

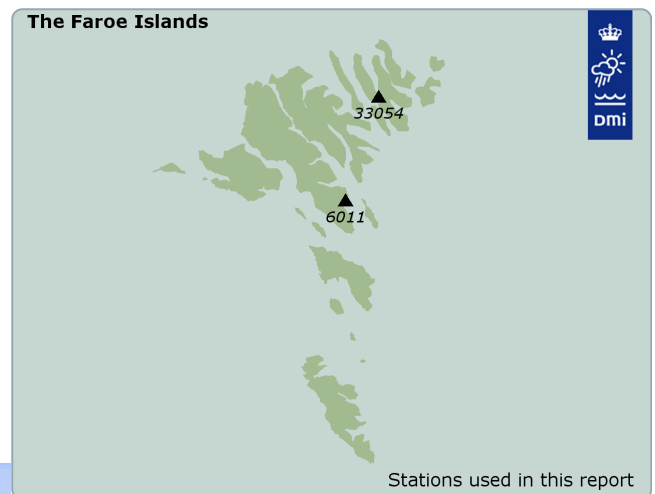


Technical Report 14-05

The Faroe Islands - DMI Historical Climate Data Collection 1873-2013

-with Danish Abstracts

John Cappelen (ed)



Copenhagen 2014



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Important note:

This report is an annual update (2013 data) of the “DMI observational, monthly and annual Faroe Islands 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 [8], 2) Technical Report No. 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. DMI Copenhagen 2003 [20] and 3) 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 [7].

Front Page:

Heinanøva near Gasadalur, Vagar seen towards NNW 6 September 2002. Photo: Juncher Jensen, DMI.



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Abstract

This report contains the available DMI historical data collection 1873-2013 from the Faroe Islands, including observations (atmospheric pressure) and long monthly and annual series of station based data.

Resumé

Denne rapport indeholder tilgængelige historiske DMI datasamlinger 1873-2013 fra Færøerne. Det drejer sig om observationer af lufttryk samt lange månedlige og årlige stationsdataserier.



Preface

This report contains a DMI historical data collection 1873-2013 for The Faroe Islands, including long series of station based data comprising observations of atmospheric pressure plus monthly and annual values of selected parameters. Descriptions of the general weather and climate at the Faroes [6] is included.

This information has been published earlier in different DMI reports [9], [10], [11]. From 2011 it has been published in one report divided in sections covering the different data types.

The data collection comprises observational, monthly and annual blended data sets with a long record (blended station data series). 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 Appendices. Other metadata as descriptions of the construction of data sets and data series behind, information concerning atmospheric pressure and additional notes on monthly values 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 [21]. This publication contains information concerning a major part of the stations included in this report.

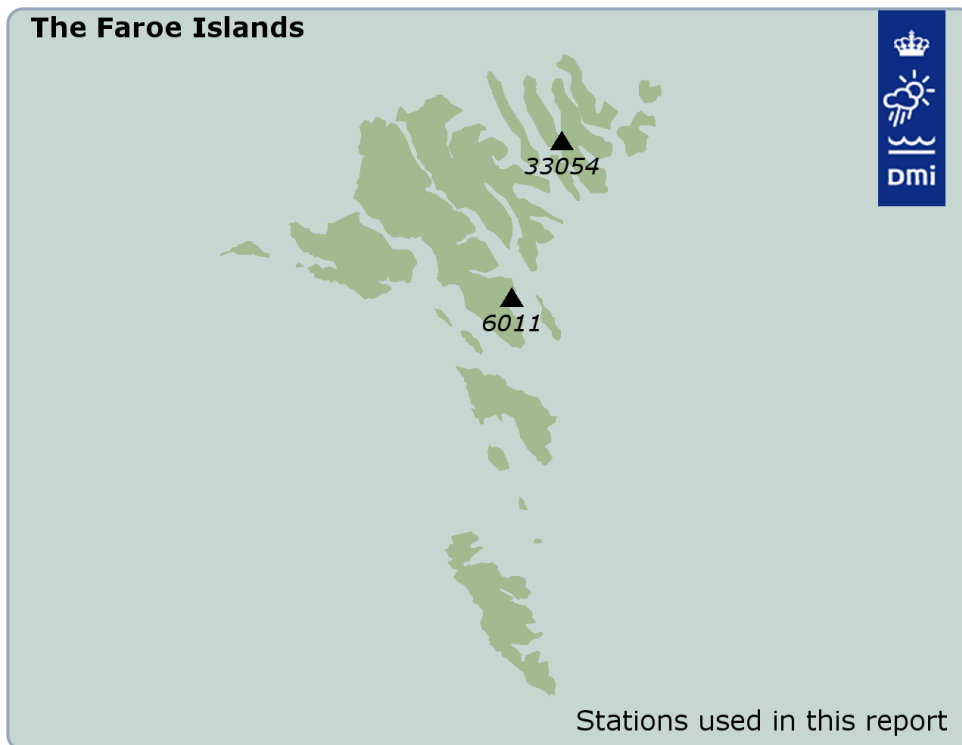
2. Overall data overview

Below is an overview of all the information from the Faroes 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.
- A survey of the different products.

Detailed metadata (data about data) and file formats describing the different data files included in this report can be found in Appendices.

2.1. Stations



| Data set id* | Station* | First year of appearance |
|--------------|---------------------|--------------------------|
| 6011 | Tórshavn | 1873 |
| 33054 | Strond Kraftstation | 1932 |

*latest station number and name



2.2. Products

| Data Collection | Products in the report | Page |
|--------------------------------|--|-------------|
| Observation¹ | Section 4.2.1. and Appendix 2: Atmospheric pressure observations, 1 station 6011 Tórshavn (1874-2013) | 13 |
| Monthly | Section 5.2.1 – 5.2.10 and Appendix 3: Mean air temperature, mean of daily minimum and maximum temperatures and highest/lowest temperature, mean atmospheric pressure, accumulated precipitation, highest 24-hour precipitation, no. of days with snow cover and mean cloud cover, 1 station: 6011 Tórshavn (1873-2013) | 17 |
| | Section 5.2.1 - 5.2.2 and Appendix 3: Accumulated precipitation and highest 24-hour precipitation, 1 station: 33054 Strond Kraftstation (1932-2005) | 17 |
| Annual | Section 6.2.1. and Appendix 4: Mean air temperature, mean of daily minimum and maximum temperatures and highest/lowest temperature, mean atmospheric pressure, accumulated precipitation, highest 24-hour precipitation, no. of days with snow cover and mean cloud cover, 1 station: 6011 Tórshavn (1873-2013) | 22 |
| | Section 6.2.1. and Appendix 4: Accumulated precipitation and highest 24-hour precipitation, 1 station: 33054 Strond Kraftstation (1932-2005) | 22 |
| | Section 6.2.2. - 6.2.3 and Appendix 4: Mean air temperature; graph and values with gauss filtered values, 1 station: 6011 Tórshavn (1873-2013) | 22 |

¹”Tórshavn observations”, 1 station, 10 parametres, hourly observations, 1958 - 2013 are published separately [15].



Denne rapport indeholder en DMI historisk dataindsamling 1873-2013 for Færøerne. Det drejer sig om tilgængelige lange serier af stationsbaserede data, herunder observationer af lufttryk samt månedlige og årlige værdier af udvalgte parametre. Beskrivelser af det generelle vejr og klima på Færøerne [6] er medtaget.

Datasamlingen er blevet offentliggjort tidligere i forskellige DMI rapporter [9], [10], [11]. Fra 2011 blev det samlet i én rapport opdelt i sektioner, der dækker de forskellige datatyper.

Nedenfor er en oversigt over tilgængelig klimainformation fra Færøerne, du kan finde i denne rapport. Et kort og en liste over Færøeske vejrstationer (nuværende navn og placering), hvorfra denne rapport's stationsbaserede datasæt kommer fra kan ses på side 6.

| Datasamling | Produkter i rapporten | Sidetotal |
|--------------------------------|--|------------------|
| Observation¹ | Sektion 4.2.1. og Appendix 2: Lufttryksobservationer, 1 station 6011 Tórshavn (1874-2013) | 13 |
| Måned | Sektion 5.2.1. – 5.2.10 og Appendix 3: Middel luft-, max- og min-temperatur samt højeste og laveste temperatur, middellufttryk, nedbørsum, max 24 t nedbørsum, antal snedækkedage og middelskydække, 1 station: 6011 Tórshavn (1873-2013) | 17 |
| | Sektion 5.2.1 - 5.2.2. og Appendix 3: Nedbørsum og max 24 t nedbørsum, 1 station: 33054 Strond Kraftstation (1932-2005) | 17 |
| År | Sektion 6.2.1. og Appendix 4: Middel luft-, max- og min-temperatur samt højeste og laveste temperatur, middellufttryk, nedbørsum, max 24 t nedbørsum, antal snedækkedage og middelskydække, 1 station: 6011 Tórshavn (1873-2013) | 22 |
| | Sektion 6.2.1. og Appendix 4: Nedbørsum og max 24 t nedbørsum, 1 station: 33054 Strond Kraftstation (1932-2005) | 22 |
| | Sektion 6.2.2 - 6.2.3. og Appendix 4: Middeltemperatur som data og grafik med gauss-filtrerede værdier: 1 station: 6011 Tórshavn (1873-2013) | 22 |

¹ "Tórshavn observationer", 1 station, 10 parametre, timeobservationer, 1958 - 2013 publiceres i særskilt rapport [15]



3. Weather and climate in general; The Faroe Islands

The Faroe Islands (Føroyar) are situated at approximately latitude 62° N, longitude 7° W and consist of 18 small, hilly islands. The islands have a total area of 1399 km², and extend 113 km from north to south and 75 km from east to west. The highest elevations, reaching nearly 890 m above sea level are found in the northern islands.

The climate in the Faroe Islands is greatly influenced by the warm Gulf Stream and by the passage of frequent cyclones, which arrive from the south and west depending on the position of the polar frontal zone. Consequently the climate is humid, unsettled and windy, with mild winters and cool summers.

