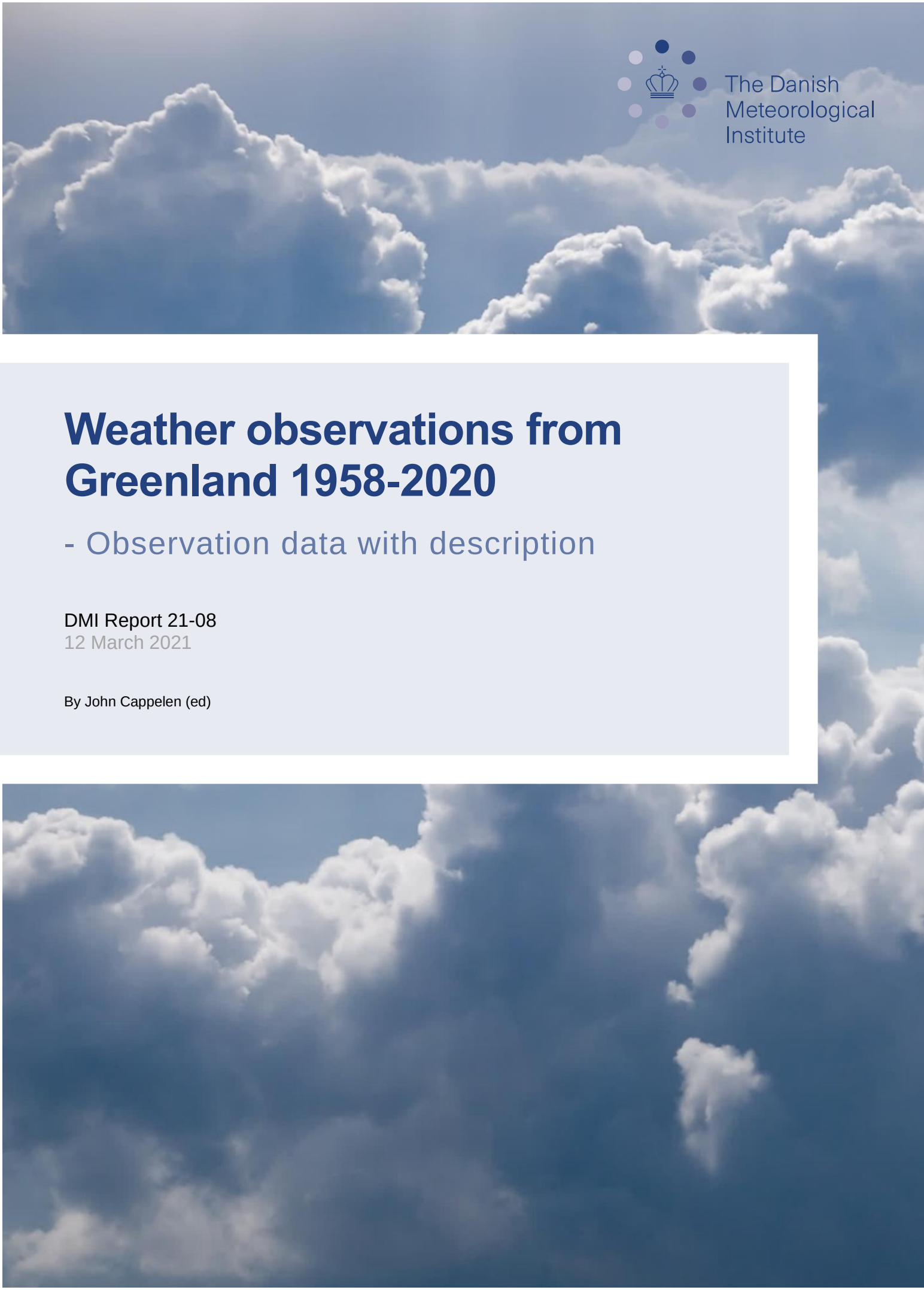

The Danish Meteorological Institute

Weather observations from Greenland 1958-2020

- Observation data with description

DMI Report 21-08
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The Danish Meteorological Institute

Colophon

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Content

1 Abstract

The purpose of this report is to present DMI Greenlandic weather observations 1958-2020, accessible to the public. Data series from 90 stations are attached as separated files.

2 Resumé

Formålet med denne rapport er at præsentere DMI grønlandske vejrobservationer 1958-2020 som er tilgængelige for offentligheden. Dataserier fra 90 stationer er vedhæftede som individuelle filer.

3 Introduction

The Danish Meteorological Institute has previously published a series of DMI Technical Reports, the latest Technical Report 11-10 [2], containing a description of Greenlandic weather observations from 1958 to 2010. Large parts of this dataset have primarily been used for research and educational purposes and as background for data analysis as in Greenland climatological standard normal (DMI Technical Report 00-18 [1]) and the DMI historical climate data collection – Greenland (latest report DMI Technical Report 21-04 [7]).

By publishing DMI Technical Report 11-15 [3] the Greenlandic weather observation datasets in the period 1958-2010 for the first time became accessible to the public.

At the same time a comprehensive quality control was applied to the whole dataset and erroneous data were removed. This quality control was described in DMI Technical Report 11-16 [4]. It must be stressed that the data series in question not at all have been tested for homogeneity nor homogenized.

This new procedure introduced in DMI Technical Reports 11-15 and 11-16 was followed by updates every year since, the latest DMI Technical Reports 14-08 with data up to 2013 [5].

Because of a new data structure, DMI introduced in 2014, the data from 2014 was processed in a new format and DMI Technical Reports 14-08 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 15-08 [6].

The purpose of this DMI report is to update the Greenlandic weather observation datasets with quality controlled 2020 data in the new data format, but also include the old data format from 1958-2013. A description of both data formats is included. It is up to the users of the data to compile the two data sets.

The data series have variable length and characteristics depending on type of station, parameter and many other factors. 88 Greenlandic stations with up to 10 parameters are included in the “old” dataset. 48 stations with up to 17 parameters are included in the “new” dataset.

