

**CLIMATE REFERENCE STATION
SASKATOON
ANNUAL SUMMARY 2021**

V. Wittrock
Saskatchewan Research Council
Environmental Performance & Climate



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COVER PHOTOGRAPHS

Report cover: Diffuse Radiation with autoshield

Inside cover: The Saskatoon SRC Climate Reference Station January 2021

photo credit: V. Witrock

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This report is being provided for informational purposes only. While the SRC believes this report to be accurate, it may contain errors or inaccuracies. SRC assumes no responsibility for the accuracy or comprehensiveness of this data and reliance on this data is entirely at the user's own risk.

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Enquiries concerning the SRC Saskatoon Climate Reference Station (CRS), its data, measurement programs and publications or becoming a supporter are most welcome. For further information contact:

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 Monthly data sheets and annual summaries: <http://src.nu/crsdata>

SASKATCHEWAN RESEARCH COUNCIL
CLIMATE REFERENCE STATION SUPPORTERS, 2021-2022
WE GRATEFULLY ACKNOWLEDGE THE SUPPORT OF THE FOLLOWING:



SRC'S SASKATOON CLIMATE REFERENCE STATION HISTORY

Meteorological observations at or near Saskatoon were first taken by the Northwest Mounted Police in 1889 with the recording of temperature. There is some disagreement in the early records as to the exact location of the weather observing point, but the majority of the evidence indicates 52 15'N, 106 20'W, elevation 480m above sea level as the most probable location. This would place it at Clark's Crossing on the South Saskatchewan River, approximately 16 km northeast of the centre of the City of Saskatoon. At that time, there was a settlement at Clark's Crossing as well as 10 to 15 families on either side of the river where Saskatoon is now located.

Little is known about the very early observers; however, the records do show that Major T.H. Keenan took observations from March 1892 until March 1895, and Mr. George Will was the observer from January 1897 until April 1897. It is thought that T.H. Copeland was involved in the observational program from 1895 to 1 May 1901, at which time it was taken over by Mr. Eby, Sr. Mr. Eby Sr. recorded the observations until his death in 1921, at which time his daughter (E.S. Eby) continued to record the observations. Her brother (J.M. Eby) recorded the observations beginning in April 1931 until the station closed on 31 October 1942. The Eby station recorded temperature, precipitation and weather notes on fog, thunderstorms, winds and any unusual weather phenomena. Reports were made twice daily (morning and evening).

In 1916, a climate reference station was established by the University of Saskatchewan and continuous observations were kept twice daily until 15 January 1965. The longtime observer was Mr. Sidney Cox. The SRC took over the program in the fall of 1963 and moved it to a new location 52 09'N, 106 36'W and elevation 497 m above sea level¹. The first observer was Terry Beck followed three years later by Orville Olm². In 1967, Joe Calvert became the primary observer until his retirement in 1983. Ray Begrand succeeded Mr. Calvert until 1988 when Virginia Wittrock became the primary observer. Carol Beaulieu became primary observer in 1992 until her retirement summer of 2014. Virginia Wittrock is project manager (1992 to present) and primary observer. Assistance with the site maintenance from 2014 to present was provided by Ken Babich, Graham Epp and Ryan Jansen.

In the summer of 1992, Saskatoon CRS began to be converted to an automated system of data collection with the installation of a Campbell Scientific data logger and automatic sensors. The updating, replacing, re-installing and adding of new sensors began in 2009 and was completed in 2012. Elements presently recorded at the Saskatoon CRS are temperature (maximum and minimum), precipitation, relative humidity, snow depth, wind (speed and direction), solar radiation (bright sunshine, global and diffuse), barometric pressure, grass level temperature, soil temperature (seven levels), and soil moisture (three levels). Soil moisture instruments became operational June 2019.

¹Christiansen 1970; Environment Canada 1975; ²Olm 2001

Mr. James Eby was one of the original members of the Temperance Colony Society. He filed his homestead in 1882 and returned with his family in 1883. He was the first president of the school board and served as the township supervisor for Nutana. While riding a horse in 1890, he was struck by lightning and was a partial invalid thereafter. In 1901, he and his daughter moved to Nutana where he served as a Federal Meteorologist for the next 20 years until his death in 1921 at the age of 77. He was buried, next to his wife, in the Nutana pioneer cemetery.¹

¹Ladd, 2008



photo: C. Beaulieu

WHAT IS THE CLIMATE REFERENCE STATION?

The Saskatchewan Research Council's Climate Reference Station (SRC CRS) at Saskatoon is classified as a principal climatological station with supplementary climatological observations¹. A climate reference station's data are intended for the purpose of determining climatic trends. This requires long periods (not less than thirty years) of homogeneous records, where man-made environmental changes have been or are expected to remain at a minimum. Ideally the records should be of sufficient length to enable the identification of secular changes of climate². At CRS Saskatoon, half-hourly readings are taken of elements (temperature, precipitation amount, humidity, wind and atmospheric pressure). Supplemental observations include rainfall intensity, soil temperature, bright sunshine, solar radiation (diffuse and global), snow depth, relative humidity, barometric pressure, soil moisture and grass level temperature. High quality and consistent climatological observations are maintained providing data sets to meet the current concerns of the effects of climatic change and increased variability.

Purpose and Benefits

The purpose of the SRC CRS is to provide a record of observed meteorological elements in order that the climate of the area and its changes can be accurately documented and described. Climatological data have assumed new importance as a result of social and environmental issues in which climate is a dominant factor. Climatological information assists in realizing new technological opportunities and social changes. It is necessary and valuable for areas such as agriculture, forestry, land use and facility placement, water and energy resources, as well as health and comfort.

The CRS allows us to:

- Evaluate long-term climatic trends – early warning system for increased frequencies of extreme events such as floods, droughts, etc.;
- Determine the impacts of climate events on society, economy, health and ecosystems – e.g., intense rainfall causing flooding and property damage, heat stress with its health implications;
- Do value-added research;
- Be part of regional, national and global networks in important agricultural and ecological areas;
- Facilitate development of additional programs – e.g., air quality, biodiversity and climate change monitoring;
- Have roles in various programs within SRC including spray drift work, Boreal Ecosystem Atmospheric Study (BOREAS), and collaborative research with the Western College of Veterinary Medicine and the College of Agriculture, University of Saskatchewan; and
- Provide climate data to various industries, government organizations, non-government organizations, media outlets, institutions of learning, and interested individuals.

Goals

The goals of the CRS are first to maintain the high quality of data gathered over its fifty plus years of existence at its current location and, second to continue to monitor a large variety of elements. These various elements combined with the long-term collection period as well as the stable location allow SRC CRS at Saskatoon to be an extremely valuable climate information collection station.

