



The Danish
Meteorological
Institute

The Faroe Islands – DMI Historical Climate Data Collection 1873-2020

DMI Report 21-05
15 March 2021

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Colophon

Serial title	DMI Report 21-05
Title	The Faroe Islands – DMI Historical Climate Data Collection 1873-2020
Subtitle	
Author(s)	John Cappelen (ed)
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Responsible institution	Danish Meteorological Institute
Language	English
Keywords	The Faroe Islands, atmospheric pressure observations, monthly and annual climate data, extremes, air temperature, atmospheric pressure, precipitation, sunshine, cloud cover, snow cover, time series from 1873, graphics, weather
URL	https://www.dmi.dk/publikationer/
Digital ISBN	
ISSN	2445-9127 (online)
Version	15 March 2021
Website	www.dmi.dk
Copyright	Application and publication of data is allowed with proper reference and acknowledgment

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1 Abstract

This report contains the available DMI historical data collection 1873-2020 from the Faroe Islands, including observations (atmospheric pressure) and long monthly and annual series of station based data.

2 Resumé

Denne rapport indeholder tilgængelige historiske DMI datasamlinger 1873-2020 fra Færøerne. Det drejer sig om observationer af lufttryk samt lange månedlige og årlige stationsdataserier.

3 Introduction

This report contains a DMI historical data collection 1873-2020 for The Faroe Islands, including long series of station based/blended data comprising observations of atmospheric pressure plus monthly and annual values of selected parameters and some selected graphics. A description 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. This report is an annual update (2020 data)

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 [22]. This publication contains information concerning a major part of the stations included in this report.

4 General data overview

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

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

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

Figure 1. Map showing station position, 06011 Tórshavn and 33054 Strond Kraftstation, The Faroe Islands.

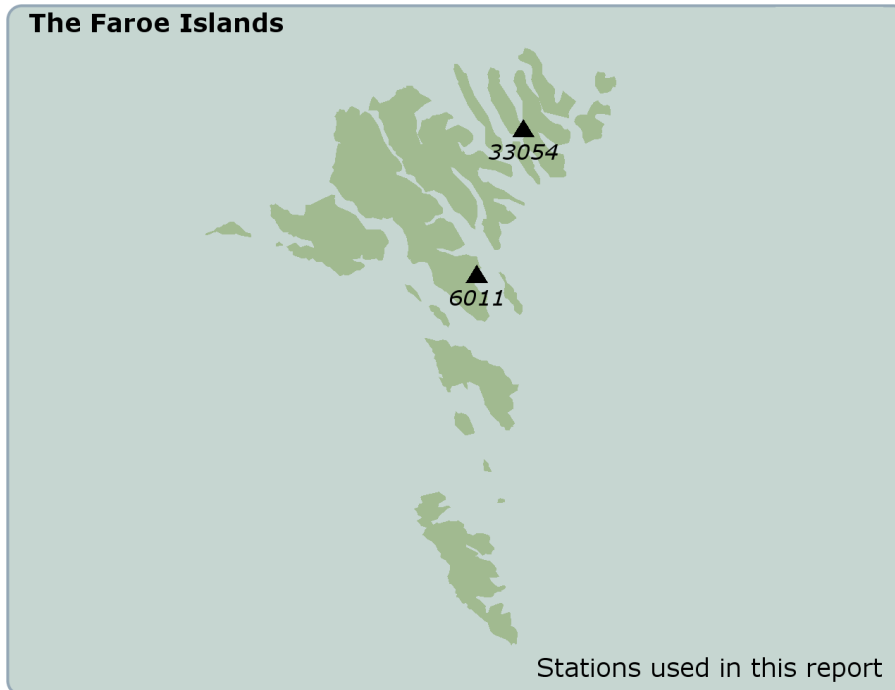


Figure 1 note: The map shows the station positions of the stations where the data sets referred to in this report come from. Only the latest positions are marked. The official WMO station identifier for Tórshavn consists of 5 digits “06011”. However, in this report the in front “0” is omitted, giving 4 digits i.e. “6011” for Tórshavn, which is also used on the map. The national station identifiers describing manual precipitation stations or sunshine stations in the Faroe Islands consist of 5 digits, always starting with 33. In this report “33054” is used for Strond Kraftstation and “33069” used for Tórshavn Radiosonde. “33069” is not marked on the map. The location is very close to 6011 Tórshavn.

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

Data set id*	Station*	First year of appearance
6011	Tórshavn	1873
33054	Strond Kraftstation	1932
33069	Tórshavn Radiosonde	1922

Table 1 note: * latest station number and name.

5 Data collections; general overview

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

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

Type	Data Collections	Section, Page, Appendix
Observation*	<ul style="list-style-type: none"> Atmospheric pressure (msl) 1 data set (blended): 6011 Tórshavn (1874-2020)	Sec 7, p 8-10, App 2
Monthly/ Annual	<ul style="list-style-type: none"> Average air temperature Average daily minimum air temperature Average daily maximum air temperature Highest air temperature Lowest air temperature Average atmospheric pressure (msl) Accumulated hours of bright sunshine Accumulated precipitation Highest 24-hour accumulated precipitation No. of days with snow cover Average cloud cover 1 data set (blended): 6011 Tórshavn (1873-2020) <ul style="list-style-type: none"> Accumulated precipitation Highest 24-hour accumulated precipitation 1 data set (blended): 33054 Strond Kraftstation (1932-2005) <ul style="list-style-type: none"> Accumulated hours of bright sunshine 1 data set (blended): 33069 Tórshavn Radiosonde (1922-2007)	Sec 8, p 11-16, App 3
Graphics/ annual	<ul style="list-style-type: none"> Average air temperature; graph Accumulated precipitation; graph Accumulated hours of bright sunshine; graph 4 data sets (blended): 6011 Tórshavn (1873-2020), air temperature 6011 Tórshavn (1890-2020), precipitation 33069 Tórshavn Radiosonde (1922-2007), sunshine 6011 Tórshavn (2006-2020); sunshine	Sec 9, p 16-20, App 4

General note to table 2: When compared to earlier published data collections minor changes can have been introduced. This is related to an ongoing quality control of data.

Table 2 note:

- * Tórshavn observations are published separately [16],
1 station, 10 parameters, hourly observations, 1953 - 2013
- 1 station, 17 parameters, hourly observations, 2014 - 2020

Elements/Parameters used in this report can be seen in the table 3 below. ‘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.

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

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

6 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 air 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 some-times 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.

7 Observational section: Historical DMI climate data Collection

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

Type	Data Collections	Section, Page, Appendix
Observation*	<ul style="list-style-type: none"> Atmospheric pressure (msl) 1 data set (blended): 6011 Tórshavn (1874-2020)	Sec 7, p 8-10, App 2

Table 4 note: * Tórshavn observations are published separately [16]:1 station, 10 parameters, hourly observations, 1953 – 2013, 1 station, 17 parameters, hourly observations, 2014 - 2020

Table 4 note: Latest earlier report: [12] Cappelen, J. (ed), 2020: The Faroe Islands - DMI Historical Climate Data Collection 1873-2019. DMI Report 20-05. Copenhagen.

Figure 2. Map showing station position, 06011 Tórshavn, The Faroe Islands.

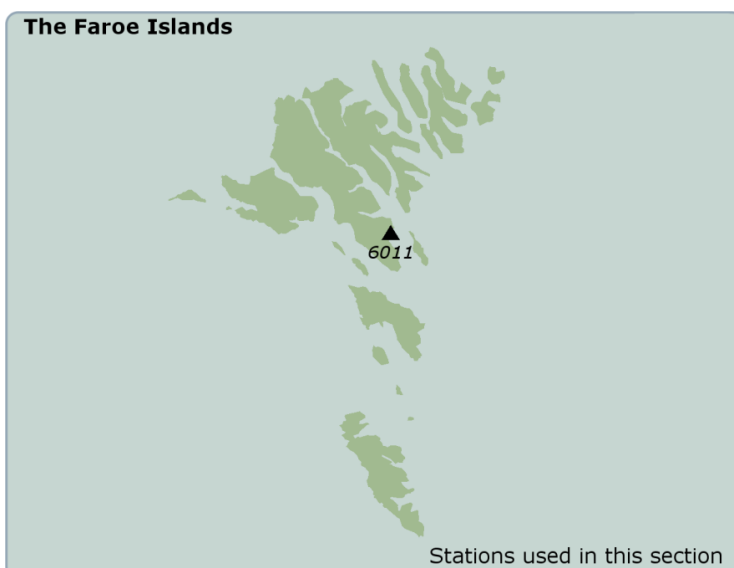


Figure 2 note: The map shows the station positions of the stations where the observational data sets referred to in the observational section come from. Only the latest position is marked. The official WMO station identifier for Tórshavn consists of 5 digits “06011”. However, in this report the in front “0” is omitted, giving 4 digits i.e.” 6011” for Tórshavn, which is also used on the map.