The Azores High is sometimes displaced towards the islands, in which case settled summer weather with fairly high temperatures may prevail for several weeks. During the winter time the course of the lows may be more southerly than normal, in which case cold air from the north dominates the weather. This situation may cause sunny weather with an unusually high frequency of days with frost and also snowfall. The latter occurs in conjunction with the build up of showers in the cold air above the relatively warm sea water. The northern part of the islands particularly almost always experiences wintry weather with snow or frost for a prolonged period during the winter time - occasionally some of the fiords freeze over with a thin layer of ice.

The maritime climate is also influenced by the bifurcation of the East Iceland current (polar current), a branch of which is directed from eastern Iceland towards the Faroes. This sea current flows round the Faroe Islands in a clockwise direction. The mixing of the water masses causes a relatively large difference in the sea temperatures to the north and to the south or south west of the Faroe Islands as well as local variations in sea surface temperatures.

The cooling of humid air masses by the cold sea water is a contributory cause of frequent fog in June, July and August.

The precipitation pattern reflects the topography of the islands, the precipitation being smallest near the coastal areas and rising to a peak at the centre of the hilliest islands. Nearly all coastal areas receive around 1000 mm per year, rising to above 3000 mm in the central parts. Investigations [16] have shown that some places receive more than 4000 mm. This precipitation distribution is attributable to both topographical and meteorological conditions. The topographical orographic precipitation occurs in conjunction with lows moving east and north east. The land lifts the air masses, leading to a discharge of precipitation. The amount and intensity of the precipitation are of course also determined by the wind speed and the instability of the air.

Being close to the common cyclone tracks in the North Atlantic region the islands have a windy climate. The air in the lower atmosphere is affected by the hilly islands, causing considerable local winds, as a result from stowing, channelling and turbulence. This and the fact that the sea currents between the islands are very strong, sometimes causes navigational problems for ships. The turbulence in the mountain regions also causes problems for air traffic.

Intensive cyclone developments frequently give unstable weather, especially in autumn and winter. Drops in atmospheric pressure of about 20 hPa in 24 hours occur in nearly all months but sometimes the pressure falls more rapidly - occasionally more than 80 hPa in 24 hours - and such situations cause very high wind speeds and considerable damages all over the islands.

4. Observational Section: Historical DMI Data Collection

| Data Collection | Products in the report | Page |
|-----------------|---|------|
| Observation | Section 4.2.1. and Appendix 2: Atmospheric pressure observations, 1 station 6011 Tórshavn (1874-2013) | 13 |



| Datasamling | Produkter i rapporten | Sidetæl |
|-------------|--|---------|
| Observation | Sektion 4.2.1. og Appendix 2: Luftryksobservationer, 1 station 6011 Tórshavn (1874-2013) | 13 |



Latest earlier report:

[12] Cappelen, J. (ed), 2012: The Faroe Islands - DMI Historical Climate Data Collection 1873-2012 – with Danish Abstracts. DMI Technical Report 13-05. Copenhagen.

4.1. Introduction

The purpose of this section is to publish one mean sea level atmospheric pressure data series from Tórshavn, The Faroe Islands (*observations*) covering the period 1874-2013.

According to the intentions to update regularly, preferably every year, this section contains an update (2013 data) of one Faroe Islands mean sea level atmospheric pressure series from Tórshavn originally published in DMI Technical Report 97-3: North Atlantic-European pressure observations 1868-1995 - WASA dataset version 1.0 [25].

As part of a former project called WASA, selected DMI series of atmospheric pressure observations from Denmark, Greenland and the Faroe Islands 1874-1970 on paper were digitised. The pressure observations were digitised from the meteorological yearbooks, which means that the observations were station level data corrected for index error, 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” [26].



Figure 4.1.1. Location of the stations that originally provided atmospheric pressure observations to the WASA pressure data set [25]. In this chapter the updated Faroe series Tórshavn is presented. The station representing this site is 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 Denmark (three sites) and Ammassalik/Tasiilaq, Greenland are presented in the representative historical Climate Data Collection; DMI Technical Report 14-02 [13]) and DMI Technical Report 14-04 [14]).



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 chapter has been tested and corrected carefully, mainly based on visual tests. Thus it must be stressed that the updated atmospheric pressure data after the WASA project consist of the values *as observed*, and that no final testing for homogeneity has been performed on these observations for the whole period up to now. They are therefore not necessarily homogenized as such and this should be considered before applying the data series for climate research purposes.

For the benefit of scientists that may wish to conduct such testing various metadata up to 1996 can be found in [21]. The station history can be found in Appendix 1.2.

The mean sea level atmospheric pressure data set from 6011 Tórshavn, The Faroe Islands 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.



Formålet med denne sektion er at publicere en tilgængelig dataserie af observationer af lufttryk (msl) fra Tórshavn, Færøerne 1874-2013. I afsnit 4.2 kan ses hvilke stationer, det drejer sig om. Stationshistorien kan ses i Appendix 1.2. Dataseriernes detaljer kan ses i Appendix 2.2 og filformat af de medfølgende filer kan ses i Appendix 2.1.

4.2. Data sets, station series and parameters

4.2.1. Atmospheric pressure

The atmospheric pressure measurements started 1874 at a national climate station Tórshavn Skole, continued from 1925 in Hoyvík. Measurements of atmospheric pressure were stopped at this manually operated climate station in 1983. In the 1950s atmospheric pressure measurements were also started at a synoptic station in Tórshavn. In the WASA project the data were merged into a long homogeneous series (1873-1995). Table 4.2.1 and Appendix 2.2 indicates how the stations were merged and how many observations the series contains in the different parts.

Table 4.2.1. The Tórshavn data set of atmospheric pressure observations (at MSL, mean sea level). See more details in Appendix 2.

| Dataset* | Station series | Dataset id | Period | Parameter |
|-----------------------|----------------|------------|-----------|----------------------------|
| Tórshavn 1874-2013 | Tórshavn Skole | 6011 | 1874-1925 | Atmospheric pressure (MSL) |
| | Hoyvik | | 1925-1957 | Atmospheric pressure (MSL) |
| | Tórshavn | | 1958-1993 | Atmospheric pressure (MSL) |
| | Tórshavn | | 1993-2013 | Atmospheric pressure (MSL) |

*Blended data sets, see details in Appendix 2.2.

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

4.2.2. Data Dictionary

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

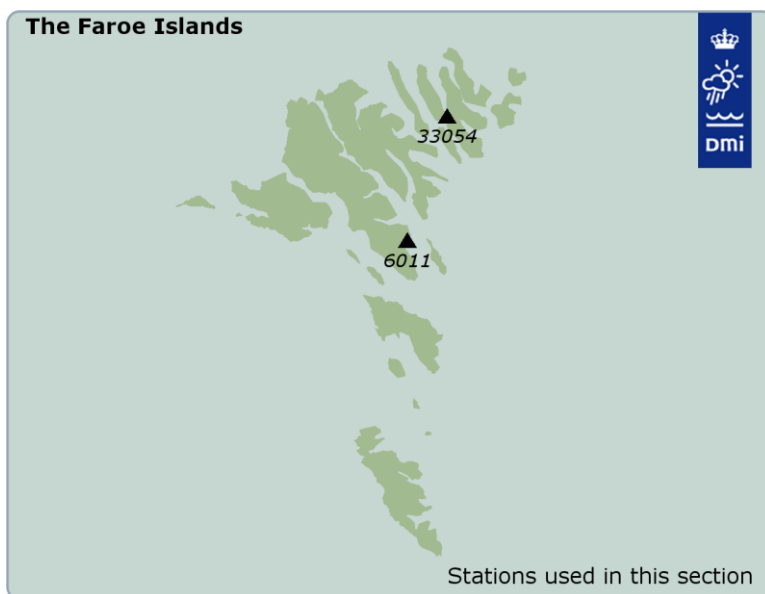
| Abbr. | Parameter | Method | Unit |
|-------|----------------------------|--------|---------|
| pppp | Atmospheric pressure (MSL) | obs | 0,1 hPa |

5. Monthly Section: Historical DMI Data Collection

| Data Collection | Products in the report | Page |
|-----------------|--|------|
| Monthly | Section 5.2.1. - 5.2.10 and Appendix 3: Mean air temperature, mean of daily minimum and maximum temperatures and highest/lowest temperature, mean atmospheric pressure, accumulated precipitation, highest 24-hour precipitation, no. of days with snow cover and mean cloud cover, 1 station: 6011 Tórshavn (1873-2013) | 17 |
| | Section 5.2.1. - 5.2.2 and Appendix 3: Monthly accumulated precipitation and highest 24-hour precipitation, 1 station: 33054 Strond Kraftstation (1932-2005) | 17 |



| Datasamling | Produkter i rapporten | Sidetæl |
|-------------|---|---------|
| Måned | Sektion 5.2.1. – 5.2.10 og Appendix 3: Middel luft-, max- og min-temperatur samt højeste og laveste temperatur, middellufttryk, nedbørsum, max 24 t nedbørsum, antal snedækkedage og middelskydække, 1 station: 6011 Tórshavn (1873-2013) | 17 |
| | Sektion 5.2.1. – 5.2.2 og Appendix 3: Nedbørsum og max 24 t nedbørsum, 1 station: 33054 Strond Kraftstation (1932-2005) | 17 |



Latest earlier report:

[12] Cappelen, J. (ed), 2013: The Faroe Islands - DMI Historical Climate Data Collection 1873-2012 – with Danish Abstracts. DMI Technical Report 13-05. Copenhagen.



5.1. Introduction

The purpose of this section is to publish available long *monthly* DMI data series 1873-2013 from the Faroe Islands. The data parameters include mean temperature, minimum temperature, maximum temperature, atmospheric pressure, accumulated precipitation, highest 24-hour precipitation, number of days with snow and cloud cover.

