DMI Report 20-09

Weather observations from Tórshavn, The Faroe Islands 1953-2019

- Observation data with description

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Front page:
Map with location of 06011 Tórshavn weather station and photo of the station seen from southeast.
Photo: DMI Technicians.

Content

Abstract

The purpose of this report is to present DMI weather observations 1958-2019 from Tórshavn, The Faroe Islands, accessible to the public. The data series is attached.

Resumé

Formålet med denne rapport er at præsentere DMI vejrobservationer 1958-2019 fra Tórshavn, Færøerne, som er tilgængelige for offentligheden. Dataserien er vedhæftet.

1. Introduction

Before 2014 the Danish Meteorological Institute has not previously published weather observations from Tórshavn, but large parts of this dataset have primarily been used for research and educational purposes and as background for data analysis as in The Faroe Islands climatological standard normal (DMI Technical Report 98-14 [1]) and the DMI historical climate data collection – the Faroe Islands (latest report DMI Report 20-05 [4]).

By publishing the DMI Technical Report 14-09 [2] weather observation from Tórshavn in the period 1953-2013 for the first time became accessible to the public.

A comprehensive quality control has been applied to the whole dataset and erroneous data were removed. It must be stressed that the data series in question not at all have been tested for homogeneity nor homogenized.

Because of a new data structure, that DMI recently introduced, the data from 2014 was processed in a new format and DMI Technical Reports 14-09 with data up to 2013 then finished the "old" data format.

The "new" data format was for the first time introduced in DMI Technical Reports 15-09 [3]. The purpose of this report is to update the Faroe weather observation datasets with quality controlled 2019 data in the new data format, but also include the old data format from 1953-2013. A description of both data formats is included. It is up to the users of the data to compile the two data sets.

One station, Tórshavn, with 10 parameters is included in the "old" dataset. One station, Tórshavn, with 17 parameters is included in the "new" dataset.

A similar report with weather observations from Greenland 1958-2019 can be found in DMI Report 20-08 [5].

2. Description of the data

2.1 Synoptic stations

Synoptic stations at the Faroe Islands such as Tórshavn have been operated with different degrees of automation over time which has had consequences for the way parameters are observed and for the quality of data series.

Time stamps

The station Tórshavn included in the dataset is a synoptic station. Synoptic stations (or SYNOP-station) all over the world follow at least a 3-hour interval (00, 03, 06, 09, 12, 15, 18 and 21 hours UTC).

Since 1 December 1992 an introduction of 1-hour interval began (00, 03, 06, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23 hours UTC. Since 16 March 1995 observations 04 and 05 hours UTC were added. Since 1 November 1998 observations every whole hour UTC the clock around can be found.

Synoptic stations always follow the same guidelines[1]. In Appendix 2 it is indicated which observations from Tórshavn are 3-hourly or hourly.

Parameters

A synoptic station should observe as standard *weather*, *cloud cover*, *visibility*, *snow cover*, *air temperature*, *relative humidity*, *wind*, *air pressure* and *precipitation*. The selected parameters in the current DMI Tórshavn dataset are given in table 1 and 2.

Station identification

The official WMO station identifiers describing synoptic stations at The Faroe Islands consist of 5 digits, always starting with 06. However, in the old data series the in front "0" is omitted, giving 4 digits i.e. 6011 for Tórshavn.

In the new data format "00" is added to all station identifiers, so they consist of 6 digits i.e. 601100 for Tórshavn.

2.2 Stations and data series

The position of the weather station Tórshavn can be seen in figure 1. The station details and its coordinates are furthermore listed in appendix 1.

A complete visual overview of the "old" data series can be seen in Appendix 2, where all parameters are shown with data series length. One cell equals one data year. A data year is one year in one data series for one parameter, so the total number of data years is the length of all data series aggregated. The number of data years for the station is shown in the left upper corner of the overview.

Please notice that each cell represents one year of data regardless of the amount of data in this year. Hence data years do not necessarily correspond to a calendar year of data.

The "old" data series Tórshavn 1953-2013 are identical to the one in DMI Technical Report 14-09 [2] data. Please notice, that compared to earlier published similar datasets, minor changes may be

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[1] See more at http://www.wmo.int (WMO - World Meteorological Organization)

found. This can be related to the ongoing quality control of data.