The purpose of this observational section is to publish one (1) mean sea level atmospheric pressure data series from Tórshavn, The Faroe Islands (observations) covering the period 1874-2020.

According to the intentions to update regularly, preferably every year, this section contains an update (2020 data) of one (1) 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 [26].

As part of a former project called WASA, selected DMI series of atmospheric pressure observations from Denmark, Greenland and the Faroe Islands 1874-1970 on paper were digitised. The pressure observations were digitised from the meteorological yearbooks, which means that the observations were station level data corrected for index error, air temperature and, since 1893, gravity. From 1971 the pressure data were taken from the DMI Climate Database. The WASA project was originally titled: "The impact of storms on waves and surges: Changing climate in the past 100 years and perspectives for the future" [27].

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

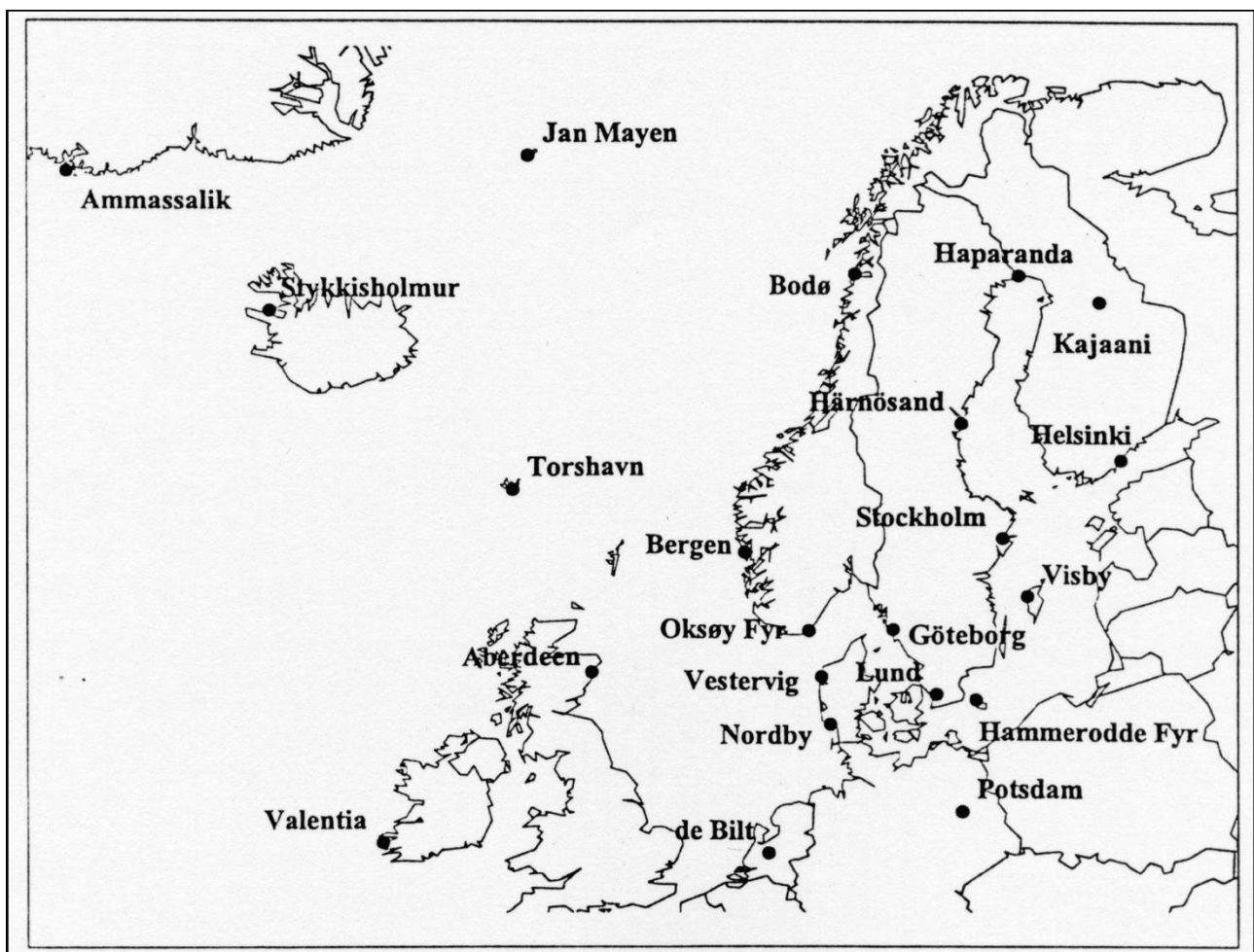


Figure 3 note: The original WASA pressure data sets were published in [26]. Pressure data sets from Denmark (three sites) and Ammassalik/Tasiilaq, Greenland are presented in the representative historical Climate Data Collection; DMI Report 21-02 [14] and DMI Report 21-04 [15].

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

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

For the benefit of scientists that may wish to conduct such testing, various metadata up to 1996 can be found in [22]. The station history can be found in Appendix 1.

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 5 and Appendix 2 indicates how the stations were merged and how many observations the series contains in the different parts.

Table 5. The Tórshavn data set of atmospheric pressure observations (at msl, mean sea level; element number 401). See details in Appendix 2.

Dataset*	Station series**	Dataset id	Period	Parameter
Tórshavn 1874-2020	Tórshavn Skole	fr_obs_401: 6011	1874-1925	Atmospheric pressure (msl)
	Hoyvik		1925-1957	Atmospheric pressure (msl)
	Tórshavn		1958-1993	Atmospheric pressure (msl)
	Tórshavn		1993-2020	Atmospheric pressure (msl)

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

Table 5 note:

*Blended data sets, see details in Appendix 2.

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

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

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

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

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.

8 Monthly/annual section: Historical DMI climate data Collection

Table 7. Overview of monthly/annual section – data collections in this report.

Type	Data Collections	Section, Page, Appendix
Monthly/ Annual	<ul style="list-style-type: none"> • Average air temperature • Average daily minimum air temperature • Average daily maximum air temperature • Highest air temperature • Lowest air temperature • Average atmospheric pressure (msl) • Accumulated hours of bright sunshine • Accumulated precipitation • Highest 24-hour accumulated precipitation • No. of days with snow cover • Average cloud cover <p>1 data set (blended): 6011 Tórshavn (1873-2020)</p> <ul style="list-style-type: none"> • Accumulated precipitation • Highest 24-hour accumulated precipitation <p>1 data set (blended): 33054 Strond Kraftstation (1932-2005)</p> <ul style="list-style-type: none"> • Accumulated hours of bright sunshine <p>1 data set (blended): 33069 Tórshavn Radiosonde (1922-2007)</p>	Sec 8, p11-16, App 3

Table 7 note: Latest earlier report: [12] Cappelen, J. (ed), 2020: The Faroe Islands - DMI Historical Climate Data Collection 1873-2019. DMI Report 20-05. Copenhagen.

Figure 4. Map showing station position, 06011 Tórshavn and 33054 Strond Kraftstation, The Faroe Islands.