¹Environment Canada 1992 ²World Meteorological Organization 1988

ACTIVITIES ASSOCIATED WITH THE SASKATOON CLIMATE REFERENCE STATION, 2021

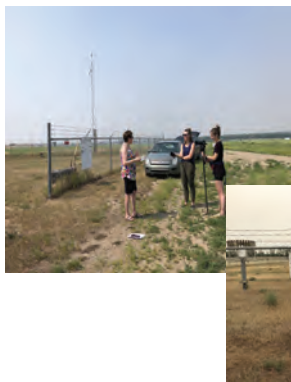
The Saskatoon Climate Reference Station (CRS) had another busy year of activities. We continued to share important climate information from the CRS through monthly e-mails, media interviews, presentations and various social media. Monthly and annual climate information from both SRC’s Saskatoon and Conservation Learning Centre CRSs is available online (<http://src.nu/crsdata>). Over the last 55+ years, SRC provided hands-on experience with our weather instruments to hundred of students (young and older), and gave presentations highlighting Saskatoon’s climate: past, present and future. Like many events in the COVID-19 pandemic years of 2020 and 2021, most site tours had to be cancelled. It is a very good thing we have a virtual tour of our Saskatoon CRS available. The virtual tour can be found at: <http://src.nu/1OLBg5H>.

Even though we had to put school and large(r) tours on pause due to the pandemic, we were still able to host some smaller tours of the site. One was to allow my Environment and Climate Change Canada (ECCC) colleague and a local media outlet to use the SRC CRS Saskatoon as a backdrop for a media interview. The other was to tour a colleague from the Agriculture and Bioresources College from the University of Saskatchewan around the station. They have experimental plots in close proximity to the station and rely on data from CRS Saskatoon.

Walking into the CRS Saskatoon during the winter of 2020 / 2021 got very old very fast, so we automated the diffuse shade ring allowing us to move the ring remotely. Cameras and hydraulics that can work in both hot and freezing cold weather have made my life much easier plus have increased the security on site.

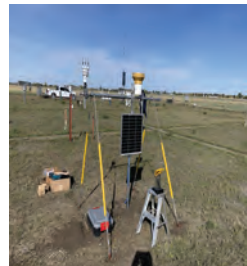
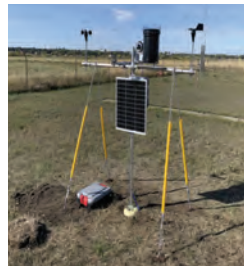
One of the benefits of having such a large footprint for the climate reference station is that we can run experiments on site. We have been testing three different “small foot-print” weather stations at CRS Saskatoon. This experiment is to determine the reliability, accuracy and instrumentation robustness as compared to our high-end climate station. The results have been promising.

SRC had a major IT issue in the fall of 2021. This resulted in us not being able to access data from the datalogger for about three months. Unknown to us was the power went out in mid-September. This resulted in us losing some data in October from a few instruments. A larger battery back-up system was installed as a result of this incident.



Saskatoon CRS SRC being utilized as by a backdrop for an ECCC media interview 13 July 2021 (left); Colleague from the Agriculture and Bioresources College, University of Saskatchewan 16 Aug 2021 (below)) Photos: V. Wittrock

Automatic Diffuse Radiation Ring 11 March 2021 Photo: V. Wittrock



Small foot-print weather stations comparison experiment 21 Sept 2021 Photos: V. Wittrock

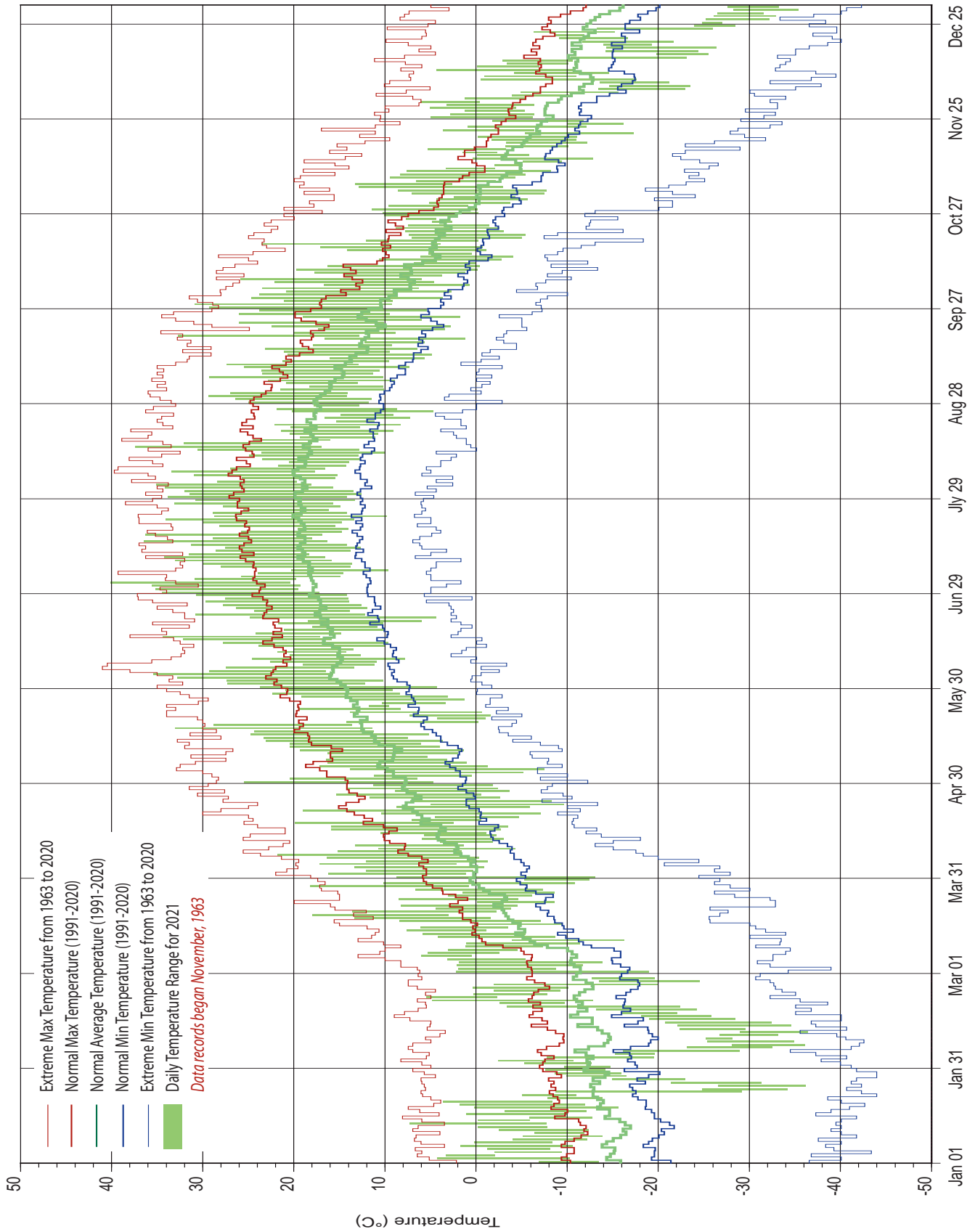
SUMMARY FOR 2021

Data, including temperature, precipitation, wind speed and direction, bright sunshine, solar radiation, soil temperature, snow depth and soil moisture levels were recorded at the Saskatchewan Research Council's (SRC) Climate Reference Station (CRS) (52 09'N, 106 36'W, 497m asl) in Saskatoon, SK during 2021. It is compared in this report with the long-term (circa 1963-2020) and standard-period/normal (1991-2020) record.