According to the intentions to update regularly, preferably every year, this section contains an update (2013 data) of the “DMI Monthly Climate Data Collection” published for the first time in that form in 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 [20]. A similar collection of long DMI *annual* climate data series from the Faroe Islands can be found in section 6 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 [18,19,20]), REWARD (Relating Extreme Weather to Atmospheric circulation using a Regionalised Dataset [17,19,20]), NORDKLIM (Nordic Co-operation within Climate activities, see NORDKLIM project homepage: http://www.smhi.se/hfa_coord/nordklim/) [19,20] and NARP (Nordic Arctic Research Programme) [19,20,22].

The original DMI Monthly Climate Data Collection published in DMI Technical Report 03-26 [20] was for that reason, 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 means, 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 [20].

Therefore only already published recommended DMI monthly data series with relevant updates/corrections have been included since and will be included in this and the coming reports comprising DMI Monthly Data Collections from the Faroe Islands.

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 report have been tested and corrected carefully, mainly based on visual tests. Otherwise it is indicated if care should be taken when using the series.



Special care should be taken concerning most of the series with mean cloud cover. There are still problems to be solved in the data sets mainly due to the difficult character of the observation (visual) and the shift to automatic detection with a ceilometer starting approximately in the beginning of the new millennium. Care should also be taken in the case of series with number of days with snow cover, another visual parameter.

The monthly 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 3.



Formålet med denne sektion er at publicere tilgængelige lange anbefalede månedlige DMI dataserier 1873-2013 fra Færøerne. Det omfatter middeltemperatur, minimumtemperatur, maksimumtemperatur, atmosfærisk tryk, nedbørsum, maksimal 24t nedbørsum, antallet af dage med sne og skydække. I afsnit 5.2 kan ses hvilke stationer og parametre, det drejer sig. Stationshistorien kan ses i Appendix 1.2. I Appendix 3.1 er filformatet af de medfølgende filer beskrevet og de enkelte seriers sammensætning kan ses i Appendix 4.2. Appendix 3.3-3.4 omhandler flere metadata.

5.2. Data sets, station series and parameters

5.2.1. Accumulated precipitation

Table 5.2.1. Data sets and station series; monthly accumulated precipitation. See details in Appendix 3.2. This counts for all the following tables.

| Dataset* | Station series** | Dataset id | Period | Parameter |
|----------------------------------|-------------------------------|----------------|-----------|---------------------------|
| Tórshavn 1890-2013 | NARP1 Tórshavn | tors_6011_601 | 1890-1921 | Accumulated precipitation |
| | JC-TS1154 Tórshavn | | 1922-1997 | Accumulated precipitation |
| | Tórshavn | | 1998-2013 | Accumulated precipitation |
| Strond Kraftstation 1932-2005 | Strond Kraftstation | stro_33054_601 | 1932-1960 | Accumulated precipitation |
| | JC-TS1161 Strond Kraftstation | | 1961-1990 | Accumulated precipitation |
| | Strond Kraftstation | | 1991-2005 | Accumulated precipitation |

*Blended monthly data sets part of the monthly section. Count also for the following tables.

**Not a part of the monthly section. Count also for the following tables.

5.2.2. Highest 24-hour precipitation

Table 5.2.2. Data sets and station series; highest monthly 24-hour precipitation.

| Dataset* | Station series** | Dataset id | Period | Parameter |
|----------------------------------|-------------------------------|----------------|-----------|-----------------------|
| Tórshavn 1890-2013 | NARP1 Tórshavn | tors_6011_602 | 1890-1960 | Highest 24-hour prec. |
| | JC-TS1161 Tórshavn | | 1961-1990 | Highest 24-hour prec. |
| | Tórshavn | | 1991-2013 | Highest 24-hour prec. |
| Strond Kraftstation 1932-2005 | Strond Kraftstation | stro_33054_602 | 1932-1960 | Highest 24-hour prec. |
| | JC-TS1172 Strond Kraftstation | | 1961-1990 | Highest 24-hour prec. |
| | Strond Kraftstation | | 1991-2005 | Highest 24-hour prec. |

5.2.3. Mean temperature

Table 5.2.3. Data sets and station series; monthly mean temperature.

| Dataset* | Station series** | Dataset id | Period | Parameter |
|-----------------------|--------------------|---------------|-----------|------------------|
| Tórshavn 1890-2013 | NARP1 Tórshavn | tors_6011_101 | 1890-1921 | Mean temperature |
| | EVL-TS353 Tórshavn | | 1922-1997 | Mean temperature |
| | Tórshavn | | 1998-2013 | Mean temperature |

5.2.4. Mean daily maximum temperature

Table 5.2.4. Data sets and station series; monthly mean daily maximum temperature.

| Dataset* | Station series** | Dataset id | Period | Parameter |
|-----------------------|--------------------|---------------|-----------|----------------------------|
| Tórshavn 1873-2013 | NARP1 Tórshavn | tors_6011_111 | 1873-1960 | Mean daily max temperature |
| | EVL-TS361 Tórshavn | | 1961-1990 | Mean daily max temperature |
| | Tórshavn | | 1991-2013 | Mean daily max temperature |

5.2.5. Highest temperature

Table 5.2.5. Data sets and station series; monthly highest temperature.

| Dataset* | Station series** | Dataset id | Period | Parameter |
|-----------------------|--------------------|---------------|-----------|---------------------|
| Tórshavn 1873-2013 | NARP1 Tórshavn | tors_6011_112 | 1873-1960 | Highest temperature |
| | EVL-TS368 Tórshavn | | 1961-1990 | Highest temperature |
| | Tórshavn | | 1991-2013 | Highest temperature |

5.2.6. Mean daily minimum temperature

Table 5.2.6. Data sets and station series; monthly mean daily minimum temperature.

| Dataset* | Station series** | Dataset id | Period | Parameter |
|-----------------------|--------------------|---------------|-----------|----------------------------|
| Tórshavn 1873-2013 | NARP1 Tórshavn | tors_6011_121 | 1873-1960 | Mean daily min temperature |
| | EVL-TS375 Tórshavn | | 1961-1990 | Mean daily min temperature |
| | Tórshavn | | 1991-2013 | Mean daily min temperature |

5.2.7. Lowest temperature

Table 5.2.7. Data sets and station series; monthly lowest temperature.

| Dataset* | Station series** | Dataset id | Period | Parameter |
|-----------------------|--------------------|---------------|-----------|--------------------|
| Tórshavn 1873-2013 | NARP1 Tórshavn | tors_6011_122 | 1873-1960 | Lowest temperature |
| | EVL-TS496 Tórshavn | | 1961-1990 | Lowest temperature |
| | Tórshavn | | 1991-2013 | Lowest temperature |

5.2.8. Mean atmospheric pressure

Table 5.2.8 Data sets and station series; monthly mean atmospheric pressure.

| Dataset* | Station series** | Dataset id | Period | Parameter |
|-----------------------|--------------------|---------------|-----------|---------------------------|
| Tórshavn 1890-2013 | NARP1 Tórshavn | tors_6011_401 | 1890-1960 | Mean atmospheric pressure |
| | JC-TS1220 Tórshavn | | 1961-1990 | Mean atmospheric pressure |
| | Tórshavn | | 1991-2013 | Mean atmospheric pressure |

5.2.9. Number of days with snow cover

Table 5.2.9. Data sets and station series; monthly number of days with snow cover.

| Dataset* | Station series** | Dataset id | Period | Parameter |
|-----------------------|--------------------|---------------|-----------|-----------------------------|
| Tórshavn 1939-2006 | NARP1 Tórshavn | tors_6011_702 | 1939-1960 | No. of days with snow cover |
| | JC-TS1224 Tórshavn | | 1961-1990 | No. of days with snow cover |
| | Tórshavn | | 1991-2006 | No. of days with snow cover |

5.2.10. Cloud cover

Table 5.2.10. Data sets and station series; monthly mean cloud cover.

| Dataset* | Station series** | Dataset id | Period | Parameter |
|-----------------------|-------------------|---------------|-----------|------------------|
| Tórshavn 1890-2013 | NARP1 Tórshavn | tors_6011_801 | 1890-1960 | Mean cloud cover |
| | JC-TS532 Tórshavn | | 1961-1990 | Mean cloud cover |
| | Tórshavn | | 1991-2013 | Mean cloud cover |



5.2.11. Data Dictionary

Table 5.2.11. Parameters used in this report. 'Method' specifies whether the element is a sum, a mean 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. At the moment (2013) there are about 250 entries.

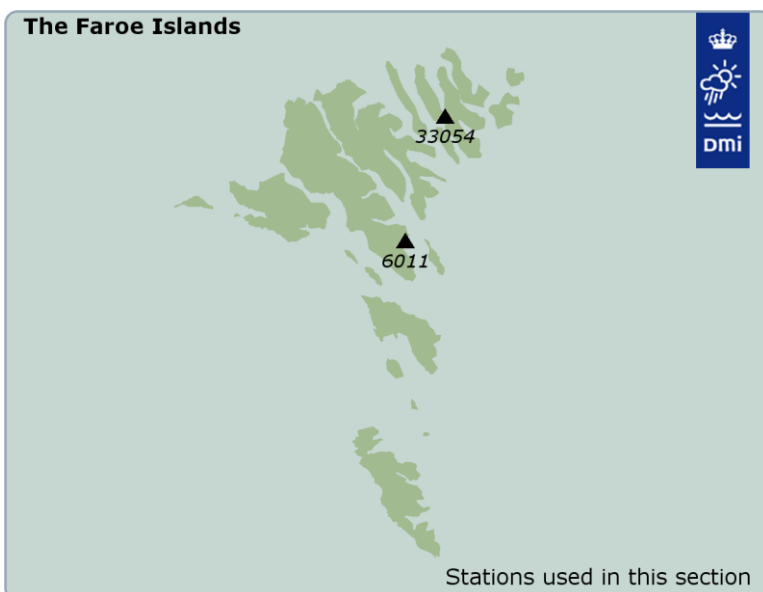
| Number | Abbr. | Parameter | Method | Unit |
|--------|-------|--|--------|---------|
| 101 | T | Mean temperature | Mean | 0,1°C |
| 111 | Tx | Mean of daily maximum temperature | Mean | 0,1°C |
| 112 | Th | Highest temperature | Max | 0,1°C |
| 121 | Tn | Mean of daily minimum temperature | Mean | 0,1°C |
| 122 | Tl | Lowest temperature | Min | 0,1°C |
| 401 | P | Mean atmospheric pressure | Mean | 0,1 hPa |
| 601 | R | Accumulated precipitation | Sum | 0,1 mm |
| 602 | Rx | Highest 24-hour precipitation | Max | 0,1 mm |
| 701 | DSC | No. of days with snow cover (> 50 % covered) | Sum | days |
| 801 | N | Mean cloud cover | Mean | % |

