

Antigua and Barbuda, 1991-2020 Climatological Normals

The WMO Member provided data for one (1) station in a single Excel file. NCEI converted the Excel file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

The original Excel file is provided along with the CSV file.

Excel Files	CSV Files
VCBirdInternationalAirportVCBIA_78862.xlsx	VCBirdInternationalAirportVCBIA_78862.csv

Bahamas, 1991-2020 Climatological Normals

The WMO Member provided data for one (1) station in a single Excel file. NCEI converted the Excel file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

The original Excel file is provided along with the CSV file.

Excel Files	CSV Files
LyndenPindlingIntlAirport_78073.xls	LyndenPindlingIntlAirport_78073.csv

Barbados, 1991-2020 Climatological Normals

The WMO Member provided data for one (1) station in a single Excel file. NCEI converted the Excel file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note that the Parameter TSUN (Total Sunshine) appeared to be computed as the Normal of the average number of hours of sunshine in each month (and year) rather than the Normal of the total number of hours of sunshine in each month in the original Excel file. In the CSV file NCEI recomputed these as the total number of hours of sunshine per month by multiplying the provided average values by the number of days in the month. The annual value computed as the sum of the monthly values.

The original Excel file is provided along with the CSV file.

Excel Files	CSV Files
Charnocks_78954.xlsx	Charnocks_78954.csv

Belize, 1991-2020 Climatological Normals

The WMO Member provided data for nine (9) stations in individual Excel files. NCEI converted each Excel file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note:

- 1) Station Phillip Goldson Airport annual Total Sunshine was incorrectly computed as an average rather than a sum of the monthly values in the Excel file provided by the WMO member. NCEI recomputed the annual Total Sunshine value for this station by summing the monthly values and placed this recomputed value in the CSV file PhillipGoldsonAirport_78583.csv.
- 2) For all stations, Parameter 2 annual value was incorrectly computed as an average rather than a sum of the monthly values in the Excel file provided by the WMO member. NCEI recomputed the annual DPO1 for all stations by summing the monthly values. These recomputed values are in the respective CSV file for each station.

The original Excel files are provided along with the CSV files for all stations.

Excel Files	CSV Files
Belmopan.xlsx	Belmopan.csv
CentralFarm.xlsx	CentralFarm.csv
Libertad.xlsx	Libertad.csv
Melinda.xlsx	Melinda.csv
PhillipGoldsonAirport_78583.xlsx	PhillipGoldsonAirport_78583.csv
PuntaGorda.xlsx	PuntaGorda.csv
Savannah.xlsx	Savannah.csv
SpanishLookout.xlsx	SpanishLookout.csv
Towerhill.xlsx	Towerhill.csv

Bermuda*, 1991-2020 Climatological Normals

This Non-WMO Member provided data for one (1) station in a single Excel file. NCEI converted the Excel file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

The original Excel file is provided along with the CSV file.

Additional information from the WMO Member is provided below this table.

Excel Files	CSV Files
BermudaWeatherService_78016.xlsx	BermudaWeatherService_78016.csv

***Non-WMO Member**

Additional Explanatory Information from this Non-WMO Member

Notes and metadata as of this submission (December 2022):

- The climatological day runs 06Z to 06Z
- The method of calculation for daily means were:
 - to take the mean of the daily maximum and minimum for Temperature
 - to take the mean of 8 evenly spaced observations for Pressure
 - to take the mean of 8 evenly spaced observations for Vapour pressure
- the underlying data were not assessed for homogeneity
- sun-hours availability for Bermuda does not meet the required 80% threshold (22 years of data are available for sun-hours)
- the WIGOS station ID was copied from this URL (although the three letters 'BMD' were replaced with the station id 78016)
- <https://oscar.wmo.int/surface/#/search/station/stationReportDetails/0-20008-0-BMD>.

Canada, 1991-2020 Climatological Normals

The WMO Member provided data for 108 stations in individual comma separated values (CSV) files. Explanatory information from the WMO Member is provided below.

Supplement to WMO Submission for the 1991 - 2020 Normals Meteorological Services of Canada (MSC)

LAST UPDATED: 28 DECEMBER 2022

The 1991-2020 Canadian Normals contains averages and extremes for twenty-four (24) parameters from one hundred and eight (108) locations. Similarly to other countries, Canada's observational network has experienced a transition toward automation. Network changes, internal system upgrades, and the implementation of station composites have contributed to making the production of these Normals particularly complex. Although homogenization and data estimation methodologies of the national dataset were not performed, the data, composed of stations operated by the Meteorological Service of Canada (MSC) or its partners, was statistically assessed for joining suitability.

1. Background to the Normals Data

A total of one hundred and eight (108) Regional Basic Climate Network (RBCN) surface weather stations operated by the Meteorological Services of Canada (MSC) and its partners was selected for the production of the 1991-2020 Normals. These are submitted according to the station name and WMO ID of the current RBCN site, as of December 2020. If the station designation has changed since the submission of the 1981-2010 Normals, in 2019, the former name and/or WMO ID are shown in parentheses next to the current station name. Since 2019, five (5) of the one hundred and eight (108) stations have had RBCN designation changes, and of those, four (4) have undergone changes in operator from staffed aviation to complete MSC auto. For the complete station list and RBCN designation change list, see *Appendix A* and *Table 1* respectively.

Stations that have been selected for inclusion in the Normals adhere to the following characteristics:

- They are identified as current RBCN stations and transmit CLIMAT bulletins;
- At least one primary parameter, temperature, is present for the required twenty-four (24) years out of thirty (30) for at least one month, either as a single station or composite time series;
- Data meets the completeness requirement for the minimum twenty-four (24) years and is available for multiple elements;
- Composite stations selected are either co-located or located within a three (3) kilometer distance and less than ten (10) meter elevation difference to the RBCN designated site, with some exceptions such as in data sparse areas. All selected stations have passed a suitability assessment (see *Appendix D*).

General notes:

- Derived parameters will only be reported if data used for the primary element meets the completeness criteria and has passed all Quality Control (QC) checks. For example, parameters such as the "Number_of_Days_with_Daily_Precipitation" values or "Boundaries_of_quintiles_of_monthly_precipitation" will not be reported if the primary element "Precipitation_Total" does not qualify for Normals.

- Station composites are threaded from the beginning of the Normals period (1991) to present, where the predecessor site's data is used up until the end of its period of record and is then joined to the current RBCN designated site to extend the time series to the end of the Normals period.
- QC'ed staffed station data is prioritized over automated station data.
- Some stations' data is missing in 2020 as a result of COVID, particularly for precipitation elements and staffed aviation sites.

2. Network and Station Changes

The 1991-2020 Normals represents the first reporting period for which data are derived from automated observing stations. Since the 1961-1990 Normals, most stations in the surface climatological network for Canada have undergone some manner of change; from staffed to automatic, daily climate to hourly automatic, and MSC-owned and operated to partner-owned and operated. The rise of automation began in the early 1990s and has continually grown over time, whereas the number of staffed sites has decreased. The reduction in staffed sites has also led to reported elements that no longer qualify for Normals (i.e. hail, thunder, visibility, sunshine). With the exception of a few stations, almost all the stations submitted in this set of Normals are now completely automatic.

The year 2010 represents a point in this transition where much of the migration to automatic stations had already been completed, while at the same time, the majority of aviation stations, operated by a third-party, had not yet changed equipment or methods of observation. As a result, this iteration of the Normals reflects a point partway through some of the major changes in the Canadian climate networks, with the transition mostly complete by the end of 2020. The "predecessor" stations selected as part of the composite data series draws largely from Canada's staffed aviation or Daily Climate observing sites up to around 2010. Predecessor stations are either co-located or are in close proximity to present-day RBCN sites. Datasets from these stations are then joined with those of the current RBCN stations in order to extend the period of record from approximately 2010 onwards.

Challenges have emerged with elements such as snow depth. During the summer months, snow depth data is suppressed to avoid false reports of snow on ground. The introduction of the summer range suppression means that no snow depth Normal values can be produced for summer and shoulder season months, either due to suppressed values or insufficient data. This could result in some snow events being missed, particularly in northern locations. For southern locations, snow depth can be assumed to be 0 centimetres during the summer months.

3. Composite Stations

The MSC has used composite data series in order to meet the completeness requirements for this set of Normals. The composite stations development consisted of three main scenarios: data series joined by (1) dataset, (2) program, and/or (3) station. A combination of any or all three scenarios may have been used:

1. Dataset join: This involves joining data from the same location, instruments, standards and maintenance, national identifiers, but different derivations or quality control processes. The confidence in the time series integrity is very high.
2. Program join: This involves joining data from "co-located" stations within the same locality. These have different station types and national identifiers, but often times different instruments, standards and maintenance. This join type is considered medium integrity and depending on the

monitoring differences, will vary from site to site. Only those deemed high, required a suitability assessment.

3. Station join: This involves joining stations from different geographical locations and national identifiers, which may utilize different instruments and/or standards and maintenance. Only stations within the established radius and elevation of the current RBCN site are considered. This join type is the most complex and required a suitability assessment.

Although homogenization of the source data was explored, the Normals submitted are generated from non-adjusted, non-estimated data.

4. RBCN Designation Changes

The stations noted below have transitioned and have had their RBCN designation transferred from the predecessor station to the current station since the 1981-2010 Normals submitted in 2019. These five (5) designation transfers were a result of the MSC's transition from partner aviation sites to co-located MSC automatic stations. To see the metadata changes for these stations, please see *Appendix B*.