The Saskatchewan Research Council Climate Reference Station in Saskatoon synopsis of the year:

- 35 days with temperatures at or greater than 30C in Saskatoon.
- One day with above 40C temperature (02 July 2021; 40.1C)
- 15 days with temperatures at or below -30C (coldest for the year was 11 February 2021; -36.4C)
- Fourth highest maximum temperature over the period of record
- Twelfth highest minimum temperature over the period of record
- Sixth highest mean temperature over the period of record
- Every season had well above normal temperatures
- July was hot hot hot
 - Broke number of growing degree days record
 - Broke number of cooling degree days record
 - Really broke number of extreme cooling degree days record
- 2021 was definitely dry. It was the second driest year on record (167.6mm). The driest year was 2001 with 165.8mm.
 - Winter was the third driest year on record
 - Spring was the tenth driest
 - Summer was the driest
 - Fall was the fifth driest
- The continuous snow cover of the winter of 2020 to 2021 was from 08 November 2020 to 12 March 2021.
- The snowpack's deepest level was measured on 20 November 2021 with a depth of 17cm.
- The lack of precipitation and cloud resulted in lots of bright sunny days. Twelfth sunniest year on record. HOWEVER, there were a lot of smokey days.
- Peak wind for the year was in January with a wind gust of 87.3 km/hr.
- 2021 had 13 days of gale winds and four days of strong gale winds.
- While there were no days in 2021 that measured temperatures at or below -40C, when the wind was included to obtain windchill, Saskatoon had 20 days of "high risk" to "very high risk" days (see windchill calculation chart).

DAILY TEMPERATURE



TEMPERATURE

2021 TEMPERATURE RECORDS									
	TYPE	DATE		NEW RECORD °C	OLD RECORD °C	YEAR	DAY		
		Month	Day						
Daily	Maximum	Highest	January	13	7.3	3.5	1986		
			February	22	5.5	5.0	1981		
			March	18	13.4	11.3	2017		
				19	18.0	13.5	2001		
				20	13.6	12.1	2019		
				28	18.2	17.2	2010		
			May	17	33.0	30.0	1964		
			June	3	35.5	35.0	1988		
				29	34.5	34.0	1984		
				30	35.2	34.7	2008		
			July	1	35.6	30.5	1988		
				2	40.1	33.0	1986		
				9	33.1	32.0	1980		
				15	36.5	33.3	2001		
			August	17	36.3	35.2	2003		
				2	35.1	33.8	2019		
				14	37.5	33.5	1992		
			September	18	32.7	32.2	1966		
				27	29.3	28.3	2011		
				28	30.9	28.9	1970		
			October	17	23.6	23.5	1986		
	Lowest	February	10	-26.7	-24.2	2008			
			11	-28.9	-23.9	1979			
			20	4.3	6.9	2009			
	Minimum	Highest	February	22	-2.3	-3.5	1984		
			March	19	3.1	0.8	2000		
			June	2	15.9	14.8	2017		
				15	17.1	17.0	1989		
				30	19.6	18.5	1989		
			July	1	19.3	17.5	1990		
				2	20.4	15.5	1982		
				3	19.8	18.3	2013		
				16	18.0	17.8	1964		
			August	3	19.7	19.1	2003		
				15	18.0	16.0	1991		
			September	18	12.8	12.3	2009		
			Lowest	February	11	-36.4	-35.5	1981	
					April	24	-8.3	-7.2	2002
					May	4	-7.5	-6.7	2002
	Mean	Highest	January	13	-0.2	-0.8	1986		
			February	22	1.6	0.5	1981		
			March	18	6.0	5.9	2012		
19				10.6	5.7	2017			
20				5.7	5.0	2019			
28				9.5	8.0	2010			
May			17	22.2	21.8	1988			
June			2	24.4	23.4	2006			
			3	25.6	25.0	1970			
			15	25.8	25.0	1987			
			29	25.9	25.3	1984			
July			30	27.4	26.3	1989			
			1	27.5	23.7	2003			
			2	30.3	22.8	1986			
			3	25.4	24.8	1996			
			9	24.5	24.3	1997			
			11	25.0	24.7	1964			
			15	26.5	24.7	2002			
August			17	26.6	25.4	2003			
			2	26.6	25.3	1989			
			14	27.3	24.1	2003			
			15	25.1	24.5	1973			
September			18	22.8	21.8	1994			
			28	20.1	18.6	1967			
Lowest			February	10	-29.9	-29.8	1988		
				11	-32.7	-28.8	1981		
				20	1.7	3.2	2009		
				21	2.9	3.5	1992		

TEMPERATURE

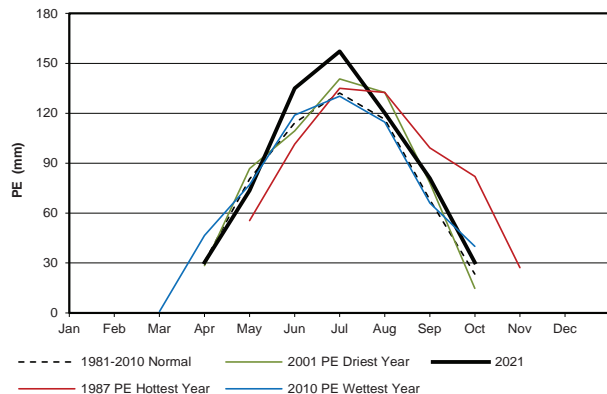
2021 TEMPERATURE RECORDS							
	TYPE	DATE		NEW RECORD °C	OLD RECORD °C	YEAR	DAY
		Month	Day				
Monthly	Highest Extreme Mean Monthly Temperature	July	2	30.3	29.5	1984	28
	Highest Extreme Maximum Monthly Temperature	July	2	40.1	39.3	2001	5
	Highest Average Maximum Monthly	March		5.4	5.2	2012	
		July		30.1	28.5	2007	
Highest Average Minimum Monthly	July		15.0	15.0	2007		

2021 EXTREME TEMPERATURES			
COLD (less than or equal to -30°C)		HOT (greater than or equal to 30°C)	
DATE	TEMPERATURE °C	DATE	TEMPERATURE °C
24-Jan	-34.2	17-May	33.0
25-Jan	-36.2	2-Jun	32.8
26-Jan	-31.3	3-Jun	35.5
6-Feb	-32.5	14-Jun	32.2
7-Feb	-36.1	15-Jun	34.4
8-Feb	-34.9	22-Jun	30.8
10-Feb	-33.1	28-Jun	30.7
11-Feb	-36.4	29-Jun	34.5
13-Feb	-34.6	30-Jun	35.2
14-Feb	-32.4	1-Jul	35.6
27-Dec	-32.2	2-Jul	40.1
28-Dec	-32.9	3-Jul	30.9
29-Dec	-31.6	8-Jul	30.0
30-Dec	-35.4	9-Jul	33.1
31-Dec	-33.2	10-Jul	34.3
		11-Jul	31.6
		14-Jul	31.3
		15-Jul	36.5
		17-Jul	36.3
		21-Jul	30.0
		22-Jul	34.1
		27-Jul	33.1
		28-Jul	30.8
		29-Jul	33.8
		30-Jul	31.5
		31-Jul	32.0
		1-Aug	34.2
		2-Aug	35.1
		5-Aug	31.0
		6-Aug	33.5
		13-Aug	30.6
		14-Aug	37.5
		15-Aug	32.1
		18-Sep	32.7
		28-Sep	30.9