6. Annual Section: Historical DMI Data Collection

| Data Collection | Products in the report | Page |
|-----------------|---|------|
| Annual | Section 6.2.1 and Appendix 4: Mean air temperature, mean of daily minimum and maximum temperatures and highest/lowest temperature, mean atmospheric pressure, accumulated precipitation, highest 24-hour precipitation, no. of days with snow cover and mean cloud cover, 1 station: 6011 Tórshavn (1873-2013) | 22 |
| | Section 6.2.1. and Appendix 4: Accumulated precipitation and highest 24-hour precipitation, 1 station: 33054 Strond Kraftstation (1932-2005) | 22 |
| | Section 6.2.2. - 6.2.3 and Appendix 4: Mean air temperature; values and graph with gauss filtered values, 1 station: 6011 Tórshavn (1873-2013). | 22 |



| Datasamling | Produkter i rapporten | Sidetæl |
|-------------|---|---------|
| År | <i>Sektion 6.2.1 og Appendix 4: Middel luft-, max- og min- temperatur samt højeste og laveste temperatur, middellufttryk, nedbørsum, max 24 t nedbørsum, antal snedækkedage og middelskydække, 1 station: 6011 Tórshavn (1873-2013)</i> | 22 |
| | <i>Sektion 6.2.1. og Appendix 4: Nedbørsum og max 24 t nedbørsum, 1 station: 33054 Strond Kraftstation (1932-2005)</i> | 22 |
| | <i>Sektion 6.2.2 – 6.2.3. og Appendix 4: Middeltemperatur som data og grafik med gauss-filtrerede værdier: 1 station: 6011 Tórshavn (1873-2013)</i> | 22 |



Latest earlier report:
[12] Cappelen, J. (ed), 2013: The Faroe Islands - DMI Historical Climate Data Collection 1873-2012 – with Danish Abstracts. DMI Technical Report 13-05. Copenhagen.

6.1. Introduction

The purpose of this section is to publish different *annual* climate data from The Faroe Islands together with relevant graphics. That is:

- Annual values within the period 1873-2013 from The Faroe Islands. The data parameters include mean temperature, minimum temperature, maximum temperature, atmospheric pressure, accumulated precipitation, highest 24-hour precipitation, number of days with snow and cloud cover.
- Annual mean temperatures and filtered values for one meteorological stations at the Faroe Islands (Tórshavn); 1873-2013, both as data and graphics.

According to the intentions to update regularly, preferably every year, this particular report contains an update (2013 data) of the “DMI Monthly 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 [7]. A similar collection of long DMI *monthly* climate data series from the Faroe Islands can be found in section 5 in this report. Annual values of mean temperatures from Tórshavn also regularly forms part of other similar publications [13,14].

One meteorological station with a long record has been operated at the Faroe Islands since the 19th century; Tórshavn. This station has digitised records back to the start of 1873 (the Danish Meteorological Institute (DMI) was established 1872. Another meteorological station with a long precipitation record has been operated at the Faroe Islands since 1932; Strond Kraftstation.

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 [19],
- and the regularly publication of the DMI historical monthly data collection in section 5.

The 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.



Formålet med denne sektion er at publicere forskellige årlige klimaværdier indenfor perioden 1873-2013 samt tilhørende grafik. Det drejer sig om henholdsvis:

- *Årsmiddelværdier for udvalgte meteorologiske stationer på Færøerne. Det omfatter middeltemperatur, minimumtemperatur, maksimumtemperatur, atmosfærisk tryk, nedbørsum, maksimal 24t nedbørsum, antallet af dage med sne og skydække.*
- *Årsmiddeltemperaturer og gauss filtrerede værdier for én meteorologisk station på Færøerne(Torshavn), både som data og grafik.*

I afsnit 6.2 kan ses hvilke stationer og parametre, det drejer sig om. Årsmiddelværdierne af de forskellige parametre kan findes sammen med de månedlige data, se sektion 5. I afsnit 6.4 er Tórshavn's årsmiddeltemperatur grafisk vist sammen med København, Danmark og forskellige stationer i Vest- og Østgrønland. Stationshistorien kan ses i Appendix 1.2. Endelig er filformatet af de medfølgende filer og grafik beskrevet i Appendix 4.

6.2. Data sets, station series, parameters and graphics

6.2.1. Annual values 1873-2013; The Faroe Islands

The calculated annual values (2 stations) are a part of the monthly data sets (see section 5; file formats in Appendix 3.1).

6.2.2. Annual mean temperatures and filtered values - Tórshavn; 1873-2013

Annual mean temperatures 1873-2013 and filtered values for one station 6011 Tórshavn, The Faroe Islands, are available as a data set together with selected meteorological data sets from the Greenland and Denmark.

Table 6.2.2. Data set and station series; annual mean temperatures. See details in Appendix 4.

| Dataset* | Station series | Dataset id | Period | Parameter |
|-----------------------|----------------|----------------------------------|-----------|---------------------|
| Tórshavn 1873-2013 | Tórshavn | fr_annual_tempera ture_dkfrgr | 1873-2013 | Mean temperature °C |

* *The annual mean temperature data 1890-2013 are the same as the calculated annual values for parameter 101 Mean Temperature mentioned in section 5.2.3. From 1873-1889 the annual mean temperatures are values processed in connection with the NACD project [24], but only published for the first time in [7].*

6.2.3. Graphics; annual mean temperatures and filtered values - Tórshavn; 1873-2013

Table 6.2.3. Graphical products; annual mean temperatures. See details in Appendix 5.

| Product* | Station series | Graph id | Period | Parameter |
|------------------------------|----------------|--------------------------------|-----------|---------------------|
| Graph; Tórshavn 1873-2013 | Tórshavn | fr_annual_tempera ture_page | 1873-2013 | Mean temperature °C |

**Graph (Danish and English version).*

The graphs are shown on the next pages. They show annual mean temperatures for Tórshavn/The Faroe Islands, København/Denmark and selected stations from West and East Greenland. See [14] for details concerning the annual temperature series from Greenland and [13] for the Danish series.

A Gauss filter with filter width (standard deviation) 9 years has been used to create the “bold” smooth curves. A Gauss filter with standard deviation 9 years is comparable to a 30-years running mean. However, the filter gives a smoother curve than a running mean, as temperatures from central years are given larger weight than temperatures from periferal years. Filter values are also calculated for the years at either end of the series. It should be noted that these values are computed from one-sided Gauss filters, and that values from later years will change, when the series is updated.

Important note concerning the graphs: 2010 in West Greenland was extremely record breaking warm many places and the graphical presentation are not ideal to deal with such extreme values (see figure 6.2.3.1).

A better graphic presentation can be seen in a poster included in another report [13] showing “Annual mean temperatures 1873-2013, Greenland” (Tr14-04_gr_temperatur_1873_2013_plakat.pdf). The following record breaking annual 2010 average temperatures can also help in the interpretation: Pituffik -7.9°C, Upernavik -3.1°C, Ilulissat -0.1°C, Nuuk 2.6°C, Narsarsuaq 5.4°C. Tasiilaq 1.1°C was second warmest (2003 warmest; 1.2°C). Danmarkshavn with -11.3°C in northeast Greenland was in the warm end of the scale, but not near the record (-9,5°C in 2005).

