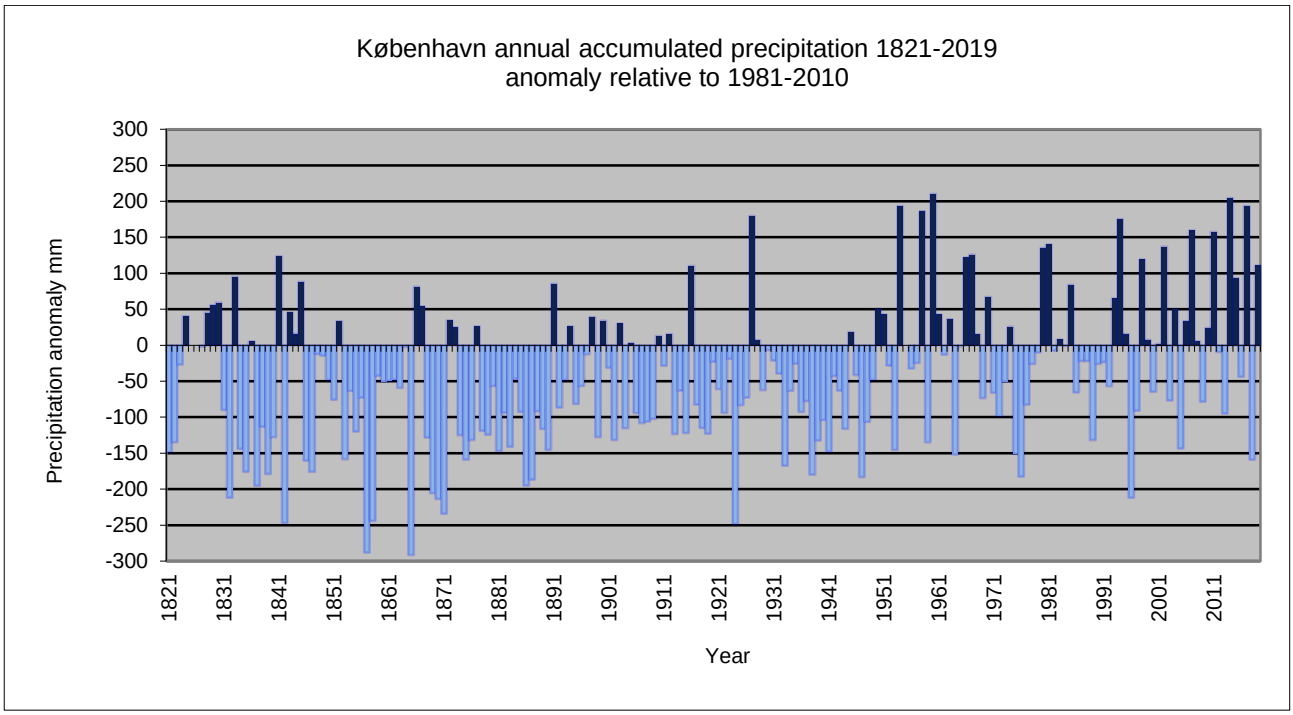


Figure 8.2.12. Annual accumulated precipitation, København, 1821-2019, anomaly relative to 1981-2010. There are missing values for some early years 1825-1826.

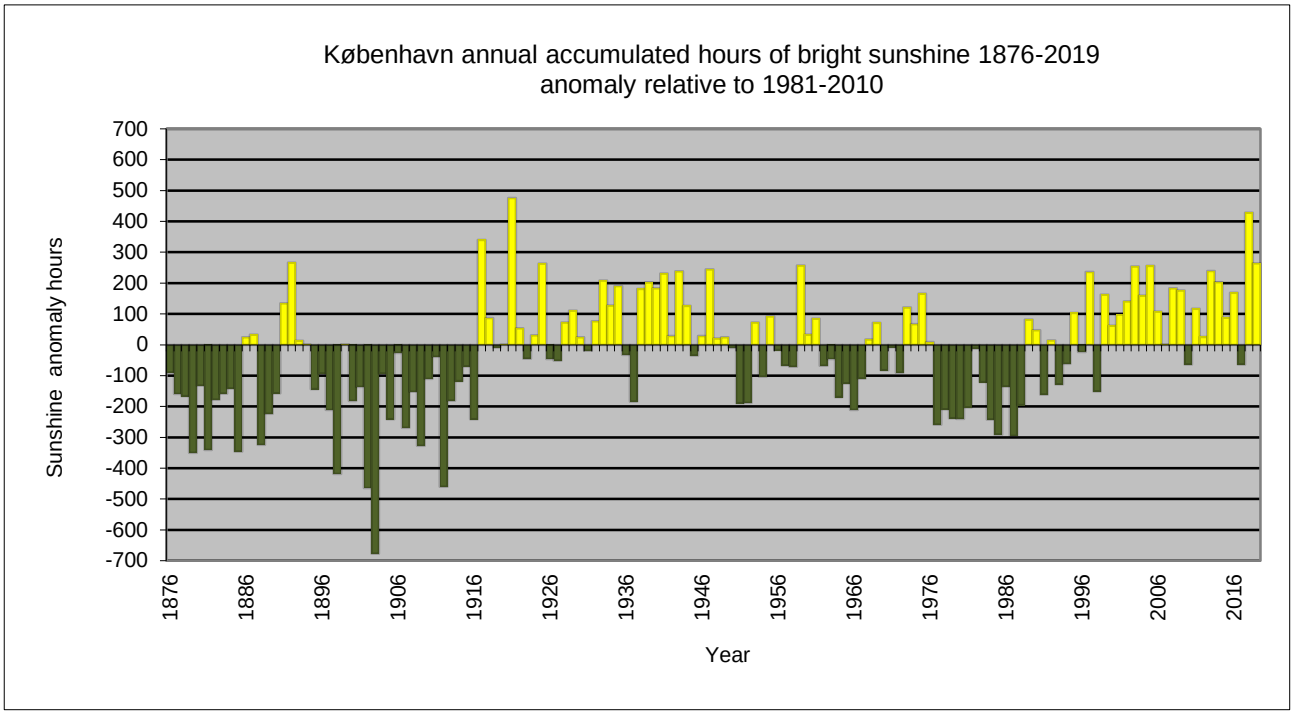


Figure 8.2.13. Annual accumulated hours of bright sunshine, København, 1876-2019, anomaly relative to 1981-2010. OBS! DMI has since 2002 observed the hours of bright sunshine using measurements of global radiation instead of measurements from a traditional Campbell-Stokes sunshine recorder. For that reason "new" and "old" 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].

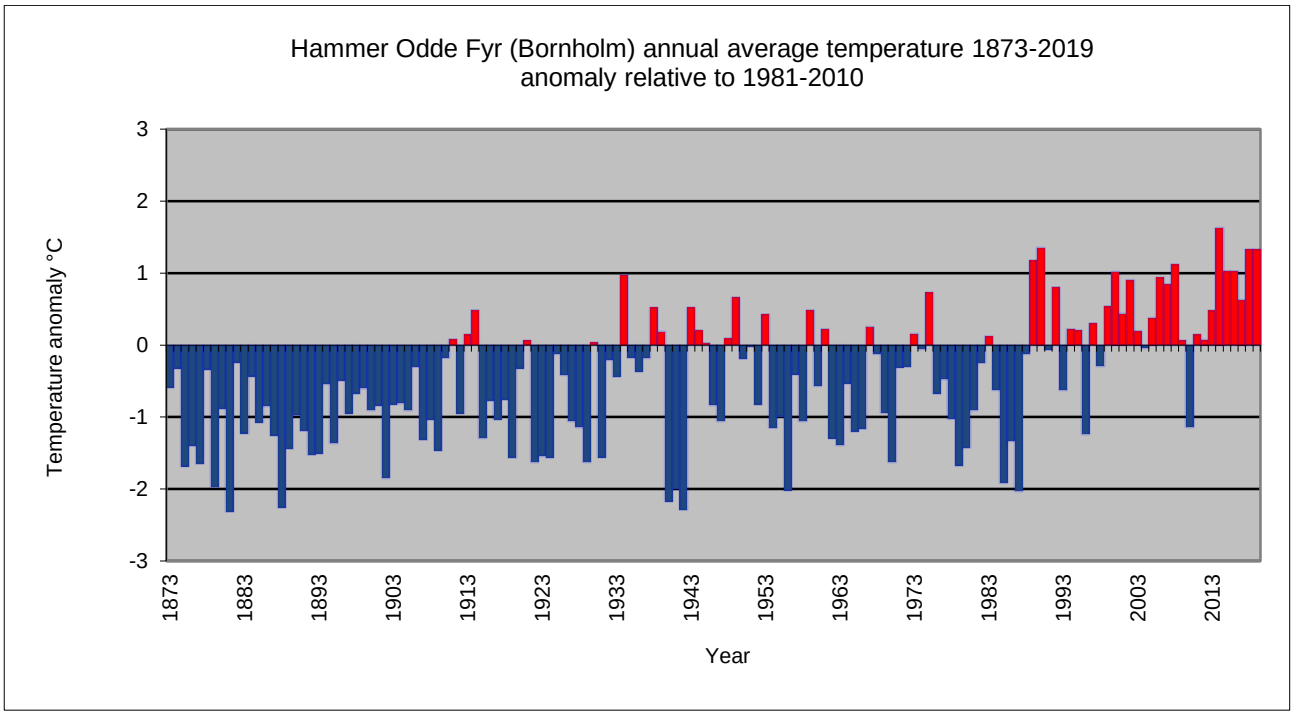


Figure 8.2.14. Annual average air temperature, Hammer Odde Fyr (Bornholm), 1873-2019, anomaly relative to 1981-2010.