Coloured cells indicate extremes for the year

POTENTIAL EVAPOTRANSPIRATION (PE) using the Thornthwaite Method¹

MONTH	PE (mm) 2021	PE (mm) 2010 Wettest Year	PE (mm) 2001 Driest Year	PE (mm) 1987 Hottest Year	PE (mm) 1981-2010 Normal
Jan	0	0	0	0	0
Feb	0	0	0	0	0
Mar	0	0.9	0	0	0
Apr	30.4	46.5	28.5	55.5	30.9
May	73.7	77.0	86.8	101.4	80.5
June	134.9	118.8	109.3	135.0	114.2
July	157.2	130.2	140.6	132.5	132.1
Aug	120.1	114.6	132.4	99.2	116.3
Sept	81.0	66.1	78.1	82.1	67.9
Oct	30.4	40.1	14.8	27.3	23.4
Nov	0	0	0	0	0
Dec	0	0	0	0	0
Total	627.7	594.3	590.4	632.9	565.4

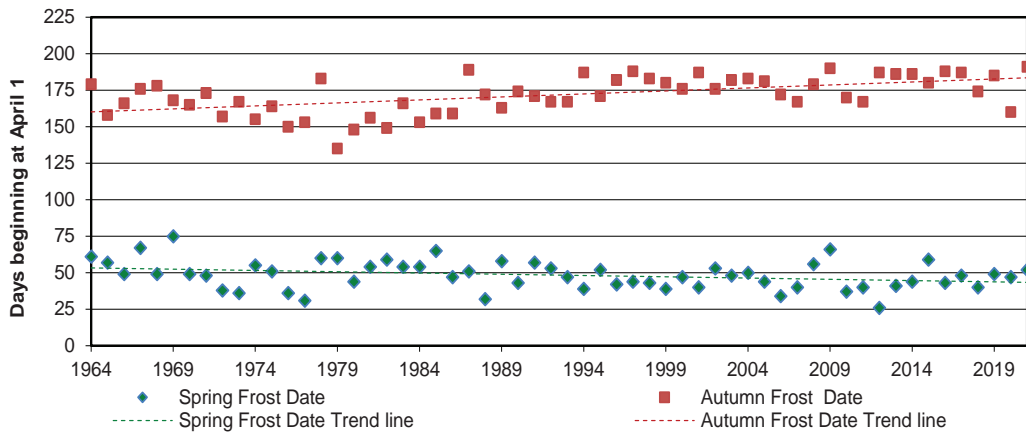
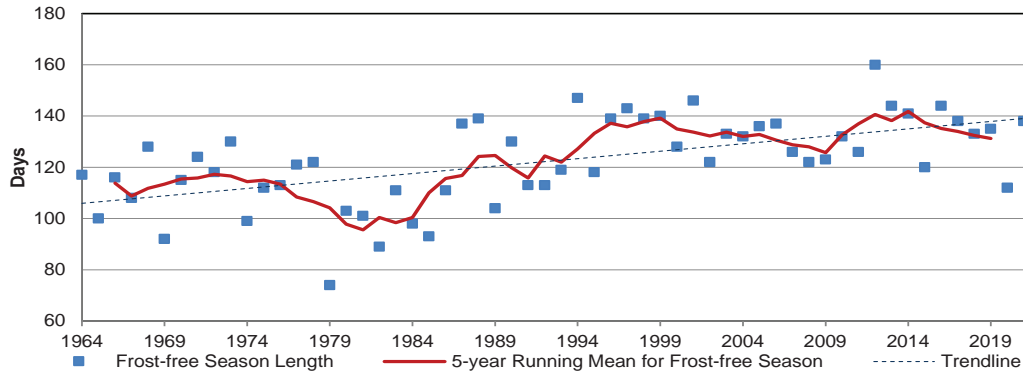


¹Thornthwaite and Mather 1955
Thornthwaite 1948



Temperature and Relative Humidity Sensors (automated)
 July 2021
 (Photo: V. Wittrock)

DATES & DURATION OF THE FROST-FREE SEASON			
YEAR	LAST SPRING FROST	FIRST FALL FROST	Frost-free Season Length
1964	May 31	Sept 26	117
1965	May 27	Sept 05	100
1966	May 19	Sept 13	116
1967	Jun 06	Sept 23	108
1968	May 19	Sept 25	128
1969	Jun 14	Sept 15	92
1970	May 19	Sept 12	115
1971	May 18	Sept 20	124
1972	May 08	Sept 04	118
1973	May 06	Sept 14	130
1974	May 25	Sept 02	99
1975	May 21	Sept 11	112
1976	May 06	Aug 28	113
1977	May 01	Aug 31	121
1978	May 30	Sept 30	122
1979	May 30	Aug 13	74
1980	May 14	Aug 26	103
1981	May 24	Sept 03	101
1982	May 29	Aug 27	89
1983	May 24	Sept 13	111
1984	May 24	Aug 31	98
1985	Jun 04	Sept 06	93
1986	May 17	Sept 06	111
1987	May 21	Oct 06	137
1988	May 02	Sept 19	139
1989	May 28	Sept 10	104
1990	May 13	Sept 21	130
1991	May 27	Sept 18	113
1992	May 23	Sept 14	113
1993	May 17	Sept 14	119
1994	May 09	Oct 04	147
1995	May 22	Sept 18	118
1996	May 12	Sept 29	139
1997	May 14	Oct 05	143
1998	May 13	Sept 30	139
1999	May 09	Sept 27	140
2000	May 17	Sept 23	128
2001	May 10	Oct 04	146
2002	May 23	Sept 23	122
2003	May 18	Sept 29	133
2004	May 20	Sept 30	132
2005	May 14	Sept 28	136
2006	May 04	Sept 19	137
2007	May 10	Sept 14	126
2008	May 26	Sept 26	122
2009	June 05	Oct 07	123
2010	May 07	Sept 17	132
2011	May 10	Sept 14	126
2012	April 26	Oct 04	160
2013	May 11	Oct 04	144
2014	May 14	Oct 03	141
2015	May 29	Sept 27	120
2016	May 13	Oct 05	144
2017	May 18	Oct 04	138
2018	May 10	Sept 21	133
2019	May 17	Oct 02	135
2020	May 15	Sept 07	112
2021	May 22	Oct 08	138
1991-2020 Normal	May 16	Sept 28	132
1981-2010 Normal	May 18	Sept 20	124



Clouds
June 2021
(Photo: V. Wittrock)