Table 1. List of RBCN designation changes of predecessor and replacement stations

Predecessor Station				Replacement Station			
Station Name	WMO ID	End Date	Station Type	Station Name	WMO ID	Start Date	Station Type
SIOUX LOOKOUT A	71842	March 2019	Staff aviation	SIOUX LOOKOUT AIRPORT	73017	April 2019	MSC auto
PRINCE ALBERT A	71869	March 2019	Staff aviation	PRINCE ALBERT GRASS FIELD	73002	April 2019	MSC auto
CORAL HARBOUR A	71915	March 2019	Staff aviation	CORAL HARBOUR RCS	71134	April 2019	MSC auto
FORT NELSON A	71945	March 2019	Staff aviation	FORT NELSON	71594	April 2019	MSC auto
SCHEFFERVILLE	71828	February 2020	MSC auto	SCHEFFERVILLE COTE-NORD	73075	March 2020	MSC auto

5. Climatological Day

Generally, the climatological day is based on primary elements (temperature and precipitation). Note that for daily-only reporting sites, there are differences in climatological day even between primary elements.

For stations operating on a 24-hour basis, the climatological day starts at 0601 UTC and ends at 0600 UTC of the following day.

At locations not operating on a 24-hour basis, observations are taken once or twice a day. For sites reporting only once per day, the calendar day rather than climatological day applies. For sites reporting twice daily, observations are taken in the morning and evening. For those sites, the climatological day for precipitation and maximum temperature ends at the morning observation of the following day, whereas the climatological day for minimum temperatures ends at the afternoon observation of the current day.

6. Instrumentation

The instrumentation and observing practices vary between staffed and automated sites. For the simplification of this document, four (4) station types are used to describe typical instrumentation: daily climate, hourly staffed, hourly automated, and aviation, which could be either staffed or automated.

Daily climate (staffed)

- Observations are taken once or twice a day. Elements typically reported are temperature, rainfall, snowfall, total precipitation and snow on ground.
- Temperature is measured in Celsius using two thermometers, a maximum and a minimum thermometer, shielded within a Stevenson's screen and located approximately 2 metres above the ground.
- Rainfall is measured in millimetres using a MSC Type-B rain gauge.
- Snowfall is measured in centimeters with a Standard Snow Ruler, one metre in length. It is an average of measurements taken on a snow board.
- Total precipitation, in millimetres, is calculated from the rainfall and liquid equivalent of the snowfall.
- The snow depth or snow on ground is measured in whole centimeters, using a Standard Snow Ruler, as an average of several measurements.

Staffed stations

- Temperature is measured using either a thermistor or min/max thermometers located in a ventilated Stevenson's screen housed approximately 2 metres above ground.
- Atmospheric pressure, also called barometric pressure, is measured using a digital barometer typically located within the Stevenson's screen housing the thermistors.
- Precipitation is measured with a rain gauge, Nipher gauge, or a weighing-type gauge.
- The station elevation is the vertical distance in metres above Mean Sea Level of the datum level to which barometer readings are corrected to obtain station pressure.
- Snow depth or snow on ground is measured in whole centimeters, using a Standard Snow Ruler, as an average of several measurements.
- Wind speed, direction and gusts are measured using an anemometer at a 10-m height above ground. The wind velocity is averaged over a ten-minute period and is reported in meters per second (m/s).
- The reported visibility is the prevailing visibility observed at eye level (internationally defined as 1.5 meters above the ground). Visibility charts are available at each observation station and include day and night markers that are valid for use in all four seasons. Optical devices enhancing visibility, such as binoculars, are not used.
- The presence of hail and thunder are measured.

Automated stations

- Since hourly staffed and automated stations use a similar suite of instruments, please refer to the instruments listed under 'Staffed Station', with the exception of the following elements:
 - Snow depth is measured using an acoustic snow sensor.
 - Typically, most stations do not report visibility; however, at stations where visibility is reported, it is measured with a transmissometer.

Aviation (staffed or automated)

- These stations use a suite of instruments similar to that of the hourly staffed and automated stations; though, only visibility, hail, and thunder continue to be reported at aviation sites. The majority of instruments are now automated.
- The wind velocity is averaged over a two-minute period and is reported in meters per second (m/s).

7. Calculation Methodology

Reported surface weather observations at each of the one hundred and eight (108) stations consists of anywhere between twenty-four (24) years to thirty (30) years for each of the parameters listed in *Appendix C*. The calculations for the parameters and rounding practices were followed as per the guidelines published in “WMO Guidelines on the Calculation of Climate Normals” 2017 Edition. World Meteorological Organization. WMO-No. 1203.

- Daily Mean Temperature – calculated as the average of the maximum and minimum temperature for daily reporting sites. For hourly reporting sites, it is calculated as the average of the twenty-four (24) hourly temperature values.
- Mean Station Pressure – calculated as the hourly mean of all available hours; this element is measured on site.
- Mean Sea Level Pressure – calculated as the hourly mean of all available hours; typically it is derived from hourly station pressure.
- Mean Vapour Pressure – calculated as the hourly mean using dewpoint values derived from hourly relative humidity.

8. Completeness

The MSC has adhered to past completeness rule of ‘3/5’ rather than the ‘5/11’ rule for daily elements notably “Daily_Maximum_Temperature”, “Daily_Minimum_Temperature”, “Daily_Mean_Temperature”, and “Number_of_Days_with” parameters. For the remainder of the parameters, either “all available values” for extremes, “83% of hours” for hourly elements, or “80%” or “100%” completeness rules were used. To see the complete list of completeness rules please see *Appendix C*.

9. Homogenization

No homogenization, data estimation, or gap filling methodologies were applied to this set of Normals.

APPENDIX A – List of Normals Stations

Table 2. List of 108 qualifying RBCN stations submitted for the Canadian 1991-2020 Normals

Note that some stations' names have changed, where the former name is indicated in parentheses next to the current name.

WMO ID	Normals Station Name	WMO ID	Normals Station Name	WMO ID	Normals Station Name
71018	RESOLUTE CS	71321	IQALUIT CLIMATE	71710	ILES DE LA MADELEINE
71026	MEDICINE HAT RCS	71322	ARVIAT CLIMATE	71713	LA POCATIERE
71028	TATLAYOKO LAKE RCS	71331	ISLAND FALLS (AUT)	71721	MANIWAKI AIRPORT
71029	HOLMAN CS (ULUKHAKTOK)	71332	KUGLUKTUK CLIMATE	71726	PARENT
71044	OLD CROW RCS	71355	ALERT CLIMATE	71727	BAGOTVILLE A
71063	OTTAWA CDA RCS	71356	BAKER LAKE CLIMATE	71741	KAMLOOPS AUT
71066	HIGH LEVEL A	71357	QIKIQTARJUAQ CLIMATE	71742	GANDER AIRPORT CS
71077	BUFFALO NARROWS (AUT)	71361	HAY RIVER CLIMATE	71744	MIRAMICHI RCS
71079	THOMPSON A	71362	FORT SMITH CLIMATE	71747	ATIKOKAN (AUT)
71101	SANDSPIT AIRPORT AUTO	71363	GJOA HAVEN CLIMATE	71754	NORTH BATTLEFORD RCS
71109	PORT HARDY A	71364	INUVIK CLIMATE	71758	SYDNEY CS
71120	COLD LAKE A	71365	FORT SIMPSON CLIMATE	71773	WHITEHORSE AUTO
71122	BANFF CS	71401	WARFIELD RCS	71779	QUESNEL AIRPORT AUTO
71134	CORAL HARBOUR RCS	71407	KUGAARUK CLIMATE	71783	VICTORIA UNIVERSITY CS
71152	BURGEO NL	71434	PEAWANUCK (AUT)	71813	NATASHQUAN AIRPORT (NATASHQUAN A)
71155	EDMONTON INTERNATIONAL CS	71446	SWIFT CURRENT CDA	71816	GOOSE A
71199	WATSON LAKE (AUT)	71467	SACHS HARBOUR CLIMATE	71818	CARTWRIGHT A
71207	SQUAMISH AIRPORT	71480	NORMAN WELLS CLIMATE	71823	LA GRANDE IV
71208	BIG TROUT LAKE	71493	PARRSBORO	71827	LA GRANDE RIVIERE A
71212	FORET MONTMORENCY RCS	71508	TORONTO CITY	71834	GERALDTON A
71219	HOLLAND ROCK	71550	DAUPHIN CS	71868	HUDSON BAY (AUT)
71222	DEASE LAKE (AUT)	71559	ESTEVAN	71884	YARMOUTH RCS
71261	GODERICH	71573	DELHI CS	71894	ESTEVAN POINT CS

71279	SEPT-ILES	71575	KINNGAIT (CAPE DORSET CLIMATE)*	71906	KUUJJUAQ A
71288	CAMBRIDGE BAY GSN	71576	POND INLET CLIMATE	71907	INUKJUAQ
71294	BANCROFT AUTO	71585	FORT MCMURRAY CS	71952	BURNS LAKE DECKER LAKE
71296	EGBERT CS	71586	LA RONGE RCS	71956	GORE BAY CLIMATE
71298	HARROW CDA AUTO	71590	EDMUNDSTON	71966	DAWSON
71299	KAPUSKASING CDA ON	71594	FORT NELSON	71984	PAULATUK
71307	RIDGETOWN RCS	71613	EUREKA CLIMATE	71989	MOULD BAY CS
71309	MOOSONEE RCS	71622	LONDON CS	73002	PRINCE ALBERT GLASS FIELD
71311	NAPPAN AUTO	71632	LYNN LAKE RCS	73017	SIOUX LOOKOUT AIRPORT
71315	CHARLO AUTO	71665	NAIN	73024	DANIEL'S HARBOUR
71317	DEBERT	71693	SLAVE LAKE RCS	73025	SABLE ISLAND
71318	CORONATION CLIMATE	71695	THE PAS CLIMATE	73026	PORT AUX BASQUES
71320	SANIRAJAK (HALL BEACH CLIMATE)*	71696	CHURCHILL CLIMATE	73075	SCHEFFERVILLE COTE-NORD

*Two Nunavut stations have undergone a provincial name change in 2020. Both the former and new names are included.