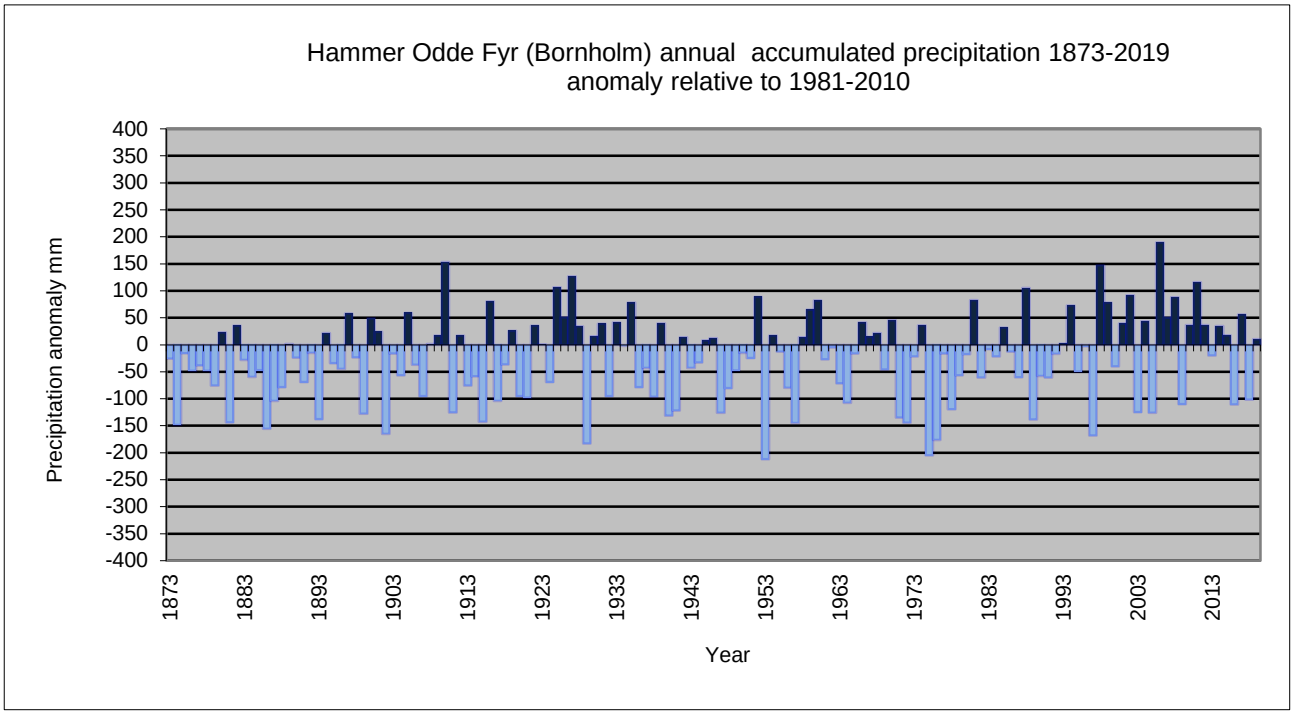


Figure 8.2.15. Annual accumulated precipitation, Hammer Odde Fyr (Bornholm), 1873-2019, anomaly relative to 1981-2010.

9. Storm Section: Historical DMI Data Collection

Type	Data Collections	Section, Page, Appendix
Storm	• **List of storms 1891-2019 (Denmark); table** 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 9.2.1., p 51-56, App 7**

Latest earlier report:
[21] Cappelen, J. (ed), 2020: Denmark - DMI Historical Climate Data Collection 1873-2019. DMI Report No. 20-02.

9.1. Introduction

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 the table 9.2.1.2 and the four major events are marked in grey.

9.2. Storm data

9.2.1. Table; list of storms

Table 9.2.1.1. Table product; list of Danish storms. See details in Appendix 7.

Product*	Dataset id	Period	Parameter
Table; list of storms; Denmark 1891-2019	dk_storm	1891-2019	Classification, see table 9.2.1.2

*English version.

The table are shown on the next pages, 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 [25].

Table 9.2.1.2. The list of classified storms in Denmark 1891-2019.

STORMS IN DENMARK 1891-2019

Classification

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
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 “Ulvsund” 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
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
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,	10/1-2015	w2

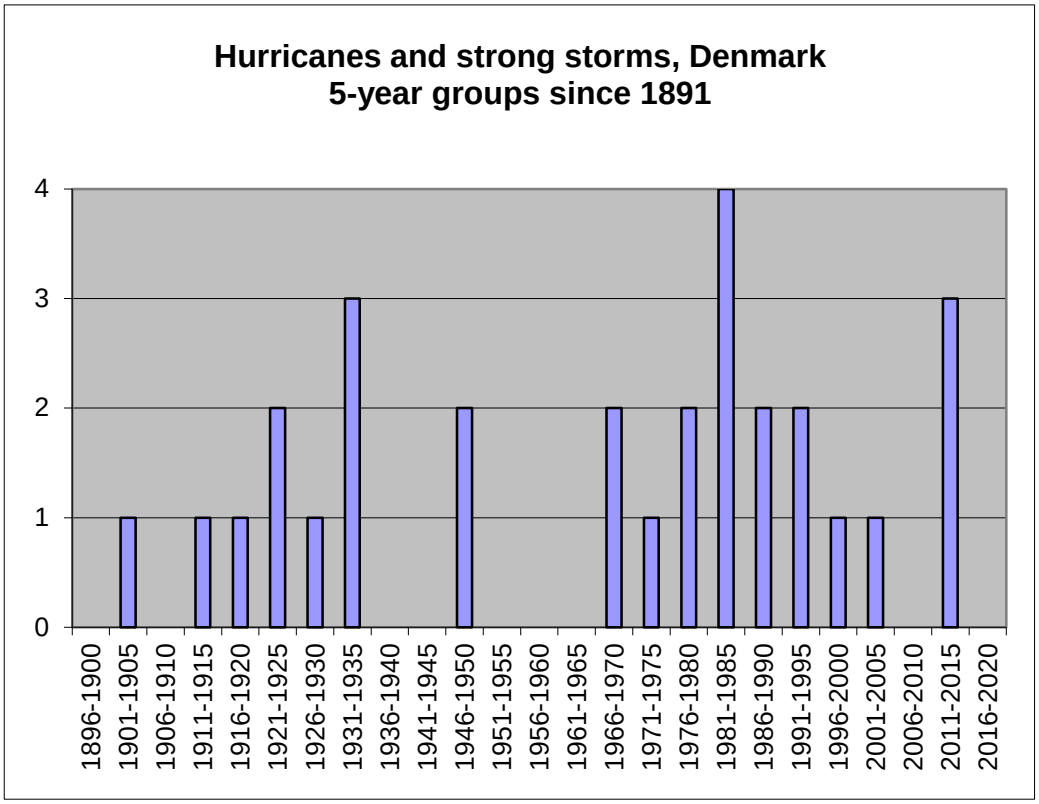
		named Egon		
7-8/11	2015	Stormy, the northern parts of Jutland and some coastal areas, named Freja	8/11-2015	W1
29/11	2015	Strong storm (hurricane-like), coastal areas, named Gorm	29/11-2015	w3
4/12	2015	Stormy, the northern parts of Jutland and some coastal areas along the west coast of Jutland, named 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
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

Class 4	13
Class 3	17
Class 2	52
Class 1	106
Total	**188**

Table 9.2.1.3. Graphical products; Danish storms. See details in Appendix 6.

Product*	Graph id	Period	Parameter
Graph; number of storms 1891-2019	dk_graph_storm	1891-2019	Class 3 and 4 storms; see table 9.2.1.2

**English version.*



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

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Appendices - File formats and metadata

Appendix 1 Station history
Appendix 2 Observational section
Appendix 3 Daily section
Appendix 4 Monthly/Annual section
Appendix 5 Country-wise section
Appendix 6 Storm section

Appendix 1. Station history - File Formats and metadata

Appendix 1.1. File formats; Station position file

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 in Appendix 1.2.