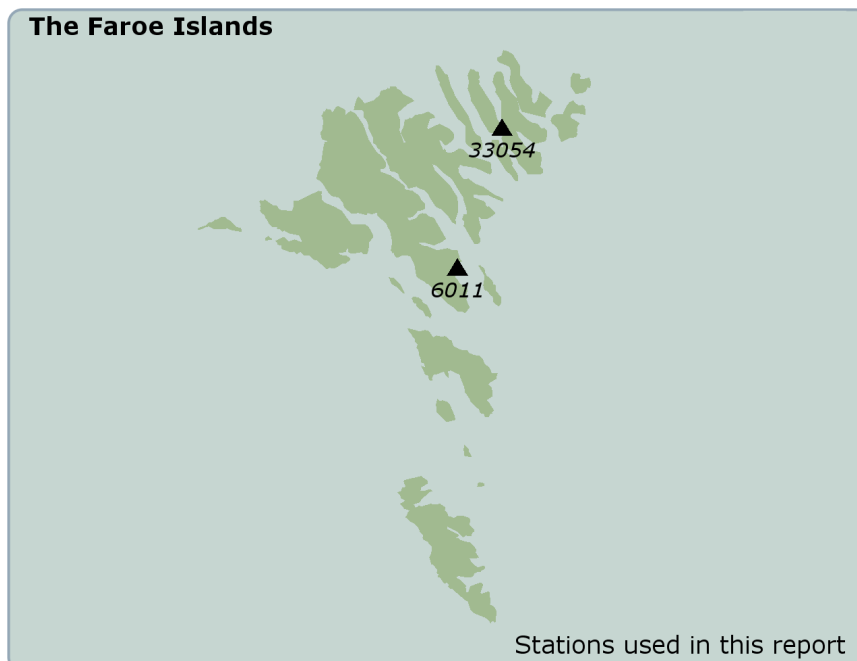


Figure 4 note: The map shows the station positions of the stations where the monthly/annual data sets referred to in the monthly/annual section come from. Only the latest positions are marked. The official WMO station identifier for Tórshavn consists of 5 digits "06011". However, in this report the in front "0" is omitted, giving 4 digits i.e. "6011" for Tórshavn, which is also used on the map. The national station identifiers describing manual precipitation stations in the Faroe Islands consist of 5 digits, always starting with 33. In this report "33054" is used for Strond Kraftstation and "33069" used for Tórshavn Radiosonde. "33069" is not marked on the map. The location is very close to 6011 Tórshavn.

The purpose of this monthly/annual section is to publish available long monthly and annual DMI data series 1873-2020 from the Faroe Islands. The data parameters include average air temperature, average of minimum and maximum air temperature, lowest and highest air temperature, average atmospheric pressure, hours of bright sunshine, accumulated precipitation, highest 24-hour accumulated precipitation, number of days with snow and average cloud cover.

According to the intentions to update regularly, preferably every year, this section contains an update (2020 data) of the "DMI Monthly and Annual Climate Data Collection" published for the first time in that form in 1) DMI Technical Report 03-26: DMI Monthly Climate Data Collection 1860-2002, Denmark, The Faroe Island and Greenland. An update of: NACD, REWARD, NORDKLIM and NARP datasets, Version 1, Copenhagen 2003 [20] and in 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 [7].

Some of the monthly and annual data have over the years been published in connection with different Nordic climate projects like NACD (North Atlantic Climatological Dataset [19,20,21]), REWARD (Relating Extreme Weather to Atmospheric circulation using a Regionalised Dataset [18,20,21]), NORDKLIM (Nordic Co-operation within Climate activities [21,22]) and NARP (Nordic Arctic Research Programme [20,21,23]).

The original DMI Climate Monthly Data Collection published in DMI Technical Report 03-26 [21] 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 fulfill 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 up to 1995 and many holes have been filled compared to the observed dataset.

The revision/update of those datasets was completed with the DMI Technical Report 03-26 [21].

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 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 cloud cover data. 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.

Three (3) stations; 6011 Tórshavn, 33054 Strond kraftstation and 33069 Tórshavn Radisonde; the Faroe Islands have long records with monthly/annual values of different parameters within the period 1873-2020. The monthly/annual parameters in this report are listed below in tables 8 – 20.

Table 8. Monthly/annual average air temperature (element number 101); data sets and station series. See details in Appendix 3.

Dataset*	Station series**	Dataset id	Period	Parameter
Tórshavn 1873-2020	NARP1 Tórshavn	fr_monthly_all_	1890-1921	Average temperature
	EVL-TS353 Tórshavn	1873_2020:	1922-1997	Average temperature
	Tórshavn	6011	1998-2020	Average temperature

Table 8 note:

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

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

Table 9. Monthly/annual average daily maximum air temperature (element number 111); data sets and station series. See details in Appendix 3.

Dataset*	Station series**	Dataset id	Period	Parameter
Tórshavn 1873-2020	NARP1 Tórshavn	fr_monthly_all_	1873-1960	Average daily max temperature
	EVL-TS361 Tórshavn	1873_2020:	1961-1990	Average daily max temperature
	Tórshavn	6011	1991-2020	Average daily max temperature

Table 9 note:

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

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

Table 10. Monthly/annual highest air temperature (element number 112); data sets and station series. See details in Appendix 3.

Dataset*	Station series**	Dataset id	Period	Parameter
Tórshavn 1873-2020	NARP1 Tórshavn	fr_monthly_all_	1873-1960	Highest temperature
	EVL-TS368 Tórshavn	1873_2020:	1961-1990	Highest temperature
	Tórshavn	6011	1991-2020	Highest temperature

Table 10 note:

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

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

Table 11. Monthly/annual average daily minimum air temperature (element number 121); data sets and station series. See details in Appendix 3.

Dataset*	Station series**	Dataset id	Period	Parameter
Tórshavn 1873-2020	NARP1 Tórshavn	fr_monthly_all_	1873-1960	Average daily min temperature
	EVL-TS375 Tórshavn	1873_2020:	1961-1990	Average daily min temperature
	Tórshavn	6011	1991-2020	Average daily min temperature

Table 11 note:

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

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

Table 12. Monthly/annual lowest air temperature (element number 122); data sets and station series. See details in Appendix 3.

Dataset*	Station series**	Dataset id	Period	Parameter
Tórshavn 1873-2020	NARP1 Tórshavn	fr_monthly_all_	1873-1960	Lowest temperature
	EVL-TS496 Tórshavn	1873_2020:	1961-1990	Lowest temperature
	Tórshavn	6011	1991-2020	Lowest temperature

Table 12 note:

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

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

Table 13. Monthly/annual average atmospheric pressure (msl; element number 401); data sets and station series. See details in Appendix 3.

Dataset*	Station series**	Dataset id	Period	Parameter
Tórshavn 1890-2020	NARP1 Tórshavn	fr_monthly_all_	1890-1960	Average atmospheric pressure (msl)
	JC-TS1220 Tórshavn	1873_2020:	1961-1990	Average atmospheric pressure (msl)
	Tórshavn	6011	1991-2020	Average atmospheric pressure (msl)

Table 13 note:

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

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

Table 14. Monthly/annual accumulated hours of bright sunshine (Fuess; element number 501); data sets and station series. See details in Appendix 3.

Dataset*	Station series**	Dataset id	Period	Parameter
Tórshavn 1922-2007	EVL-TS354 Tórshavn	fr_monthly_all_	1822-1997	Hours of bright sunshine (Fuess)
	Tórshavn Radiosonde	1873_2020: 33069	1998-2007	Hours of bright sunshine (Fuess)

Table 14 note:

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

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

Table 15. Monthly/annual accumulated hours of bright sunshine (Star; element number 504); data sets and station series. See details in Appendix 3.

Dataset	Station series	Dataset id	Period	Parameter
Tórshavn 2006-2020	Tórshavn	fr_monthly_all_ 1873_2020: 6011	2006-2020	Hours of bright sunshine (Star)

Table 16. Monthly/annual accumulated precipitation (element number 601); data sets and station series. See details in Appendix 3.

Dataset*	Station series**	Dataset id	Period	Parameter
Tórshavn 1890-2020	NARP1 Tórshavn	fr_monthly_all_	1890-1921	Accumulated precipitation
	JC-TS1154 Tórshavn	1873_2020: 6011	1922-1997	Accumulated precipitation
	Tórshavn		1998-2020	Accumulated precipitation
Strond Kraftstation 1932-2005	Strond Kraftstation	fr_monthly_all_	1932-1960	Accumulated precipitation
	JC-TS1161 Strond Kraftstation	1873_2020:	1961-1990	Accumulated precipitation
	Strond Kraftstation	33054	1991-2005	Accumulated precipitation

Table 16 note:

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

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

Table 17. Monthly/annual highest monthly/annual 24-hours accumulated precipitation (element number 602); data sets and station series. See details in Appendix 3.