A similar report with weather observations from Tórshavn, The Faroe Islands 1953-2020 can be found in DMI Report 21-09 [8].

4 Description of the data

Synoptic stations in Greenland 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. Furthermore, some stations in remote areas are unmanned, meaning that maintenance and calibration often are done with long intervals (at least a year).

All stations included in the dataset are synoptic stations except seven manual precipitation stations, see below. Synoptic stations (or SYNOP-station) all over the world should at least follow a 3-hour interval (00, 03,

06, 09, 12, 15, 18 and 21 hours UTC). Since 1996, Greenland stations (not all from 1996) started with 1-hour observations (every whole hour UTC). Recently some stations also started with observations every 10 minutes, but this report only includes hourly observations. Synoptic stations always follow the same guidelines. In the attached file *data series overview 14-08.pdf* it is indicated, which DMI Greenlandic observations are 3-hourly or 1-hourly.

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 DMI Greenlandic datasets are given in table 1, 2, 3 and 4.

The official WMO station identifiers describing synoptic stations in Greenland consist of 5 digits, always starting with 04. However, in the old data series the in front “0” is omitted, giving 4 digits i.e. 4250 for Nuuk.

In the new data format “00” is added to all station identifiers, so they consist of 6 digits i.e. 425000 for Nuuk.

Out of seven manual precipitation stations in Greenland six still operate. 34250 Nuuk was closed 1 September 2012.

Except 34231 Mitt. Kangerlussuaq the manual precipitation stations still in operation observe 12 hours UTC, covering the previous 24 hours. 34231 Mitt. Kangerlussuaq observe 18 hours UTC. 34250 Nuuk observed 21 hours UTC.

A manual precipitation station only measures daily accumulated precipitation (could cover more than 24 hours; i.e. 48, 72, 120 etc. if accumulated over several days). The parameters in the daily precipitation datasets are given in table 2 and 4.

The national station identifiers describing manual precipitation stations in Greenland consist of 5 digits, always starting with 34. In the new data format “50” is added to the station identifiers, so they consist of 7 digits i.e. 3423450 for Sisimiut.

As seen in figure 1 and 2 the stations are scattered across Greenland, although most stations are located in the more populated southern Greenland. Furthermore, most stations are coastal or near-coastal stations and only a few stations are located on the ice cap. The stations and their coordinates are furthermore listed in appendix 1.

The length of the data series varies significantly within and between stations depending on location and type of station. A complete visual overview of all “old” data series 1958-2013 can be seen in the attached file *data series overview 14-08.pdf*, where all 88 stations in this dataset 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 each station is shown below the station name. The overall total number of data years for the whole dataset 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 1958-2013 are identical to the ones in DMI Technical Report 14-08 [5]. Please notice, that compared to earlier published similar datasets, minor changes may be found. This can be related to the ongoing quality control of data.

The “new” data series from 2014 have no similar visual overview. All stations still operating have ideally all data connected to the specific type of station with few exceptions (see also table 3, 4 and Appendix 1). On page 8 the type of stations are listed.

Figure 1. Station positions, Greenland. The section marked is enlarged in figure 2 (graphics M. Scharling). More explanations can be seen in the figure 2 caption.