The file name is:
dk_station_position.dat

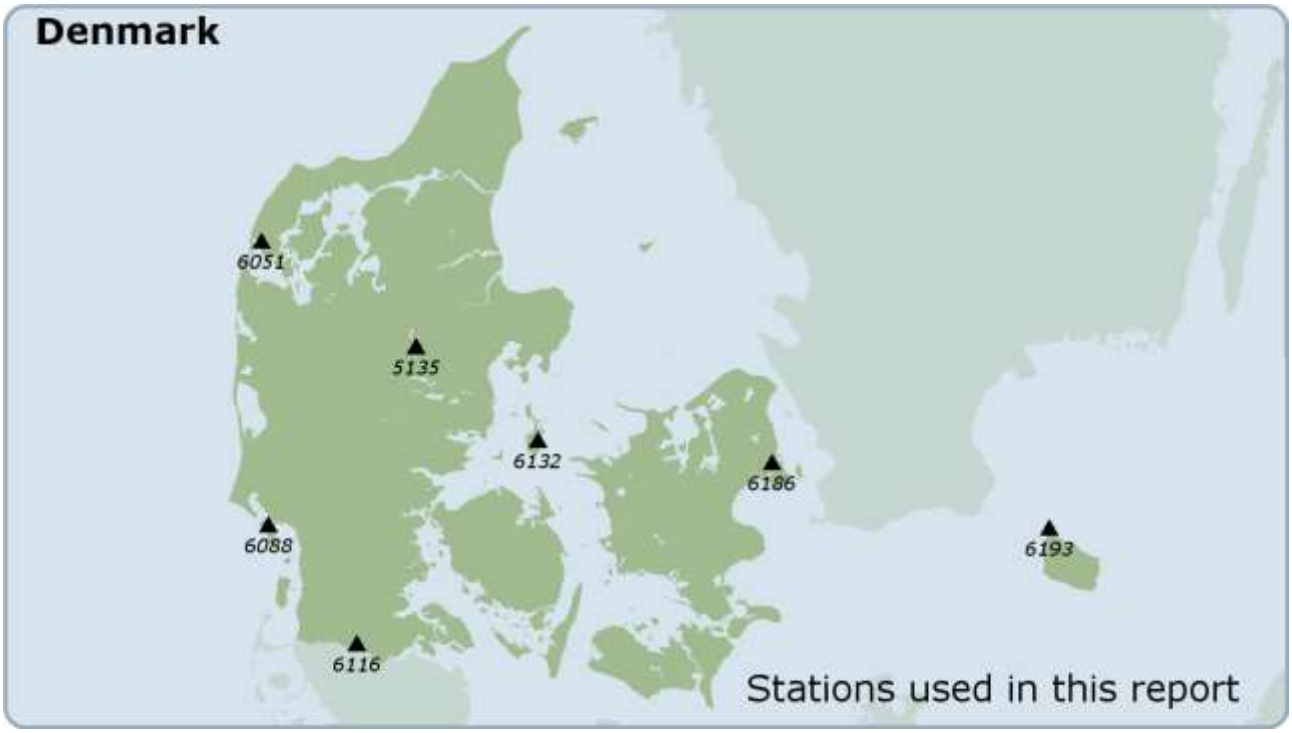
Format of the station position fixed format text file:

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 mean 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), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02. Copenhagen.

Appendix 1.2. Metadata - Station history

By convention a time series is named after the most recent primary station delivering the data. Here is 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 data series in the next section. More metadata on the series/station may be found in [35]. The information can also be found in a file attached to this report, see Appendix 1.1.



Station based data sets referred to in the report. 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.

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		snow_man	32V	6291492	458551	81919	564551	18
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

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

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

25171	Esbjerg R/A V	07-AUG-1990	23-MAY-2012	precip_aut	32U	6149430	464030	82600	552900	3
25171	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

6116 Store Jyndevad (Broderup)

No.	Name	Start	End	Type	UTM	Northings	Eastings	Longitude	Latitude	Elev.
26400	Store Jyndevad	15-OCT-1960	30-JUN-1978	clima_man	32U	6083960	508370	90800	545400	15
26400	Store Jyndevad	01-JUL-1978	30-JUN-1987	clima_man	32U	6083440	507920	90700	545400	14
26400	Store Jyndevad	01-JUL-1987	30-JUN-1992	precip_man	32U	6083921	508179	90800	545400	15
26400	Store Jyndevad	01-JUL-1992	10-DEC-2001	precip_man	32U	6083960	508268	90800	545400	15
26400	Store Jyndevad	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 Jyndevad	05-SEP-1984	23-JUN-1988	synop_dk	32U	6083730	507970	90700	545400	15
6116	Store Jyndevad	06-JUN-2001		synop_dk	32U	6083716	507960	90727	545357	15

6132 Tranebjerg

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

6186 Københavns Landbohøjskole

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.

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

*) The ground level of the tower is 7 m above MSL. The thermometer was situated app. 43 m above MSL.

6193 Hammer Odde Fyr/Lighthouse

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		snow_man	33U	6113129	498051	145800	551000	94
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

Appendix 1.3. File formats; Station angles file

Another station file contains digitised information on the rain gauge exposure.

The file name is:
dk_station_ang.dat

The file contains the digitised information on the rain gauge exposure. The information is expressed as the angle to the horizon in eight directions, as the summarising angle index and the exposure class. The information is only available for some of the stations and only through the recent years.

The text file has the following format:

Position	Format	Description
1-5	F5.0	Station number
6-25	Datetime20	Start date (DD-MMM-YYYY HH:MM:SS)
26-45	Datetime20	End date (DD-MMM-YYYY HH:MM:SS)
46-51	F6.0	Angle towards N
52-57	F6.0	Angle towards NE
58-63	F6.0	Angle towards E
64-69	F6.0	Angle towards SE
70-75	F6.0	Angle towards S
76-81	F6.0	Angle towards SW
82-87	F6.0	Angle towards W
88-93	F6.0	Angle towards NW
94-99	F6.0	Angle index
100-177	A78	Remarks
178-178	A1	Exposure class

The following dependence of exposure class on angle index are used:

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

Data are only to be used with proper reference to the accompanying report:

Cappelen, J. (ed), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02. Copenhagen.

Appendix 2. Observational section - File Formats and metadata

Appendix 2.1. File Formats; Observation data files

The observation files included in this report contains blended mean sea level (msl) atmospheric pressure observations 1874-2019 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_2019.csv
dk_obs_401_6088_1874_2019.csv
dk_obs_401_6193_1874_2019.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 4.2.2, in section 4.2.

Data are only to be used with proper reference to the accompanying report:

Cappelen, J. (ed), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02. Copenhagen.

Appendix 2.2. Metadata - Description of observational atmospheric pressure datasets

Three (3) Danish data sets have long series of atmospheric pressure observations (at msl, mean sea level). The table 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].

Dataset/period	Station	Start	End	Obs. hours (utc)
Vestervig **1874-2019**	21100 Vestervig 6052 Thyborøn 6052 Thyborøn	01 January 1874 01 August 1987 22 November 2000	31 July 1987 22 November 2000 31 December 2019	7,13,20 0,3,6,9,12,15,18,21 0 – 23 every hour
Nordby/Fanø **1874-2019**	25140 Nordby/Fanø 6080 Esbjerg Airport 6080 Esbjerg Airport	01 January 1874 01 August 1987 10 September 2003	31 July 1987 10 September 2003 31 December 2019	7,13,20 0,3,6,9,12,15,18,21 0 – 23 every hour
Hammer Odde **1874-2019**	32030 Sandvig **or** 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr 6193 Hammer Odde Fyr	01 January 1874 01 June 1987 30 August 2001	31 May 1987 30 August 2001 31 December 2019	7,13,20 0,3,6,9,12,15,18,21 0 – 23 every hour

The three Danish series of atmospheric pressure observations (at msl, mean sea level). Important note: Blended data sets are a part of the observational section, Single station series are not a part of the observational section.