Dataset*	Station series**	Dataset id	Period	Parameter
Tórshavn 1890-2020	NARP1 Tórshavn	fr_monthly_all_	1890-1960	Highest 24-hour acc. prec.
	JC-TS1161 Tórshavn	1873_2020: 6011	1961-1990	Highest 24-hour acc.prec.
	Tórshavn		1991-2020	Highest 24-hour acc.prec.
Strond Kraftstation 1932-2005	Strond Kraftstation	fr_monthly_all_	1932-1960	Highest 24-hour acc.prec.
	JC-TS1172 Strond Kraftstation	1873_2020:	1961-1990	Highest 24-hour acc.prec.
	Strond Kraftstation	33054	1991-2005	Highest 24-hour acc.prec.

Table 17 note:

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

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

Table 18. Monthly/annual number of days with snow cover (element number 701); data sets and station series. See details in Appendix 3.

Dataset*	Station series**	Dataset id	Period	Parameter
Tórshavn 1939-2006	NARP1 Tórshavn	fr_monthly_all_	1939-1960	No. of days with snow cover
	JC-TS1224 Tórshavn	1873_2020:	1961-1990	No. of days with snow cover
	Tórshavn	6011	1991-2006	No. of days with snow cover

Table 18 note:

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

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

Table 19. Monthly/annual average cloud cover (element number 801); data sets and station series. See details in Appendix 3.

Dataset*	Station series**	Dataset id	Period	Parameter
Tórshavn 1890-2020	NARP1 Tórshavn	fr_monthly_all_	1890-1960	Average cloud cover
	JC-TS532 Tórshavn	1873_2020:	1961-1990	Average cloud cover
	Tórshavn	6011	1991-2020	Average cloud cover

Table 19 note:

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

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

Table 20. Data dictionary for the monthly/annual parameters published in the report.

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

Table 20 note: 'Method' specifies whether the element is a sum, an average or an extreme. The units of the monthly/annual values in the data files are specified in 'Unit'.

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

9 Graphics section: Historical DMI climate data Collection

Table 21. Overview of graphics section – data collections in this report.

Type	Data Collections	Section, Page, Appendix
Graphics/ annual	<ul style="list-style-type: none"> • Average air temperature; graph • Accumulated precipitation; graph • Accumulated hours of bright sunshine; graph 4 data sets (blended): 6011 Tórshavn (1873-2020), air temperature 6011 Tórshavn (1890-2020), precipitation 33069 Tórshavn Radiosonde (1922-2007), sunshine 6011 Tórshavn (2006-2020), sunshine	Sec 9, p 16-20, App 4

Table 21 note: Latest earlier report: [12] Cappelen, J. (ed), 2020: The Faroe Islands - DMI Historical Climate Data Collection 1873-2019. DMI Report 20-05. Copenhagen.

Figure 5. Map showing station position, 06011 Tórshavn, The Faroe Islands.

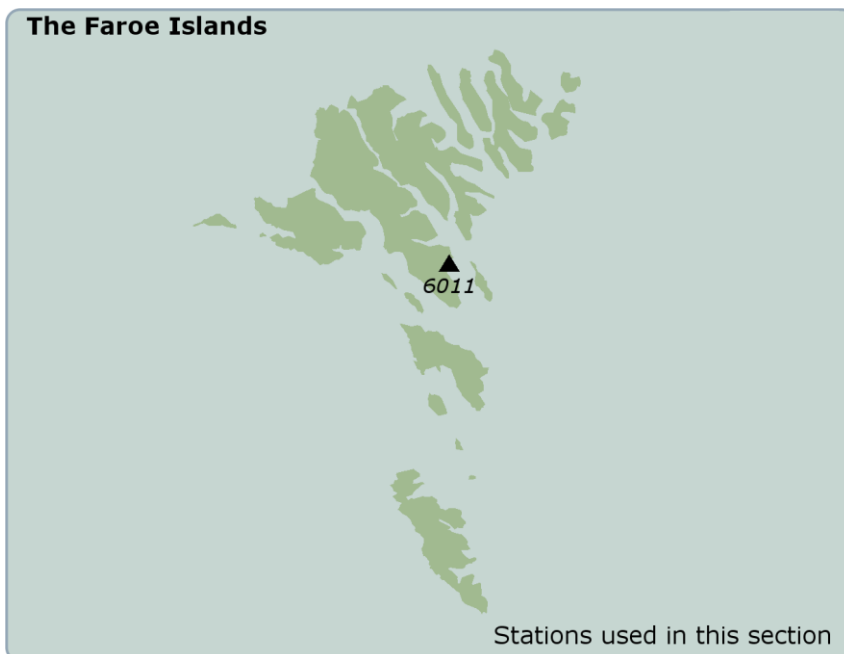


Figure 5 note: The map shows the station positions of the stations where the graphical data sets referred to in the graphics section come from. Only the latest positions are marked. The official WMO station identifier for Tórshavn consists of 5 digits "06011". However, in this report the in front "0" is omitted, giving 4 digits i.e. "6011" for Tórshavn, which is also used on the map. The national station identifiers describing manual precipitation stations in the Faroe Islands consist of 5 digits, always starting with 33. In this report "33054" is used for Strond Kraftstation and "33069" used for Tórshavn Radiosonde. "33069" is not marked on the map. The location is very close to 6011 Tórshavn.

The purpose of this graphics section is to publish different graphics based on annual climate data from The Faroe Islands. That is:

- Annual average air temperature, annual accumulated precipitation and annual accumulated hours of bright sunshine within the period 1873-2020 for Tórshavn.

According to the intentions to update regularly, preferably every year, this particular report contains an update (2020 data) of the “DMI Climate Data Graphics Collection” published for the first time in that form in DMI Technical Report 05-06: DMI Annual Climate Data Collection 1873-2004, Denmark, The Faroe Islands and Greenland - with Graphics and Danish Abstracts. Copenhagen 2005 [7].

Meteorological stations in Tórshavn with long records have been operated at the Faroe Islands since the 19th century. The stations have digitised records back to the start of 1873 (the Danish Meteorological Institute (DMI) was established 1872) and can be merged into long series of data. It is obvious that the quality and homogeneity of the series have been affected in various degrees. The series behind the graphics 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/annual data collection in section 8.

Annual graphics are available for three (3) parameters; average air temperature, accumulated precipitation and hours of bright sunshine within the period 1873-2020 and for two (2) stations, 6011 Tórshavn and 33069 Tórshavn Radiosonde. The graphs are available in an English version.

Table 22. Graphical products; annual average air temperature (element number 101), annual accumulated precipitation (element number 601) and annual accumulated hours of bright sunshine (element number 501 and 504). See details in Appendix 4.

Product*	Station series	Graph id	Period	Parameter
Graph; Tórshavn 1873-2020	Tórshavn	fr_graph_annual_temperature_6011	1873-2020	Average temperature
Graph; Tórshavn 1890-2020	Tórshavn	fr_graph_annual_precipitation_6011	1890-2020	Acc. precipitation
Graph; Tórshavn 1822-2007	Tórshavn	fr_graph_annual_sunshine_33069	1922-2007	Acc. hours of bright sunshine (Fuess sunshine recorder)
Graph; Tórshavn 2006-2020	Tórshavn	fr_graph_annual_sunshine_6011	2006-2020	Acc. hours of bright sunshine (Star radiation pyranometer)

Table 22 note: *Graph (English version).

The annual data behind the graphics are described in chapter 8 and can be downloaded together with the monthly/annual data (see appendix 3). The graphs are shown on the next pages. They show annual average air temperatures, accumulated precipitation and hours of bright sunshine for Tórshavn/The Faroe Islands. The values are shown relative to average 1981-2010 [see also 13].

Figure 6. Annual average air temperature since 1873; 6011 Tórshavn. Anomaly relative to 1981-2010.