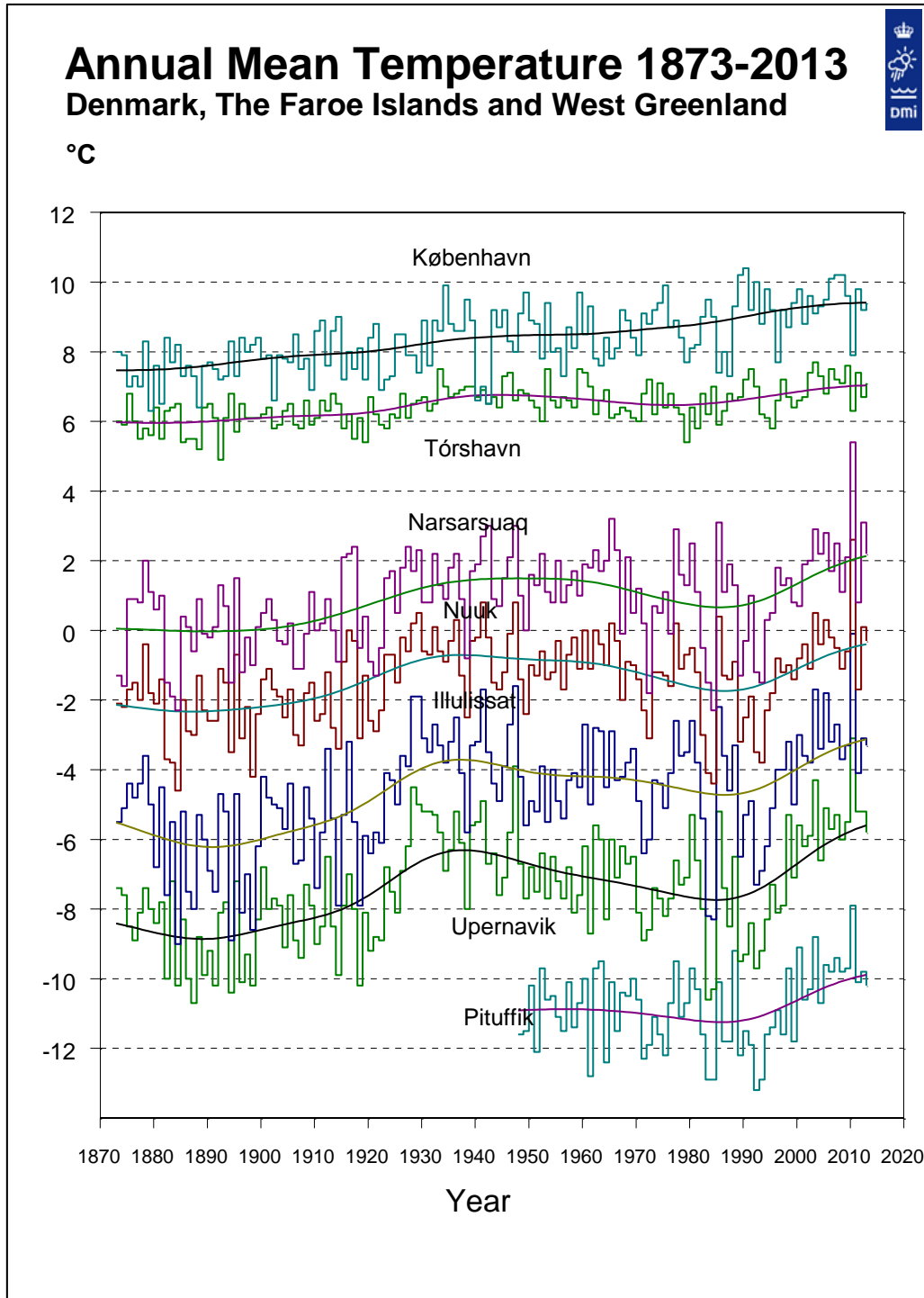


Figure 6.2.3.1. Annual mean temperatures 1873-2013, Denmark, The Faroes and West Greenland.

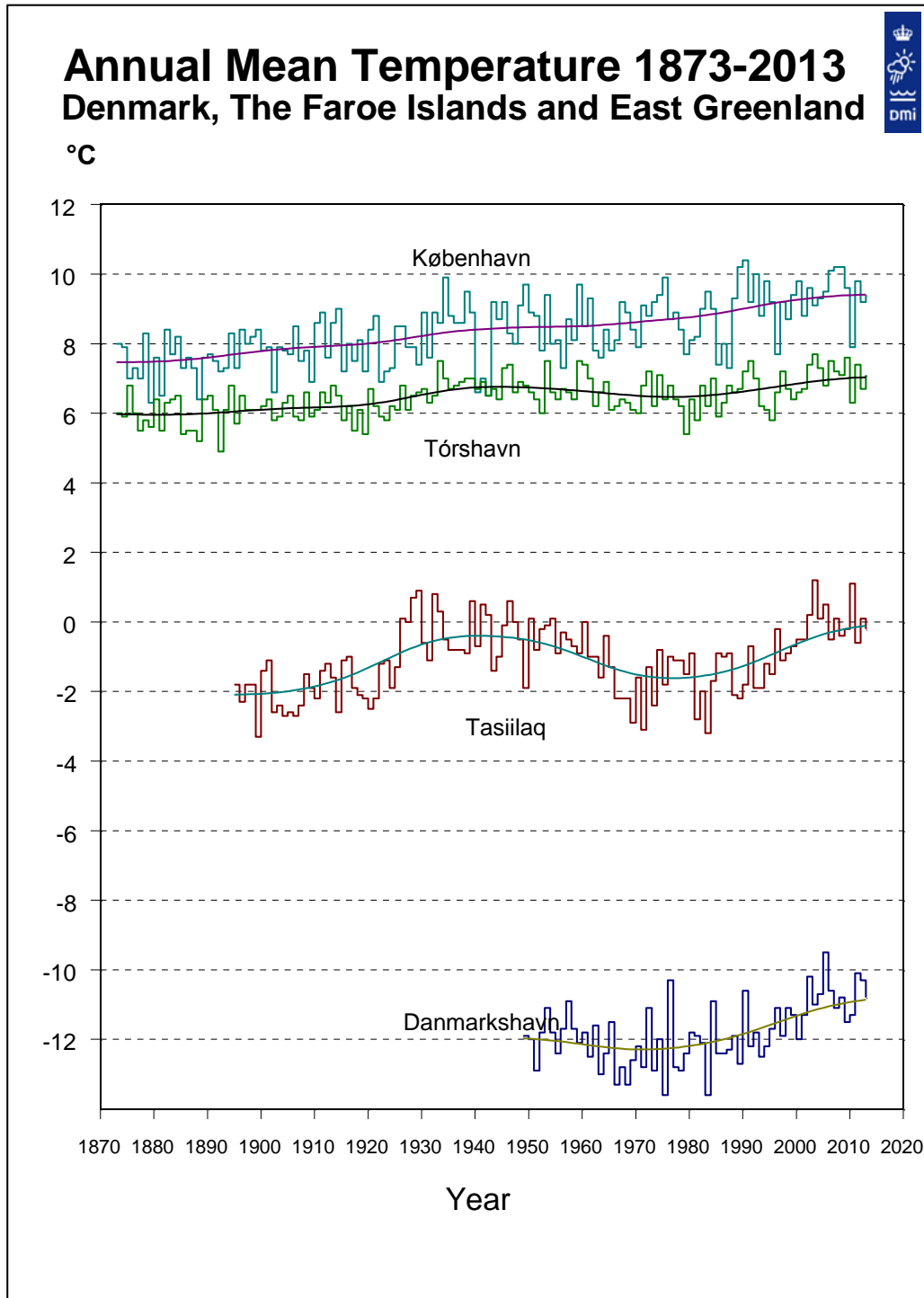


Figure 6.4.3.2. Annual mean temperatures 1873-2013, Denmark, The Faroes and East Greenland.



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Previous reports

Previous reports from the Danish Meteorological Institute can be found on:
<http://www.dmi.dk/laer-om/generelt/dmi-publikationer/>



Appendices - File formats and metadata

Appendix 1 Station history

Appendix 2 Observational section

Appendix 3 Monthly section

Appendix 4 Annual 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 file name is:

fr_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, precip_man = manual precipitation 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) |

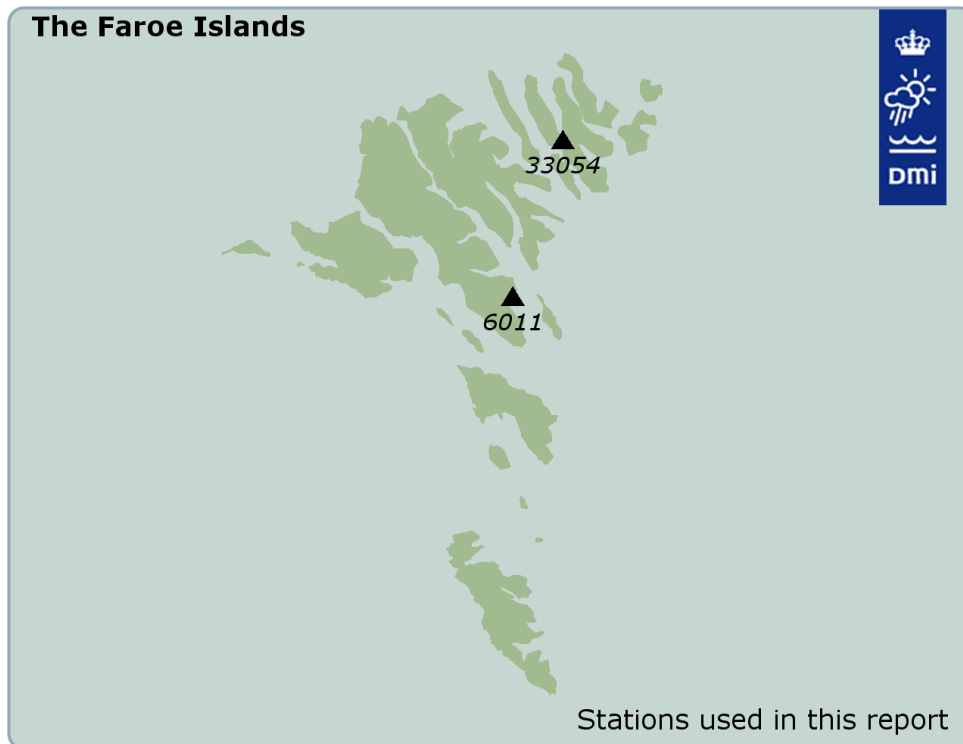
Data are only to be used with proper reference to the accompanying report:

Cappelen, J. (ed), 2014: The Faroe Islands - DMI Historical Climate Data Collection 1873-2013 – with Danish Abstracts. DMI Technical Report 14-05. 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 different data series in the report.

More metadata on the series/station may be found in [21]. The information can also be found in a text file attached to this report, see Appendix 1.1.