APPENDIX B – RBCN Station Metadata Changes

Table 3. Metadata changes between the predecessor and the current RBCN designated station (since the last submission of the 1981-2010 Normals in 2019).

RBCN Station Location	Station Name	WMO ID	Station Type	Lat	Long	Elev. (m)	Designation Status
SIOUX LOOKOUT	SIOUX LOOKOUT A	71842	Aviation staffed	50° 06' 51.0" N	91° 54' 29.0" W	383.1	Predecessor
	SIOUX LOOKOUT AIRPORT	73017	MSC auto	50° 06' 51.0" N	91° 54' 20.0" W	388.1	Replacement
PRINCE ALBERT	PRINCE ALBERT A	71869	Aviation staffed	53° 12' 52.0" N	105° 40' 23.0" W	428.2	Predecessor
	PRINCE ALBERT GRASS FIELD	73002	MSC auto	53° 12' 37.0" N	105° 40' 36.0" W	425.5	Replacement
CORAL HARBOUR	CORAL HARBOUR A	71915	Aviation staffed	64° 11' 36.0" N	83° 21' 34.0" W	62.2	Predecessor
	CORAL HARBOUR RCS	71134	MSC auto	64° 11' 00.0" N	83° 21' 00.0" W	57.0	Replacement
FORT NELSON	FORT NELSON A	71945	Aviation staffed	58° 50' 11.0" N	122° 35' 49.0" W	381.9	Predecessor
	FORT NELSON	71594	MSC auto	58° 50' 29.0" N	122° 34' 27.0" W	380.2	Replacement
SCHEFFERVILLE	SCHEFFERVILLE	71828	MSC auto	54° 48' 00.0" N	66° 48' 00.0" W	517.2	Predecessor
	SCHEFFERVILLE COTE-NORD	73075	MSC auto	54° 48' 09.7" N	66° 48' 16.0" W	517.2	Replacement

APPENDIX C – List of Parameters and Completeness Rules

Table 4. List of submitted parameters, measurement units and completeness rules

Parameter_Code	Primary Parameters	Units	Completeness Rule
1	Precipitation_Total	mm	100% complete
2	Number_of_Days_with_Precipitation_≥_1 mm	count	3 and 5 rule
3	Daily_Maximum_Temperature	Deg_C	3 and 5 rule
4	Daily_Minimum_Temperature	Deg_C	3 and 5 rule
5	Daily_Mean_Temperature	Deg_C	3 and 5 rule
6	Mean_Sea_Level_Pressure	hPa	83% of hours
7	Mean_Vapor_Pressure	hPa	83% of hours
Parameter_Code	Secondary Parameters	Units	Completeness Rule
10	Mean_Station-Level_Pressure	hPa	83% of hours
11	Boundaries_of_quintiles_of_monthly_precipitation	mm	80% complete
12	Number_of_Days_with_Maximum_Temperature_≥_25_Deg_C	count	3 and 5 rule
12	Number_of_Days_with_Maximum_Temperature_≥_30_Deg_C	count	3 and 5 rule
12	Number_of_Days_with_Maximum_Temperature_≥_35_Deg_C	count	3 and 5 rule
12	Number_of_Days_with_Maximum_Temperature_≥_40_Deg_C	count	3 and 5 rule
13	Number_of_Days_with_Minimum_Temperature_≤_0_Deg_C	count	3 and 5 rule
16	Number_of_Days_with_Daily_Precipitation_≥_5_mm	count	3 and 5 rule
16	Number_of_Days_with_Daily_Precipitation_≥_10_mm	count	3 and 5 rule
16	Number_of_Days_with_Daily_Precipitation_≥_50_mm	count	3 and 5 rule
16	Number_of_Days_with_Daily_Precipitation_≥_100_mm	count	3 and 5 rule
16	Number_of_Days_with_Daily_Precipitation_≥_150_mm	count	3 and 5 rule
17	Number_of_Days_with_Snow_Depth_>_0_cm	count	3 and 5 rule
17	Number_of_Days_with_Snow_Depth_>_1_cm	count	3 and 5 rule
17	Number_of_Days_with_Snow_Depth_>_10_cm	count	3 and 5 rule
17	Number_of_Days_with_Snow_Depth_>_50_cm	count	3 and 5 rule
18	Number_of_Days_with_Wind_Speed_≥_10_m/s	count	83% of hours
18	Number_of_Days_with_Wind_Speed_≥_20_m/s	count	83% of hours

18	Number_of_Days_with_Wind_Speed_≥_30_m/s	count	83% of hours
19	Number_of_Days_with_Visibility_<_50_m	count	83% of hours
19	Number_of_Days_with_Visibility_<_100_m	count	83% of hours
19	Number_of_Days_with_Visibility_<_1000_m	count	83% of hours
20	Highest_Value_of_Mean_Daily_Temperature	Deg_C	All available values
21	Lowest_Value_of_Mean_Daily_Temperature	Deg_C	All available values
22	Highest_Value_of_Daily_Maximum_Temperature	Deg_C	All available values
23	Lowest_Value_of_Daily_Minimum_Temperature	Deg_C	All available values
24	Highest_Value_of_Daily_Precipitation	mm	All available values
25	Highest_Wind_Gust	m/s	All available values
26	Mean_Number_of_Days_with_Thunder	count	3 and 5 rule
27	Mean_Number_of_Days_with_Hail	count	3 and 5 rule
Parameter_Code	Other Parameters	Units	Completeness Rule
61	Number_Days_Maximum_Temperature_≤_0_Deg_C	count	3 and 5 rule

Notes:

- "3 and 5" rule, where there is no more than three (3) consecutive daily values missing or five (5) total missing days in a month
- Completeness of all "Number_of_Days_with" secondary and other parameters has been changed to "3 and 5 rule" from previous "100%"
- Completeness for all hourly parameters has been reduced to "83%" from the previous "90%" or "100%"
- Sunshine hours is no longer measured by MSC and will not qualify for this or any future Normals
- The parameter "Days_with_Hail" was added. Only aviation sites qualify for hail, thunder, and visibility Normals

APPENDIX D – Station Threading Join Threads

Table 5. Stations used in time series threading

Normals WMO ID	Normals Station Name	PROV	Composite Station Names	WMO ID	Station Type	Latitude	Longitude
71018	RESOLUTE CS	NU	RESOLUTE CARS		Aviation staffed	74° 43' 01.0" N	94° 58' 10.0" W
			RESOLUTE CS	71018	MSC auto	74° 42' 57.0" N	94° 58' 59.0" W
			RESOLUTE BAY A		Aviation staffed	74° 43' 01.0" N	94° 58' 10.0" W
71026	MEDICINE HAT RCS	AB	MEDICINE HAT A		Aviation staffed	50° 01' 08.0" N	110° 43' 15.0" W
			MEDICINE HAT AWOS		MSC auto	50° 01' 08.1" N	110° 43' 15.0" W
			MEDICINE HAT RCS	71026	MSC auto	50° 01' 30.4" N	110° 43' 02.1" W
			MEDICINE HAT		Aviation auto	50° 01' 08.0" N	110° 43' 15.0" W
71028	TATLAYOKO LAKE RCS	BC	TATLAYOKO LAKE		Daily Climate	51° 40' 29.0" N	124° 24' 18.0" W
			TATLAYOKO LAKE RCS	71028	MSC auto	51° 40' 28.4" N	124° 24' 11.3" W
71029	HOLMAN CS (ULUKHAKTOK)	NWT	ULUKHAKTOK A		Aviation staffed	70° 45' 46.0" N	117° 48' 22.0" W
			HOLMAN CS	71029	MSC auto	70° 45' 41.0" N	117° 48' 00.0" W
			ULUKHAKTOK A		Aviation auto	70° 45' 46.0" N	117° 48' 22.0" W
71044	OLD CROW RCS	YT	OLD CROW A		Aviation staffed	67° 34' 14.0" N	139° 50' 21.0" W
			OLD CROW RCS	71044	MSC auto	67° 34' 14.0" N	139° 50' 21.0" W
71063	OTTAWA CDA RCS	ON	OTTAWA CDA		Daily Climate	45° 23' 00.0" N	75° 43' 00.0" W
			OTTAWA MACDONALD-CARTIER INT'L A		Staffed	45° 19' 21.0" N	75° 40' 09.0" W
			OTTAWA CDA RCS	71063	MSC auto	45° 23' 00.0" N	75° 43' 00.0" W
			OTTAWA INTL A		Aviation staffed	45° 19' 00.0" N	75° 40' 00.0" W