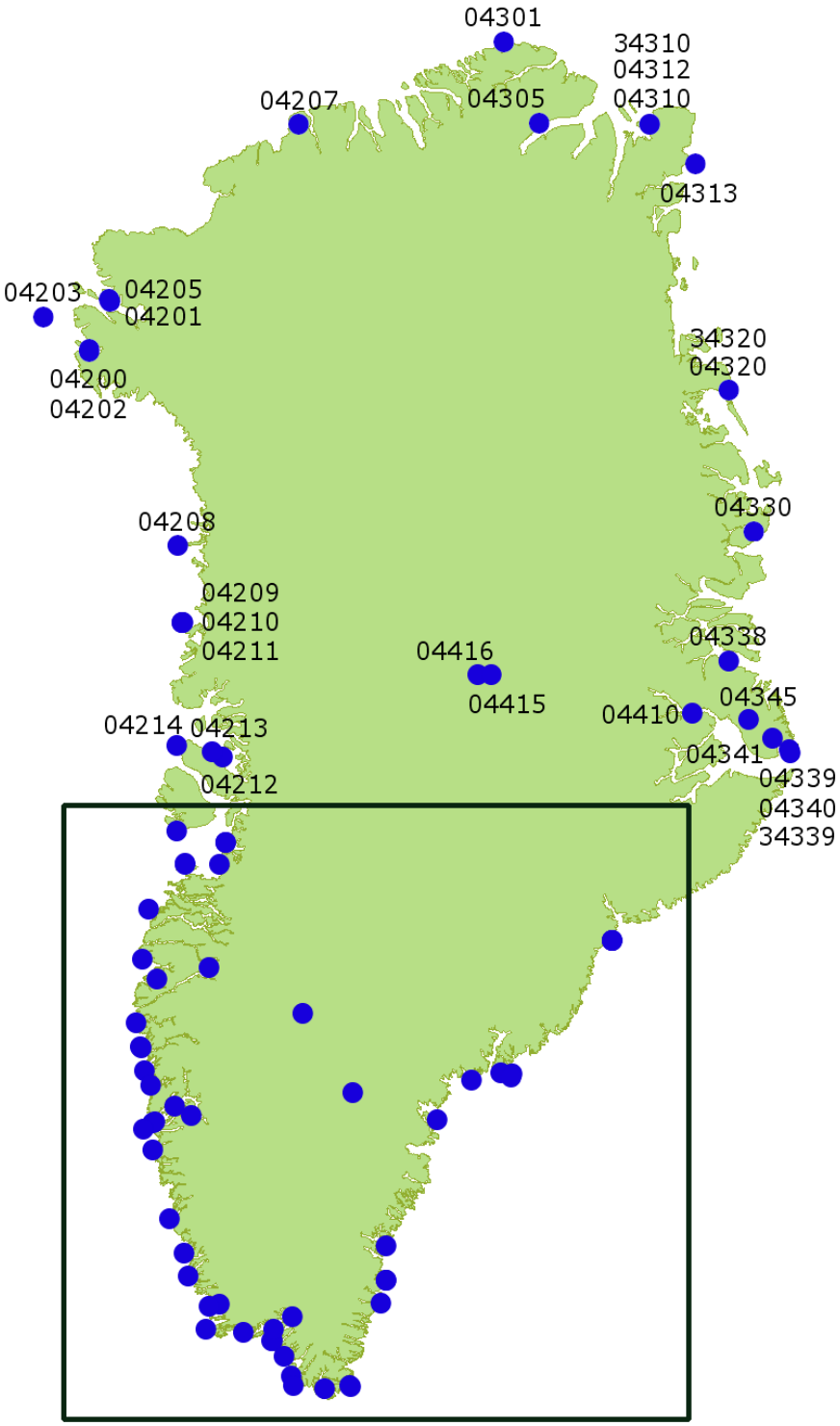
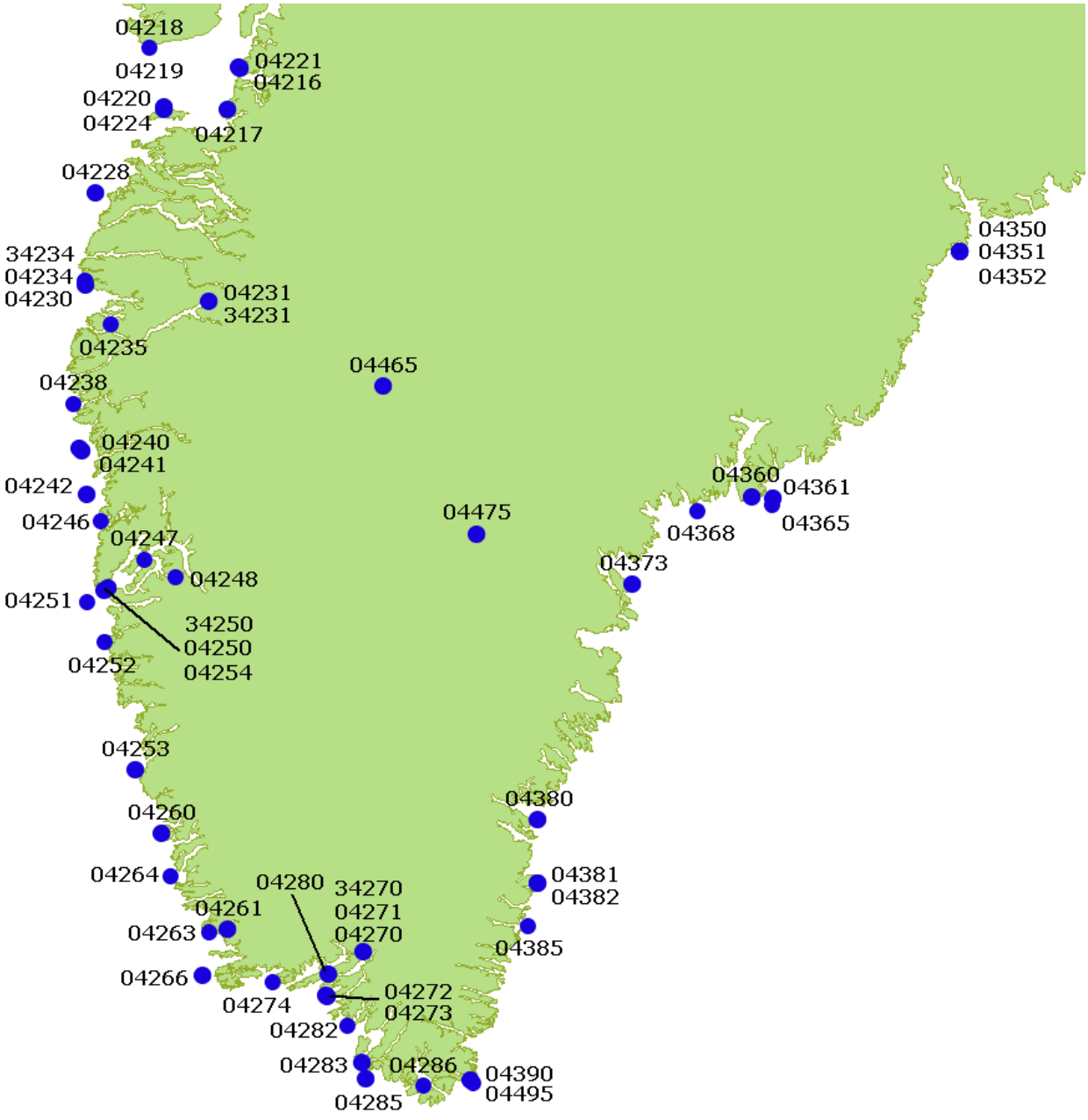


Figure 2. Station positions, Southern Greenland. See figure 1 for a map of Greenland as a whole (graphics M. Scharling). The official WMO station identifier for Greenland consist of 5 digits "04xxx".On the map the station identifiers "04xxx" are used. The national station identifiers describing manual precipitation stations in Greenland consist of 5 digits "34xxxx", also used on the map. These identifiers with five digits are used in the "old" data sets before 2014, where the in front "0" is omitted i.e. "4250" for Nuuk. In the "new" data sets "00" is added to all station identifiers, so they consist of 6 digits i.e. 425000 for Nuuk. Concerning the national station identifiers "50" is added to the station identifiers in the "new" data sets, so they consist of 7 digits i.e. 3423450 for Sisimiut.



Type of stations:

- V98 (Weather Station 1998); 8 stations) is an automatic station with hourly data (basically 10 min data) for all temperature parameters (101,112,113,122,123), relative humidity (201), all wind parameters (301,305,365,371; six stations), atmospheric air pressure (401), sunshine duration (504; six stations), radiation (550, six stations), precipitation (601,603,609; five stations) and cloud cover (801; six stations). Sampling continuously.