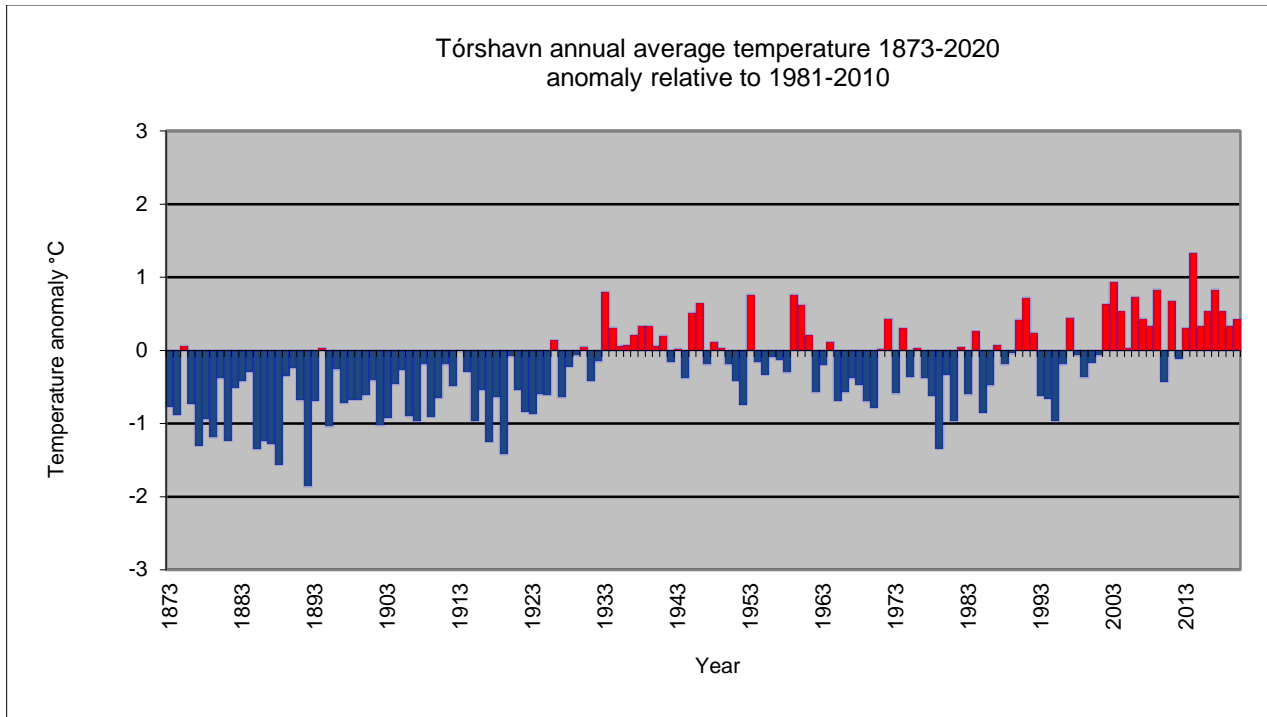


Figure 7. Annual accumulated precipitation since 1890; 6011 Tórshavn. Anomaly relative to 1981-2010. There are missing values for the years 2008 and 2012.

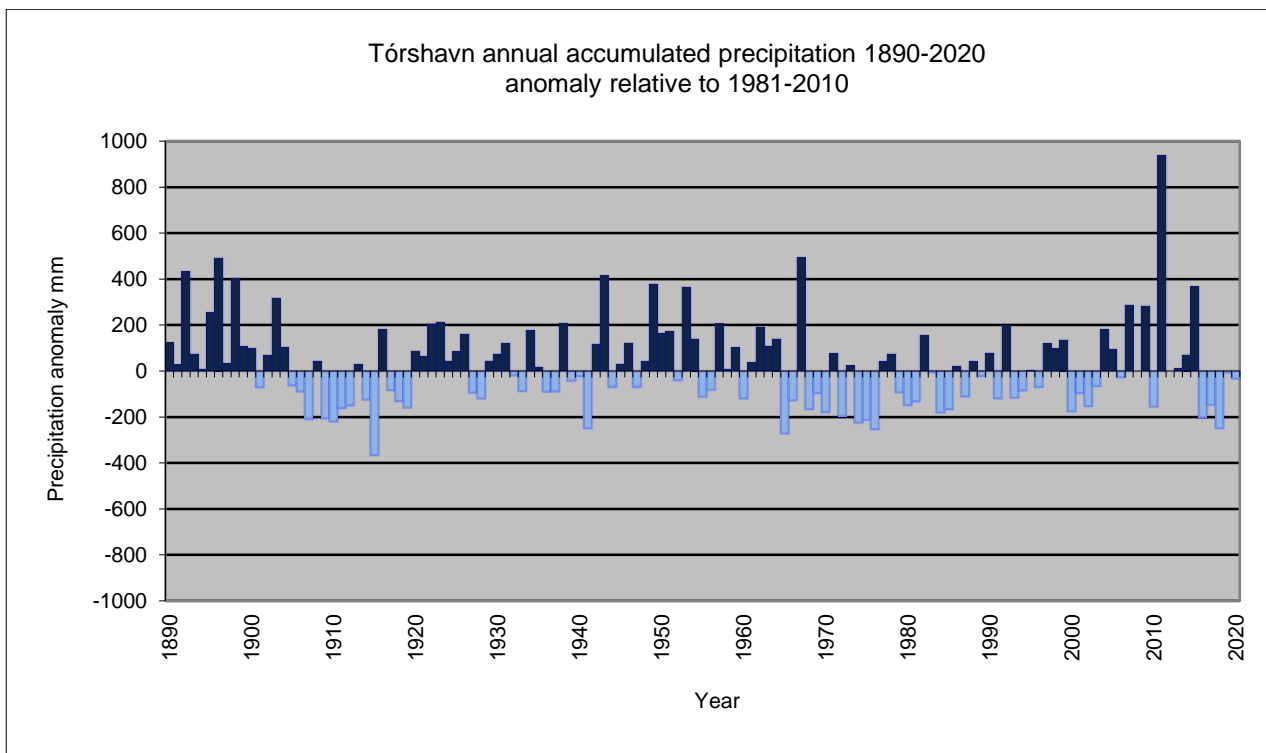


Figure 8. Annual accumulated hours of bright sunshine 1922-2007; 33069 Tórshavn Radiosonde. Anomaly relative to 1981-2007.

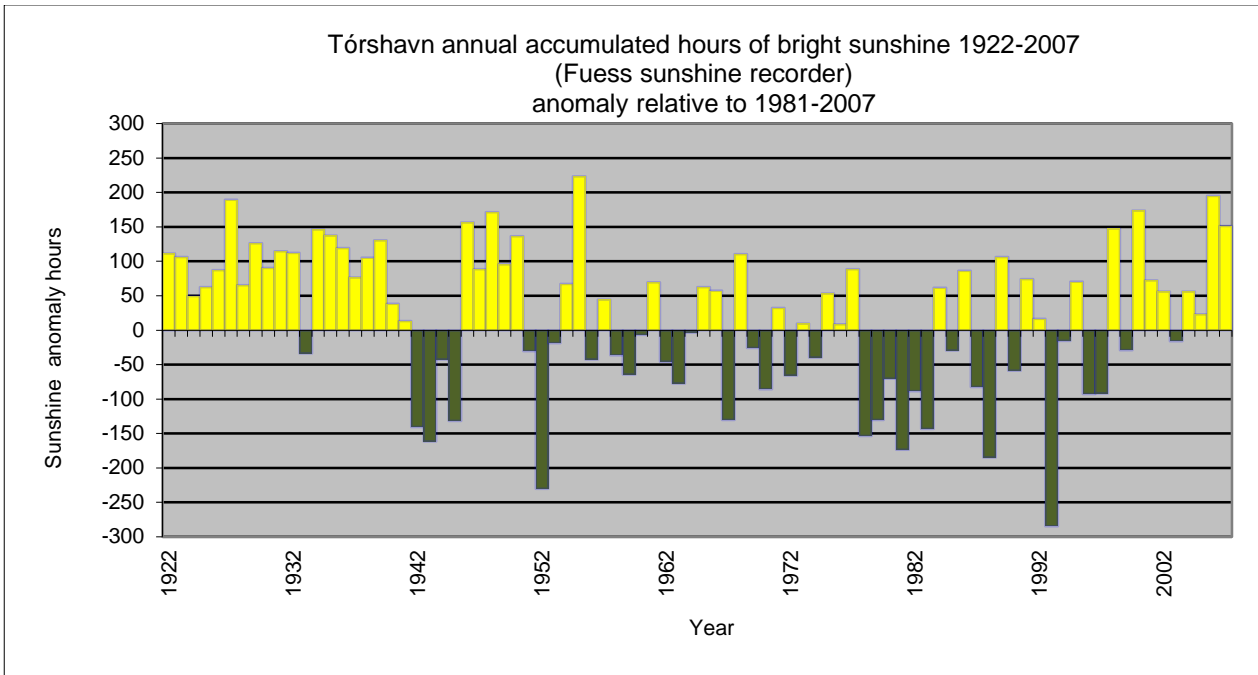


Figure 8 note: Instrument; Fuess sunshine recorder. DMI has since Sep 2006 observed the hours of bright sunshine using measurements of global radiation instead of measurements from a Fuess sunshine recorder. For that reason “new” and “old” hours of bright sunshine cannot directly be compared; see figure 9 below.