The "new" data series Tórshavn (V98) from 2014 has no similar visual overview. The station has ideally all data connected to the specific type of station (see table 2 and Appendix 1):

- **V98** (Weather station 1998) is an automatic station with **hourly data** for all temperature parameters (101,112,113,122,123), relative humidity (201), all wind parameters (301,305,365,371), atmospheric air pressure (401), sunshine duration (504), radiation (550), precipitation (601,603,609) and cloud cover (801). Sampling continuously.

Figure 1. *Station position, 06011 Tórshavn, The Faroe Islands. The official WMO station number for Tórshavn consist of 5 digits "06011". On the map the station identifier "6011" is used for Tórshavn. This identifier is used in the "old" data sets before 2014. In the "new" data sets "00" is added to all station identifiers, so they consist of 6 digits i.e. 601100 for Tórshavn.*

3. Data format 1953-2013

Data can be found in one ZIP-compressed file attached to this report. The ZIP-file contains 2 files representing all data from one station Tórshavn. The "old" data series is available as one tabulator separated txt-file: *DMIRep20-09_old_dataformat_1953_2013.txt*. All time stamps are given in UTC. Each column in the txt-files has a header, which is described in table 1.

Headers in synoptic data series-files

Parameter	Description
stat_no	4 digit station number in the format '6011'
year	Year of observation
month	Month of observation
day	Day of observation
hour	Hour of observation (UTC)
dd/365	Mean wind direction over the 10-minute period preceding the observation. In 1 or 10-degree intervals. 0 applies to calms. 990 applies to variable wind directions
ff/301	Mean wind speed (0.1 m/s) over the 10-minute period preceding the observation
n/801	Cloud cover (octas; 0/8 clear sky -> 8/8 overcast). 9 apply to obscured sky, due to fog or heavy snow, and therefore no available observation
pppp/401	Air pressure (0.1 hPa) at mean sea level
ttt/101	Dry bulb temperature (0.1°C)
txtxtx/113	Absolute maximum temperature (0.1°C). Observation period depends on the interval of SYNOP time intervals, normally 12 hours at 6 and 18 hours UTC
tntntn/123	Absolute minimum temperature (0.1°C). Observation period depends on the interval of SYNOP time intervals, normally 12 hours at 6 and 18 hours UTC
rh*/201	Relative humidity (%)
rrr6/603**	6 and 12 hours accumulated precipitation (0.1 mm). -1 applies to more than 0 mm, but less than 0.1 mm. Normally 6 and 18 hours UTC cover 12 hours; 0 and 12 hours UTC cover 6 hours. In rare occasions rrr6 could also cover more than 12 hours
sss*	Snow depth (cm). -1 applies to less than 0.5 cm. -2 applies to snow cover not interconnected

Table 1. Description of parameters in the synoptic data series (old data format). Resolution 1 to 24 hours. Parameter numbers connected to the "new" data format shown in table 2 are indicated together with the corresponding parameter code in the "old" data format. Parameters given in 0.1-values (ff, pppp, ttt, txtxtx, tntntn, rrr6) are to be divided with 10 to obtain the actual value. Remember that in order to obtain i.e. daily acc. precipitation, you cannot just add precipitation using the observations at 0,6,12 and 18 hours UTC. The precipitation at 0 and 12 hours UTC cover 6 hours; precipitation at 6 and 18 hours UTC cover 12 hours and therefore the precipitation at 0 and 12 hours UTC are imbedded in the precipitation at 6 and 18 hours UTC (see special note on the calculation of daily acc. precipitation on the next page).
*Note * Relative humidity:*
   1) In periods it is evident that the relative humidity at 6011 Tórshavn is characterized by different instruments and calibrations. These periods are not excluded in the data series, but care should be taken when using the data in these periods.
   2) Some relative humidity values above 100% are changed (not excluded) to 100%, when it was evident, that this was OK.
*Note ** Accumulated precipitation: At manually operated stations back in time both 6 and 12 hours acc. precipitation occur in parameter rrr6 (18 and 24 hours in rare occasions). At normally operated DMI stations acc. precipitation at 6 and 18 hours UTC normally cover 12 hours; 0 and 12 hours UTC cover 6 hours.*
*Note *** Snow depth: 6011 Tórshavn has observed snow depth in the period 18 Jan 1955 12UTC - 9 Apr 2006 06UTC. The observations are however sparse and some observations have been changed (not excluded) in this report, when it was evident, that it should have been divided by 10. For a more continuous series of snow depth very near to Tórshavn, please check the climate station 33060 Hoyvik in different yearbooks [5] or in the DMI climate database.*

Special note on the calculation of daily accumulated precipitation before 2014:

AT DMI the daily accumulated precipitation before 2014 in general have been calculated from 06H01 UTC the day in question to 06H00 UTC next day using a routine:

Only the observations at 00 (normally covering 6 hours), 06 (normally covering 12 hours), 12 (normally covering 6 hours) and 18 hours UTC (normally covering 12 hours) are used in the calculation.