Appendix 3. Daily section – File formats and metadata

Appendix 3.1. File formats; Daily data files

The daily files included in this report contain single and blended daily DMI data series 1872 - 2019 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 2003-2019)
dk_daily_27080_6132_101.csv (period 1872-2019) (blend)

dk_daily_21100_112.csv (period 1874-2003)
dk_daily_6051_112.csv (period 2003-2019)
dk_daily_21100_6051_112.csv (period 1874-2019) (blend)
dk_daily_25140_112.csv (period 1874-2003)
dk_daily_6088_112.csv (period 2003-2019)
dk_daily_25140_6088_112.csv (period 1874-2019) (blend)
dk_daily_27080_112.csv (period 1873-2003)
dk_daily_6132_112.csv (period 2003-2019)
dk_daily_27080_6132_112.csv (period 1873-2019) (blend)
dk_daily_30380_112.csv (period 1874-1997)
dk_daily_6186_112.csv (period 1995-2019)
dk_daily_30380_6186_112.csv (period 1874-2019) (blend)
dk_daily_32030_112.csv (period 1874-1970)
dk_daily_32020_112.csv (period 1971-1987)
dk_daily_6193_112.csv (period 1984-2019)
dk_daily_32030_32020_6193_112.csv (period 1874-2019) (blend)

dk_daily_21100_122.csv (period 1874-2003)
dk_daily_6051_122.csv (period 2003-2019)
dk_daily_21100_6051_122.csv (period 1874-2019) (blend)
dk_daily_25140_122.csv (period 1874-2003)
dk_daily_6088_122.csv (period 2003-2019)
dk_daily_25140_6088_122.csv (period 1874-2019) (blend)
dk_daily_27080_122.csv (period 1872-2003)
dk_daily_6132_122.csv (period 2003-2019)
dk_daily_27080_6132_122.csv (period 1872-2019) (blend)
dk_daily_30380_122.csv (period 1874-1997)

dk_daily_6186_122.csv (period 1995-2019)
dk_daily_30380_6186_122.csv (period 1874-2019) (blend)
dk_daily_32030_122.csv (period 1874-1970)
dk_daily_32020_122.csv (period 1971-1987)
dk_daily_6193_122.csv (period 1984-2019)
dk_daily_32030_32020_6193_122.csv (period 1874-2019) (blend)

dk_daily_21100_401.csv (period 1874-1987)
dk_daily_6052_401.csv (period 1962-2019)
dk_daily_21100_6952_401.csv (period 1874-2019) (blend)
dk_daily_25140_401.csv (period 1874-1987)
dk_daily_6080_401.csv (period 1959-2019)
dk_daily_25140_6080_401.csv (period 1874-2019) (blend)
dk_daily_6193_401.csv (period 1874-2019)

dk_daily_6051_601.csv (period 1874-2019)
dk_daily_5135_601.csv (period 1874-2019)
dk_daily_6088_601.csv (period 1874-2019)
dk_daily_26410_601.csv (period 1920-1993)
dk_daily_26409_601.csv (period 1995-2006)
dk_daily_6116_601.csv (period 1987-2019)
dk_daily_26410_6116_601.csv (period 1920-2019) (blend)
dk_daily_27080_601.csv (period 1872-2001)
dk_daily_5165_601.csv (period 2001-2019)
dk_daily_27080_5165_601.csv (period 1872-2019) (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 1961-2019)
dk_daily_30380_5735_601.csv (period 1874-2019) (blend)
dk_daily_32030_601.csv (period 1874-1970)
dk_daily_32020_601.csv (period 1961-1987)
dk_daily_6193_601.csv (period 1984-2019)
dk_daily_32030_32020_6193_601.csv (period 1874-2019) (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 5.2.7, in section 5.2.

Data are only to be used with proper reference to the accompanying report:

Cappelen, J. (ed), 2020: DMI Historical Climate Data Collection 1768-2019, Denmark. DMI Report 20-02. Copenhagen.

Air temperature at 14 hours DNT or 12 UTC files

dk_daily_101.xlsx

The sheets in the xlsx-file are named:
27080_101 (period 1872-2003)
6132_101 (period 2003-2019)
27080_6132_101 (period 1872-2019) (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 2003-2019)
dk_daily_27080_6132_101.csv (period 1872-2019) (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)

Daily highest air temperature files

dk_daily_112.xlsx

The sheets in the xlsx-file are named:
21100_112 (period 1874-2003)
6051_112 (period 2003-2019)
21100_6051_112 (period 1874-2019) (blend)

25140_112 (period 1874-2003)
6088_112 (period 2003-2019)
25140_6088_112 (period 1874-2019) (blend)

27080_112 (period 1873-2003)
6132_112 (period 2003-2019)
27080_6132_112 (period 1873-2019) (blend)

30380_112 (period 1874-1997)
6186_112 (period 1995-2019)
30380_6186_112 (period 1874-2019) (blend)

32030_112 (period 1874-1970)
32020_112 (period 1971-1987)
6193_112 (period 1984-2019)
32030_32020_6193_112 (period 1874-2019) (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 2003-2019)
dk_daily_21100_6051_112.csv (period 1874-2019) (blend)

dk_daily_25140_112.csv (period 1874-2003)
dk_daily_6088_112.csv (period 2003-2019)
dk_daily_25140_6088_112.csv (period 1874-2019) (blend)
dk_daily_27080_112.csv (period 1873-2003)
dk_daily_6132_112.csv (period 2003-2019)
dk_daily_27080_6132_112.csv (period 1873-2019) (blend)
dk_daily_30380_112.csv (period 1874-1997)
dk_daily_6186_112.csv (period 1995-2019)
dk_daily_30380_6186_112.csv (period 1874-2019) (blend)
dk_daily_32030_112.csv (period 1874-1970)
dk_daily_32020_112.csv (period 1971-1987)
dk_daily_6193_112.csv (period 1984-2019)
dk_daily_32030_32020_6193_112.csv (period 1874-2019) (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.

Daily lowest air temperature files

dk_daily_122.xlsx

The sheets in the xlsx-file are named:
21100_122 (period 1874-2003)
6051_122 (period 2003-2019)
21100_6051_122 (period 1874-2019) (blend)

25140_122 (period 1874-2003)
6088_122 (period 2003-2019)
25140_6088_122 (period 1874-2019) (blend)

27080_122 (period 1872-2003)
6132_122 (period 2003-2019)
27080_6132_122 (period 1872-2019) (blend)

30380_122 (period 1874-1997)
6186_122 (period 1995-2019)
30380_6186_122 (period 1874-2019) (blend)

32030_122 (period 1874-1970)
32020_122 (period 1971-1987)
6193_122 (period 1984-2019)
32030_32020_6193_122 (period 1874-2019) (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 2003-2019)
dk_daily_21100_6051_122.csv (period 1874-2019) (blend)
dk_daily_25140_122.csv (period 1874-2003)
dk_daily_6088_122.csv (period 2003-2019)
dk_daily_25140_6088_122.csv (period 1874-2019) (blend)
dk_daily_27080_122.csv (period 1872-2003)
dk_daily_6132_122.csv (period 2003-2019)
dk_daily_27080_6132_122.csv (period 1872-2019) (blend)
dk_daily_30380_122.csv (period 1874-1997)
dk_daily_6186_122.csv (period 1995-2019)
dk_daily_30380_6186_122.csv (period 1874-2019) (blend)
dk_daily_32030_122.csv (period 1874-1970)
dk_daily_32020_122.csv (period 1971-1987)
dk_daily_6193_122.csv (period 1984-2019)
dk_daily_32030_32020_6193_122.csv (period 1874-2019) (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.

Daily average atmospheric pressure files

dk_daily_401.xlsx

The sheets in the xlsx-file are named:
21100_401 (period 1874-1987)
6052_401 (period 1962-2019)
21100_6952_401 (period 1874-2019) (blend)

25140_401 (period 1874-1987)
6080_401 (period 1959-2019)
25140_6080_401 (period 1874-2019) (blend)

6193_401 (period 1874-2019)

The data can also be found in separate csv-files:
dk_daily_21100_401.csv (period 1874-1987)
dk_daily_6052_401.csv (period 1962-2019)
dk_daily_21100_6952_401.csv (period 1874-2019) (blend)
dk_daily_25140_401.csv (period 1874-1987)
dk_daily_6080_401.csv (period 1959-2019)
dk_daily_25140_6080_401.csv (period 1874-2019) (blend)
dk_daily_6193_401.csv (period 1874-2019)

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 atmospheric pressure observation files:

Position	Format	Description
1-5	F5.0	Station number
6-9	F4.0	Year
10-11	F2.0	Month
12-13	F2.0	Day
14-15	F2.0	End hour (UTC) Please notice that the “End 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.
16-20	F5.0	Atmospheric pressure reduced to MSL (0.1 hPa)
21-25	F5.0	No. of observations in daily average (null: Not available, but ideally 8 with start 3-4 decades ago (least 4 observations per day); 24 in recent years.

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.

Daily accumulated precipitation files

dk_daily_601.xlsx

The sheets in the xlsx-file are named:
6051_601 (period 1874-2019)

5135_601 (period 1874-2019)

6088_601 (period 1874-2019)

26410_601 (period 1920-1993)
26409_601 (period 1995-2006)
6116_601 (period 1987-2019)
26410_6116_601 (period 1920-2019) (blend)

27080_601 (period 1872-2001)
5165_601 (period 2001-2019)
27080_5165_601 (period 1872-2019) (blend)

30380_601 (period 1874-1996)
30210_1_601 (period 1875-1922)
30210_2_601 (period 1961-1984)
5735_601 (period 1961-2019)
30380_5735_601 (period 1874-2019) (blend)

32030_601 (period 1874-1970)
32020_601 (period 1961-1987)
6193_601 (period 1984-2019)
32030_32020_6193_601 (period 1874-2019) (blend)

The data can also be found in separate csv-files:
dk_daily_6051_601.csv (period 1874-2019)
dk_daily_5135_601.csv (period 1874-2019)
dk_daily_6088_601.csv (period 1874-2019)
dk_daily_26410_601.csv (period 1920-1993)
dk_daily_26409_601.csv (period 1995-2006)
dk_daily_6116_601.csv (period 1987-2019)
dk_daily_26410_6116_601.csv (period 1920-2019) (blend)
dk_daily_27080_601.csv (period 1872-2001)
dk_daily_5165_601.csv (period 2001-2019)
dk_daily_27080_5165_601.csv (period 1872-2019) (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 1961-2019)

dk_daily_30380_5735_601.csv (period 1874-2019) (blend)
dk_daily_32030_601.csv (period 1874-1970)
dk_daily_32020_601.csv (period 1961-1987)
dk_daily_6193_601.csv (period 1984-2019)
dk_daily_32030_32020_6193_601.csv (period 1874-2019) (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.