- SAVS (Semi-Automatic Weather Station; airports; 18 stations) is an semi-automatic station with hourly data for drybulb and mean temperature (101), 12 hours max./min. temperatures (113,123), relative humidity (201), atmospheric air pressure (401), all wind parameters (301,305, 365, 371), precipitation (603, one station; Mitt. Kangerlussuaq (Hellman rain gauge) up to March 31, 2016 and (609 one station; Mitt. Kangerlussuaq (Hellman rain gauge) from April 1, 2016 - May 23 2017) and cloud cover (801; twelve stations). Sampling continuously.

- GIWS (Greenland Isolated Weather Station; 15 stations) is an automatic station with hourly data for drybulb temperature (101), relative humidity (201), wind speed and –direction (301,365) and atmospheric air pressure (401). Sampling 10 minutes every hour.

- ARGOS (Worldwide tracking and environmental monitoring by satellite ARGOS; 1 station) is an automatic station with 3-hourly data for drybulb temperature (101), relative humidity (201), wind speed and –direction (301,365) and atmospheric air pressure at station level. Sampling 10 minutes every hour.

- Hellman (Hellman rain gauge; 6 stations are manually operated precipitation stations with 24-hourly data of accumulated precipitation (601).

5 Data format 1953 - 2013

The “old” data series are available as tabulator separated txt-files and are found in one ZIP-compressed file *DMIRep21-08_old_dataformat_1958_2013.zip* attached to this report. The ZIP-file contains 88 txt-files each representing all data from one station. Time stamps are given in UTC. Each parameter in the txt-files has a header, which is described in table 1 and 2..

Table 1. Description of headers/parameters in the 83 synoptic data series 1953-2013 (old data format).

Parameter	Description
stat_no	4 digit station number, all in the format ‘4xxx’
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

General notes to table 1: Data resolution 1 to 24 hours. Parameter numbers connected to the “new” data format shown in table 3 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 accumulated 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 accumulated precipitation below).

Table 1 note *: Accumulated precipitation: At manually operated stations back in time both 6 and 12 hours accumulated precipitation occur in parameter rrr6 (18 and 24 hours in rare occasions). At normally operated DMI stations accumulated precipitation at 6 and 18 hours UTC normally cover 12 hours; 0 and 12 hours UTC cover 6 hours.

Table 1 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:

i.e. station 4216 daily accumulated precipitation (April 14 at 6 UTC - April 15 at 6 UTC = 3,2 mm), are calculated using April 14 at 12 UTC = 2,0 mm (covering 12 hours because at that time the station only measured at 0,12,15,18 UTC) + April 15 at 18 UTC = 1,2 mm (covering 6 hours). April 15 at 0 UTC: missing accumulated precipitation and April 15 at 6 UTC: no observation. 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), 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 periods a part of the precipitation gauges at synoptical stations in Greenland have 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 synoptical stations were manually operated with a Hellman raingauge, the observations could have been irregular…and covering odd periods. Please notice that manually operated rain gauges also operates in Greenland in recent times. They have a prefix "34" in front of the station number and they normally observe once a day at a certain time (not 6 UTC) covering 24 hours.

Table 2. Description of parameters in the 5 manual precipitation data series (old data format).

Parameter	Description
stat_no	5 digit station number, all in the format '34xxx'
year	Year of observation
month	Month of observation
day	Day of observation
hour	Hour of observation (UTC)
precip	24 hours (or more) accumulated precipitation (0.1 mm). -1 applies to more than 0 mm, but less than 0.1 mm
periode	Period covered in precip (hours). Could be more than 24 hours i.e. 48, 76 hours etc.

General notes to table 2: Resolution 24 hours (or more indicated by periode). Parameter given in 0.1 - value (precip) is to be divided with 10 to obtain the actual value.

6 Data format 2014 -

The “new” data series are available as csv-files (; separated) and are found in one ZIP-compressed file *DMIRep21-08_new_dataformat_2014_2020.zip* attached to this report. The ZIP-file contains 48 files each representing all data from one station. The time stamps are given in UTC time. Each parameter in the csv-files has a header, which is described in table 3 and 4. The synoptic data files cover the period December 31, 2013 – January 1, 2021. The manual precipitation data files cover the period January 1, 2014 – December 31, 2020.

Table 3. Description of headers/parameters in the 42 synoptic data series from 2014 (new data format).

Parameter	Description
Station	6 digit station number, all in the format ‘4xxx00’
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 or 3 hours. 1 hour. V98, SAVS, GIWS. 3 hours; one station; ARGOS; Summit.
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, SAVS.
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, SAVS.
201	Mean relative humidity (%). Mean of relative humidity last hour. If not available, relative humidity; minute = 0. Time resolution 1 or 3 hours. 1 hour. V98, SAVS, GIWS. 3 hours; one station; ARGOS; Summit.
301	Mean wind speed (m/s; 10 metres above ground) observed last 10 min; minute = 0. Time resolution 1 or 3 hours. 1 hour. V98, SAVS, GIWS. 3 hours; one station; ARGOS; Summit.
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, SAVS, GIWS.
365	Mean wind direction (degrees; 10 metres above ground) observed last 10 min; minute = 0. 0 applies to calms. Time resolution 1 or 3 hours. 1 hour. V98, SAVS, GIWS. 3 hours; one station; ARGOS; Summit.
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 or 3 hours. 1 hour. V98, SAVS, GIWS. 3 hours; one station; ARGOS; Summit.
401	Air pressure (hPa) at mean sea level; minute = 0. V98, SAVS, GIWS.
504	Accumulated sunshine duration (hours) last hour. Six stations. V98; Aasiaat, Nuuk, Narsarsuaq Radiosonde, Tasiilaq, Ittoqqoortoormiit, Danmarkshavn.*
550	Mean incoming (global) radiation (W/m^2) last hour. Six stations. V98; Aasiaat, Nuuk, Narsarsuaq Radiosonde, Tasiilaq, Ittoqqoortoormiit, Danmarkshavn.
601	Accumulated precipitation (mm; about 3 metres above ground) last hour. V98. **