71066	HIGH LEVEL A	AB	HIGH LEVEL A		Aviation staffed	58° 37' 17.0" N	117° 09' 53.0" W
			HIGH LEVEL A	71066	Aviation auto	58° 37' 18.0" N	117° 09' 53.00" W
71077	BUFFALO NARROWS (AUT)	SK	BUFFALO NARROWS A		Staffed	55° 50' 00.0" N	108° 26' 00.0" W
			BUFFALO NARROWS (AUT)	71077	MSC auto	55° 50' 26.0" N	108° 25' 14.0" W
71079	THOMPSON A	MB	THOMPSON A		Aviation staffed	55° 48' 12.0" N	97° 51' 45.0" W
			THOMPSON A	71079	Aviation staffed	55° 48' 17.0" N	97° 51' 45.0" W
71101	SANDSPIT AIRPORT AUTO	BC	SANDSPIT A		Daily Climate	53° 15' 14.0" N	131° 48' 47.0" W
			SANDSPIT AWOS		MSC auto	53° 15' 15.0" N	131° 48' 50.0" W
			SANDSPIT AIRPORT AUTO	71101	MSC auto	53° 14' 58.0" N	131° 48' 47.26" W
			SANDSPIT		Aviation auto	53° 15' 15.0" N	131° 48' 50.0" W
71109	PORT HARDY A	BC	PORT HARDY A		Aviation staffed	50° 40' 49.0" N	127° 21' 58.0" W
			PORT HARDY A	71109	Aviation staffed	50° 40' 50.0" N	127° 22' 00.0" W
71120	COLD LAKE A	AB	COLD LAKE A	71120	Partner staffed	54° 25' 00.0" N	110° 17' 00.0" W

APPENDIX D – Station Join Threads (2 of 9)

Normal's WMO ID	Normals Station Name	PROV	Composite Station Names	WMO ID	Station Type	Latitude	Longitude
71122	BANFF CS	AB	BANFF		MSC staffed	51° 11' 00.0" N	115° 34' 00.0" W
			BANFF (AUT)		MSC auto	51° 11' 00.0" N	115° 34' 00.0" W
			BANFF CS	71122	MSC auto	51° 11' 36.1" N	115° 33' 08.1" W
71134	CORAL HARBOUR RCS	NU	CORAL HARBOUR A		Aviation staffed	64° 11' 36.0" N	83° 21' 34.0" W
			CORAL HARBOUR RCS	71134	MSC auto	64° 11' 00.0" N	83° 21' 00.0" W
			CORAL HARBOUR A		Aviation staffed	64° 11' 36.0" N	83° 21' 34.0" W
71152	BURGEO NL	NFLD	BURGEO		MSC auto	47° 37' 00.0" N	57° 37' 00.0" W

			BURGEO 2		MSC auto	47° 37' 00.0" N	57° 37' 00.0" W
			BURGEO NL	71152	MSC auto	47° 37' 00.0" N	57° 37' 00.0" W
71155	EDMONTON INTERNATIONAL CS	AB	EDMONTON INT'L A		Aviation staffed	53° 19' 00.0" N	113° 35' 00.0" W
			EDMONTON INTERNATIONAL CS	71155	MSC auto	53° 18' 24.0" N	113° 36' 21.0" W
			EDMONTON INTL A		Aviation staffed	53° 18' 36.0" N	113° 34' 46.0" W
71199	WATSON LAKE (AUT)	YT	WATSON LAKE A		Aviation staffed	60° 06' 59.4" N	128° 49' 20.4" W
			WATSON LAKE (AUT)	71199	MSC auto	60° 06' 57.0" N	128° 49' 55.0" W
			WATSON LAKE A		Aviation staffed	60° 06' 59.0" N	128° 49' 21.0" W
71207	SQUAMISH AIRPORT	BC	SQUAMISH AIRPORT	71207	MSC auto	49° 46' 59.6" N	123° 09' 40.3" W
71208	BIG TROUT LAKE	ON	BIG TROUT LAKE		MSC staffed	53° 50' 00.0" N	89° 52' 00.0" W
			BIG TROUT LAKE READAC		MSC auto	53° 48' 56.0" N	89° 53' 44.0" W
			BIG TROUT LAKE	71208	MSC auto	53° 48' 58.0" N	89° 53' 30.0" W
			BIG TROUT LAKE A		Aviation auto	53° 49' 04.0" N	89° 53' 49.0" W
71212	FORET MONTMORENCY RCS	QUE	FORET MONTMORENCY		Daily Climate	47° 19' 00.0" N	71° 09' 00.0" W
			FORET MONTMORENCY RCS	71212	MSC auto	47° 19' 22.0" N	71° 08' 54.0" W
71219	HOLLAND ROCK	BC	HOLLAND ROCK	71219	MSC auto	54° 10' 20.0" N	130° 21' 39.1" W
71222	DEASE LAKE (AUT)	BC	DEASE LAKE		Staffed	58° 25' 42.0" N	130° 00' 38.0" W
			DEASE LAKE (AUT)	71222	MSC auto	58° 25' 34.0" N	130° 01' 30.0" W
71261	GODERICH	ON	GODERICH	71261	MSC auto	43° 46' 00.0" N	81° 43' 00.0" W
71279	SEPT-ILES	QUE	SEPT-ILES A		Aviation staffed	50° 13' 00.0" N	66° 16' 00.0" W
			SEPT-ILES	71279	MSC auto	50° 13' 00.0" N	66° 15' 00.0" W
			SEPT-ILES A		Aviation staffed	50° 13' 24.0" N	66° 15' 56.0" W

71288	CAMBRIDGE BAY GSN	NU	CAMBRIDGE BAY A		Aviation staffed	69° 06' 29.0" N	105° 08' 18.0" W
			CAMBRIDGE BAY GSN	71288	MSC auto	69° 06' 29.0" N	105° 08' 18.0" W
			CAMBRIDGE BAY A		Aviation staffed	69° 06' 29.0" N	105° 08' 14.0" W

APPENDIX D – Station Join Threads (3 of 9)

Normal s WMO ID	Normals Station Name	PROV	Composite Station Names	WMO ID	Station Type	Latitude	Longitude
71294	BANCROFT AUTO	ON	BANCROFT AUTO	71294	MSC auto	45° 04' 17.0" N	77° 52' 44.0" W
71296	EGBERT CS	ON	EGBERT CARE		MSC auto	44° 14' 00.0" N	79° 47' 00.0" W
			EGBERT CS	71296	MSC auto	44° 14' 00.0" N	79° 47' 00.0" W
71298	HARROW CDA AUTO	ON	HARROW CDA		Daily Climate	42° 02' 00.0" N	82° 54' 00.0" W
			HARROW AUTOMATIC CLIMATE STATION		MSC auto	42° 02' 00.0" N	82° 54' 00.0" W
			HARROW CDA AUTO	71298	MSC auto	42° 02' 00.0" N	82° 54' 00.0" W
71299	KAPUSKASING CDA ON	ON	KAPUSKASING A		Staffed	49° 24' 50.0" N	82° 28' 03.0" W
			KAPUSKASING CDA ON	71299	MSC auto	49° 24' 23.0" N	82° 26' 37.0" W
			KAPUSKASING A		Aviation staffed	49° 24' 42.0" N	82° 28' 06.0" W
71307	RIDGETOWN RCS	ON	RIDGETOWN AUTOMATIC CLIMATE STATION		MSC auto	42° 27' 00.0" N	81° 53' 00.0" W
			RIDGETOWN RCS	71307	MSC auto	42° 27' 00.0" N	81° 53' 00.0" W
71309	MOOSONEE RCS	ON	MOOSONEE A		MSC staffed	51° 17' 29.0" N	80° 36' 27.0" W
			MOOSONEE AWOS		MSC auto	51° 17' 00.0" N	80° 36' 00.0" W
			MOOSONEE RCS	71309	MSC auto	51° 17' 30.0" N	80° 37' 05.0" W
			MOOSONEE		Aviation auto	51° 17' 28.0" N	80° 36' 28.0" W
71311	NAPPAN AUTO	NS	NAPPAN CDA		Daily Climate	45° 46' 00.0" N	64° 15' 00.0" W
			NAPPAN AUTO	71311	MSC auto	45° 45' 34.4" N	64° 14' 29.2" W

71315	CHARLO AUTO	NB	CHARLO A		Aviation staffed	47° 59' 00.0" N	66° 20' 00.0" W
			CHARLO AUTO	71315	MSC auto	47° 59' 24.0" N	66° 20' 03.0" W
71317	DEBERT	NS	DEBERT		Daily Climate	45° 25' 00.0" N	63° 25' 00.0" W
			DEBERT	71317	MSC auto	45° 25' 00.0" N	63° 28' 00.0" W
71318	CORONATION CLIMATE	AB	CORONATION A		MSC staffed	52° 04' 00.0" N	111° 27' 00.0" W
			CORONATION (AUT)		MSC auto	52° 05' 00.0" N	111° 27' 00.0" W
			CORONATION CLIMATE	71318	MSC auto	52° 04' 27.0" N	111° 26' 58.0" W
71320	SANIRAJAK (HALL BEACH CLIMATE)	NU	HALL BEACH A		Staffed	68° 46' 33.0" N	81° 14' 33.0" W
			HALL BEACH AWOS		MSC auto	68° 46' 34.0" N	81° 14' 37.0" W
			SANIRAJAK (HALL BEACH CLIMATE)	71320	MSC auto	68° 46' 34.0" N	81° 14' 37.0" W
			SANIRAJAK AIRPORT (HALL BEACH A)		Aviation auto	68° 46' 33.0" N	81° 14' 33.0" W
71321	IQALUIT CLIMATE	NU	IQALUIT A		Aviation staffed	63° 45' 00.0" N	68° 33' 00.0" W
			IQALUIT CLIMATE	71321	MSC auto	63° 44' 50.0" N	68° 32' 40.0" W
			IQALUIT A		Aviation staffed	63° 45' 24.0" N	68° 33' 22.0" W