Cloud cover at 8, 14 and 21 hours DNT file

dk_daily_801.xlsx

The sheet in the xlsx-file is 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).

Appendix 3.2. Metadata - Description of daily station data series

Air temperature at 14 hours DNT or 12 UTC

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 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.

Dataset/period*	Station	Start	End
Tranebjerg **1872-2019**	27080 Tranebjerg 6132 Tranebjerg Blended: 27080 Tranebjerg 6132 Tranebjerg	1 December 1872 21 August 2003 1 December 1872 21 August 2003	20 August 2003 31 December 2019 20 August 2003 31 December 2019

Important 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.

**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.*

Highest air temperature

Eleven (11) Danish station series with a record of daily highest air temperatures can be blended into five (5) long data sets. The table 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.

Dataset/period*	Station	Start	End
Vestervig **1874-2019**	21100 Vestervig 6051 Vestervig Blended: 21100 Vestervig 6051 Vestervig	2 August 1874 02 October 2003 2 August 1874 02 October 2003	10 September 2003 31 December 2019 10 September 2003 31 December 2019
Nordby/Fanø **1874-2019**	25140 Nordby/Fanø 6088 Nordby/Fanø Blended: 25140 Nordby/Fanø 6088 Nordby/Fanø	2 May 1874 25 July 2003 2 May 1874 25 July 2003	18 July 2003 31 December 2019 18 July 2003 31 December 2019
Tranebjerg **1873-2019**	27080 Tranebjerg 6132 Tranebjerg Blended: 27080 Tranebjerg 6132 Tranebjerg	1 January 1873 21 August 2003 1 January 1873 21 August 2003	10 August 2003 31 December 2019 10 August 2003 31 December 2019
København **1874-2019**	30380 Landbohøjskolen 6186 Landbohøjskolen Blended:	1 January 1874 1 December 1995	30 June 1997 31 December 2019

	30380 Landbohøjskolen 6186 Landbohøjskolen	1 January 1874 1 December 1995	30 November 1995 31 December 2019
Hammer Odde 1874-2019	32030 Sandvig 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr Blended: 32030 Sandvig 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr	2 April 1874 1 January 1971 1 January 1984 2 April 1874 1 January 1971 1 January 1984	31 December 1970 24 June 1987 31 December 2019 31 December 1970 31 December 1983 31 December 2019

Important 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.

**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.*

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.

See 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.

Lowest air temperature

Eleven (11) Danish station series with a record of daily lowest air temperatures can be blended into five (5) long data sets. The table 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.

Dataset/period*	Station	Start	End
Vestervig 1874-2019	21100 Vestervig 6051 Vestervig Blended: 21100 Vestervig 6051 Vestervig	19 June 1874 02 October 2003 19 June 1874 02 October 2003	10 September 2003 31 December 2019 10 September 2003 31 December 2019
Nordby/Fanø 1874-2019	25140 Nordby/Fanø 6088 Nordby/Fanø Blended: 25140 Nordby/Fanø 6088 Nordby/Fanø	1 May 1874 25 July 2003 1 May 1874 25 July 2003	18 July 2003 31 December 2019 18 July 2003 31 December 2019
Tranebjerg 1872-2019	27080 Tranebjerg 6132 Tranebjerg	1 December 1872 21 August 2003	10 August 2003 31 December 2019

	Blended: 27080 Tranebjerg 6132 Tranebjerg	 1 December 1872 21 August 2003	 10 August 2003
København 1874-2019	30380 Landbohøjskolen 6186 Landbohøjskolen Blended: 30380 Landbohøjskolen 6186 Landbohøjskolen	1 January 1874 1 December 1995 1 January 1874 1 December 1995	30 June 1997 31 December 2019 30 November 1995 31 December 2019
Hammer Odde 1874-2019	32030 Sandvig 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr Blended: 32030 Sandvig 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr	1 January 1874 1 January 1971 1 January 1984 1 January 1874 1 January 1971 1 January 1984	31 December 1970 24 June 1987 31 December 2019 31 December 1970 31 December 1983 31 December 2019

Important 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.

**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 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.

Average atmospheric pressure

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 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 except the Hammer Odde series). Overlap periods have been included when available.

Dataset/period*	Station	Start	End
Vestervig 1874-2019	21100 Vestervig 6052 Thyborøn Blended: 21100 Vestervig 6052 Thyborøn	01 January 1874 02 March 1962 01 January 1874 02 March 1962	01 August 1987 31 December 2019 01 March 1962 31 December 2019
Nordby/Fanø 1874-2019	25140 Nordby/Fanø 6080 Esbjerg Airport Blended: 25140 Nordby/Fanø 6080 Esbjerg Airport	01 January 1874 29 March 1959 01 January 1874 29 March 1959	01 August 1987 31 December 2019 28 March 1959 31 December 2019
Hammer Odde 1874-2019	32030 Sandvig **or** 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr	01 January 1874 - 02 June 1987	- 1 June 1987 31 December 2019

	Blended: 32030 Sandvig **or** 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr	 01 January 1874 02 June 1987	 1 June 1987 31 December 2019

Important 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.

**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 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.

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 2019 the data are from 6193 Hammer Odde Fyr and the averaging follows that of 6052 Thyborøn.

Concerning reduction to MSL
As part of the WASA project [43], selected DMI series of pressure observations 1874-1970 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.

Important note: For the present data set, the pressure data from these "old" manually operated climate stations were reduced to mean sea level applying the formulas that can be seen in Appendix 3.3. Other adjustments (Appendix 3.3) have not been applied to the daily value dataset. This is the explanation for small differences between the daily series presented in section 5.2.6 and the daily series that can be calculated using the homogenized atmospheric pressure observations presented in section 4.2.1. It is advised for the reader to take this probable need of adjustment into account when using the daily value data set.

Accumulated precipitation

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

Dataset/period*	Station	Start	End
Vestervig 1874-2019	6051/21100 Vestervig Blended: 6051/21100 Vestervig	1 January 1874 1 January 1874	31 December 2019 31 December 2019
Grønbæk 1874-2019	5135/21430 Grønbæk/ Allingskovgård Blended: 5135/21430 Grønbæk/ Allingskovgård	1 September 1874 1 September 1874	31 December 2019 31 December 2019
Nordby/Fanø 1874-2019	6088/25140 Nordby/Fanø Blended: 6088/25140 Nordby/Fanø	1 January 1874 1 January 1874	31 December 2019 31 December 2019
Store Jyndevad 1920-2019	26410 Broderup/Bajstrup/ Gårdeby/Rødebæk/Broderup Mark 26409 Tinglev 6116/26400 Store Jyndevad Blended: 26410 Broderup/Bajstrup/ Gårdeby/Rødebæk/Broderup Mark 6116/26400 Store Jyndevad	1 July 1920 1 June 1995 1 July 1987 1 July 1920 1 July 1987	30 June 1993 31 December 2006 31 December 2019 30 June 1987 31 December 2019
Tranebjerg 1872-2019	27080 Tranebjerg 5165/27082 Tranebjerg Øst Blended:	1 December 1872 02 August 2001	01 August 2001 31 December 2019

	27080 Tranebjerg 5165/27082 Tranebjerg Øst	1 December 1872 02 August 2001	01 August 2001 31 December 2019
København 1874-2019	30380 Landbohøjskolen 30210 Meteorologisk Institut 30210 Meteorologisk Institut 5735/30370 Botanisk Have Blended: 30380 Landbohøjskolen 5735/30370 Botanisk Ha-ve/Livgardens Kaserne	1 January 1874 1 January 1875 1 January 1961 1 January 1961 1 January 1874 2 October 1996	1 October 1996 30 June 1922 31 December 1984 31 December 2019 1 October 1996 31 December 2019
Hammer Odde 1874-2019	32030 Sandvig 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr Blended: 32030 Sandvig 32020 Hammer Odde Fyr 6193 Hammer Odde Fyr	1 January 1874 1 January 1961 1 January 1984 1 January 1874 1 January 1971 1 January 1984	31 December 1970 30 June 1987 31 December 2019 31 December 1970 31 December 1983 31 December 2019

Important 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.