Parameter	Description
603	Accumulated precipitation (mm; about 3 metres above ground) last 12 hours. V98. One station; Hellman; Mitt. Kangerlussuaq.**
609	Accumulated precipitation (mm; about 3 metres above ground) last 24 hours. V98. One station; Hellman; Mitt. Kangerlussuaq.**
801	Cloud cover (%); minute = 0. Observations of obscured sky are converted to overcast if possible using additional weather information, otherwise cloud cover is missing. Six stations. V98; Aasiaat, Nuuk, Qaqortoq, Tasiilaq, Ittoqqoortoormiit, Danmarkshavn. Twelve stations; SAVS; Mitt. Upernavik, Mitt. Quarsut, Mitt. Ilulissat, Mitt. Aasiaat, Mitt. Kangerlussuaq, Mitt. Sisimiut, Mitt. Maniitsoq, Mitt. Nuuk, Mitt. Paamiut, Mitt. Narsarsuaq, Mitt. Kulusuk, Mitt. Nerlerit Inaat. ***

General notes to table 3: Data resolution from 1 to 24 hours. All parameters are given with one decimal except 201, 365, 371, 550 and 801.

Table 3 note *: Six V98 pyranometers have permanent problems with the calculation of sunshine duration: Aasiaat, Nuuk, Narsarsuaq Radiosonde, Danmarkshavn, Ittoqqoortoormiit and Tasiilaq. For that reason permanently excluded.

Table 3 note **: Six Hellman manual stations observe 24-hours accumulated precipitation giving 24-hours daily values; parameter 601; Mitt. Kangerlussuaq, Mitt.Sisimiut, Mitt. Narsarsuaq, Station Nord, Danmarkshavn and Ittoqqoortoormiit; see table 6 in Appendix 1. One SAVS station (Mitt. Kangerlussuaq) has observed 12 hours accumulated precipitation which has been reported as 12 hours values 6 and 18 UTC; parameter 603.In 2016 in Kangerlussuaq this practice changed to 24-hours accumulated precipitation giving 24-hours daily values; parameter 609. In 2017 the practice was changed again, so precipitation was reported as 24-hours daily values; parameter 601, see table 6. The V98 automatic rain gauges in Greenland can occasionally have technical problems: Aasiaat, Nuuk, Qaqortoq, Pr. Chr. Sund and Tasiilaq. For that reason the rain data are excluded in these periods.

Table 3 note ***: Nine SAVS ceilometers have permanent problems with cloud cover measurements (clear sky not reported): Mitt. Upernavik, Mitt. Ilulissat, Mitt. Aasiaat, Mitt. Sisimiut, Mitt. Maniitsoq, Mitt. Nuuk, Mitt. Paamiut, Mitt. Narsarsuaq and Mitt. Nerlerit Inaat (up to Aug 1, 2017/after Sep 21, 2018). For that reason permanently excluded.

Table 3 special note on the calculation of daily accumulated precipitation after 2014: At DMI the daily accumulated precipitation from automatic synoptical stations in Greenland in general are calculated from 06H00 UTC the day in question to 06H00 UTC next day adding the hourly values (parameter 601).

It is also possible to use the accumulated precipitation from 06 - 18 UTC (covering 12 hours) on the day in question (parameter 603) and the accumulated precipitation from 18 UTC the day in question - 06 UTC next day (covering 12 hours; parameter 603). 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. And finally use the accumulated precipitation from 06 - 06 UTC (covering 24 hours) the next day (parameter 609) and list it on the date where the period starts.

Please notice that we still have manually operated rain gauges left in Greenland. They have a prefix “34” in front of the station number and they observe once a day at a certain time (not 6 UTC) covering 24 hours.

Table 4. Description of parameters in the 6 manual precipitation data series.

Parameter	Description
Station	7 digit station number, all in the format '34xxx50'
År	Year of observation
Måned	Month of observation
Dag	Day of observation
Time (utc)	Hour of observation (UTC)
601	24-hours (or more) accumulated precipitation (mm). Six stations; Hellman; Mitt. Kangerlussuaq, Mitt. Sisimiut, Mitt. Narsarsuaq, Station Nord, Danmarkshavn, Ittoqqortoormiit
pc	Period covered in 601 (hours). Could be more than 24 hours i.e. 48, 76 hours etc.

General notes to table 4: Resolution 24 hours (or more indicated by pc). Parameter (601) is given with one decimal.

7 Differences between "old" and "new" data format

In table 5 below differences between parameters in the "old" and "new" data format can be seen. See also table 1, 2, 3 and 4.

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

Parameter	Data description 1958-2013	Data description 2014 -
ttt/101	Drybulb temperature (0.1°C) 2 m above ground. Observed minute = 0. Time resolution 1, 3 or more hours.	Mean air temperature (°C; 2 m above ground). Mean of drybulb temperatures last hour. If not available, drybulb temperature (°C) observed minute = 0. Time resolution 1 or 3 hours. 1 hour. V98, SAVS, GIWS. 3 hours; one station; ARGOS; Summit.
/112	NA	Absolute maximum temperature (°C; 2 m above ground). Absolute maximum temperature last hour. V98.
txtxtx/113	Absolute maximum temperature (0.1°C) 2 m 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 m above ground). Absolute maximum temperature last 12 hours. V98, SAVS.
/122	NA	Absolute minimum temperature (°C; 2 m above ground). Absolute minimum temperature last hour. V98.
tntntn/123	Absolute minimum temperature (0.1°C) 2 m 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 m above ground). Absolute minimum temperature last 12 hours. V98, SAVS.
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 or 3 hours. 1 hour. V98, SAVS, GIWS. 3 hours; one station; ARGOS; Summit.