APPENDIX D – Station Join Threads (4 of 9)

Normals WMO ID	Normals Station Name	PROV	Composite Station Names	WMO ID	Station Type	Latitude	Longitude
71322	ARVIAT CLIMATE	NU	ARVIAT A		Aviation staffed	61° 06' 00.0" N	94° 04' 00.0" W
			ARVIAT CLIMATE	71322	MSC auto	61° 06' 00.0" N	94° 04' 00.0" W
71331	ISLAND FALLS (AUT)	SASK	ISLAND FALLS		Daily Climate	55° 32' 00.0" N	102° 21' 00.0" W
			ISLAND FALLS (AUT)	71331	MSC auto	55° 32' 00.0" N	102° 21' 00.0" W
71332	KUGLUKTUK CLIMATE	NU	KUGLUKTUK A		Aviation staffed	67° 49' 00.0" N	115° 08' 38.0" W

			KUGLUKTUK CLIMATE	71332	MSC auto	67° 49' 02.0" N	115° 08' 07.0" W
			KUGLUKTUK A		Aviation staffed	67° 49' 00.0" N	115° 08' 38.0" W
71355	ALERT CLIMATE	NU	ALERT		MSC auto	82° 31' 04.0" N	62° 16' 50.0" W
			ALERT CLIMATE	71355	MSC auto	82° 30' 00.0" N	62° 20' 00.0" W
71356	BAKER LAKE CLIMATE	NU	BAKER LAKE A		Aviation staffed	64° 17' 56.0" N	96° 04' 40.0" W
			BAKER LAKE CLIMATE	71356	MSC auto	64° 19' 00.0" N	96° 00' 00.0" W
			BAKER LAKE A		Aviation staffed	64° 17' 56.0" N	96° 04' 40.0" W
71357	QIKIQTARJUAQ CLIMATE	NU	QIKIQTARJUAQ A		Aviation staffed	67° 32' 45.0" N	64° 01' 53.0" W
			QIKIQTARJUAQ AWOS		MSC auto	67° 32' 45.0" N	64° 01' 53.0" W
			QIKIQTARJUAQ CLIMATE	71357	MSC auto	67° 32' 50.7" N	64° 02' 00.4" W
			QIKIQTARJUAQ A		Aviation auto	67° 32' 48.0" N	64° 01' 54.0" W
71361	HAY RIVER CLIMATE	NWT	HAY RIVER A		Aviation staffed	60° 50' 23.0" N	115° 46' 58.0" W
			HAY RIVER CLIMATE	71361	MSC auto	60° 50' 20.0" N	115° 46' 36.0" W
			HAY RIVER A		Aviation staffed	60° 50' 23.0" N	115° 46' 58.0" W
71362	FORT SMITH CLIMATE	NWT	FORT SMITH A		Aviation staffed	60° 01' 13.0" N	111° 57' 43.0" W
			FORT SMITH CLIMATE	71362	MSC auto	60° 01' 34.0" N	111° 55' 46.0" W
			FORT SMITH A		Aviation staffed	60° 01' 13.0" N	111° 57' 43.0" W
71363	GJOA HAVEN CLIMATE	NU	GJOA HAVEN A		Aviation staffed	68° 38' 08.0" N	95° 51' 01.0" W
			GJOA HAVEN CLIMATE	71363	MSC auto	68° 38' 08.0" N	95° 51' 01.0" W
71364	INUVIK CLIMATE	NWT	INUVIK A		Aviation staffed	68° 18' 15.0" N	133° 28' 58.0" W

			INUVIK CLIMATE	71364	MSC auto	68° 19' 00.0" N	133° 31' 00.0" W
			INUVIK A		Aviation staffed	68° 18' 14.0" N	133° 28' 59.0" W
71365	FORT SIMPSON CLIMATE	NWT	FORT SIMPSON A		Aviation staffed	61° 45' 37.0" N	121° 14' 12.0" W
			FORT SIMPSON CLIMATE	71365	MSC auto	61° 45' 37.0" N	121° 14' 12.0" W
			FORT SIMPSON A		Aviation staffed	61° 45' 37.0" N	121° 14' 12.0" W
71401	WARFIELD RCS	BC	WARFIELD		Daily Climate	49° 06' 00.0" N	117° 45' 00.0" W
			WARFIELD RCS	71401	MSC auto	49° 06' 43.0" N	117° 44' 20.0" W
71407	KUGAARUK CLIMATE	NU	KUGAARUK A		Aviation staffed	68° 32' 26.0" N	89° 47' 50.0" W
			KUGAARUK CLIMATE	71407	MSC auto	68° 32' 15.1" N	89° 47' 47.0" W
71434	PEAWANUCK (AUT)	ON	PEAWANUCK (AUT)	71434	MSC auto	54° 59' 00.0" N	85° 26' 00.0" W

APPENDIX D – Station Join Threads (5 of 9)

Normals WMO ID	Normals Station Name	PROV	Composite Station Names	WMO ID	Station Type	Latitude	Longitude
71446	SWIFT CURRENT CDA	SK	SWIFT CURRENT A		MSC auto	50° 18' 00.0" N	107° 41' 00.0" W
			SWIFT CURRENT CDA	71446	MSC auto	50° 16' 00.0" N	107° 44' 00.0" W
			SWIFT CURRENT		Aviation auto	50° 17' 31.0" N	107° 41' 26.0" W
71467	SACHS HARBOUR CLIMATE	NWT	SACHS HARBOUR A		Aviation staffed	72° 00' 00.0" N	125° 16' 00.0" W
			SACHS HARBOUR CLIMATE	71467	MSC auto	71° 59' 33.0" N	125° 15' 15.0" W
			SACHS HARBOUR A		Aviation auto	71° 59' 37.0" N	125° 14' 29.0" W
71480	NORMAN WELLS CLIMATE	NWT	NORMAN WELLS A		Aviation staffed	65° 16' 57.0" N	126° 48' 01.0" W
			NORMAN WELLS CLIMATE	71480	MSC auto	65° 17' 15.1" N	126° 45' 12.1" W

			NORMAN WELLS A		Aviation staffed	65° 16' 53.0" N	126° 47' 55.0" W
71493	PARRSBORO	NS	PARRSBORO		Daily Climate	45° 24' 00.0" N	64° 20' 00.0" W
			PARRSBORO	71493	MSC auto	45° 24' 48.0" N	64° 20' 46.1" W
71508	TORONTO CITY	ON	TORONTO		Daily Climate	43° 40' 00.0" N	79° 24' 00.0" W
			TORONTO CITY	71508	MSC auto	43° 40' 00.0" N	79° 24' 00.0" W
71550	DAUPHIN CS	MB	DAUPHIN A		MSC auto	51° 06' 00.0" N	100° 03' 00.0" W
			DAUPHIN CS	71550	MSC auto	51° 06' 01.4" N	100° 03' 24.8" W
			DAUPHIN		Aviation auto	51° 06' 03.0" N	100° 03' 09.0" W
71559	ESTEVAN	SK	ESTEVAN A		Daily Climate	49° 13' 00.0" N	102° 58' 00.0" W
			ESTEVAN A		Aviation staffed	49° 12' 37.0" N	102° 57' 57.0" W
			ESTEVAN	71559	MSC auto	49° 13' 00.0" N	102° 58' 00.0" W
			ESTEVAN A		Aviation auto	49° 12' 37.0" N	102° 57' 57.0" W
71573	DELHI CS	ON	DELHI CDA		Daily Climate	42° 52' 00.0" N	80° 33' 00.0" W
			DELHI CS	71573	MSC auto	42° 52' 00.0" N	80° 33' 00.0" W
71575	KINNGAIT (CAPE DORSET CLIMATE)	NU	CAPE DORSET A		Aviation staffed	64° 13' 49.0" N	76° 31' 30.0" W
			CAPE DORSET AWOS		MSC auto	64° 13' 48.0" N	76° 31' 36.0" W
			KINNGAIT (CAPE DORSET CLIMATE)	71575	MSC auto	64° 13' 50.7" N	76° 31' 49.6" W
			KINNGAIT AIRPORT (CAPE DORSET A)		Aviation auto	64° 13' 49.0" N	76° 31' 30.0" W
71576	POND INLET CLIMATE	NU	POND INLET A		Aviation staffed	72° 41' 22.0" N	77° 58' 08.0" W
			POND INLET AWOS		MSC auto	72° 41' 22.0" N	77° 58' 08.0" W
			POND INLET CLIMATE	71576	MSC auto	72° 41' 36.0" N	77° 57' 27.0" W
			POND INLET A		Aviation auto	72° 41' 22.0" N	77° 58' 08.0" W
71585	FORT MCMURRAY CS	AB	FORT MCMURRAY A		MSC staffed	56° 39' 00.0" N	111° 13' 00.0" W
			FORT MCMURRAY AWOS A		MSC auto	56° 39' 12.0" N	111° 13' 24.0" W