**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 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.

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 presents an overview of this station data series (identified by the station name and number).

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

Important 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.

Appendix 3.3. Information concerning atmospheric pressure data

The atmospheric pressure data from the old manually operated climate stations were reduced to mean sea level by applying the formulas that can be seen in tables A3.3.1, A3.3.2, A3.3.3 and A´3.3.4, see [9], [43].

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 A3.3.1. 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). 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 (0.1ºC).

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 A3.3.2. 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). 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 (0.1ºC).

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 A3.3.3. 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'. 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 (0.1ºC). The data from 1970 was already reduced to msl.

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 A3.3.4. 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). 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 (0.1ºC). The data from 1970 was already reduced to msl.

Appendix 3.4. More information concerning the series of atmospheric pressure

The reduction formulas of tables A3.3.1 to A3.3.4 in Appendix 3.3 make use of the barometer heights listed in tables A3.4.1 to A3.4.5 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 A3.4.4 and A3.4.5 (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 A3.4.4 and A3.4.5. It is advised for the reader to take this probable need of adjustment into account when using the data.**

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 = (p8+p14+p21)/3
18930101	19550601	7	P=(p8+p14+p21)/3 + corr. 45 N
19550601	-	7	P=(p8+p14+p21)/3 + corr. 45 N + red. sea level
18730101	18930101	10	P=4/3*(7000+p)*(1-k1*cos(2*Ø))*(1+Hb/k2/(k3+t))
18930101	19560101	10	P=4/3*(7000+p)*(1+Hb/k2/(k3+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 A3.4.1. Meta data regarding atmospheric pressure measurements at station 32030 Sandvig, Bornholm (used in the 6193 Hammer Odde atmospheric pressure series) (from NACD and WASA projects, see list of references). 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).

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 = (p8+p14+p21)/3 + corr 45 N + red. sea level
19710101	-	7	P = (p8+p14+p21)/3 + corr. 45N
19540701	-	10	P = 4/3*(7000+p)
19710100	-	10	P * (1 + 9.82/287.04 * 10.9/(T/10+273.15))

Table A3.4.2. Meta data regarding atmospheric pressure measurements at station 32020 Hammer Odde Fyr, Bornholm (used in the 6193 Hammer Odde pressure series) (from NACD and WASA projects, see list of references). 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).

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
19110501	19110501	5	Bar. no. 2571
19590601	19590601	5	Bar. no. 2571
19120101	-	6	0.1 mm Hg – 7000
19120101	-	7	P = (p8+p14+p21)/3 + corr. 45 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 A3.4.3. See caption for table A3.4.1 and A3.4.2.

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 = (p8+p14+p21)/3
18930101	19530101	7	P=(p8+p14+p21)/3 + corr. 45 N
19530101	19710101	7	P=(p8+p14+p21)/3 + corr. 45 N + red. sea level
19710101	-	7	P=(p8+p14+p21)/3 + corr. 45 N
18870819	18870819	8	New reduction table
18731201	18930101	10	P=4/3*(7000+p)*(1-k1*cos(2*Ø))*(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
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 A3.4.4. Meta data regarding atmospheric pressure measurements at station 21100 Vestervig (from NACD and WASA projects, see references). 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.

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
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 + corr. 45 N
19280806	-	7	P = (p8+p14+p21)/3 + corr. 45 N
19280801	19360405	8	Station moved to Vestervejen 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*Ø))*(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

Station 25140 Nordby/Fanø metadata			
Start	End	Type	Description
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	12.012.012.012.012.012.012.012.012.012.012.0
-	19360400	12	3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 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 6.0
-	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 A3.4.5. Meta data regarding atmospheric pressure measurements at station 25140 Nordby/Fanø (from NACD and WASA projects, see references). 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.

Appendix 3.5. 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 A3.5.1 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].

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 A3.5.1. Information on station instrumentation concerning rain gauge and Stevenson screen (thermometer screen). From ’table 6’ in [8].

Appendix 3.6. Information about 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 4.1. Introduction) 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 A3.6.1 together with comments on the adjustments made. Element numbers and quality codes are explained in tables A3.6.2 and A3.6.3.

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
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 A3.6.1. Quality of series of monthly values published in [27].

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 A3.6.2. Explanation of element numbers used in table A3.6.1.

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

Table A3.6.3. Explanation of quality codes used in table A3.6.1.

Appendix 4. Monthly/annual section - File formats and metadata

Appendix 4.1. File formats; Monthly/annual data files

The monthly/annual files included in this report contain monthly and annual DMI blended data series within the period 1768-2019 comprising different parameters from five (5) stations in Denmark.

The file name are determined as follows:
dk_monthly_all_<period>.csv

In this report one (1) ;-separated csv file:
dk_monthly_all_1768_2019.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 6.2.12, in section 6.2.

In the file **dk_monthly_all_1768_2019.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), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02. Copenhagen.

Special remarks:

The annual values 2014-2019 are calculated directly on hourly values. The annual values before 2014 are calculated on the monthly values mentioned in section 6.2.3.

In the monthly section 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] available from:
https://www.dmi.dk/publikationer/

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.

Appendix 4.2. Metadata - Description of monthly data sets

Vestervig (VEST) – 6051; 1874-2019

Element No.101 (Average Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1874 – 2019	Monthly-db VEST 21100/6051 + TR99-5	1752	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: 2003/10-2019. 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).				

Element No.111 (Average of Daily Maximum Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1875 – 2019	Monthly-db VEST 21100/6051 + TR99-5	1740	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: 2003/10-2019. 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.				

Element No.112 (Highest Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1875 – 2019	Monthly-db VEST 21100/6051 + TR99-5	1740	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: 2003/10-2019. 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.				

Element No.121 (Average of Daily Minimum Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1875 – 2019	Monthly-db VEST 21100/6051 + TR99-5	1740	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: 2003/10-2019. 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).				

Element No.122 (Lowest Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1875 – 2019	Monthly-db VEST 21100/6051 + TR99-5	1740	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 2003/10-2019. 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.				

Vestervig (VEST) – 6051 (continued)

Element No.401 (Average Atmospheric Pressure)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1874 – 2019	Monthly-db VEST 21100 + 6052	1752	0
Details: Created using monthly-db VEST 21100: 1874-1987/7 reduced to mean sea level (see appendix), monthly-db 6052 Thyborøn: 1987/8-2019. Missing (2011/7-8) filled using 6058 Hvide Sande.				

Element No.601 (Accumulated Precipitation) – Not necessarily homogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1874 – 2019	Monthly-db VEST 21100/6051	1752	0
Details: Created using monthly-db VEST 21100/6051: 1874-2019. November 16, 2010 an automatic raingauge was installed at 6051 Vestervig. Not necessarily homogenous, because of new ways of detection from 2010.				

Element No.602 (Highest 24-hour Precipitation) – Not necessarily homogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1874 – 2019	Monthly-db VEST 21100/6051	1752	0
Details: Created using monthly-db VEST 21100/6051: 1874-2019. 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.				

Element No.701 (Number of Days with Snow Cover)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1939 – 2019	Monthly-db VEST 21100 + TR99-5	972	0
Details: Created using monthly-db VEST 21100: 1939-1960, TR99-5 VEST 21100: 1961-1990, monthly-db VEST 21100: 1991-2019. 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.				

Element No.801 (Average Cloud Cover) - Inhomogenous based on a visual test				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1874 – 2019	PF-TS110 + Monthly-db VEST 21100 + 6052	1752	5
Details: Created using monthly-db VEST 21100: 1874-1889, PF-TS110 1890-1995 and monthly_db 6052 Thyborøn: 1996-2019. 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.				

Nordby/Fanø (NORD) – 6088; 1872-2019

Element No.101 (Average Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1872 – 2019	Monthly-db NORD 25140/6088 + TR99-5	1776	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, ObsDB (calc) 0-23utc NORD 6088: 2011/5-2019. 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.				

Element No.111 (Average of Daily Maximum Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1875 – 2019	Monthly-db NORD 25140/6088 + TR99-5	1740	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, ObsDB (calc) 0-23utc NORD 6088: 2011/5-2019. 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.				

Element No.112 (Highest Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1874 – 2019	Monthly-db NORD 25140/6088 + TR99-5	1752	0
Details: Created using monthly-db NORD 25140: 1874-1960, TR99-5 25140: 1961-1990, monthly-db NORD 6088: 1991-2011/4, ObsDB (calc) 0-23utc NORD 6088: 2011/5-2019. 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.				

Element No.121 (Average of Daily Minimum Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1875 – 2019	Monthly-db NORD 25140/6088 + TR99-5	1740	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, ObsDB (calc) 0-23utc NORD 6088: 2011/5-2019. 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.				