Parameter	Data description 1958-2013	Data description 2014 -
ff/301	Mean wind speed (0.1 m/s) over the 10-minute period preceding the observation.	Mean wind speed (m/s; 10 m above ground) observed last 10 min.; minute = 0. Time resolution 1 or 3 hours. 1 hour. V98, SAVS, GIWS. 3 hours; one station; ARGOS; Summit.
/305	NA	Highest 3 sec. wind speed (m/s; 10 m above ground) last hour. If not available, highest 3 sec. wind speed (m/s) observed last 10 min. V98, SAVS, GIWS).
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 m above ground) observed last 10 min.; minute = 0. 0 applies to calms . Time resolution 1 or 3 hours. 1 hour. V98, SAVS, GIWS. 3 hours; one station; ARGOS; Summit.
/371	NA	Mean wind direction (degrees; 10 m 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 or 3 hours. 1 hour. V98, SAVS, GIWS. 3 hours; one station; ARGOS; Summit.
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, SAVS, GIWS.
/504	NA	Accumulated sunshine duration (hours) last hour. Six stations. V98; Aasiaat, Nuuk, Narsarsuaq Radiosonde, Tasiilaq, Ittoqqoortoormiit, Danmarkshavn.*
/550	NA	Mean incoming (global) radiation (W/m^2) last hour. Six stations. V98; Aasiaat, Nuuk, Narsarsuaq Radiosonde, Tasiilaq, Ittoqqoortoormiit, Danmarkshavn.
/601	NA	Accumulated precipitation (mm; about 3 m 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**. One station; Hellman; Mitt. Kangerlussuaq.
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**. One station; Hellman; Mitt. Kangerlussuaq.
precip/601	24 hours (or more) accumulated precipitation (0.1 mm). -1 applies to more than 0 mm, but less than 0.1 mm****	24-hours (or more) accumulated precipitation (mm). Six stations; Hellman; Mitt. Kangerlussuaq, Mitt. Sisimiut, Mitt. Narsarsuaq, Station Nord, Danmarkshavn, Ittoqqortoormiit****

Parameter	Data description 1958-2013	Data description 2014 -
periode/pc	Period covered in precip (hours). Could be more than 24 hours i.e. 48, 76 hours etc.****	Period covered in 601 (hours). Could be more than 24 hours i.e. 48, 76 hours etc. Six stations; Hellman; Mitt. Kangerlussuaq, Mitt. Sisimiut, Mitt. Narsarsuaq, Station Nord, Danmarkshavn, Ittoqqortoormiit****
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. Six stations. V98; Aasiaat, Nuuk, Qaqortoq, Tasiilaq, Ittoqqoortoormiit, Danmarkshavn. Twelve stations; SAVS; Mitt. Upernavik, Mitt. Quarsut, Mitt. Ilulissat, Mitt. Aasiaat, Mitt. Kangerlussuaq, Mitt. Sisimiut, Mitt. Maniitsoq, Mitt. Nuuk, Mitt. Paamiut, Mitt. Narsarsuaq, Mitt. Kulusuk, Mitt. Nerlerit Inaat. *****
sss	Snow depth (cm). -1 applies to less than 0.5 cm. -2 applies to snow cover not interconnected ******	NA******

General notes to table 5: Both parameter numbers connected to the “new” data format shown in table 3,4 and the parameter code in the “old” data format shown in table 1,2 are shown in the table.

Table 5 note *: Six V98 pyranometers have permanent problems with the calculation of sunshine duration: Aasiaat, Nuuk, Narsarsuaq Radiosonde, Danmarkshavn, Ittoqqoortoormiit and Tasiilaq. For that reason permanently excluded.

Table 5 note **: The V98 automatic rain gauges in Greenland can occasionally have technical problems: Aasiaat, Nuuk, Qaqortoq, Pr, Chr. Sund and Tasiilaq. For that reason the rain data are excluded in these periods.

Table 5 note ***: At manually operated stations back in time both 6 and12 hours accumulated precipitation occur in parameter rrr6 (18/24 hours in rare occasions). At normally operated DMI stations accumulated precipitation at 6 and 18 hours UTC normally cover 12 hours; 0 and 12 hours UTC cover 6 hours.

Table 5 note ****: Seven DMI stations have manually observed 24-hours accumulated precipitation, which in special files can be seen as daily values (or covering more days indicated by period/pc); parameter precip/601; Mitt. Kangerlussuaq, Mitt. Sisimiut, Nuuk, Mitt. Narsarsuaq, Station Nord, Danmarkshavn and Ittoqqoortoormiit. One other station also (period from 2016-17) has manually 24-hours accumulated precipitation; parameter 609; Kangerlussuaq.

Table 5 note *****: Nine SAVS ceilometers have permanent problems with cloud cover measurements (clear sky not reported): Mitt. Upernavik, Mitt. Ilulissat, Mitt. Aasiaat, Mitt. Sisimiut, Mitt. Maniitsoq, Mitt. Nuuk, Mitt. Paamiut, Mitt. Narsarsuaq and Mitt. Nerlerit Inaat (up to Aug 1, 2017/after Sep 21, 2018) - permanently excluded.

Table 5 note *****: Snow observations not a part of the observation plan in Greenland the last at least 10 years. Parameter not defined in the “new” data format.

8 References

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[7] Cappelen, J. (ed) (2021): Greenland – DMI Historical Climate Data Collection 1873-2020. DMI Report 21-04. Danish Meteorological Institute. Copenhagen.

[8] Cappelen, J. (ed) (2021): Weather observations from Tórshavn 1953-2020 – Observation data with description. DMI Report 21-09. Danish Meteorological Institute. Copenhagen.

9 Previous reports

Previous reports from the Danish Meteorological Institute can be found on:
https://www.dmi.dk/publikationer/

10 Appendix 1 – Station details

Table 6. Station details: Greenland.