			FORT MCMURRAY CS	71585	MSC auto	56° 39' 04.0" N	111° 12' 48.0" W
			FORT MCMURRAY A		Aviation auto	56° 39' 12.0" N	111° 13' 24.0" W

APPENDIX D – Station Join Threads (6 of 9)

Normals WMO ID	Normals Station Name	PROV	Composite Station Names	WMO ID	Station Type	Latitude	Longitude
71586	LA RONGE RCS	SK	LA RONGE A		Aviation staffed	55° 09' 00.0" N	105° 16' 00.0" W
			LA RONGE RCS	71586	MSC auto	55° 08' 47.0" N	105° 16' 13.0" W
			LA RONGE A		Aviation staffed	55° 09' 05.0" N	105° 16' 01.0" W
71590	EDMUNDSTON	NB	EDMUNDSTON		Daily Climate	47° 20' 47.0" N	68° 11' 16.0" W
			EDMUNDSTON	71590	MSC auto	47° 25' 00.0" N	68° 19' 28.0" W
71594	FORT NELSON	BC	FORT NELSON A		Aviation staffed	58° 50' 11.0" N	122° 35' 50.0" W
			FORT NELSON A		Aviation staffed	58° 50' 11.0" N	122° 35' 49.0" W
			FORT NELSON	71594	MSC auto	58° 50' 29.0" N	122° 34' 27.0" W
71613	EUREKA CLIMATE	NU	EUREKA A		Daily Climate	79° 59' 00.0" N	85° 56' 00.0" W
			EUREKA CLIMATE	71613	MSC auto	79° 59' 21.0" N	85° 56' 02.0" W
			EUREKA A		Aviation staffed	79° 59' 40.0" N	85° 48' 43.0" W
			EUREKA A		Aviation auto	79° 59' 40.0" N	85° 48' 43.0" W
71622	LONDON CS	ON	LONDON INT'L AIRPORT		Aviation staffed	43° 01' 59.0" N	81° 09' 04.0" W
			LONDON CS	71622	MSC auto	43° 02' 00.0" N	81° 09' 00.0" W
			LONDON A		Aviation staffed	43° 01' 59.0" N	81° 09' 04.0" W
71632	LYNN LAKE RCS	MB	LYNN LAKE A		Daily Climate	56° 51' 50.0" N	101° 04' 34.0" W
			LYNN LAKE		MSC auto	56° 51' 50.0" N	101° 04' 34.0" W
			LYNN LAKE RCS	71632	MSC auto	56° 51' 00.4" N	101° 04' 00.0" W
			LYNN LAKE		Aviation auto	56° 51' 50.0" N	101° 04' 34.0" W

71665	NAIN	NFLD	NAIN A		Staffed	56° 33' 00.0" N	61° 41' 00.0" W
			NAIN	71665	MSC auto	56° 33' 00.0" N	61° 41' 00.0" W
			NAIN A		Aviation staffed	56° 33' 02.0" N	61° 40' 56.0" W
			NAIN A		Aviation auto	56° 33' 02.0" N	61° 40' 56.0" W
71693	SLAVE LAKE RCS	AB	SLAVE LAKE A		Staffed	55° 17' 00.0" N	114° 47' 00.0" W
			SLAVE LAKE AWOS A		MSC auto	55° 17' 35.0" N	114° 46' 38.0" W
			SLAVE LAKE		Aviation auto	55° 17' 35.0" N	114° 46' 38.0" W
			SLAVE LAKE RCS	71693	MSC auto	55° 17' 35.0" N	114° 46' 38.0" W
71695	THE PAS CLIMATE	MB	THE PAS A		Staffed	53° 58' 00.0" N	101° 06' 00.0" W
			THE PAS CLIMATE	71695	MSC auto	53° 58' 00.0" N	101° 06' 00.0" W
			THE PAS A		Aviation staffed	53° 58' 17.0" N	101° 05' 28.0" W
			THE PAS A		Aviation auto	53° 58' 17.0" N	101° 05' 28.0" W
71696	CHURCHILL CLIMATE	MB	CHURCHILL A		Aviation staffed	58° 44' 21.0" N	94° 03' 59.0" W
			CHURCHILL CLIMATE	71696	MSC auto	58° 44' 00.0" N	94° 04' 00.0" W
			CHURCHILL A		Aviation staffed	58° 44' 21.0" N	94° 03' 59.0" W

APPENDIX D – Station Join Threads (7 of 9)

Normals WMO ID	Normals Station Name	PROV	Composite Station Names	WMO ID	Station Type	Latitude	Longitude
71710	ILES DE LA MADELEINE	QUE	ILES DE LA MADELEINE A		Aviation staffed	47° 25' 00.0" N	61° 47' 00.0" W
			ILES DE LA MADELEINE	71710	MSC auto	47° 25' 31.0" N	61° 46' 29.0" W
			ILES DE LA MADELEINE A		Aviation staffed	47° 25' 30.0" N	61° 46' 41.0" W

71713	LA POCATIERE	QUE	LA POCATIERE CDA		Daily Climate	47° 21' 00.0" N	70° 02' 00.0" W
			LA POCATIERE	71713	MSC auto	47° 21' 21.0" N	70° 01' 55.0" W
71721	MANIWAKI AIRPORT	QUE	MANIWAKI AIRPORT	71721	MSC auto	46° 16' 29.0" N	75° 59' 31.0" W
71726	PARENT	QUE	PARENT S		Daily Climate	47° 55' 00.0" N	74° 37' 00.0" W
			PARENT	71726	MSC auto	47° 55' 20.0" N	74° 37' 27.0" W
71727	BAGOTVILLE A	QUE	BAGOTVILLE A	71727	Partner staffed	48° 20' 00.0" N	71° 00' 00.0" W
71741	KAMLOOPS AUT	BC	KAMLOOPS A		Aviation staffed	50° 42' 08.0" N	120° 26' 31.0" W
			KAMLOOPS A		Aviation staffed	50° 42' 09.0" N	120° 26' 55.0" W
			KAMLOOPS AUT	71741	MSC auto	50° 42' 08.0" N	120° 26' 31.0" W
71742	GANDER AIRPORT CS	NFLD	GANDER INT'L A		Staffed	48° 56' 47.0" N	54° 34' 37.0" W
			GANDER AIRPORT CS	71742	MSC auto	48° 56' 46.0" N	54° 34' 01.0" W
			GANDER INTL A		Aviation staffed	48° 56' 13.0" N	54° 34' 05.0" W
71744	MIRAMICHI RCS	NB	MIRAMICHI A		Staffed	47° 00' 34.1" N	65° 28' 04.4" W
			MIRAMICHI RCS	71744	MSC auto	47° 00' 34.0" N	65° 27' 54.0" W
71747	ATIKOKAN (AUT)	ON	ATIKOKAN MARMION		Daily Climate	48° 48' 00.0" N	91° 35' 00.0" W
			ATIKOKAN (AUT)	71747	MSC auto	48° 45' 40.0" N	91° 37' 41.0" W
71754	NORTH BATTLEFORD RCS	SK	NORTH BATTLEFORD A		Daily Climate	52° 46' 19.0" N	108° 15' 20.0" W
			NORTH BATTLEFORD		MSC auto	52° 46' 00.0" N	108° 15' 00.0" W
			NORTH BATTLEFORD		Aviation auto	52° 46' 09.0" N	108° 14' 37.0" W
			NORTH BATTLEFORD RCS	71754	MSC auto	52° 46' 19.0" N	108° 15' 20.0" W
71758	SYDNEY CS	NS	SYDNEY A		Staffed	46° 10' 00.0" N	60° 02' 53.3" W
			SYDNEY CS	71758	MSC auto	46° 09' 48.0" N	60° 02' 30.0" W

			SYDNEY A		Aviation staffed	46° 09' 41.0" N	60° 02' 53.0" W
71773	WHITEHORSE AUTO	YT	WHITEHORSE A		Aviation staffed	60° 42' 34.2" N	135° 04' 07.8" W
			WHITEHORSE AUTO	71773	MSC auto	60° 43' 59.0" N	135° 05' 52.0" W
			WHITEHORSE A		Aviation staffed	60° 42' 34.0" N	135° 04' 02.0" W
71779	QUESNEL AIRPORT AUTO	BC	QUESNEL A		Daily Climate	53° 01' 34.0" N	122° 30' 36.0" W
			QUESNEL AWOS		MSC auto	53° 01' 34.0" N	122° 30' 36.0" W
			QUESNEL AIRPORT AUTO	71779	MSC auto	53° 01' 36.0" N	122° 30' 23.0" W
			QUESNEL		Aviation auto	53° 01' 34.0" N	122° 30' 37.0" W
71783	VICTORIA UNIVERSITY CS	BC	VICTORIA UNIVERSITY CS	71783	MSC auto	48° 27' 25.2" N	123° 18' 16.6" W

APPENDIX D – Station Join Threads (8 of 9)