Element No.122 (Lowest Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1875 – 2019	Monthly-db NORD 25140/6088 + TR99-5	1740	0
Details: Created using monthly-db NORD 25140: 1875-1960, TR99-5 25140: 1961-1990, monthly-db 6088: 1991-2011/4, ObsDB (calc) 0-23utc NORD 6088: 2011/5-2019. 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.				

Nordby/Fanø (NORD) – 6088 (continued)

Element No.401 (Average Atmospheric Pressure)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1872 – 2019	Monthly-db NORD 25140 + 6080/6081/6096	1776	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 – 2019. Five months 1942/6 – 1942/9 and 1952/11 are missing.				

Element No.601 (Accumulated Precipitation) – Not necessarily homogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1872 – 2019	Monthly-db NORD 25140/6088	1776	0
Details: Created using monthly-db NORD 25140/6088: 1872-2019. 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.				

Element No.602 (Highest 24-hour Precipitation) – Not necessarily homogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1872 – 2019	Monthly-db NORD 25140/6088	1776	0
Details: Created using monthly-db NORD 25140/6088: 1872-2019. 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.				

Element No.701 (Number of Days with Snow Cover) – Not necessarily homogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1957 – 2019	Monthly-db NORD 25140 + 6080 + 25045 +TR99-5	756	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: 2007-2019. 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.				

Element No.801 (Average Cloud Cover) - Inhomogenous based on a visual test				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1872 – 2019	Monthly-db NORD 25140 + PF-TS126 + 6080 + 6096	1776	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 – 2019. 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.				

Tranebjerg (TRAN) – 6132; 1872-2019

Element No.101 (Average Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db TRAN 27080/6132 + TR99-5	1764	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: 2003/9-2019. 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.				

Element No.111 (Average of Daily Maximum Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db TRAN 27080/6132 + TR99-5	1764	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: 2003/9-2019. 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.				

Element No.112 (Highest Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db TRAN 27080/6132 + TR99-5	1764	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: 2003/9-2019. 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.				

Element No.121 (Average of Daily Minimum Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db TRAN 27080/6132 + TR99-5	1764	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: 2003/9-2019. 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.				

Element No.122 (Lowest Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db TRAN 27080/6132 + TR99-5	1764	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: 2003/8-2019. 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.				

Tranebjerg (TRAN) – 6132 (continued)

Element No.401 (Average Atmospheric Pressure)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1872 – 2019	Monthly-db TRAN 27080 + 6159	1765	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 – 2019. One month (2009/2) was filled using an average of 6073 Sletter Hage Fyr, 6169 Gniben, 6120 Odense Airport. 2011/9 was filled using 6169 Gniben. Twelve months are missing: 1911/5-8, 1924/8, 1925/1, 1945/11, 1946/9, 1947/11, 1949/3, 1972/10-11.				

Element No.601 (Accumulated Precipitation) - Not necessarily homogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db TRAN 27080 + 27082 + 5165	1764	0
Details: Created using monthly-db TRAN 27080: 1873-2001/7, 27082: 2001/8 – 2011/3, /4, monthly-db TRAN 5165: 2011/4-2019. 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.				

Element No.602 (Highest 24-hour Precipitation) - Not necessarily homogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db TRAN 27080 + 27082 + 5165	1764	0
Details: Created using monthly-db TRAN 27080: 1873-2001/7, 27082: 2001/8-2011/3, monthly-db TRAN 5165: 2011/4-2019. 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.				

Element No.701 (Number of days with Snow Cover)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1949 – 2019	Monthly-db TRAN 27080 + TR99-5 + 27082	852	44
Details: Created using monthly-db TRAN 27080: 1949-1960, TR99-5: 1961-1990, monthly-db TRAN 27080: 1991- 2000, 27082: 2004/9 - 2019. 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.				

Element No.801 (Cloud Cover)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
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.				

København (KOEB) – 6186; 1768-2019

Element No.101 (Average Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1768 – 2019	Monthly-db KOEB 6186/30380+ Rundetårn+old Botanical Garden	3024	168
Details: Created using monthly-db KOEB 6186/30380: 1860-2019, 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.				

Element No. 111 (Average of Daily Maximum Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1861 – 2019	Monthly-db KOEB 6186/30380	1908	0
Details: Created using monthly-db KOEB 6186/30380: 1861-2019. 1970/12 was filled using a value from station 6180 Københavns Lufthavn.				

Element No. 112 (Highest Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1861 – 2019	Monthly-db KOEB 6186/30380	1908	0
Details: Created using monthly-db KOEB 6186/30380: 1861-2019. 1970/12 was filled using a value from station 6180 Københavns Lufthavn.				

Element No. 121 (Average of Daily Minimum Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1861 – 2019	Monthly-db KOEB 6186/30380	1908	0
Details: Created using monthly-db KOEB 6186/30380: 1861-2019. 1970/12 was filled using a value from station 6180 Københavns Lufthavn.				

Element No. 122 (Lowest Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1861 – 2019	Monthly-db KOEB 6186/30380	1908	0
Details: Created using monthly-db KOEB 6186/30380: 1861-2019. 1970/12 was filled using station 6180 Københavns Lufthavn.				

København (KOEB) – 6186 (continued)

Element No.401 (Average Atmospheric Pressure)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1923 – 2019	Monthly-db KOEB 30380 + 6180	1164	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 – 2019. 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.				

Element No. 504 (Hours of bright sunshine)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1876 – 2019	EVL-TS276+Monthly-db KOEB30380/30340/30341/6187	1728	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: 2012-2019. 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].				

Element No. 601 (Accumulated Precipitation) - Not necessarily homogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1821 – 2019	Monthly-db KOEB 6186/30380+30370+5735+old botanical garden	2388	19
Details: Created using monthly-db KOEB 6186/30380: 1860-1995, 30370: 1996-2011/3, monthly-db 5735: 2011/4-2019 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.				

Element No. 602 (Highest 24-hour Precipitation) - Not necessarily homogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1843 – 2019	Monthly-db KOEB 6186/30380+30370+5735+old botanical garden	2124	0
Details: Created using monthly-db KOEB 6186/30380: 1860-1995, 30370: 1996-2011/3, monthly-db 5735: 2011/4-2019 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.				

Element No. 701 (Number of Days with Snow Cover)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1938 – 2019	Monthly-db KOEB 6186/30380+6180+30370+30187+30215	984	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: 2018/3-2019/12. Jun, Jul, Aug & Sep months 1970-1990 had missing data, zero's were inserted. 1970/12 was filled using a values from 6180.				

Element No. 801 (Cloud Cover) - Inhomogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1876 – 2019	PF-TS153 + Monthly-db KOEB 6186/30380 + 6180	1728	0
Details: Created using monthly-db KOEB 6186/30380: 1876-1889, PF-TS153 1890-1995 and monthly-db 6180: 1996-2019. 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.				

Hammer Odde Fyr (HAMM) – 6193; 1873-2019

Element No.101 (Average Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db HAMM 6193/32020 + 32030 + TR99-5	1764	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, 1991-2019: 6193 Hammer Odde Fyr.				

Element No.111 (Average of Daily Maximum Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1875 – 2019	Monthly-db HAMM 6193/32020 + 32030 + TR99-5	1740	0
Details: Created using monthly-db 1875-1953: 32030 Sandvig, 1953-1960: Average of 32030 and 32020/6193, 1961-1990: TR99-5 6193, 1991-2019: 6193 Hammer Odde Fyr. Missing values for 1951/9+10 were filled using 32025 Hammeren Fyr.				

Element No.112 (Highest Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1874 – 2019	Monthly-db HAMM 6193/32020 + 32030 + TR99-5	1752	2
Details : Created using monthly-db 1874-1953: 32030-Sandvig, 1953-1960: Average of 32030 and 32020/6193, 1961-1990: TR99-5 6193, 1991-2019: 6193 Hammer Odde Fyr. Missing 1874/3 and 1874/5. Missing values for 1951/9+10 were filled using 32025 Hammeren Fyr.				

Element No.121 (Average of Daily Minimum Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db HAMM 6193/32020 + 32030 + TR99-5	1764	0
Details: Created using monthly-db 1873-1953: 32030-Sandvig, 1953-1960: Average of 32030 and 32020/6193, 1961-1990: TR99-5 6193, 1991-2019: 6193 Hammer Odde Fyr.				

Element No.122 (Lowest Air Temperature)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db HAMM 6193/32020 + 32030 + TR99-5	1764	0
Details: Created using monthly-db 1873-1953: 32030-Sandvig, 1953-1960: Average of 32030 and 32020/6193, 1961-1990: TR99-5 6193, 1991-2019: 6193 Hammer Odde Fyr.				

Hammer Odde Fyr (HAMM) – 6193 (continued)

Element No.401 (Average Atmospheric Pressure)				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db HAMM 6193/32020 + 32030	1764	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 1987/07-2019: 6193 Hammer Odde Fyr/Lighthouse. Missing value 1966/07 filled with 32020 reduced to mean sea level.				