Owner: DMI: Danish Meteorological Institute. MIT: Mittarfeqarfiit (Greenland Airports) before GLV: Greenland Airport Authority. SLV: Denmark Airport Authority. USAF: US Air Force. GTO: Greenland's Technical Organization. LORAN: US Navigation system. ASIAQ: Greenland Survey.

	Owner/type	Time of operation		Latitude N		Longitude W		Elevation
		start	stop	degrees	minute	degrees	minute	m.a.s.
04200 Dundas	DUNDAS RADIO	01-01-1961	31-08-1983	76	34	68	48	21
04201 Qaanaaq	DMI	10-08-1995	13-10-2004	77	28	69	13	16
04202 Pituffik	USAF	01-01-1974	27-11-2006	76	32	68	45	77
04203 Kitsissut	DMI/GIWS	02-06-1980		76	38	73	00	11
04205 Qaanaaq	DMI	02-01-1964	30-06-1980	77	29	69	12	14
04205 Mitt. Qaanaaq	MIT/SAVS	30-08-2001		77	29	69	23	16
04207 Hall Land	DMI	30-08-1982	06-09-2007	81	41	59	57	105

Owner: DMI: Danish Meteorological Institute. MIT: Mittarfeqarfiit (Greenland Airports) before GLV: Greenland Airport Authority. SLV: Denmark Airport Authority. USAF: US Air Force. GTO: Greenland's Technical Organization. LORAN: US Navigation system. ASIAQ: Greenland Survey.

	Owner/type	Time of operation		Latitude N		Longitude W		Elevation
		start	stop	degrees	minute	degrees	minute	m.a.s.
04208 Kitsissorsuit	DMI/GIWS	10-09-1981		74	02	57	49	40
04209 Upernavik AWS	DMI	30-08-1984	26-09-1995	72	47	56	10	63
04210 Upernavik	DMI	01-01-1958	28-01-1987	72	47	56	10	63
04210 Upernavik		08-09-1995	16-08-2004	72	47	56	10	120
04211 Mitt. Upernavik	MIT/SAVS	25-10-2000		72	47	56	08	126
04212 Uummannaq	DMI	01-01-1961	21-08-1989	70	40	52	07	39
04212 Uummannaq Heli.	MIT	23-01-2004	30-06-2006	70	41	52	07	2
04213 Mitt. Qaarsut	DMI	23-11-2000	23-10-2005	70	44	52	42	88
	MIT/SAVS	01-02-2006		70	44	52	42	88
04214 Qullitsat	DMI/GIWS	01-01-1961	31-08-1972	70	03	52	51	2
04214 Nuussuaq		18-09-1982		70	41	54	37	27
04216 Ilulissat	DMI	01-01-1961	31-08-1992	69	13	51	03	39
04217 Qasigiannguit	DMI	01-01-1962	30-06-1980	68	49	51	05	77
04217 Qasigiannguit Heli.	ASIAQ/SAVS	04-04-2004		68	49	51	10	24
04218 Qeqertarsuaq	DMI	01-01-1962	30-06-1980	69	14	53	31	24
04219 Qeqertarsuaq Heli.	MIT/SAVS	01-07-2010		69	15	53	32	11
04220 Aasiaat	DMI/V98	01-01-1958		68	42	52	45	43
04221 Mitt. Ilulissat	MIT/SAVS	15-08-1991		69	14	51	04	29
04224 Mitt. Aasiaat	MIT/SAVS	02-11-2000		68	43	52	47	23
04228 Kitsissut/Attu	DMI/GIWS	18-08-1983		67	47	53	58	12
04230 Sisimiut	DMI	01-01-1961	22-06-2001	66	55	53	40	12
04231 Mitt. Kangerlussuaq	DMI/SAVS	01-05-1973	31-12-1989	67	00	50	48	50
		01-01-1990		67	01	50	42	50
04234 Mitt. Sisimiut	MIT/SAVS	28-11-2000		66	57	53	43	10
04235 Dye 1	USAF	13-03-1974	18-09-1989	66	38	52	52	1439
04238 Kangaamiut	DMI	14-09-1966	30-12-1969	65	49	53	19	–
04240 Maniitsoq	DMI	01-01-1961	30-01-1987	65	24	52	52	25
04241 Mitt. Maniitsoq	MIT/SAVS	06-12-2000		65	25	52	56	28
04242 Sioralik	DMI/GIWS	16-06-1983		65	01	52	33	14
04246 Atammik	DMI	14-02-1966	30-12-1969	64	48	52	09	–
04247 Qoornoq	DMI	03-01-1966	31-12-1969	64	32	51	03	–
04248 Kapisillit	DMI	26-01-1966	30-12-1969	64	25	50	18	–
04250 Nuuk	DMI/V98	01-01-1958	31-08-1991	64	10	51	45	54
		01-09-1991		64	10	51	45	80