TEMPERATURE RANKINGS

AVERAGE ANNUAL TEMPERATURES °C					
MAXIMUM TEMP		MINIMUM TEMP		MEAN TEMP	
1987	11.6	2016	0.1	1987	5.4
2001	10.8	2015	-0.7	2016	5.3
1981	10.5	1987	-0.8	2015	4.8
2021	10.5	2006	-1.3	2001	4.6
2016	10.4	2012	-1.3	1981	4.5
2015	10.2	1999	-1.4	2021	4.5
1988	10.1	2017	-1.4	1998	4.3
1998	10.1	2010	-1.5	1999	4.2
1999	9.8	1981	-1.5	2006	4.2
2017	9.7	1998	-1.5	2017	4.2
2006	9.6	2005	-1.6	2012	4.0
2011	9.6	2021	-1.6	1988	3.9
1976	9.5	2001	-1.6	2011	3.8
1997	9.5	2011	-2.1	2005	3.8
2003	9.3	2007	-2.2	2010	3.7
2012	9.3	2020	-2.2	1997	3.5
2005	9.1	1988	-2.3	2003	3.4
1986	9.0	1997	-2.4	2020	3.4
2020	9.0	2003	-2.5	1991	3.2
1991	8.9	1993	-2.5	1986	3.2
2010	8.9	1991	-2.5	2007	3.2
2000	8.8	1992	-2.5	1976	3.0
1984	8.7	1986	-2.6	1992	3.0
1990	8.7	2018	-2.7	2000	3.0
1977	8.6	2004	-2.8	1984	2.9
1980	8.6	2002	-2.9	1993	2.8
2007	8.6	2014	-2.9	2004	2.8
1992	8.5	1984	-2.9	2018	2.8
2008	8.5	2000	-2.9	2002	2.8
2002	8.5	1964	-2.9	1964	2.7
1994	8.5	1994	-3.2	1994	2.7
2004	8.4	2019	-3.2	2008	2.6
1989	8.3	1983	-3.2	1990	2.6
2018	8.3	2008	-3.3	1977	2.5
1964	8.2	2013	-3.3	2019	2.4
1993	8.1	1995	-3.4	1980	2.4
2019	8.1	1968	-3.4	2014	2.4
1995	7.9	1976	-3.5	1989	2.3
1973	7.8	1990	-3.6	1995	2.3
1968	7.7	1977	-3.6	1983	2.2
2009	7.7	1989	-3.8	2013	2.2
2013	7.7	1980	-3.8	1968	2.2
1983	7.7	2009	-3.8	2009	2.0
2014	7.6	1973	-4.0	1973	1.9
1978	7.4	1970	-4.0	1970	1.7
1970	7.3	1978	-4.6	1978	1.4
1974	7.1	1969	-4.6	1971	1.2
1971	7.1	1971	-4.6	1974	1.2
1967	7.0	1974	-4.7	1967	1.1
1985	6.9	1967	-4.7	1969	1.1
1975	6.9	1985	-4.8	1985	1.1
1969	6.8	1972	-4.8	1975	0.9
1979	6.5	1975	-5.1	1972	0.6
1966	6.4	1996	-5.2	1979	0.6
1965	6.3	1965	-5.3	1965	0.5
1982	6.2	1982	-5.3	1966	0.4
1996	6.1	1979	-5.3	1996	0.4
1972	6.1	1966	-5.5	1982	0.4

SEASONAL MAXIMUM AVERAGE TEMPERATURES °C							
WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2012	-1.9	1977	12.9	2021	27.2	1987	13.1
1987	-3.6	1987	12.7	2001	26.5	2011	12.6
2006	-4.7	1988	12.6	2003	26.3	2021	12.6
2016	-4.8	2016	12.5	1984	26.1	2009	12.1
1998	-4.8	1981	12.1	1988	26.0	1994	11.8
2000	-5.4	2021	12.0	1970	25.9	2001	11.8
1992	-5.7	1998	12.0	2006	25.6	2008	11.8
2002	-6.0	2001	11.9	1998	25.6	1999	11.4
2017	-6.6	2015	11.7	1997	25.6	2015	11.3
1964	-6.6	1994	11.5	2017	25.4	1981	11.1
2020	-6.7	2010	11.4	2018	25.4	1997	11.0
1983	-7.1	1993	11.4	1981	25.3	2005	11.0
1988	-7.2	1980	11.3	1989	25.3	1976	10.8
2021	-7.2	1986	11.1	2002	25.3	1980	10.8
2004	-7.2	2000	11.0	2015	25.1	2016	10.8
1986	-7.3	2012	10.9	1983	25.0	1974	10.6
1976	-7.3	1992	10.8	1996	24.9	1979	10.6
1981	-7.4	2019	10.6	1991	24.8	2004	10.5
1977	-7.4	1991	10.5	2020	24.8	1998	10.4
2015	-7.4	1976	10.4	1964	24.6	1967	10.4
2007	-7.7	2017	10.2	2008	24.5	2000	10.3
2003	-8.0	1984	10.2	2016	24.5	1988	10.3
2005	-8.0	1999	10.1	2007	24.5	2013	10.1
1975	-8.0	2007	10.1	1979	24.5	1975	9.9
1999	-8.0	2006	10.1	1995	24.4	1989	9.8
1984	-8.1	1968	10.0	2011	24.4	2007	9.8
1995	-8.1	2004	10.0	2012	24.4	1990	9.7
1990	-8.2	1985	10.0	1967	24.3	1968	9.7
2018	-8.3	1990	10.0	1978	24.2	2010	9.6
1991	-8.6	2005	9.9	1965	24.2	2003	9.4
1989	-8.7	1973	9.9	1969	24.1	1970	9.3
2013	-9.2	1978	9.7	1990	24.1	2014	9.2
2001	-9.3	2003	9.4	1987	24.0	1983	9.2
1970	-9.3	2008	9.1	1972	24.0	2017	9.1
2011	-9.5	1972	9.1	1976	23.8	2020	8.9
1980	-9.5	2018	8.8	1973	23.8	1992	8.8
2010	-9.8	1971	8.6	2000	23.8	1971	8.8
2019	-9.8	1969	8.3	2019	23.8	1964	8.8
1968	-9.8	1995	8.3	2013	23.7	1978	8.7
2008	-10.1	1989	8.2	1971	23.6	1977	8.7
1973	-10.3	1964	8.2	1966	23.6	1966	8.6
1997	-11.0	1966	8.1	1994	23.5	1995	8.6
1967	-11.1	2020	8.0	1980	23.5	2019	8.5
1993	-11.5	1997	7.6	1975	23.2	1993	8.4
1985	-11.6	2011	7.5	1999	23.1	1982	8.3
2009	-11.7	2009	7.4	2014	23.1	2012	8.2
2014	-11.8	1983	7.0	2010	23.0	1969	8.0
1994	-12.1	2014	6.8	1977	23.0	2002	7.8
1996	-12.2	1982	6.7	2009	22.9	2006	7.5
1974	-12.6	2013	6.4	1966	22.8	1986	7.3
1966	-13.1	1996	6.3	1982	22.6	1965	7.3
1982	-13.3	1970	6.1	2005	22.6	1973	7.3
1971	-13.4	2002	5.8	1985	22.4	1991	7.0
1978	-14.5	1965	5.7	1974	22.4	1972	6.6
1965	-14.8	1979	4.8	1992	22.4	2018	6.5
1972	-14.9	1974	4.7	1968	22.0	1996	6.2
1969	-15.2	1975	4.4	2004	21.6	1984	5.6
1979	-15.5	1967	4.4	1993	21.1	1985	4.5