Normals WMO ID	Normals Station Name	PROV	Composite Station Names	WMO ID	Station Type	Latitude	Longitude
71813	NATASHQUAN AIRPORT (NATASHQUAN A)	QUE	NATASHQUAN A		Daily Climate	50° 11' 00.0" N	61° 49' 00.0" W
			NATASHQUAN AIRPORT	71813	MSC auto	50° 11' 24.0" N	61° 48' 39.0" W
			NATASHQUAN A		Aviation auto	50° 11' 24.0" N	61° 47' 20.0" W
71816	GOOSE A	NFLD	GOOSE A	71816	Partner staffed	53° 19' 00.0" N	60° 25' 00.0" W
71818	CARTWRIGHT A	NFLD	CARTWRIGHT		Staffed	53° 42' 30.0" N	57° 02' 06.0" W
			CARTWRIGHT A		Aviation staffed	53° 40' 57.0" N	57° 02' 31.0" W
			CARTWRIGHT A	71818	Aviation auto	53° 40' 57.0" N	57° 02' 31.0" W
71823	LA GRANDE IV	QUE	LA GRANDE IV A		Staffed	53° 45' 26.0" N	73° 40' 45.0" W
			LA GRANDE IV	71823	MSC auto	53° 45' 26.0" N	73° 40' 43.0" W
			LA GRANDE 4 A		Aviation auto	53° 45' 17.0" N	73° 40' 31.0" W

71827	LA GRANDE RIVIERE A	QUE	LA GRANDE RIVIERE A		Aviation staffed	53° 38' 00.0" N	77° 42' 00.0" W
			LA GRANDE RIVIERE A	71827	Aviation staffed	53° 37' 31.0" N	77° 42' 15.0" W
71834	GERALDTON A	ON	GERALDTON A		Staffed	49° 46' 58.1" N	86° 55' 50.1" W
			GERALDTON A	71834	Aviation staffed	49° 46' 43.0" N	86° 56' 19.0" W
71868	HUDSON BAY (AUT)	SK	HUDSON BAY A		Staffed	52° 49' 00.0" N	102° 19' 00.0" W
			HUDSON BAY		MSC auto	52° 49' 00.0" N	102° 19' 00.0" W
			HUDSON BAY (AUT)	71868	MSC auto	52° 49' 00.0" N	102° 19' 00.0" W
71884	YARMOUTH RCS	NS	YARMOUTH A		Staffed	43° 49' 51.0" N	66° 05' 19.0" W
			YARMOUTH RCS	71884	MSC auto	43° 49' 51.0" N	66° 05' 17.0" W
			YARMOUTH A		Aviation staffed	43° 49' 37.0" N	66° 05' 17.0" W
71894	ESTEVAN POINT CS	BC	ESTEVAN POINT		Partner staffed	49° 22' 59.9" N	126° 32' 35.2" W
			ESTEVAN POINT CS	71894	MSC auto	49° 22' 59.9" N	126° 32' 35.2" W
71906	KUUJJUAQ A	QUE	KUUJJUAQ A		Aviation staffed	58° 06' 00.0" N	68° 25' 00.0" W
			KUUJJUAQ A	71906	Aviation staffed	58° 05' 22.0" N	68° 25' 20.0" W
71907	INUKJUAK	QUE	INUKJUAK A		Aviation staffed	58° 28' 19.0" N	78° 04' 37.0" W
			INUKJUAK	71907	MSC auto	58° 28' 19.0" N	78° 04' 37.0" W
			INUKJUAK A		Aviation auto	58° 28' 19.0" N	78° 04' 37.0" W
71952	BURNS LAKE DECKER LAKE	BC	BURNS LAKE DECKER LAKE	71952	MSC auto	54° 22' 59.4" N	125° 57' 31.2" W
71956	GORE BAY CLIMATE	ON	GORE BAY A		MSC staff-auto	45° 53' 00.0" N	82° 34' 00.0" W
			GORE BAY AWOS		MSC auto	45° 53' 00.0" N	82° 34' 00.0" W
			GORE BAY-MANITOULIN		Aviation auto	45° 52' 54.0" N	82° 34' 02.0" W
			GORE BAY CLIMATE	71956	MSC auto	45° 53' 00.0" N	82° 34' 00.0" W

71966	DAWSON	YT	DAWSON A		Aviation staffed	64° 02' 35.0" N	139° 07' 40.0" W
			DAWSON	71966	MSC auto	64° 03' 39.1" N	139° 07' 36.0" W

APPENDIX D – Station Join Threads (9 of 9)

Normals WMO ID	Normals Station Name	PROV	Composite Station Names	WMO ID	Station Type	Latitude	Longitude
71984	PAULATUK	NWT	PAULATUK A		Aviation staffed	69° 21' 40.0" N	124° 04' 31.0" W
			PAULATUK	71984	MSC auto	69° 21' 28.0" N	124° 04' 57.0" W
71989	MOULD BAY CS	NWT	MOULD BAY A		MSC staffed	76° 14' 00.0" N	119° 20' 00.0" W
			MOULD BAY CAMP		Auto	76° 14' 00.0" N	119° 19' 00.0" W
			MOULD BAY CS	71989	MSC auto	76° 14' 15.1" N	119° 20' 50.0" W
73002	PRINCE ALBERT GLASS FIELD	SK	PRINCE ALBERT A		Aviation staffed	53° 13' 00.0" N	105° 40' 00.0" W
			PRINCE ALBERT A		Aviation staffed	53° 12' 52.0" N	105° 40' 23.0" W
			PRINCE ALBERT GLASS FIELD	73002	MSC auto	53° 12' 37.0" N	105° 40' 36.0" W
73017	SIOUX LOOKOUT AIRPORT	ON	SIOUX LOOKOUT A		Aviation staffed	50° 07' 00.0" N	91° 54' 00.0" W
			SIOUX LOOKOUT A		Aviation staffed	50° 06' 51.0" N	91° 54' 29.0" W
			SIOUX LOOKOUT AIRPORT	73017	MSC auto	50° 06' 51.0" N	91° 54' 20.0" W
73024	DANIEL'S HARBOUR	NFLD	DANIELS HARBOUR		MSC auto	50° 14' 11.0" N	57° 34' 52.0" W
			DANIEL'S HARBOUR	73024	MSC auto	50° 14' 09.0" N	57° 34' 51.0" W
73025	SABLE ISLAND	NS	SABLE ISLAND		MSC auto	43° 55' 56.0" N	60° 00' 34.0" W
			SABLE ISLAND	73025	MSC auto	43° 55' 53.0" N	60° 00' 30.0" W
			SABLE ISLAND A		Aviation auto	43° 55' 46.0" N	59° 57' 35.0" W
73026	PORT AUX BASQUES	NFLD	PORT AUX BASQUES		MSC auto	47° 34' 26.0" N	59° 09' 17.0" W

			PORT AUX BASQUES	73026	MSC auto	47° 34' 26.0" N	59° 09' 17.0" W
73075	SCHEFFER VILLE COTE- NORD	QUE	SCHEFFERVILLE A		Aviation staffed	54° 48' 00.0" N	66° 49' 00.0" W
			SCHEFFERVILLE		MSC auto	54° 48' 00.0" N	66° 48' 00.0" W
			SCHEFFERVILLE A		Aviation auto	54° 48' 19.0" N	66° 48' 19.0" W
			SCHEFFERVILLE COTE-NORD	73075	MSC auto	54° 48' 09.1" N	66° 48' 16.0" W

Notes:

- Threading is done on an element level. For the majority of elements, the station with RBCN designation is used in the threading as the current operating site. Some data is supplemented where there are co-located sites, often aviation sites, or for elements that are not measured at MSC auto stations (i.e. hail, thunder, visibility).
- Start and end dates reflect the earliest and latest dates used from each station for all elements, which may result in overlapping date ranges. However, no overlapping data are used in each composite elemental thread.

Cayman Islands, 1991-2020 Climatological Normals

The WMO Member provided data for one (1) station in a single CSV file. Additional information from the WMO Member is provided below this table.

Excel Files	CSV Files
N/A	OwenRobertIntlAirport_78384.csv

WMO Member EXPLANATORY NOTES

For file: OwenRobertIntlAirport_78384

TIME CONSTRAINT:

The station 78384 operates from 11Z – 03Z

MISSING VALUES:

Data was interpolated for missing data in max temperature, min temperature, relative humidity and cloud cover.

Data missing for days of thunder and rainfall were replaced with the value “0.0”.

Costa Rica, 1991-2020 Climatological Normals

The WMO Member provided data for four (4) stations in individual Excel files. NCEI converted each Excel file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note:

- 1) The annual Precipitation values for all stations were incorrectly provided as an average of the monthly values. NCEI recomputed the annual Precipitation normals as the sum of the monthly values and included the recomputed values in the CSV files.
- 2) Two sets of data for Parameter 2 (Number_of_Days_with_Precipitation_>=_1_mm) were provided in the Excel files. The second set in the Excel file is the total number of days over the 30-year period. NCEI removed the second instance in the CSV files.

The original Excel files are provided along with the CSV files.