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	Owner/type	Time of operation		Latitude N		Longitude W		Elevation
		start	stop	degrees	minute	degrees	minute	m.a.s.
04251 Kitsissut	DMI	01-01-1961	31-12-1973	64	02	52	05	19
04252 Kangerluarsoruseq	DMI	02-01-1961	31-08-1973	63	42	51	33	10
04253 Ukiivik	DMI/GIWS	20-06-1982		62	34	50	25	22
04254 Qeqertarsuatsiaat	DMI	17-01-1967	30-12-1969	63	05	50	41	–
04254 Mitt. Nuuk	MIT/SAVS	01-11-2000		64	12	51	41	86
04260 Paamiut	DMI	01-01-1958	21-09-1992	62	00	49	43	15
04260 Paamiut Heliport	DMI	22-09-1992	06-12-2007	62	00	49	40	13
04260 Mitt. Paamiut	MIT/SAVS	07-12-2007		62	01	49	40	36
04261 Kangilinnguit	DMI	01-01-1961	01-09-1974	61	13	48	07	27
		01-01-1981	19-09-1997	61	14	48	06	35
04263 Arsuk	DMI	01-08-1964	30-12-1969	61	11	48	27	–
04264 Narsalik	DMI	23-11-1966	30-12-1969	61	39	49	22	–
04266 Nunarsuit	DMI/GIWS	22-07-1981		60	46	48	27	33
04270 Mitt. Narsarsuaq	MIT/SAVS	01-01-1961		61	10	45	25	27
04271 Narsarsuaq Radisonde	DMI/V98	25-09-2012		61	09	45	26	4
04272 Qaqortoq	DMI/V98	01-01-1961		60	43	46	03	32
04273 Qaqortoq Heliport	MIT/SAVS	17-03-2004		60	43	46	02	18
04274 Qassimiut	DMI	08-04-1964	30-12-1969	60	48	47	06	–
04280 Narsaq	DMI	01-01-1958	31-12-1969	60	54	45	58	30
04280 Narsaq Heliport	ASIAQ/SAVS	10-03-2005		60	55	46	03	25
04282 Alluitsup PAA Helip.	MIT	07-08-2006	31-01-2011	60	28	45	35	23
04283 Nanortalik	DMI	02-01-1961	31-10-1985	60	08	45	13	21
04283 Nanortalik Heliport	ASIAQ/SAVS	10-03-2005		60	08	45	14	5
04285 Angissoq	DMI/GIWS	01-01-1964	28-12-1973	59	59	45	08	20
		22-07-1981		59	59	45	08	20
04286 Narsaq Kujalleq	DMI	01-01-1971	31-12-1973	59	58	44	03	–
		01-03-1982	31-12-1983	59	58	44	03	–
04301 Kap Morris Jesup	DMI/GIWS	16-07-1980		83	39	33	22	4
04305 Kap Harald Moltke	DMI	24-08-1983	17-07-1991	82	09	29	55	4
04310 Station Nord	DMI	01-01-1961	09-07-2007	81	36	16	39	36
04312 Station Nord AWS	DMI/GIWS	26-07-1985		81	36	16	40	34
04313 Henrik Krøyer Holme	DMI/GIWS	01-07-1985		80	39	13	43	10
04320 Danmarkshavn	DMI/V98	01-01-1958		76	46	18	40	11
04330 Daneborg	DMI/GIWS	01-01-1958	31-07-1975	74	18	20	13	12

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	Owner/type	Time of operation		Latitude N		Longitude W		Elevation
		start	stop	degrees	minute	degrees	minute	m.a.s.
		04-01-1979		74	18	20	13	44
04338 Mestersvig	SLV	01-01-1961	25-10-1985	72	15	23	54	16
04339 Ittoqqortoormiit	DMI/V98	01-11-1980	16-08-2005	70	29	21	57	65
		17-08-2005		70	29	21	57	70
04340 Uunarteq	DMI	01-01-1958	31-10-1980	70	25	21	58	42
		05-09-1985	10-06-1990	70	25	21	58	41
04341 Mitt. Nerlerit Inaat	MIT/SAVS	26-05-2002		70	45	22	39	13
04345 Jameson Land	DMI	11-02-1985	18-09-1989	71	11	23	37	261
04350 Aputiteeq	DMI	01-01-1958	09-02-1987	67	47	32	18	20
04351 Aputiteeq	DMI/GIWS	31-01-1987		67	47	32	18	13
04352 Aputiteeq	DMI	18-06-1980	08-04-1982	67	47	32	18	13
04360 Tasiilaq	DMI/V98	01-01-1958	31-03-1982	65	36	37	38	36
		01-04-1982	14-08-2005	65	36	37	37	50
		15-08-2005		65	36	37	37	53
04361 Mitt. Kulusuk	MIT/SAVS	28-11-2000		65	35	37	09	35
04365 DYE 4	USAF	24-01-1974	20-05-1991	65	31	37	10	329
04368 Orsuiagssuaq	LORAN STATION	13-09-1971	31-12-1973	65	29	38	53	71
04373 Ikermit	DMI/GIWS	01-11-1986		64	47	40	18	85
04380 Timmiarmiut	DMI/GTO (TELE)	01-01-1958	30-06-1979	62	32	42	08	10
04381 Ikermiuarsuk	DMI	06-12-1979	29-11-1989	61	56	42	04	39
04382 Ikermiuarsuk	DMI/GIWS	18-06-1980		61	56	42	04	39
04385 Qulleq	LORAN STATION	01-05-1962	31-12-1973	61	32	42	14	157
04390 Ikerasassuaq	DMI/V98	01-01-1958	09-10-1980	60	02	43	07	75
		14-05-1981	30-06-1992	60	03	43	10	26
		01-07-1992		60	03	43	10	88
04410 Renland	DMI	23-09-1987	15-07-1988	71	30	26	32	2320
04415 Summit	DMI	02-01-1991	15-06-1994	72	35	37	38	3250
04416 Summit	DMI/ARGOS	04-11-1997	08-12-2020	72	35	38	27	3202
04465 DYE 2	USAF	25-01-1974	18-08-1988	66	29	46	17	2332
04475 DYE 3	USAF	24-01-1974	18-09-1989	65	11	43	50	2652
04495 Ikerasassuaq	DMI	01-10-1980	22-05-1981	60	02	43	07	26
34231 Mitt. Kangerlussuaq	DMI/Hellman	01-01-2017		67	01	50	42	50

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	Owner/type	Time of operation		Latitude N		Longitude W		Elevation
		start	stop	degrees	minute	degrees	minute	m.a.s.
34234 Mitt. Sisimiut	DMI/Hellman	01-12-2004		66	57	53	43	10
34250 Nuuk	DMI/Hellman	02-02-1999	01-09-2012	64	11	51	44	54
34270 Narsarsuaq	DMI/Hellman	22-01-2009		61	10	45	25	26
34310 Station Nord	DMI/Hellman	01-02-2008		81	36	16	40	36
34320 Danmarkshavn	DMI/Hellman	01-01-2009		76	46	18	40	11
34339 Ittoqqortoormiit	DMI/Hellman	01-09-2014		70	29	21	57	65