TEMPERATURE RANKINGS

SEASONAL MINIMUM AVERAGE TEMPERATURES °C								SEASONAL MEAN AVERAGE TEMPERATURES °C							
WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)		WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2012	-12.6	2016	0.8	2021	13.6	2016	1.5	2012	-7.3	2016	6.6	2021	20.4	2009	6.7
2016	-12.6	1993	0.3	2012	12.9	2015	1.3	1987	-8.6	1987	6.2	2003	19.4	2011	6.5
2006	-13.2	2010	0.2	2015	12.6	2009	1.3	2016	-8.7	1977	6.2	1988	19.2	2021	6.5
1998	-13.4	2012	0.0	2006	12.5	2005	0.4	2006	-8.9	1993	5.8	2001	19.1	1987	6.4
1987	-13.6	1987	-0.2	2003	12.5	2021	0.4	1998	-9.1	2010	5.8	1970	19.1	2015	6.3
2017	-14.7	1977	-0.5	2016	12.4	2011	0.3	1992	-10.3	1988	5.8	2006	19.1	2016	6.2
1992	-14.9	1999	-0.5	1988	12.3	2008	0.1	2000	-10.6	1981	5.6	2015	18.9	2008	5.9
1964	-15.0	1985	-0.7	2020	12.3	1998	0.1	2017	-10.7	2015	5.4	2002	18.8	2001	5.8
2002	-15.5	1994	-0.8	1970	12.3	1981	0.0	2002	-10.8	2012	5.4	2018	18.8	2005	5.7
1983	-15.6	2015	-0.8	2002	12.2	2001	-0.1	1964	-10.8	1994	5.4	1984	18.7	1994	5.7
2000	-15.8	1981	-1.0	1991	12.2	1967	-0.2	1983	-11.4	2001	5.4	2012	18.7	1981	5.5
2015	-16.0	1992	-1.0	2018	12.0	1968	-0.2	2020	-11.6	2021	5.2	2017	18.7	1999	5.4
2020	-16.3	2006	-1.0	2013	12.0	1997	-0.3	2015	-11.7	1986	5.0	1998	18.6	1997	5.4
2021	-16.6	1988	-1.0	2014	11.9	1987	-0.3	2021	-12.0	1998	5.0	2020	18.6	1998	5.3
2004	-16.7	1986	-1.1	2017	11.9	2004	-0.4	2004	-12.0	1992	4.9	1997	18.5	1967	5.1
1999	-16.8	2000	-1.1	2011	11.8	1994	-0.5	1981	-12.3	2000	4.9	1991	18.5	2004	5.0
2007	-17.0	2001	-1.2	2001	11.7	1999	-0.6	1986	-12.3	1999	4.8	1989	18.5	1980	5.0
1981	-17.1	2007	-1.3	2007	11.7	1992	-0.7	2007	-12.4	1985	4.7	2016	18.4	1968	4.8
1995	-17.2	2005	-1.4	1989	11.6	2010	-0.7	1999	-12.4	2006	4.5	1983	18.1	1979	4.6
1986	-17.3	1990	-1.5	1998	11.6	1980	-0.9	1988	-12.5	2007	4.4	1981	18.1	1988	4.4
2003	-17.5	2021	-1.6	2010	11.5	2019	-1.0	1976	-12.6	1980	4.4	2011	18.1	2010	4.4
2018	-17.5	2017	-1.6	1997	11.5	2014	-1.0	1995	-12.7	1991	4.3	2007	18.1	2007	4.4
1988	-17.8	1973	-1.7	2008	11.3	1983	-1.0	2003	-12.7	2005	4.3	1996	18.1	2000	4.3
1976	-17.8	1978	-1.7	1984	11.2	1970	-1.1	2005	-12.9	1990	4.3	2008	17.9	2013	4.3
1984	-17.8	1991	-2.0	1996	11.2	2007	-1.1	1984	-13.0	2017	4.2	2013	17.9	1970	4.2
2005	-17.8	1968	-2.0	2019	11.2	1964	-1.4	2018	-13.0	1973	4.1	1964	17.8	1974	4.1
2011	-18.3	1998	-2.0	1983	11.2	1988	-1.4	1977	-13.1	1978	4.0	1995	17.7	2014	4.1
2013	-18.4	1984	-2.2	1964	11.0	1979	-1.4	1975	-13.3	1968	4.0	2014	17.6	1983	4.1
1975	-18.5	2003	-2.3	2005	11.0	2013	-1.5	1990	-13.7	1984	4.0	2019	17.5	1992	4.1
1970	-18.7	1972	-2.4	1972	11.0	2017	-1.7	2013	-13.8	2019	4.0	1972	17.5	1989	4.0
1977	-18.8	2004	-2.5	2000	11.0	2000	-1.7	1989	-13.8	2004	3.8	2000	17.4	1975	3.8
1989	-18.9	1980	-2.6	1981	10.9	2020	-1.8	2011	-14.0	2003	3.6	1990	17.4	2017	3.7
2001	-19.0	2019	-2.6	1995	10.8	1989	-1.8	1991	-14.0	1976	3.5	1965	17.4	2019	3.7
2010	-19.1	2008	-3.2	1990	10.7	1969	-1.9	1970	-14.0	1972	3.4	1987	17.3	1964	3.7
1990	-19.1	2018	-3.3	1999	10.7	2012	-1.9	2001	-14.2	2008	2.9	1979	17.3	1976	3.6
1991	-19.3	1976	-3.3	1987	10.6	1971	-2.1	2010	-14.5	2018	2.7	1976	17.2	2003	3.6
2008	-19.5	1983	-3.7	1994	10.6	2002	-2.2	1980	-14.6	1971	2.3	2010	17.2	2020	3.6
2019	-19.5	1969	-3.8	1965	10.5	2003	-2.2	2019	-14.7	1969	2.2	1994	17.1	1971	3.4
1980	-19.6	1995	-3.8	1976	10.5	1977	-2.4	2008	-14.8	1995	2.2	1978	17.0	1977	3.2
1968	-20.0	1966	-3.9	1971	10.3	1974	-2.4	1968	-15.0	1964	2.2	1971	17.0	1990	3.2
1973	-20.3	1964	-3.9	2009	10.3	1975	-2.5	1973	-15.4	1966	2.1	1973	17.0	2012	3.1
1993	-20.5	2011	-3.9	1973	10.0	1993	-2.5	1993	-16.0	2020	2.0	1999	16.9	1969	3.1
1994	-20.8	2020	-4.0	1979	10.0	1995	-2.6	1967	-16.1	1989	2.0	1967	16.9	1995	3.0
1967	-21.1	1971	-4.0	1966	9.9	2018	-2.6	1997	-16.2	2011	1.9	2005	16.8	1978	2.9
1997	-21.3	2014	-4.2	1993	9.9	1972	-2.7	1994	-16.5	1997	1.7	1969	16.7	1993	2.9
2009	-21.4	1997	-4.3	1975	9.8	2006	-2.8	2009	-16.6	1983	1.6	1986	16.6	2002	2.8
1996	-21.9	1982	-4.3	2004	9.7	1978	-2.9	2014	-16.9	2014	1.3	2009	16.6	2006	2.4
2014	-22.0	1989	-4.3	1978	9.7	1986	-3.1	1996	-17.1	1982	1.2	1980	16.6	1982	2.3
1974	-22.6	1996	-4.9	1980	9.6	1990	-3.4	1985	-17.3	2009	0.9	1975	16.5	1966	2.2
1985	-22.9	2013	-4.9	1982	9.6	1976	-3.6	1974	-17.6	1996	0.7	1966	16.4	1986	2.1
1971	-23.1	1970	-5.0	1986	9.6	1982	-3.7	1971	-18.3	2013	0.7	1982	16.2	2018	1.9
1982	-23.6	2009	-5.6	1974	9.6	1991	-3.7	1966	-18.4	1970	0.5	1974	16.0	1972	1.9
1966	-23.6	1965	-5.8	1967	9.5	1984	-3.8	1982	-18.5	1965	-0.1	1977	15.9	1991	1.6
1969	-24.0	1979	-6.1	1969	9.4	1966	-4.3	1965	-19.4	1979	-0.7	2004	15.7	1965	1.5
1965	-24.0	1974	-6.5	1968	9.2	1996	-4.3	1978	-19.5	1974	-0.9	1992	15.6	1973	1.3
1978	-24.5	1975	-6.5	1992	8.8	1965	-4.4	1969	-19.6	2002	-0.9	1968	15.6	1984	0.9
1972	-25.0	1967	-6.9	1977	8.8	1973	-4.6	1972	-20.0	1975	-1.0	1993	15.5	1996	0.9
1979	-25.2	2002	-7.6	1985	8.2	1985	-6.0	1979	-20.4	1967	-1.3	1985	15.3	1985	-0.8