In the first place the accumulated precipitation from 06 - 18 UTC on the day in question is determined. If accumulated precipitation at 18 hours UTC exist (covering 12 hours), this value is used, else the accumulated precipitation at 12 hours UTC is used (covering 6 hours) is used.

Then the accumulated precipitation from 18 UTC the day in question - 06 UTC next day is determined. If accumulated precipitation at 06 hours UTC next day exist (covering 12 hours), this value is used, else the accumulated precipitation at 00 hours UTC (covering 6 hours) is used.

The daily accumulated precipitation is then the sum of the accumulated precipitation from 06-18 UTC and the accumulated precipitation from 18-06 UTC and normally is listed on the date where the period starts.

Anyway, normally the daily accumulated precipitation in most cases is calculated using accumulated precipitation at 6 and 18 hours UTC covering 12 hours.

When this is not possible one can try to get as much precipitation as possible within 6-6 UTC. Off course in rare cases that can be questioned, but that's the way DMI have done it! We could off course have omitted the calculation.

Summa summarum: DMI have calculated all derived values as accurate as possible, but in cases where the observations are odd (could happen back in time), we have tried to do it as best as possible in order to involve as much precipitation as possible in the derived values.

It could be added that for the recent period the precipitation gauge at the synoptical stations Tórshavn at The Faroe Islands has been automatic. It means that observations have been taken regularly the clock around and therefore the observations 06 and 18 UTC covering 12 hours all ways have been present.

Only back in times where the stations were manually operated with a Hellman raingauge, the observations could have been irregular…and covering odd periods.

4. Data format 2014-

The "new" data series is available as a csv-file (;separated) and are found in the file: *DMIRep20-09_new_dataformat_2014_2019.csv* in a ZIP-compressed file attached to this report. All time stamps are given in UTC. Each parameter in the csv-file has a header, which is described in table 2.

Headers in synoptic data series-files

Parameter	Description
Station	6 digit station number in the format '601100'
År	Year of observation
Måned	Month of observation
Dag	Day of observation
Time (utc)	Hour of observation (UTC)
101	Mean air temperature (°C; 2 metres above ground). Mean of drybulb temperatures last hour. If not available, drybulb temperature (°C); minute = 0. Time resolution 1 hour. V98.
112	Absolute maximum temperature (°C; 2 metres above ground). Absolute maximum temperature last hour. V98.
113	Absolute maximum temperature (°C; 2 metres above ground). Absolute maximum temperature last 12 hours. V98.
122	Absolute minimum temperature (°C; 2 metres above ground). Absolute minimum temperature last hour. V98.
123	Absolute minimum temperature (°C; 2 metres above ground). Absolute minimum temperature last 12 hours. V98.
201	Mean relative humidity (%). Mean of relative humidity last hour. If not available, relative humidity; minute = 0. Time resolution 1 hour. V98.
301	Mean wind speed (m/s; 10 metres above ground) observed last 10 min; minute = 0. Time resolution 1 hour. V98.
305	Highest 3 sec. wind speed (m/s; 10 metres above ground) last hour. If not available, highest 3 sec. wind speed (m/s) observed last 10 min. V98.
365	Mean wind direction (degrees; 10 metres above ground) observed last 10 min; minute = 0. 0 applies to calms. Time resolution 1 hour. V98.
371	Mean wind direction (degrees; 10 metres above ground). Mean of wind direction last hour. If not available, mean wind direction (degrees) observed last 10 min. 0 applies to calms. Time resolution 1 hour. V98.
401	Air pressure (hPa) at mean sea level; minute = 0. V98.
504	Accumulated sunshine duration (hours) last hour. V98.
550	Mean incoming (global) radiation (W/m^2) last hour. V98.
601	Accumulated precipitation (mm; about 3 metres above ground) last hour. V98.
603	Accumulated precipitation (mm; about 3 metres above ground) last 12 hours. V98. -0.1 applies to more than 0 mm, but less than 0.1 mm.
609	Accumulated precipitation (mm; about 3 metres above ground) last 24 hours. V98.
801	Cloud cover (%); minute = 0. Observations of obscured sky are converted to overcast if possible using additional weather information, otherwise cloud cover is missing. V98.