Figure 9. Annual accumulated hours of bright sunshine since 2006; 6011 Tórshavn. Anomaly relative to 2006-2015.

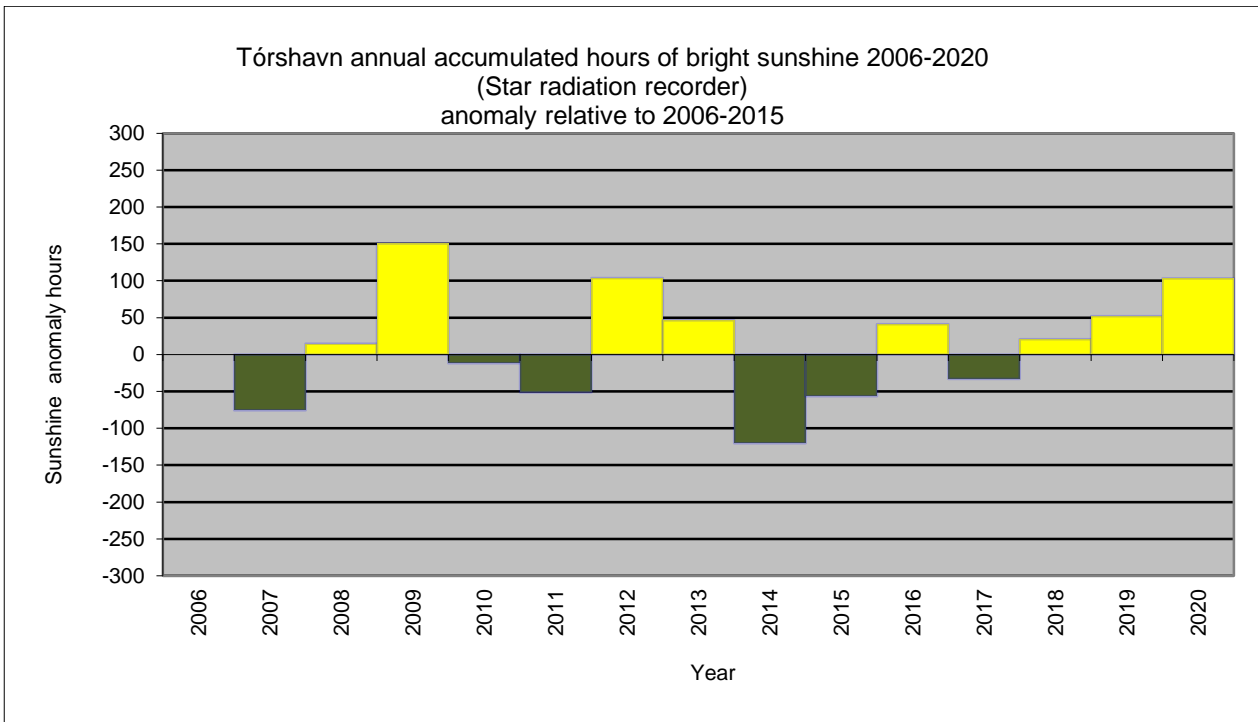


Figure 9 note: Instrument; Star radiation recorder. DMI has since Sep 2006 observed the hours of bright sunshine using measurements of global radiation. See more in the figure caption for Figure 8.

Average monthly and annual values for air temperature, accumulated precipitation and accumulated hours of bright sunshine from Tórshavn/The Faroe Islands for the period 1981-2010 are shown in graphics/table below, but can also be found in [13].

Figure 10. Average monthly/annual values; air temperature, accumulated precipitation and accumulated hours of bright sunshine from Tórshavn/The Faroe Islands for the period 1981-2010

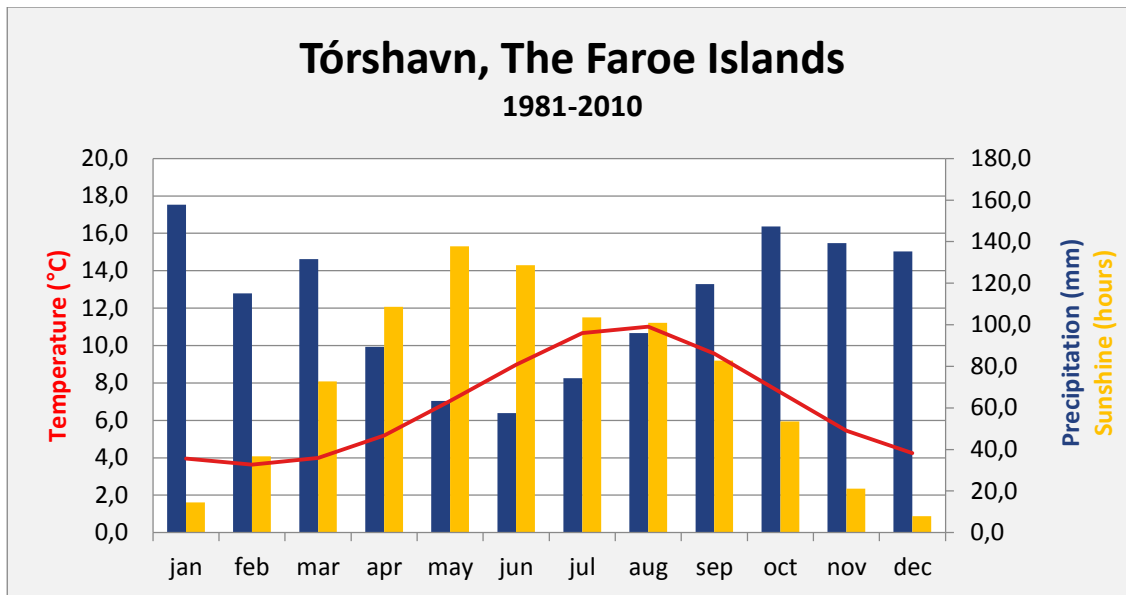


Table 23. Average monthly/annual values; air temperature, accumulated precipitation and accumulated hours of bright sunshine from Tórshavn/The Faroe Islands for the period 1981-2010

Tórshavn, The Faroe Islands (1981-2010)			
Month	Temperature (°C)	Precipitation (mm)	Sunshine* (hours)
jan	4,0	157,7	14,5
feb	3,6	115,2	36,7
mar	4,0	131,6	72,8
apr	5,2	89,5	108,6
may	7,0	63,3	137,8
jun	9,0	57,5	128,6
jul	10,7	74,3	103,6
aug	11,0	96,0	100,9
sep	9,6	119,5	82,7
oct	7,5	147,4	53,4
nov	5,5	139,3	21,1
dec	4,3	135,3	7,8
Year	6,8	1321,3	868,6

Table 23 note: *sunshine 1981-2007.

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

10 References

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- [21] Jørgensen, P. V. and Laursen, E.V. (2003): 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 Technical Report 03-26. Copenhagen.
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- [25] NACD, North Atlantic Climatological Dataset. See (Frich et al. 1996) [19].
- [26] Schmith, T., H. Alexandersson, K. Iden and H. Tuomenvirta (1997). North Atlantic-European pressure observations 1868-1995 (WASA dataset version 1.0). DMI Technical report 97-3. Copenhagen.
- [27] WASA: 'The impact of storms on waves and surges: Changing climate in the past 100 years and perspectives for the future'. See the project report: Schmith et al. 1997 [26].