TEMPERATURE

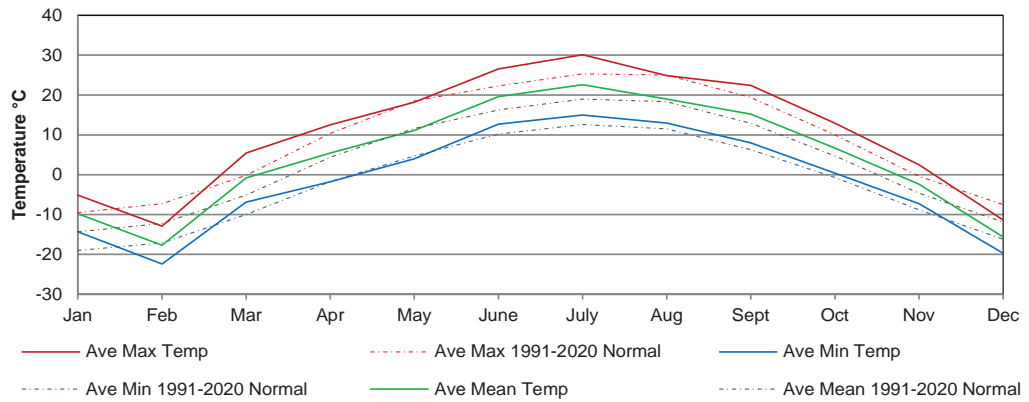
MONTH	AVERAGE MAXIMUM TEMPERATURE (°C)		AVERAGE MINIMUM TEMPERATURE (°C)		AVERAGE TEMPERATURE (°C)		EXTREME VALUES TEMPERATURE (°C)				EXTREME VALUES FOR SASKATOON STATIONS	
	2021	Normal	2021	Normal	2021	Normal	Max	Date	Min	Date	Max/Date	Min/Date
January	-5.1	-9.5	-14.3	-19.0	-9.8	-14.3	7.3	13	-36.2	25	11.0/1980/23 _{SWT}	-48.9/1893/31 _{SM}
February	-12.9	-7.3	-22.4	-17.1	-17.7	-12.2	5.5	22	-36.4	11	12.8/1931/19 _{SE}	-50.0/1893/01 _{SM}
March	5.4	-0.1	-6.9	-10.0	-0.8	-5.1	18.2	28	-19.0	1	22.8/1910/23 _{SE}	-43.3/1897/14 _{SM}
April	12.5	10.4	-1.8	-1.7	5.4	4.4	25.5	30	-9.6	23	33.3/1952/28 _{SA US}	-30.5/1979/01 _{SWT}
May	18.2	18.5	4.0	4.7	11.1	11.6	33.0	17	-7.5	4	37.2/1936/27 _{SE}	-12.8/1907/06 _{SE}
June	26.5	22.3	12.7	10.2	19.6	16.3	35.5	3	4.4	21	41.5/1988/06 _{S2}	-3.9/1917/02 _{US}
July	30.1	25.3	15.0	12.6	22.6	19.0	40.1	2	9.6	6	40.0/1919,1941,1946,2021 _{SE SA US}	-0.6/1918/25 _{SE}
August	24.9	25.0	13.0	11.5	19.0	18.3	37.5	14	4.7	25	39.7/1998/06 _{SRC}	-2.8/1901/23SM&1976/28 _{SRC}
September	22.4	19.4	8.0	6.3	15.2	12.9	32.7	18	1.2	17	35.6/1978/04 _{SRC}	-11.1/1908/28 _{SE}
October	12.9	10.0	0.4	-0.7	6.7	4.7	25.9	6	-5.6	31	32.2/1943/05 _{SA US}	-25.6/1919/26 _{SE US}
November	2.5	-0.4	-7.3	-8.8	-2.4	-4.6	13.3	5	-17.3	21	21.7/1903/03 _{SE}	-39.4/1893/30 _{SM}
December	-11.4	-7.5	-19.7	-16.2	-15.6	-11.9	6.1	1	-35.4	30	14.4/1939/05 _{SE}	-43.9/1892/22 _{SM}
Average	10.5	8.8	-1.6	-2.7	4.4	3.0						

Normal = 1991-2020

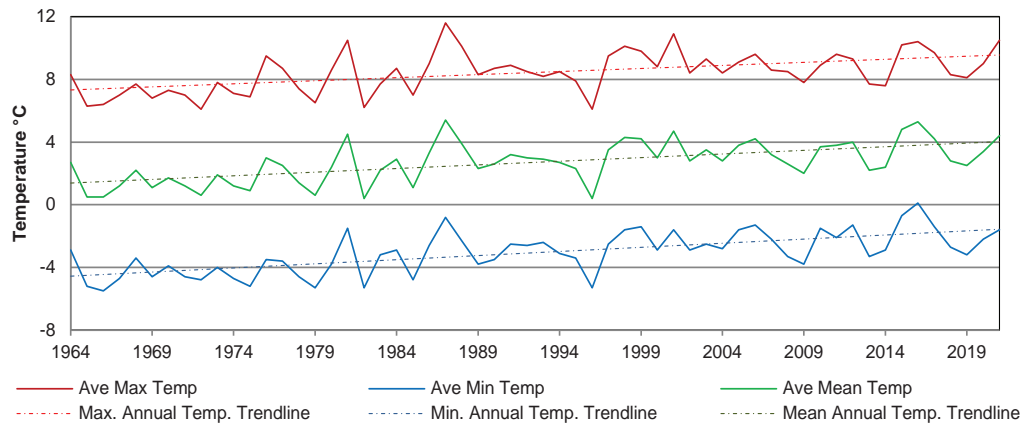
SE = Saskatoon Eby 1901-1942
 US = University of Saskatchewan 1915-1964
 SWT = Saskatoon Water Treatment Plant 1974 -
 SRC = Saskatchewan Research Council 1963-

SA = Saskatoon Diefenbaker Int'l Airport 1942-
 S2 = Saskatoon 2 1977-1990
 SM = Saskatoon stations circa 1889 -1901 (RNWMP et al)