Table 2. *Description of parameters in the synoptic data series (new data format). Resolution from 1 to 24 hours. All parameters given with one decimal except 201, 365, 371, 550 and 801.*

Special note on the calculation of daily accumulated precipitation after 2014:
At DMI the daily acc. precipitation from Tórshavn after 2014 in general are calculated from 00H01 UTC the day in question to 00H00 UTC the next day adding the hourly values (parameter 601).

5. Differences between "old" and "new" data format

In the table below differences between parameters in the "old" and "new" data format can be seen. See also table 1 and 2.

Parameter	Data description 1953-2013	Data description 2014 -
ttt/101	Drybulb temperature (0.1°C) 2 metres above ground. Observed minute = 0. Time resolution 1, 3 or more hours.	Mean air temperature (°C; 2 metres above ground). Mean of drybulb temperatures last hour. If not available, drybulb temperature (°C) observed minute = 0. Time resolution 1 hour. V98.
/112	NA	Absolute maximum temperature (°C; 2 metres above ground). Absolute maximum temperature last hour. V98.
txtxtx/113	Absolute maximum temperature (0.1°C) 2 metres above ground. Observation period depends on the interval of SYNOP time intervals, normally 12 hours at 6 and 18 hours UTC.	Absolute maximum temperature (°C; 2 metres above ground). Absolute maximum temperature last 12 hours. V98.
/122	NA	Absolute minimum temperature (°C; 2 metres above ground). Absolute minimum temperature last hour. V98.
tntntn/123	Absolute minimum temperature (0.1°C) 2 metres above ground. Observation period depends on the interval of SYNOP time intervals, normally 12 hours at 6 and 18 hours UTC.	Absolute minimum temperature (°C; 2 metres above ground). Absolute minimum temperature last 12 hours. V98.
rh/201	Relative humidity (%). Observed minute = 0. Time resolution 1, 3 or more hours.	Mean relative humidity (%). Mean of relative humidity last hour. If not available, relative humidity observed minute = 0. Time resolution 1 hour. V98.
ff/301	Mean wind speed (0.1 m/s) over the 10-minute period preceding the observation.	Mean wind speed (m/s; 10 metres above ground) observed last 10 min.; minute = 0. Time resolution 1 hour. V98.
/305	NA	Highest 3 sec. wind speed (m/s; 10 metres above ground) last hour. If not available, highest 3 sec. wind speed (m/s) observed last 10 min. V98).
dd/365	Mean wind direction (degrees) over the 10-minute period preceding the observation. In 1 or 10-degree intervals. 0 applies to calms. 990 applies to variable wind directions.	Mean wind direction (degrees; 10 metres above ground) observed last 10 min.; minute = 0. 0 applies to calms. Time resolution 1 hour. V98.
/371	NA	Mean wind direction (degrees; 10 metres above ground). Mean of wind direction last hour. If not available, mean wind direction (degrees) observed last 10 min. 0 applies to calms. Time resolution 1 hour. V98.
pppp/401	Air pressure (0.1 hPa) at mean sea level. Time resolution 1, 3 or more hours.	Air pressure (hPa) at mean sea level; minute = 0. V98.
/504	NA	Accumulated sunshine duration (hours) last hour. V98.
/550	NA	Mean incoming (global) radiation (W/m^2) last hour. V98.