6011 Tórshavn

| No. | Name | Start | End | Type | UTM | Northings | Eastings | Longitude | Latitude | Elev. |
|-------|----------------|-------------|-------------|------------|-----|-----------|----------|-----------|----------|-------|
| 33071 | Tórshavn skole | 01-JAN-1871 | 31-DEC-1871 | clima_man | 29V | 6877520 | 616750 | -64600 | 620100 | 9 |
| 33071 | Tórshavn skole | 01-OCT-1872 | 31-JUL-1907 | clima_man | 29V | 6877520 | 616750 | -64600 | 620100 | 9 |
| 33071 | Tórshavn skole | 01-AUG-1907 | 31-MAR-1925 | clima_man | 29V | 6877560 | 616920 | -64600 | 620100 | 24 |
| 33060 | Hoyvik | 01-JUN-1921 | 31-DEC-1981 | clima_man | 29V | 6879770 | 617460 | -64500 | 620200 | 20 |
| 33060 | Hoyvik | 01-FEB-1983 | 31-MAR-1983 | clima_man | 29V | 6879770 | 617460 | -64500 | 620200 | 20 |
| 33100 | Vagur | 01-NOV-1903 | 30-NOV-1922 | precip_man | 29V | 6817750 | 616350 | -64900 | 612800 | 15 |
| 33100 | Vagur | 02-JUN-1999 | 01-OCT-2011 | precip_man | 29V | 6817549 | 619270 | -64500 | 612800 | 43 |
| 6011 | Tórshavn | 01-JAN-1953 | 30-JUN-1962 | synop_dk | 29V | 6878110 | 616530 | -64600 | 620100 | 35 |
| 6011 | Tórshavn | 01-JUL-1962 | 31-DEC-1992 | synop_dk | 29V | 6878170 | 616530 | -64600 | 620100 | 43 |
| 6011 | Tórshavn | 01-JAN-1993 | | synop_dk | 29V | 6879010 | 617080 | -64600 | 620100 | 54 |



33054 Strond Kraftstation

This station was selected as a supplement to the precipitation series of Tórshavn. The Tórshavn precipitation series is not characteristic for the more extreme amounts of precipitation received at the Faroe Islands whereas Strond Kraftstation held the 24 hours record for the period 1961-1990.

| No. | Name | Start | End | Type | UTM | Northings | Eastings | Longitude | Latitude | Elev. |
|-------|---------------------|-------------|-------------|------------|-----|-----------|----------|-----------|----------|-------|
| 33054 | Strond Kraftstation | 01-MAR-1931 | 30-JUN-1981 | precip_man | 29V | 6906290 | 625480 | -63500 | 621600 | 10 |
| 33054 | Strond Kraftstation | 01-JUL-1981 | 30-JUN-1983 | precip_man | 29V | 6906250 | 625440 | -63500 | 621600 | 4 |
| 33054 | Strond Kraftstation | 01-JUL-1983 | 27-MAY-1987 | precip_man | 29V | 6906315 | 625435 | -63500 | 621600 | 8 |
| 33054 | Strond Kraftstation | 28-MAY-1987 | 01-JAN-2006 | precip_man | 29V | 6906335 | 625430 | -63500 | 621600 | 6 |
| 33020 | Fossaverkid | 01-FEB-1960 | 01-JAN-2006 | precip_man | 29V | 6892955 | 596540 | -70900 | 620900 | 2 |
| 33037 | Hvalvik | 01-JUN-1921 | 28-FEB-1930 | clima_man | 29V | 6896770 | 602305 | -70200 | 621100 | 14 |
| 33037 | Hvalvik | 01-JAN-1987 | 01-APR-2009 | precip_man | 29V | 6896770 | 602305 | -70200 | 621100 | 14 |
| 33045 | Hellur | 01-JUN-1987 | 01-JAN-2006 | precip_man | 29V | 6905115 | 611100 | -65200 | 621600 | 11 |
| 33051 | Kirkja | 01-MAY-1873 | 31-AUG-1874 | clima_man | 29V | 6912765 | 639150 | -61900 | 621900 | 44 |
| 33051 | Kirkja | 01-MAR-1879 | 30-JUN-1880 | clima_man | 29V | 6912815 | 639110 | -61900 | 621900 | 49 |
| 33051 | Kirkja | 01-JUL-1987 | 01-MAY-1999 | clima_man | 29V | 6912895 | 638960 | -61900 | 621900 | 53 |
| 33051 | Kirkja | 02-MAY-1999 | 01-JAN-2006 | precip_man | 29V | 6912895 | 638960 | -61900 | 621900 | 53 |
| 33060 | Hoyvik | 01-JUN-1921 | 31-DEC-1981 | clima_man | 29V | 6879770 | 617460 | -64500 | 620200 | 20 |
| 33060 | Hoyvik | 01-FEB-1983 | 31-MAR-1983 | clima_man | 29V | 6879770 | 617460 | -64500 | 620200 | 20 |
| 33070 | Tórshavn | 21-SEP-1906 | 09-JUL-1907 | clima_man | 29V | 6877720 | 616570 | -64600 | 620100 | 20 |
| 33070 | Tórshavn | 23-APR-1908 | 30-JUN-1916 | clima_man | 29V | 6877720 | 616570 | -64600 | 620100 | 20 |
| 33070 | Tórshavn | 01-JUL-1916 | 30-JUN-1922 | clima_man | 29V | 6878110 | 616530 | -64600 | 620100 | 35 |
| 33070 | Tórshavn | 01-JUL-1930 | 31-JAN-1942 | clima_man | 29V | 6878110 | 616530 | -64600 | 620100 | 35 |
| 33070 | Tórshavn | 01-FEB-1943 | 31-DEC-1948 | precip_man | 29V | 6878110 | 616530 | -64600 | 620100 | 35 |
| 33080 | Nolsoy Fyr | 01-APR-1955 | 30-NOV-1995 | precip_man | 29V | 6872000 | 625100 | -63600 | 615700 | 80 |
| 33090 | Sandur | 01-APR-1873 | 31-JAN-1877 | clima_man | 29V | 6858140 | 614800 | -64900 | 615000 | 34 |
| 33090 | Sandur | 01-SEP-1877 | 31-MAY-1879 | clima_man | 29V | 6858140 | 614800 | -64900 | 615000 | 34 |
| 33090 | Sandur | 01-JAN-1881 | 31-MAY-1885 | clima_man | 29V | 6858650 | 614730 | -64900 | 615000 | 9 |
| 33090 | Sandur | 01-MAR-1904 | 29-FEB-1908 | clima_man | 29V | 6860810 | 614390 | -65000 | 615200 | 16 |
| 33090 | Sandur | 01-NOV-1912 | 31-DEC-1916 | clima_man | 29V | 6858140 | 614800 | -64900 | 615000 | 34 |
| 33090 | Sandur | 01-JUN-1921 | 31-AUG-1940 | clima_man | 29V | 6860810 | 614390 | -65000 | 615200 | 16 |
| 33090 | Sandur | 01-JUN-1956 | 31-DEC-1970 | clima_man | 29V | 6858897 | 615363 | -64900 | 615100 | 10 |
| 33090 | Sandur | 01-JAN-1973 | 01-JAN-1997 | clima_man | 29V | 6858897 | 615363 | -64900 | 615100 | 10 |
| 33090 | Sandur | 01-JAN-1971 | 31-OCT-1971 | precip_man | 29V | 6858897 | 615363 | -64900 | 615100 | 10 |
| 33090 | Sandur | 01-FEB-1972 | 31-DEC-1972 | precip_man | 29V | 6858897 | 615363 | -64900 | 615100 | 10 |
| 33090 | Sandur | 02-JAN-1997 | 07-SEP-2002 | precip_man | 29V | 6858895 | 615362 | -64900 | 615100 | 10 |
| 33090 | Sandur | 08-SEP-2002 | 01-OCT-2007 | precip_man | 29V | 6858893 | 615361 | -64900 | 615100 | 9 |



Appendix 2. Observational section - File Formats and metadata

Appendix 2.1. File Formats; Observation data files

The observation file included in this report contains mean sea level (MSL) atmospheric pressure observations from 6011 Tórshavn, The Faroe Islands.

The file name is determined as follows:

fr_obs_<station number>_pppp_<period>.dat

More specifically in this report:

fr_obs_pppp_6011_1874_2013.dat

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

Format and units of the atmospheric pressure observation fixed format text file:

| 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 | Hour (UTC) |
| 16-20 | F5.0 | Atmospheric pressure reduced to MSL (0.1 hPa) |

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

Cappelen, J. (ed), 2014: The Faroe Islands - DMI Historical Climate Data Collection 1873-2013 – with Danish Abstracts. DMI Technical Report 14-05. Copenhagen.



Appendix 2.2. Metadata - Description of observational atmospheric pressure datasets

One Faroe data set (Tórshavn) has 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 id) 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 [25].

| Site and period | Station | Start | End | Obs. Hours (utc) |
|-------------------------------|----------------------|------------------|------------------|---------------------|
| Tórshavn 1874-2013 | 33071 Tórshavn Skole | 01 January 1874 | 31 March 1925 | 8,14,21 |
| | 33060 Hoyvík | 01 November 1925 | 31 December 1957 | 8,14,21 |
| | 6011 Tórshavn | 01 January 1958 | 01 January 1993 | 0,3,6,9,12,15,18,21 |
| | 6011 Tórshavn | 01 January 1993 | 31 December 2013 | 0 – 23 every hour |

The Tórshavn series of atmospheric pressure observations (at MSL, mean sea level).

Appendix 3. Monthly section - File formats and metadata

Appendix 3.1. File formats; Monthly data files

The monthly files included in this report contain monthly DMI data series 1873-2013 comprising different parameters from 2 stations at the Faroe Islands.

The files are provided for each station, for each element, named by the 4-letter station abbreviation plus station number, element number and period.

The file names are determined as follows:

fr_monthly_<station abbreviation>_<station number>_<element number>_<period>.dat

ex. *fr_monthly_tors_6011_101_1890_2013.dat* (all files are not listed here)

The fixed format text files consist of 3 columns: YEAR, MONTH, “VALUE”.

The units of “VALUE” can be seen in the data dictionary, table 5.2.11, in chapter 5.2.

In addition a dataset containing all monthly data series is also available as both a fixed format text file, a Excel file and a csv file (; seperated) named: fr_monthly_all

In the fixed format text file **fr_monthly_all.dat** each record contains:

| Variable | Start | End | Format | Description |
|----------|-------|-----|--------|---|
| STAT_NO | 1 | 5 | F5.0 | Station number (see section 5.2) |
| ELEM_NO | 6 | 8 | F3.0 | Element number (see section 5.2.11) |
| YEAR | 9 | 12 | F4.0 | Year |
| JAN | 13 | 17 | F5.0 | Jan. value (units described in section 5.2.11) |
| FEB | 18 | 22 | F5.0 | Feb. value (units described in section 5.2.11) |
| MAR | 23 | 27 | F5.0 | Mar. value (units described in section 5.2.11) |
| APR | 28 | 32 | F5.0 | April value (units described in section 5.2.11) |
| MAY | 33 | 37 | F5.0 | May value (units described in section 5.2.11) |
| JUN | 38 | 42 | F5.0 | June value (units described in section 5.2.11) |
| JUL | 43 | 47 | F5.0 | July value (units described in section 5.2.11) |
| AUG | 48 | 52 | F5.0 | Aug. value (units described in section 5.2.11) |
| SEP | 53 | 57 | F5.0 | Sep. value (units described in section 5.2.11) |
| OCT | 58 | 62 | F5.0 | Oct. value (units described in section 5.2.11) |
| NOV | 63 | 67 | F5.0 | Nov. value (units described in section 5.2.11) |
| DEC | 68 | 72 | F5.0 | Dec. value (units described in section 5.2.11) |
| ANNUAL | 73 | 77 | F5.0 | Ann. value (units described in section 5.2.11) |
| CO_CODE | 78 | 80 | A3 | Country code (FR= The Faroe Islands). |

In the files **fr_monthly_all** data are sorted according to element and station number. Furthermore all missing values have been replaced with the dummy value -9999 and a calculated 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), 2014: The Faroe Islands - DMI Historical Climate Data Collection 1873-2013 – with Danish Abstracts. DMI Technical Report 14-05. Copenhagen.