11 Previous reports

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

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

12 Appendix 1: Station history - File Formats and metadata

A station file included in this report contains the digitised information on the station positions and thereby on any removals of the stations during the operation period. The same metadata can also be seen in tables 24-26 below.

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 msl, average sea level)
99-109	F11.0	Latitude, degrees N (dddmmss)
110-120	F11.0	Longitude, degrees E (dddmmss)

Data are only to be used with proper reference to the accompanying report: Cappelen, J. (ed), 2021: The Faroe Islands - DMI Historical Climate Data Collection 1873-2020. DMI Report 21-05. Copenhagen.

By convention a time series is named after the most recent primary station delivering the data. In the tables 24-26 below are presented an overview back in time of the positions and relocations and starting and (if any) closing dates of the stations used in this report. Also presented are any positions or relocations and starting and closing dates of other stations forming part of the series and therefore referred to in the description of the different data series in the report. More metadata on the series/station may be found in [22].

Figure 11. Map showing station position, 06011 Tórshavn and 33054 Strond Kraftstation, The Faroe Islands.

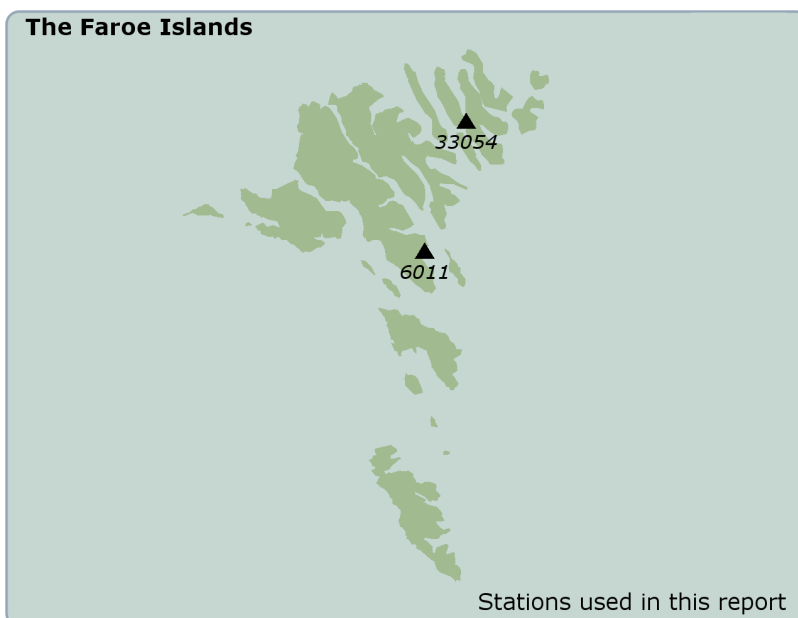


Figure 11 note: The map shows the station positions of the stations where the data sets referred to in this report come from. Only the latest positions are marked. The official WMO station identifier for Tórshavn consists of 5 digits "06011". However, in this report the in front "0" is omitted, giving 4 digits i.e. "6011" for Tórshavn, which is also used on the map. The national station identifiers describing manual precipitation stations or sunshine stations in the Faroe Islands consist of 5 digits, always starting with 33. In this report "33054" is used for Strond Kraftstation and "33069" used for Tórshavn Radiosonde. "33069" is not marked on the map. The location is very close to 6011 Tórshavn.

Table 24. Overview of the positions and relocations and starting and (if any) closing dates of 6011 Tórshavn and other stations forming part of the series used in this report.

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

Table 25. Overview of the positions and relocations and starting and (if any) closing dates of 33054 Strond Kraftstation and other stations forming part of the series used in this report.

33054 Strond Kraftstation

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

No.	Name	Start	End	Type	UTM	Northings	Eastings	Longitude	Latitude	Elev.
33090	Sandur	08-SEP-2002	01-OCT-2007	precip_man	29V	6858893	615361	-64900	615100	9

Table 25 note: 33054 Strond Kraftstation 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 accumulated precipitation record for the period 1961-1990.

Table 26. Overview of the positions and relocations and starting and (if any) closing dates of 33069 Tórshavn Radiosonde and other stations forming part of the series used in this report.

33069 Tórshavn Radiosonde

No.	Name	Start	End	Type	UTM	Northings	Eastings	Longitude	Latitude	Elev.
33060	Hoyvík	01-JUN-1921	31-MAY-1983	fuess	29V	6879770	617460	-64500	620200	20
33069	Tórshavn Radiosonde	01-JAN-1984	31-DEC-2007	fuess	29V	6879030	617090	-64600	620100	57

Table 26 note: Observations of bright sunshine from Hoyvík for 1922 to May 1983 have been compounded with observations from 33069 Tórshavn Radiosonde for January 1984 - 2007. The same sunshine recording instrument (Fuess) used in Hoyvík, was used at Tórshavn Radiosonde from 1984. Missing sunshine observations in the period June 1983 to December 1983 and a few other months, have been replaced with constructed values using monthly mean values for the rest of the series and cloud cover from Tórshavn.

13 Appendix 2: Observational section - File Formats and metadata

The observation file included in this report contains blended mean sea level (msl) atmospheric pressure observations 1874-2020 from one (1) station; 6011 Tórshavn, The Faroe Islands.

The file name is determined as follows:

fr_obs_401_<station number>_<period>.csv

In this report one (1) ;-separated csv-file:

fr_obs_401_6011_1874_2020.csv

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

Format and units of the atmospheric pressure observation file:

Station number (stat_no); year (year); month (month); day (day); hour UTC (hour); atmospheric pressure reduced to msl (hPa) (elem_val)

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

Data are only to be used with proper reference to the accompanying report: Cappelen, J. (ed), 2021: The Faroe Islands - DMI Historical Climate Data Collection 1873-2020. DMI Report 21-05. Copenhagen.

One (1) Faroe data set (Tórshavn) has long series of atmospheric pressure observations (at msl, mean sea level). The table 27 below 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 [26].

Table 27. The Tórshavn series of atmospheric pressure observations (at msl, mean sea level).

Dataset/period	Station	Start	End	Obs. hours (utc)
Tórshavn 1874-2020	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 2020	0 – 23 every hour

Table 27 note: The blended data set is a part of the observational section. Single station series are not a part of the observational section.

14 Appendix 3: Monthly/annual section - File Formats and metadata

The monthly/annual file included in this report contain monthly and annual DMI blended data series 1873-2020 comprising different parameters from three (3) stations 6011 Tórshavn, 33054 Strond kraftstation and 33069 Tórshavn Radisonde at the Faroe Islands.

The file contain all stations and all elements/parameters for all years and all months plus annual values.

The file name is determined as follows:

fr_monthly_all_<period>.csv

In this report one (1) ;-separated csv-fil:

fr_monthly_all_1873_2020.csv

Format of the monthly/annual file:

Station number (stat_no); element number (elem_no); year (year); January value (jan); February value (feb); March value (mar); April value (apr); May value (may); June value (jun); July value (jul); August value (aug); September value (sep); October value (oct); November value (nov); December value (dec); Annual value (annual); country code (FR= The Faroe Islands) (co_code)

The element/parameter numbers and units can be seen in the data dictionary, table 20 in section 8.

In the file fr_monthly_all_1873_2020.csv data are sorted according to station number, element and year. Furthermore any missing values have been are filled with “NULL”. An annual value and a country code have been included.

Data are only to be used with proper reference to the accompanying report: Cappelen, J. (ed), 2021: The Faroe Islands - DMI Historical Climate Data Collection 1873-2020. DMI Report 21-05. Copenhagen.

Special remarks:

The annual values 2014-2020 are calculated directly on hourly values. The annual values before 2014 are calculated on the monthly values mentioned in chapter 8.

There are no monthly average air temperatures processed for 1873-1889. From 1873-1889 the annual average air temperatures are values processed in connection with the NACD project [25], but only published for the first time in [7].