Excel Files	CSV Files
DanielOduberInternationalAirport_78774.xls	DanielOduberInternationalAirport_78774.csv
JuanSantamariaInternationalAirport_78762.xls	JuanSantamariaInternationalAirport_78762.csv
PuertoLimon_78767.xls	PuertoLimon_78767.csv
TobiasBolanosPalmaAirport_78764.xls	TobiasBolanosPalmaAirport_78764.csv

Dominica, 1991-2020 Climatological Normals

The WMO Member provided data for two (2) stations in individual Excel files. NCEI converted each Excel file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note:

- 1) For station Douglas Charles Airport annual Total Sunshine was incorrectly computed as a mean rather than a sum of the monthly values in the Excel file provided by the WMO member. NCEI recomputed the annual Total Sunshine value for this station by summing the monthly values and placed this recomputed value in the CSV file DouglasCharlesAP_78905.csv.
- 2) For both stations, Parameter 2 annual value was incorrectly computed as an average rather than a sum of the monthly values in the Excel file provided by the WMO member. NCEI recomputed the annual DP01 for both stations by summing the monthly values. These recomputed values are in the respective CSV file for each station.

The original Excel files are provided along with the CSV files.

Excel Files	CSV Files
CanefieldAP_78906.xls	CanefieldAP_78906.csv
DouglasCharlesAP_78905.xls	DouglasCharlesAP_78905.csv

Dominican Republic, 1991-2020 Climatological Normals

The WMO Member provided data for 13 stations in a single Excel file with multiple spreadsheets. NCEI converted the Excel file spreadsheets to Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note:

- 1) NCEI found station La Romana (21199) to be corrupted and excluded this station from the set of CSV files.
- 2) NCEI found the latitude and longitude values for all stations to have been provided as decimal degrees. NCEI converted these to the DMS format in the CSV files.
- 3) For station LasAmericas (78485), Mean Sea Level Pressure appears to have been assigned to the Mean Vapor Pressure parameter in the original Excel file. NCEI reassigned these as Mean Sea Level Pressure in LasAmericas_78485.csv.
- 4) Mean Sea Level Pressure (Parameter 6) for Santiago (78460) appeared to be erroneous and all values were set to missing in the file Santiago_78460.csv.

The original Excel file is provided along with the CSV files.

Excel Files	CSV Files
DominicanRepublic_WMO_Normals_9120.xls	ALaUnion_78457.csv ArroyoBarril_78466.csv Barahona_78482.csv Bayaguana_78473.csv Cabrera_78464.csv Jimani_78480.csv LasAmericas_78485.csv MonteCristi_78451.csv PuntaCana_78479.csv Santiago_78460.csv SantoDomingo_78486.csv SDeLaMar_78467.csv

El Salvador, 1991-2020 Climatological Normals

The WMO Member provided data for five (5) stations in a single Excel file with multiple spreadsheets. NCEI converted the Excel file spreadsheets to Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note that NCEI computed annual Normal for Mean Maximum Temperature for Santa Ana from the monthly Normals to fill in a missing value.

The original Excel file is provided along with the CSV files.

Excel Files	CSV Files
ElSalvador_WMO_Normals_9120.xlsx	ACAJUTLA_78650.csv ILOPANGO_78663.csv LaUnion_78672.csv SanMiguel_78670.csv SantaAna_78655.csv

Grenada*, 1991-2020 Climatological Normals

This Non-WMO Member provided data for one (1) station in a single Excel file. NCEI converted the Excel file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

The original Excel file is provided along with the CSV file.

Excel Files	CSV Files
MauriceBishopIntlAirport_78958.xlsx	MauriceBishopIntlAirport_78958.csv

***Non-WMO Member**

Guatemala, 1991-2020 Climatological Normals

The WMO Member provided data for 36 stations in individual Comma Separated Values (CSV) files.

The list of all CSV files is provided below.

Excel Files	CSV Files
N/A	AlamedaICTA_NA.csv AsuncionMita_NA.csv Camotan_NA.csv Catarina_NA.csv Chinique_NA.csv Chixoy_NA.csv Coban_78631.csv Cubulco_NA.csv ElCapitan_NA.csv ElTablon_NA.csv Esquipulas_NA.csv Flores_78615.csv Huehuetenango_78627.csv INSIVUMEH_78640.csv LaborOvalle_NA.csv LaFragua_78649.csv LasVegas_NA.csv LaUnion_NA.csv LosAltos_78629.csv LosEsclavos_NA.csv Montufar_NA.csv Nebaj_NA.csv Pasabien_NA.csv PotreroCarrillo_NA.csv PuertoBarrios_78637.csv PuertoSanJose_78647.csv Quesada_NA.csv Retalhuleu_78639.csv Sacapulas_NA.csv SanJeronimo_NA.csv SanMartinJilotepeque_NA.csv SanPedroNecta_NA.csv SantaCruzBalanya_NA.csv SantiagoAtitlan_NA.csv SuizaContenta_NA.csv TodosSantos_NA.csv

Jamaica, 1991-2020 Climatological Normals

The WMO Member provided data for two (2) stations in a single Excel file containing two spreadsheets. NCEI converted the Excel spreadsheets to Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

The original Excel file is provided along with the CSV files.

Excel Files	CSV Files
Jamaica_WMO_Normals_9120.xlsx	KingstonNormanManley_78397.csv MontegoBaySangster_78388.csv

Mexico, 1991-2020 Climatological Normals

The WMO Member provided data for 19 stations in individual Excel files. NCEI converted each Excel file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note:

- 1) the CSV files were renamed to adhere to the Normals standard format.
- 2) Total Sunshine for three (3) stations appeared to be inaccurate and were set to missing in the CSV files. Chihuahua_76225.csv, CiudadGuizman_76656, and LaBufa_76525.csv.
- 3) NCEI corrected the Latitude for Durango (76423) from 4.095 to 24.095 in Durango_76423.csv.

The original Excel files are provided along with the CSV files for all stations.

Excel Files	CSV Files
1991-2020_Acapulco.xlsx	Acapulco_76805.csv
1991-2020_Chihuahua.xlsx	Chihuahua_76225.csv
1991-2020_Ciudad_Guzmán.xlsx	CiudadGuizman_76656.csv
1991-2020_Durango.xlsx	Durango_76423.csv
1991-2020_Guanajuato.xlsx	Guanajuato_76577.csv
1991-2020_Huajuapán_de_León.xlsx	HuajuapánDeLeón_76773.csv
1991-2020_La_Bufa.xlsx	LaBufa_76525.csv
1991-2020_Manzanillo.xlsx	Manzanillo_76654.csv
1991-2020_Monterrey.xlsx	Monterrey_76393.csv
1991-2020_Morelia.xlsx	Morelia_76665.csv
1991-2020_Salttillo.xlsx	Salttillo_76390.csv
1991-2020_Sombrerete.xlsx	Sombrerete_76471.csv
1991-2020_Tacubaya.xlsx	Tacubaya_76680.csv
1991-2020_Toluca.xlsx	Toluca_76675.csv
1991-2020_Torreón.xlsx	Torreón_76382.csv
1991-2020_Tulancingo.xlsx	Tulancingo_76634.csv
1991-2020_Tuxpan.xlsx	Tuxpan_76640.csv
1991-2020_Veracruz.xlsx	Veracruz_76692.csv
1991-2020_Xalapa.xlsx	Xalapa_76687.csv

Saint Lucia, 1991-2020 Climatological Normals

The WMO Member provided data for two (2) stations in a single Excel file containing two spreadsheets. NCEI converted the Excel spreadsheets to Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

The original Excel file is provided along with the CSV files.

Excel Files	CSV Files
SaintLucia_WMO_Normals_9120.xlsx	GEORGE_F_L_CHARLES_78947.csv HEWANORRA_78948.csv

Curacao and Sint Maarten, 1991-2020 Climatological Normals

The WMO Member provided data for one (1) station in a single Excel file. NCEI converted the Excel file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

The original Excel file is provided along with the CSV file.

Excel Files	CSV Files
CLINO_SINT_MAARTEN.xlsx	PRINCESS_JULIANA_INTERNATIONAL_AIRPORT_78866.csv

Saint Kitts and Nevis*, 1991-2020 Climatological Normals

This Non-WMO Member provided data for one (1) station in a single Excel file. NCEI converted the Excel file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

The original Excel file is provided along with the CSV file.

Excel Files	CSV Files
RLBradshawIntAirport_78858.xls	RLBradshawIntAirport_78858.csv

***Non-WMO Member**

Trinidad and Tobago, 1991-2020 Climatological Normals

The WMO Member provided data for one (1) station in a single Excel file. NCEI converted the Excel file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

The original Excel file is provided along with the CSV file.

Excel Files	CSV Files
Piarco_78970.xls	Piarco_78970.csv

United States, 1991–2020 Climatological Normals

The WMO Member provided data for 515 stations in individual comma separated values (CSV) files. Information from the WMO Member is provided below.

Additional Explanatory Information provided by the WMO Member

The science and methodologies used to generate official climate normals for the United States were well established during the creation of the 1981–2010 U.S. Climate Normals. A team of NCEI researchers spent considerable time and effort improving and automating these processes, particularly for daily and hourly normals. These methods are documented in a series of five peer-reviewed publications (Applequist et al. 2012; Arguez et al. 2012; Arguez and Applequist 2013; Durre et al. 2013; Durre and Squires 2015).

The 1991–2020 Normals calculation software was updated to incorporate feedback and recommendations from [WMO Guidelines on the Calculation of Climate Normals](#) (No. 1203) published in 2017, as well as users requests for calculation changes and new normals variables. These changes are summarized in the U.S. [Normals Calculation Methodology 2020 document](#), along with additional technical documentation released with 1981–2010 Normals.

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