Special remarks:

In the following chapters the reference “NARP1” refers to the “NARP dataset version 1”, see [20].

The monthly data sets referred to in this section have been constructed by specific persons. Their names and initials/abbreviations are: John Cappelen (JC) and Ellen Vaarby Laursen (EVL).

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

Therefore, monthly data set “, JC-TS1154” means a data set (time series TS) created by John Cappelen with number 1154 in the time series classification.

“Monthly_db” refers to an internal DMI monthly database with monthly values of various weather parameters.

The reference “TR” refers to DMI Technical Reports. Therefore, “TR98-14” means DMI Technical Report 98-14 [6] available from:

<http://www.dmi.dk/laer-om/generelt/dmi-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 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 3.2. Metadata - Description of monthly data sets

Tórshavn (TORS) – 6011; 1873-2013

| Element No. 101 (Mean Temperature) | | | | |
|---|---------------|--|---------------------|-----------------------|
| <i>Dataset</i> | <i>Period</i> | <i>Content</i> | <i>Total months</i> | <i>Missing months</i> |
| Recommended | 1890 – 2013 | NARP1 + EVL-TS353 + Monthly-db TORS 6011 | 1488 | 0 |
| Details: Created using NARP1: 1890-1921, EVL-TS353: 1922-1997, monthly-db TORS 6011: 1998-2013. The original NACD series had many holes and corrections were done by comparison with 33060 Hoyvik. These holes were filled in TR98-14 [6] (EVL-TS353). | | | | |

| Element No. 111 (Mean of Daily Maximum Temperature) | | | | |
|---|---------------|--|---------------------|-----------------------|
| <i>Dataset</i> | <i>Period</i> | <i>Content</i> | <i>Total months</i> | <i>Missing months</i> |
| Recommended | 1873 – 2013 | NARP1 + EVL-TS361 + Monthly-db TORS 6011 | 1692 | 0 |
| Details: Created using NARP1: 1873-1960, EVL-TS361: 1961-1990, monthly-db TORS 6011: 1991-2013. The months 1957/9+10+11+12 and 1973/11 months were filled using values from 33060. | | | | |

| Element No. 112 (Highest Temperature) | | | | |
|---|---------------|--|---------------------|-----------------------|
| <i>Dataset</i> | <i>Period</i> | <i>Content</i> | <i>Total months</i> | <i>Missing months</i> |
| Recommended | 1873 – 2013 | NARP1 + EVL-TS368 + Monthly-db TORS 6011 | 1692 | 0 |
| Details: Created using NARP1: 1873-1960, EVL-TS368: 1961-1990, monthly-db TORS 6011: 1991-2013. The months 1957/9+10+11+12 and 1973/11 months were filled using values from 33060. | | | | |

| Element No. 121 (Mean of Daily Minimum Temperature) | | | | |
|---|---------------|--|---------------------|-----------------------|
| <i>Dataset</i> | <i>Period</i> | <i>Content</i> | <i>Total months</i> | <i>Missing months</i> |
| Recommended | 1873 – 2013 | NARP1 + EVL-TS375 + Monthly-db TORS 6011 | 1692 | 0 |
| Details: Created using NARP1: 1873-1960, EVL-TS375: 1961-1990, monthly-db TORS 6011: 1991-2013. The months 1957/9+10+11+12 and 1973/11 months were filled using values from 33060. | | | | |

| Element No. 122 (Lowest Temperature) | | | | |
|---|---------------|--|---------------------|-----------------------|
| <i>Dataset</i> | <i>Period</i> | <i>Content</i> | <i>Total months</i> | <i>Missing months</i> |
| Recommended | 1873 – 2013 | NARP1 + EVL-TS496 + Monthly-db TORS 6011 | 1692 | 0 |
| Details: Created using NARP1: 1873-1960, EVL-TS496: 1961-1990, monthly-db TORS 6011: 1991-2013. The months 1957/9+10+11+12 and 1973/11 months were filled using values from 33060. | | | | |



Tórshavn (TORS) – 6011 (continued)

| Element No. 401 (Mean Atmospheric Pressure) | | | | |
|---|---------------|--|---------------------|-----------------------|
| <i>Dataset</i> | <i>Period</i> | <i>Content</i> | <i>Total months</i> | <i>Missing months</i> |
| Recommended | 1890 – 2013 | NARP1 + JC-TS1220 + Monthly-db TORS 6011 | 1488 | 7 |
| Details: Created using NARP1: 1890-1960 (33060) reduced to mean sea level (see appendix 2.2), JC-TS1220: 1961-1990, monthly-db TORS 6011: 1991-2013. Missing: 1925/4-10. | | | | |

| Element No. 601 (Accumulated Precipitation) Not necessarily homogenous | | | | |
|--|---------------|--|---------------------|-----------------------|
| <i>Dataset</i> | <i>Period</i> | <i>Content</i> | <i>Total months</i> | <i>Missing months</i> |
| Recommended | 1890 – 2013 | NARP1 + JC-TS1154 + Monthly-db TORS 6011 | 1488 | 6 |
| Details: Created using NARP1: 1890-1921, JC-TS1154: 1922-1997, monthly-db TORS 6011: 1998-2013. Missing months 1957/9+10+11+12, 1971/8+9+10, 1972/11 & 1973/11 were filled using values from 33060. Missing months (2008/10-11 and 2012/2-5). 2009/11 has been corrected. In the period 14 – 24 November 2009 a total of 66,7 mm precipitation have been added. Data were taken from 33100 Vagur. 2 September 2006 an automatic raingauge was installed at 6011 Tórshavn. Not necessarily homogenous, because of new ways of detection. | | | | |

| Element No. 602 (Highest 24-hour Precipitation) Not necessarily homogenous | | | | |
|--|---------------|--|---------------------|-----------------------|
| <i>Dataset</i> | <i>Period</i> | <i>Content</i> | <i>Total months</i> | <i>Missing months</i> |
| Recommended | 1890 – 2013 | NARP1 + JC-TS1166 + Monthly-db TORS 6011 | 1488 | 6 |
| Details: Created using NARP1: 1890-1960, JC-TS1166: 1961-1990, monthly-db TORS 6011: 1991-2013. Missing months 1957/9+10+11+12, 1971/8+9+10, 1972/11 & 1973/11 were filled using values from 33060. Missing months (2008/10-11 and 2012/2-5). In the period 15 – 24 November 2009 a total of 66,7 mm precipitation have been added. Data are taken from 33100 Vagur. That had no effect on the highest 24 hour precipitation sum in 2009/11, because it was not found in that period. 2 September 2006 an automatic raingauge was installed at 6011 Tórshavn. Not necessarily homogenous, because of new ways of detection. | | | | |

| Element No. 701 (Number of days with Snow Cover) | | | | |
|---|---------------|--|---------------------|-----------------------|
| <i>Dataset</i> | <i>Period</i> | <i>Content</i> | <i>Total months</i> | <i>Missing months</i> |
| Recommended | 1939 – 2006 | NARP1 + JC-TS1224 + Monthly-db TORS 6011 | 812 | 0 |
| Details: Created using NARP1: 1939-1960, JC-TS1224: 1961-1990, monthly-db TORS 6011: 1991-2006/8. Missing months; 22 months (not listed here) were filled using values from 33060. Observations of snow cover were stopped 1 September 2006, when 6011 Tórshavn was changed to a full automatic station. | | | | |

| Element No. 801 (Cloud Cover) Not necessarily homogenous | | | | |
|---|---------------|---|---------------------|-----------------------|
| <i>Dataset</i> | <i>Period</i> | <i>Content</i> | <i>Total months</i> | <i>Missing months</i> |
| Recommended | 1890 – 2013 | NARP1 + JC-TS532 + Monthly-db TORS 6011 | 1488 | 3 |
| Details: Created using NARP1: 1890-1960, JC-TS532: 1961-1990, monthly-db TORS 6011: 1991-2013. Missing months 1957/9+10+11+12, 1973/11 were filled using values from 33060. 2009/6-8 could not be filled. 2 September 2006 a ceilometer for automatic detection of cloud cover was installed at 6011 Tórshavn. Not necessarily homogenous, because of the different ways of detection. | | | | |



Strond Kraftstation (STRO) – 33054; 1932-2005

| Element No. 601 (Accumulated Precipitation) | | | | |
|---|---------------|-----------------------------------|---------------------|-----------------------|
| <i>Dataset</i> | <i>Period</i> | <i>Content</i> | <i>Total months</i> | <i>Missing months</i> |
| Recommended | 1932 – 2005 | JC-TS1161 + Monthly-db STRO 33054 | 888 | 0 |
| Details: Created using monthly-db STRO 1932-1960, JC-TS1161: 1961-1990, monthly-db STRO 33054: 1991-2005. 1933/7 was filled using the average of 33060, 33070 & 33090. 1977/3, 1982/8+9+10 were filled in JC-TS1161, see TR98-14 [6] for further details. Month 1991/5+6+11 were filled using a 5-year period regression against the average of stations 33020 and 33045 ($r^2=0.810$): $St.33054 = 0.9451 * (St.33020 + St.33045)/2$. This was an improvement compared to single station correlations (with 33020, 33037, 33045, 33051, 33080 and 33090). The station was closed 1 January 2006. | | | | |

| Element No. 602 (Highest 24-hour Precipitation) | | | | |
|--|---------------|-----------------------------------|---------------------|-----------------------|
| <i>Dataset</i> | <i>Period</i> | <i>Content</i> | <i>Total months</i> | <i>Missing months</i> |
| Recommended | 1932 – 2005 | JC-TS1172 + Monthly-db STRO 33054 | 888 | 4 |
| Details: Created using monthly-db STRO 1932-1960, JC-TS1172: 1961-1990, monthly-db STRO 33054: 1991-2005. Missing: 1933/7, 2000/12, 2001/9-10. Months 1977/3 & 1982/8+9+10 were filled in JC-TS1172, see TR98-14 [6] for further details. Months 1991/5+6+11, 2001/11+12 were filled using the same regression as for element 601. The station was closed 1 January 2006. | | | | |