In the following tables 28-30 the reference “NARP1” refers to the “NARP dataset version 1”, see [21]. NACD refers to the North Atlantic Climatological Dataset, see [19,20,21]

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

Therefore, the 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/annual 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: <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 in the first place 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 climatological validation taking into account the nature of the parameter and the weather during the month has been performed in order to accept or reject the monthly value.

Table 28. Metadata - Description of monthly/annual data sets; 6011 Tórshavn. Element 101-122.

Tórshavn (TORS) – 6011; 1873-2020

Element No. 101 (Average Air Temperature)				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1890 – 2020	NARP1 + EVL-TS353 + Monthly-db TORS 6011	1572	0
Details: Created using NARP1: 1890-1921, EVL-TS353: 1922-1997, monthly-db TORS 6011: 1998-2020. 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). The month 2019/3 was adjusted using daily values from 06010.				

Element No. 111 (Average of Daily Maximum Air Temperature)				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	NARP1 + EVL-TS361 + Monthly-db TORS 6011	1776	0
Details: Created using NARP1: 1873-1960, EVL-TS361: 1961-1990, monthly-db TORS 6011: 1991-2020. The months 1957/9+10+11+12 and 1973/11 were filled using values from 33060. The month 2019/3 was adjusted using daily values from 06010.				

Element No. 112 (Highest Air Temperature)				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	NARP1 + EVL-TS368 + Monthly-db TORS 6011	1776	0
Details: Created using NARP1: 1873-1960, EVL-TS368: 1961-1990, monthly-db TORS 6011: 1991-2020. The months 1957/9+10+11+12 and 1973/11 were filled using values from 33060. The month 2019/3 was adjusted using daily values from 06010.				

Element No. 121 (Average of Daily Minimum Air Temperature)				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	NARP1 + EVL-TS375 + Monthly-db TORS 6011	1776	0
Details: Created using NARP1: 1873-1960, EVL-TS375: 1961-1990, monthly-db TORS 6011: 1991-2020. The months 1957/9+10+11+12 and 1973/11 were filled using values from 33060. The month 2019/3 was adjusted using daily values from 06010.				

Element No. 122 (Lowest Air Temperature)				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1873 – 2020	NARP1 + EVL-TS496 + Monthly-db TORS 6011	1776	0
Details: Created using NARP1: 1873-1960, EVL-TS496: 1961-1990, monthly-db TORS 6011: 1991-2020. The months 1957/9+10+11+12 and 1973/11 were filled using values from 33060. The month 2019/3 was adjusted using daily values from 06010.				

Element No. 401 (Average Atmospheric Pressure)				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1890 – 2020	NARP1 + JC-TS1220 + Monthly-db TORS 6011	1572	7
Details: Created using NARP1: 1890-1960 (33060) reduced to mean sea level (see special note below), JC-TS1220: 1961-1990, monthly-db TORS 6011: 1991-2020. Missing: 1925/4-10. The month 2019/3 was filled using the value from 06010.				

Table 29. Metadata - Description of monthly/annual data sets; 6011 Tórshavn. Element 501-801.

Tórshavn (TORS) – 6011 (continued)

Element No. 501 (Hours of bright sunshine, Campbell Stokes, Fuess sunshine recorder)				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1922 – 2007	EVL-TS354+Monthly-db TORS33069	1056	0
Details: Created using EVL-TS354: 1922-1997 (see also [6]), monthly-db 33069 Tórshavn Radiosonde: 1998-2007.				

Element No. 504 (Hours of bright sunshine, Star sunshine recorder)				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	2006 – 2020	Monthly-db TORS6011	172	0
Details: Created using monthly-db 6011 Tórshavn: 2006/9-2020. The month 2019/3 adjusted using values from VØRN station Tórshavn.				

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 – 2020	NARP1 + JC-TS1154 + Monthly-db TORS 6011	1572	6
Details: Created using NARP1: 1890-1921, JC-TS1154: 1922-1997, monthly-db TORS 6011: 1998-2020. Missing months 1957/9+10+11+12, 1971/8+9+10, 1972/11 & 1973/11 were filled using values from 33060. The month 2019/3 was adjusted using values from VØRN station Tórshavn. Missing months (2008/10-11 and 2012/2-5). 2009/11 has been corrected. In the period November 14-24; 2009 a total of 66.7 mm precipitation have been added. Data were taken from 33100 Vagur. September 2; 2006 an automatic rain gauge was installed at 6011 Tórshavn. Not necessarily homogenous, because of new ways of detection.				

Element No. 602 (Highest 24-hour Accumulated Precipitation) Not necessarily homogenous				
<i>Dataset</i>	<i>Period</i>	<i>Content</i>	<i>Total months</i>	<i>Missing months</i>
Recommended	1890 – 2020	NARP1 + JC-TS1166 + Monthly-db TORS 6011	1572	6
Details: Created using NARP1: 1890-1960, JC-TS1166: 1961-1990, monthly-db TORS 6011: 1991-2020. Missing months 1957/9+10+11+12, 1971/8+9+10, 1972/11 & 1973/11 were filled using values from 33060. The month 2019/3 was adjusted using values from VØRN station Tórshavn. Missing months (2008/10-11 and 2012/2-5). In the period November 15-24; 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. September 2; 2006 an automatic rain gauge 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 September 1; 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 – 2020	NARP1 + JC-TS532 + Monthly-db TORS 6011	1572	7
Details: Created using NARP1: 1890-1960, JC-TS532: 1961-1990, monthly-db TORS 6011: 1991-2020. Missing months 1957/9+10+11+12, 1973/11 were filled using values from 33060. 2019/3 was filled using values from 06010. 2009/6-8 and 2015/6-9 could not be filled. September 2; 2006 a ceilometer for automatic detection of cloud cover was installed at 6011 Tórshavn. Not necessarily homogenous, because of the different ways of detection.				

Table 30. Metadata - Description of monthly/annual data sets; 33054 Strond kraftstation. Element 601-602.

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
<p>Details:</p> <p>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 January 1; 2006.</p>				

Element No. 602 (Highest 24-hour Accumulated 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
<p>Details:</p> <p>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 January 1; 2006.</p>				

Additional notes on monthly values for Tórshavn and Strond Kraftstation: The original NACD series, NORDKLIM, NARP and REWARD series, the series in the DMI time series collection and values in the DMI monthly database has been studied in further details. These details can be found in the tables 31 and 32 below:

Table 31. Metadata – details on monthly data sets; 6011 Tórshavn. Element 601-801.

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>

TÓRSHAVN - TORS
<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>

Table 32. Metadata – details on monthly data sets; 33054 Strond kraftstation. Element 601-602.

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>

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

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

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

P is atmospheric pressure (0.1 hPa) at station level, 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 monthly averages of P and T are used. 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 [22].

15 Appendix 4: Graphics section - File Formats and metadata

The graphics included comprises annual average air temperature, annual accumulated precipitation and annual accumulated hours of bright sunshine within the period 1873 - 2020 for two (2) stations, 6011 Tórshavn (temperature, precipitation and sunshine) and 33069 Tórshavn Radiosonde (only sunshine), The Faroe Islands.

The file names are determined as follows:

fr_graph_annual_temperature_<station number>_<period>.png

fr_graph_annual_precipitation_<station number>_<period>.png

fr_graph_annual_sunshine_<station number>_<period>.png

In this report four (4) png-files:

fr_graph_annual_temperature_6011_1873_2020.png

Annual average air temperature 1873-2020; anomaly relative to 1981-2010. Tórshavn, The Faroe Islands. (English version)

fr_graph_annual_precipitation_6011_1890_2020.png

Annual accumulated precipitation 1890-2020; anomaly relative to 1981-2010. Tórshavn, The Faroe Islands. (English version)

fr_graph_annual_sunshine_33069_1922_2007.png

Annual accumulated hours of bright sunshine 1922-2007; anomaly relative to 1981-2007. Tórshavn Radiosonde, The Faroe Islands. (English version)

fr_graph_annual_sunshine_6011_2006_2020.png

Annual accumulated hours of bright sunshine 2006-2020; anomaly relative to 2006-2015. Tórshavn, The Faroe Islands. (English version)

Data are only to be used with proper reference to the accompanying report: Cappelen, J. (ed), 2021: The Faroe Islands - DMI Historical Climate Data Collection 1873-2020. DMI Report 21-05. Copenhagen.