/601	NA	Accumulated precipitation (mm; about 3 metres above ground) last hour. V98.
rrr6*/603	6 and 12 hours accumulated precipitation (0.1 mm). -1 applies to more than 0 mm, but less than 0.1 mm. Normally 6 and 18 hours UTC cover 12 hours; 0 and 12 hours UTC cover 6 hours. In rare occasions rrr6 could also cover more than 12 hours.	Accumulated precipitation (mm; about 3 metres above ground) last 12 hours. V98. -0.1 applies to more than 0 mm, but less than 0.1 mm.
rrr6*/609	6 and 12 hours accumulated precipitation (0.1 mm). -1 applies to more than 0 mm, but less than 0.1 mm. Normally 6 and 18 hours UTC cover 12 hours; 0 and 12 hours UTC cover 6 hours. In rare occasions rrr6 could also cover more than 12 hours	Accumulated precipitation (mm; about 3 metres above ground) last 24 hours. V98.
n/801	Cloud cover in octas (0/8 clear sky, 8/8 overcast). 9 apply to obscured sky, due to fog or heavy snow, and therefore no available observation.	Cloud cover (%); minute = 0. Observations of obscured sky are converted to overcast if possible using additional weather information, otherwise cloud cover is missing. V98.
sss**	Snow depth (cm). -1 applies to less than 0.5 cm. -2 applies to snow cover not intercon-nected.**	NA**

Table 3. *Differences between the "old" and "new" data format. Both parameter numbers connected to the "new" data format shown in table 2 and the parameter code in the "old" data format shown in table 1 are shown in the table.*

*Note * Accumulated precipitation:*
At manually operated stations back in time both 6 and12 hours acc. precipitation occur in parameter rrr6 (18/24 hours in rare occasions). At normally operated DMI stations acc. precipitation at 6 and 18 hours UTC normally cover 12 hours; 0 and 12 hours UTC cover 6 hours.

*Note ** Snow depth:*
Snow observations not a part of the observation plan in Tórshavn the last at least 10 years. Parameter not defined in the "new" data format.

References

[1] Cappelen, J. & Laursen, E.V. (1998): The Climate of the Faroe Islands – with Climatological Standard Normals, 1961-1990. DMI Technical Report 98-14. Copenhagen.

[2] Cappelen, J. (ed) (2014): Weather observations from Tórshavn 1953-2013 – Observation data with description. DMI Technical Report 14-09. Danish Meteorological Institute. Copenhagen.

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[4] Cappelen, J. (ed) (2020): The Faroe Islands – DMI Historical Climate Data Collection 1873-2019. DMI Report 20-05. Danish Meteorological Institute. Copenhagen.

[5] Cappelen, J. (ed) (2020): Weather observations from Greenland 1958-2019 – Observation data with description. DMI Report 20-08. Danish Meteorological Institute. Copenhagen.

[6] 1873-1983 "Meteorologisk Årbog"
From the start of the institute year books have been published with varying content and size. A principal rule is that these publications contain descriptions, surveys and observations. The Faroe Islands is included in the following parts of "Meteorologisk Årbog":

1873   Joint volume: Denmark, Greenland and the Faroe Islands, supplement 1868-1872
1874-1919   Part 2 (The Faroe Islands, Greenland and other colonies)
1920-1960   Part I (Denmark and The Faroe Islands) + Part 2 (Greenland)
1961-1970   Part 1 (Denmark and The Faroe Islands)
1971-1975   Not published
1976   Part 1 (Denmark and The Faroe Islands)
1977-1978   Not published
1979-1983   Part 1 (Denmark and The Faroe Islands)

1872-1895 *"Meteorologiske Middeltal og Ekstremer for Færøerne, Island og Grønland. Appendix til det danske meteorologiske Instituts Aarbog 1895, II.del", published 1899*
Additionally a joint volume for the years 1872-1895 was published in 1899.

1940-1945 *Meteorologisk Årbog - Tillæg - Færøerne 1940-45*
Additionally a joint volume for the years 1872-1895 was published in 1899.

Previous reports

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

Appendix 1 – Station details

Abbreviations - FI: The Faroe Islands.

	Owner	Time of operation		Latitude N		Longitude W		Elevation
		start	**stop**	**degrees**	**minute**	**degrees**	**minute**	**m.a.s.**
06011 Tórshavn	FI/V98	01-01-1953	30-06-1962	62	01	06	46	35
		01-07-1962	31-12-1992	62	01	06	46	43
		01-01-1993		62	01	06	46	54

![Danish Meteorological Institute]

Appendix 2 – Overview of data series 06011 Tórshavn 1953-2013

Total number of data years									601			<<< Normal period 1961-1990 >>>																										Years with data			Years with data (hourly observations)															
		1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
6011	dd																																																															
	ff																																																															
Torshavn	n																																																															
	PPPP																																																															
	ttt																																																															
Data years	txtxtx																																																															
601	tntntn																																																															
	rh																																																															
	rrr6																																																															
	sss																																																															