Appendix 3.3. Additional notes on monthly values; Tórshavn and Strond Kraftstation

For Tórshavn and Strond Kraftstation the original NACD series, the NORDKLIM, NARP and REWARD series, the present series in the time-series database and observed values in the Dmi internal monthly database has been studied in further details. These details are found in the tables below:

| TÓRSHAVN - TORS |
|---|
| <p>Element No.101 Further details: The NACD Element 101 data had extensive holes: 1925/4-10 and 1964/01 – 1965/12 and 1969/09 - 1975/12. These were filled in DMI Technical Report 98-14 [6] and introduced in NORDKLIM and NARP datasets. In NACD, several corrections were made by comparisons with Hoyvik 33060. Data in NARP (series 353) and monthly are the same from 1958 - 1999, except in two cases (1973/11 & 1980/2).</p> |
| <p>Element No. 111 Further details: Data in REWARD and “monthly” are the same from 1958 - 1995, except in very few cases (1969/10, 1979/06, 1981/01 & 1995/07). “Monthly” was used to update REWARD to include the period 1995-2000 in NORDKLIM/NARP. Data in EVL-TS361 are the same as in “monthly” except for 1973/11 where a value from Hoyvik was inserted.</p> |
| <p>Element No. 112 Further details: Data values in REWARD and “monthly” are the same from 1964 except in two cases (1969/10 & 1979/06). The values in EVL-TS368 are the same as in monthly.</p> |
| <p>Element No. 121 Further details: Data values in REWARD and monthly are the same from 1964 except in the following cases (1967/07, 1969/08, 1972/07 & 1995/10). The values in EVL-TS375 are the same as in monthly, except 1973/11.</p> |
| <p>Element No. 122 Further details: Data values in REWARD and monthly are the same from 1964 except in the following cases (1968/07, 1969/08 & 1972/07). The values in EVL-TS496 are the same as in monthly, except 1973/11.</p> |
| <p>Element No. 401 Further details: Data values in NACD and monthly are the same from 1958 except in the following cases (1980/01 & 1981/01). The values in EVL-TS1220 are the same as in monthly, except 1973/11 and 1980/01. There are no observations on the Faroe Islands during the missing period in 1925.</p> |
| <p>Element No. 601 Further details: Data values in NACD and monthly are the same from 1958 except in the following cases (1971/07, 1980/03, 1981/01 & 1985/03). The values in JC-TS1154 are completely different from both NACD and monthly until 1993/01. From then onwards, they are the same.</p> |
| <p>Element No. 602 Further details: Data values in NACD and NARP are the same. NACD and monthly are the same from 1958/01 except in the following cases (1971/09 & 1985/03). The values in JC-TS1166 are the same except the cases (1971/8+9+10, 1972/11, & 1973/11).</p> |
| <p>Element No. 701 Further details: Data values in NACD had holes for entire years 1964, 1965 and 1970. Values from DMI Technical Report 98-14 [6] are different from NACD and monthly in most months in the period 1961-1990. The values in EVL-TS1224 are the same as monthly except the cases (1962/02, 1966/12, 1967/01, 1967/03, 1967/12, 1973/11 & 1982/01).</p> |
| <p>Element No. 801 Further details: Comparison between the NACD and monthly was not made.</p> |

| STROND KRAFTSTATION – (STRO) |
|--|
| <p>Element No. 601 Further details: The series JC-TS1161 from DMI Technical Report 98-14 [6], originally had holes that were filled through correlation with 6009, 6011, 33020, 33080, 33090 [6].</p> |
| <p>Element No. 602 Details: The Element 602 (JC-TS172) from DMI Technical Report 98-14 [6], originally had holes that were filled through correlation with 6009, 6011, 33020, 33080, 33090 [6]. In the NARP/monthly-clima dataset 3 holes in 1991 as in element 601 was found. The same correlation was used to calculate the missing daily values and there from the missing monthly values. (Inserted values: 1991/05=172, 1991/06=302, 1991/11 = 591).</p> |



Appendix 3.4. Regarding monthly data of atmospheric pressure

The reading of a mercury barometer is proportional to the length of a mercury column in the barometer, which is balanced against the weight of the entire atmospheric column of air above the open surface of the mercury. The mercury barometer was therefore calibrated to “standard conditions” (0°C and a certain standard gravity). At other conditions corrections must be used.

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

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

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

For the calculation are used monthly means of P and T. This introduces an error compared to a reduction performed on the actual observations. The error is proportional to the difference between ‘the average P to T ratio’ and ‘the ratio of average P to average T’ (T in Kelvin). This means the error is zero if T is constant within the period. Within a month the maximum T-range would normally be within 30 degrees. And a numerical variation of 30 is small when compared to the 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 [21].



Appendix 4. Annual section - File formats

Appendix 4.1. File formats - Annual data files

The annual files included in this report contain annual mean temperature 1873 - 2013 for selected meteorological stations in Denmark, The Faroe Islands and Greenland.

The file names are determined as follows:

fr_annual_temperature_dkfrgr_<period>

More specifically a fixed format text file and an Excel file in this report:

fr_annual_temperature_dkfrgr_1873_2013.dat
fr_annual_temperature_dkfrgr_1873_2013.xlsx

Besides years the files contains the annual mean temperatures in degrees Celsius to one decimal place (the variable is specified with a "T" followed by a station number) and a Gaussian filtered value to 2 decimal places (the variable is specified with a "F" followed by a station number).

Description of the data format for the fixed format text file:

| Variable | Type | Start | End | Format |
|----------|--------|-------|-----|--------|
| YEAR | YEAR | 1 | 4 | F4.0 |
| T04202 | TEMP | 5 | 12 | F8.1 |
| F04202 | FILTER | 13 | 20 | F8.2 |
| T04211 | TEMP | 21 | 28 | F8.1 |
| F04211 | FILTER | 29 | 36 | F8.2 |
| T04221 | TEMP | 37 | 44 | F8.1 |
| F04221 | FILTER | 45 | 52 | F8.2 |
| T04250 | TEMP | 53 | 60 | F8.1 |
| F04250 | FILTER | 61 | 68 | F8.2 |
| T04270 | TEMP | 69 | 76 | F8.1 |
| F04270 | FILTER | 77 | 84 | F8.2 |
| T04320 | TEMP | 85 | 92 | F8.1 |
| F04320 | FILTER | 93 | 100 | F8.2 |
| T04360 | TEMP | 101 | 108 | F8.1 |
| F04360 | FILTER | 109 | 116 | F8.2 |
| T06011 | TEMP | 117 | 124 | F8.1 |
| F06011 | FILTER | 125 | 132 | F8.2 |
| T06186 | TEMP | 133 | 140 | F8.1 |
| F06186 | FILTER | 141 | 148 | F8.2 |

Note1: The annual values of the different stations in section 6.2.1 can be found together with the monthly data (see file formats; monthly data files in Appendix 3.1).

Note2: The annual mean temperature data from 1890-2013 are the same as the annual values for parameter 101 Mean Temperature mentioned in section 5.2.3. There are no monthly mean temperatures processed for 1873-1889. From 1873-1889 the annual mean temperatures are values processed in connection with the NACD project [24], but only published for the first time in [7].

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

Cappelen, J. (ed), 2014: The Faroe Islands - DMI Historical Climate Data Collection 1873-2013 – with Danish Abstracts. DMI Technical Report 14-05. Copenhagen.



Appendix 4.2. File formats; Annual graphics

Annual graphics included in this report contain graphs showing annual mean temperatures 1873-2013 for one station 6011 Tórshavn at The Faroe Islands together with København, Denmark and selected stations from West and East Greenland. The graphs are available in a Danish and English version and also in a larger version as a poster (plakat; only Danish version).

The file names are determined as follows:

fr_annual_temperatur_side_<sidetal>_<periode>_<sprog>.pdf
fr_annual_temperature_page_<page number>_<period>_<language>.pdf

More specifically a number of pdf files (Danish and English versions) in this report:

fr_annual_temperatur_side1_1873_2013_dk.pdf:

Annual mean temperatures 1873-2013 Denmark, The Faroe Islands and West Greenland (Danish version)

fr_annual_temperatur_side2_1873_2013_dk.pdf:

Annual mean temperatures 1873-2013 Denmark, The Faroe Islands and East Greenland (Danish version)

fr_annual_temperature_page1_1873_2013_eng.pdf:

Annual mean temperatures 1873-2013 Denmark, The Faroe Islands and West Greenland (English version)

fr_annual_temperature_page2_1873_2013_eng.pdf:

Annual mean temperatures 1873-2013 Denmark, The Faroe Islands and East Greenland (English version)

fr_annual_temperatur_side1_1873_2013_plakat.pdf:

Annual mean temperatures 1873-2013 Denmark, The Faroe Islands and West Greenland (Danish poster)

fr_annual_temperatur_side2_1873_2013_plakat.pdf:

Annual mean temperatures 1873-2013 Denmark, The Faroe Islands and East Greenland (Danish poster)

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

Cappelen, J. (ed), 2014: The Faroe Islands - DMI Historical Climate Data Collection 1873-2013 – with Danish Abstracts. DMI Technical Report 14-05. Copenhagen.