Element No.601 (Accumulated Precipitation) - Not necessarily homogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db HAMM 6193/32020 + 32030	1764	0
Details: Created using monthly-db 1873-1953: 32030-Sandvig, 1953-1971: Average of 32030 and 32020/6193, 1971-2019: 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.				

Element No.602 (Highest 24-hour Precipitation) - Not necessarily homogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	Monthly-db HAMM 6193/32020 + 32030	1764	0
Details: Created using monthly-db 1873-1953: 32030-Sandvig, 1953-1971: Average of 32030 and 32020/6193, 1971-2019: 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.				

Element No.701 (Number of days with Snow Cover) – Not necessarily homogenous				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1939 – 2019	Monthly-db HAMM 6193/32020+32030+6190+32080 +32175	972	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 2010/8-2019. 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.				

Element No.801 (Average Cloud Cover) - Inhomogenous based on a visual test				
Dataset	*Period*	*Content*	*Total months*	*Missing months*
Recommended	1873 – 2019	PF-TS97 + Monthly-db HAMM 6193/32020 + 32030	1764	17
Details: Created using monthly-db 32030: 1873-1889, PF-TS97 1890-1995 and monthly-db 6193: 1996-2019. 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.				

Appendix 4.3. 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" (0ºC 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, φ 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 ºC)

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 following DMI publication:

DMI Technical Report 03-24: Metadata, selected climatological and synoptic stations, 1750-1996, Copenhagen 2003 [35].

This publication can be downloaded from the publication part of DMI's web site:
https://www.dmi.dk/publikationer/

Station 25140 Nordby/Fanø: Reduction of atmospheric pressure to mean sea level. Until and including 1892 also correction for gravity.		
Start	End	Formula, P: station level pressure (0.1 hPa), T: Air temperature at station level (0.1ºC)
-	18920400	P * (1 - 0.00259 * cos(2 * 55.5 * 3.14/180)) * (1 + 9.82/287.04 * 5.5/(T/10+273.15))
18920500	18921200	P * (1 - 0.00259 * cos(2 * 55.5 * 3.14/180)) * (1 + 9.82/287.04 * 8.0/(T/10+273.15))
18930100	18991100	P * (1 + 9.82/287.04 * 8.0/(T/10+273.15))
18991200	19280700	P * (1 + 9.82/287.04 * 5.5/(T/10+273.15))
19280800	19360300	P * (1 + 9.82/287.04 * 10.5/(T/10+273.15))
19360400	19441100	P * (1 + 9.82/287.04 * 6.9/(T/10+273.15))
19441200	19450500	P * (1 + 9.82/287.04 * 7.0/(T/10+273.15))
19450600	19551100	P * (1 + 9.82/287.04 * 3.0/(T/10+273.15))
19551200	19600800	P * (1 + 9.82/287.04 * 9.7/(T/10+273.15))
19600900	-	P * (1 + 9.82/287.04 * 6.7/(T/10+273.15))

Example: The formulas take care that the published atmospheric pressure is reduced to mean sea level, 0ºC and gravity at 45º Latitude. The air temperature used is the monthly average air temperature in the NORD6088 'recommended' series. See also Appendix 3.3.

Appendix 5. Country-wise section - File formats and metadata

Appendix 5.1. File formats; Country-wise monthly/annual climate data

1) Monthly and annual country-wise Danish climate data 1874-2019 arranged in a table are included in this section 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 1891-2019 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_2019.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) 1891-2019
5. Average air temperature 1874-2019
6. Highest air temperature 1874-2019
7. Lowest air temperature 1874-2019
8. Average of daily maximum air temperature 1953-2019
9. Average of daily minimum air temperature 1953-2019
10. Accumulated precipitation 1874-2019
11. Highest 24-hour precipitation at a single station 1874-2019
12. Accumulated hours of bright sunshine 1920-2019
13. The weather during Easter, Christmas and Midsummer Day are stated in ”Særlige begivenheder”(special events) with matching dates (Danish only) 1891-2019

The element/parameter numbers and units can be seen in the data dictionary, table 7.2.1.2, in section 7.2.

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

The file name is determined as follows: **dk_country_extremes_<period>.xlsx**
In this report one (1) Excel-file: **dk_country_extremes_1874_2019.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 1874-2019
3. Lowest air temperature 1874-2019
4. Highest average air temperature 1874-2019
5. Lowest average air temperature 1874-2019
6. Highest accumulated hours of bright sunshine 1920-2019
7. Lowest accumulated hours of bright sunshine 1920-2019

8. Highest accumulated precipitation 1874-2019
9. Lowest accumulated precipitation 1874-2019
10. Highest 24-hour precipitation at a single station 1874-2019

The element/parameter numbers and units can be seen in the data dictionary, table 7.2.1.4, in section 7.2.

3) Monthly/annual country-wise data series of annual average air temperature, accumulated precipitation and hours of bright sunshine within the period 1873-2019 for Denmark as a whole are also included as an Excel file.

The file name is determined as follows: **dk_country_dataseries_tps_<period>.xlsx**
In this report one (1) Excel-file: **dk_country_dataseries_tps_1873_2019.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) 1873-2019
2. Average air temperature (corrected) 1873-2019
3. Hours of bright sunshine 1920-2019
4. Accumulated precipitation 1874-2019

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 7.2.2.1, in section 7.2.

Data are only to be used with proper reference to the accompanying report:

Cappelen, J. (ed), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02. Copenhagen.

Appendix 6. Graphics section - File formats and metadata

Appendix 5.1. File formats - Annual graphics

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 hurricanes/strong storms (1 country-wise data set) within the period 1768 - 2019.

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_2019.png
Annual average air temperatures 1873-2019 (published); anomaly relative to 1981-2010. Country-wise, Denmark. (English version)

dk_graph_annual_corrtemperature_country_1873_2019.png
Annual average air temperatures 1873-2019 (corrected); anomaly relative to 1981-2010. Country-wise, Denmark. (English version)

dk_graph_annual_precipitation_country_1874_2019.png
Annual accumulated precipitation 1874-2019; anomaly relative to 1981-2010. Country-wise, Denmark. (English version)

dk_graph_annual_sunshine_country_1920_2019.png
Annual accumulated hours of bright sunshine 1920-2019; anomaly relative to 1981-2010. Country-wise, Denmark. (English version)

dk_graph_annual_temperature_6051_1874_2019.png
Annual average air temperatures 1873-2019; anomaly relative to 1981-2010. Vestervig, Denmark. (English version)

dk_graph_annual_precipitation_6051_1874_2019.png
Annual accumulated precipitation 1874-2019; anomaly relative to 1981-2010. Vestervig, Denmark. (English version)

dk_graph_annual_temperature_6088_1872_2019.png
Annual average air temperatures 1872-2019; anomaly relative to 1981-2010. Nordby (Fanø), Denmark. (English version)

dk_graph_annual_precipitation_6088_1872_2019.png
Annual accumulated precipitation 1872-2019; anomaly relative to 1981-2010. Nordby (Fanø), Denmark. (English version)

dk_graph_annual_temperature_6132_1873_2019.png
Annual average air temperatures 1873-2019; anomaly relative to 1981-2010. Tranebjerg (Samsø), Denmark. (English version)

dk_graph_annual_precipitation_6132_1873_2019.png
Annual accumulated precipitation 1873-2019; anomaly relative to 1981-2010. Tranebjerg (Samsø), Denmark. (English version)

dk_graph_annual_temperature_6186_1768_2019.png
Annual average air temperatures 1768-2019; anomaly relative to 1981-2010. København, Denmark. (English version)

dk_graph_annual_precipitation_6186_1821_2019.png
Annual accumulated precipitation 1821-2019; anomaly relative to 1981-2010. København, Denmark. (English version)

dk_graph_annual_sunshine_6186_1876_2019.png
Annual accumulated hours of bright sunshine 1876-2019; anomaly relative to 1981-2010. København, Denmark. (English version)

dk_graph_annual_temperature_6193_1873_2019.png
Annual average air temperatures 1873-2019; anomaly relative to 1981-2010. Hammer Odde Fyr (Bornholm), Denmark. (English version)

dk_graph_annual_precipitation_6193_1873_2019.png
Annual accumulated precipitation 1873-2019; anomaly relative to 1981-2010. Hammer Odde Fyr (Bornholm), Denmark. (English version)

dk_graph_storm_1891_2019.png
Hurricanes and strong storms 1891-2019, Denmark; 5-year groups. Denmark. (English version)

Data are only to be used with proper reference to the accompanying report:

Cappelen, J. (ed), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02. Copenhagen.

Appendix 7. Storm section - File formats and metadata

Appendix 7.1. File formats; List of storms

A list of storms included in this report contains all classified storms in Denmark 1891-2019.

The file name is determined as follows:

dk_storm_<period>.pdf

In this report one (1) pdf-file:

dk_storm_1891_2019.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), 2020: Denmark - DMI Historical Climate Data Collection 1768-2019. DMI Report No. 20-02. Copenhagen.