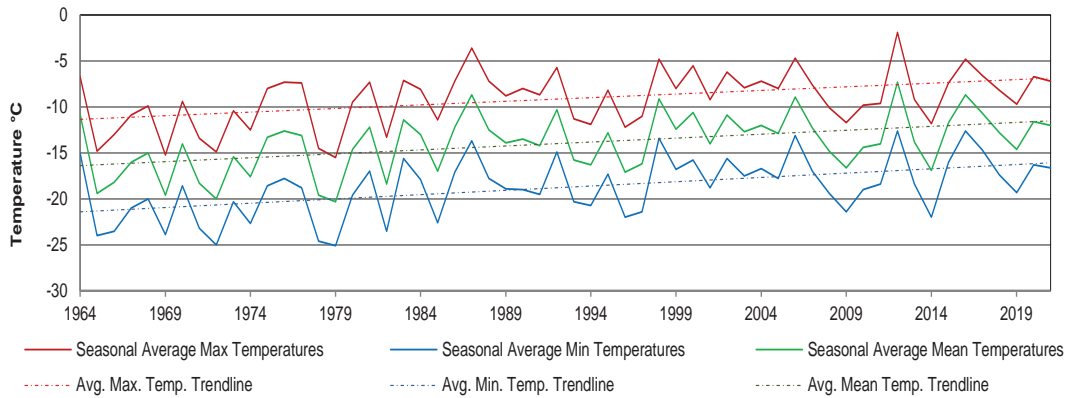
Monthly



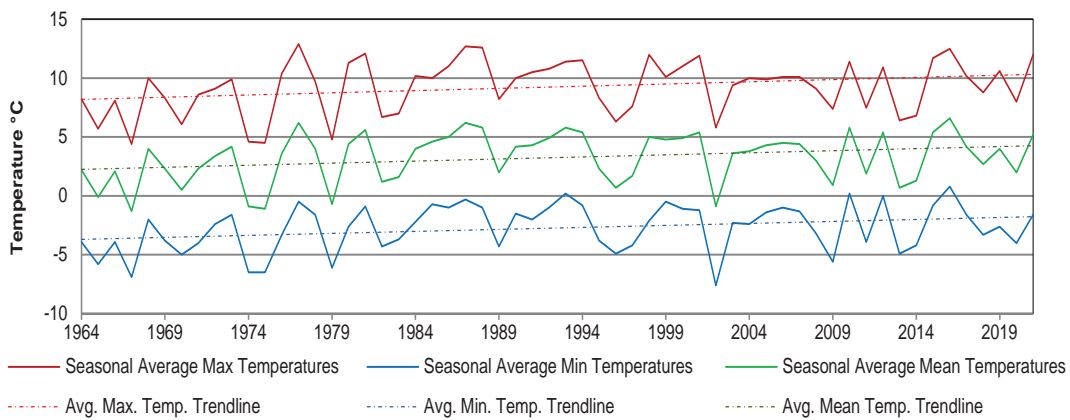
Annual



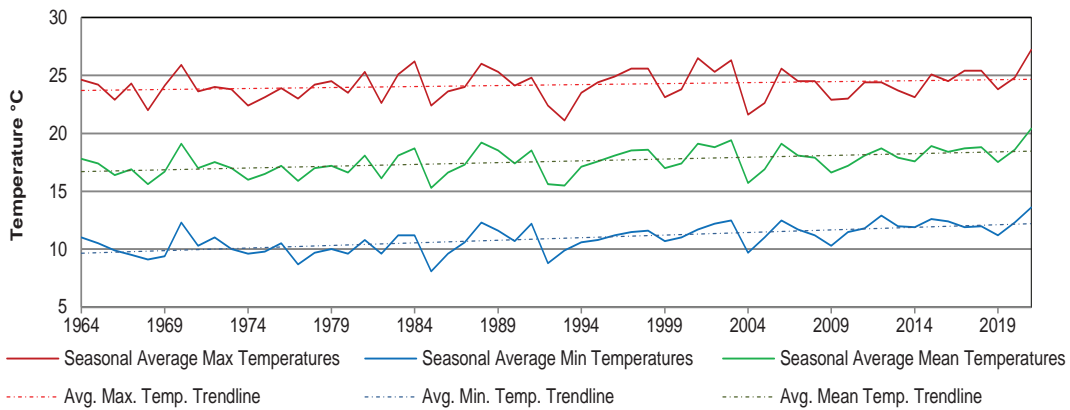
SEASONAL TEMPERATURES (period of record)



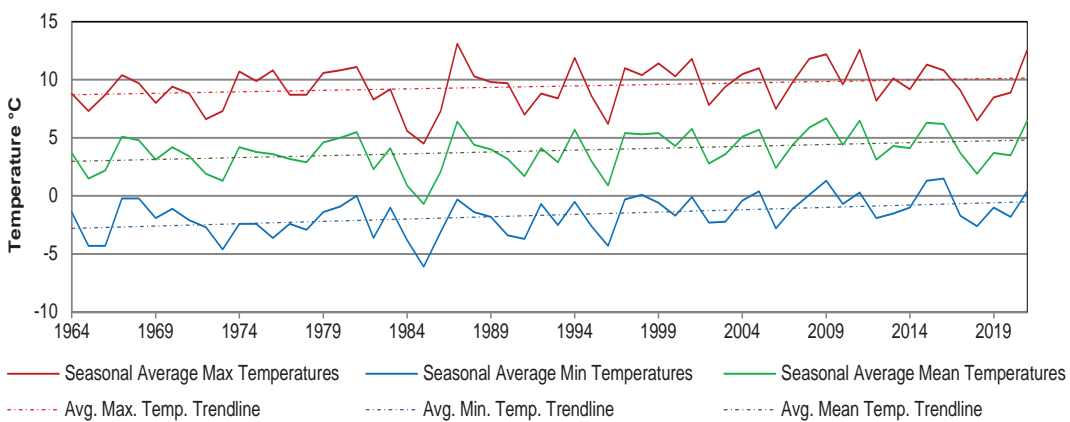
Winter (DJF)



Spring (MAM)



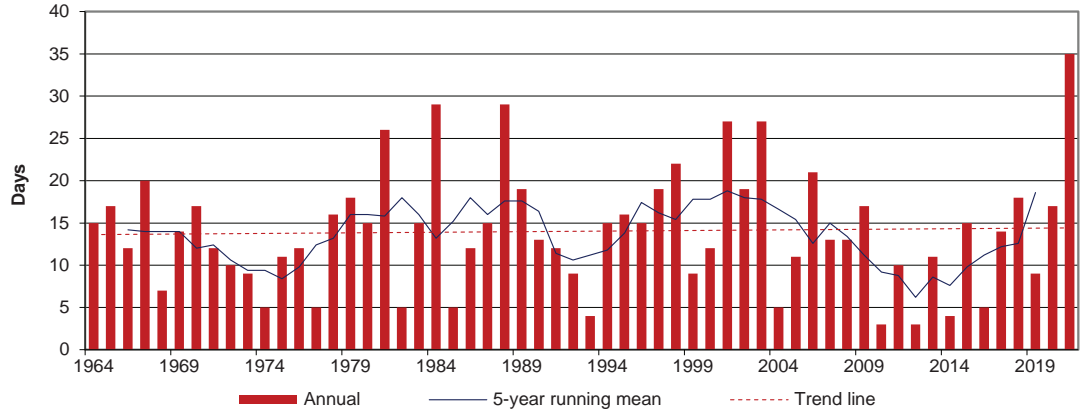
Summer (JJA)



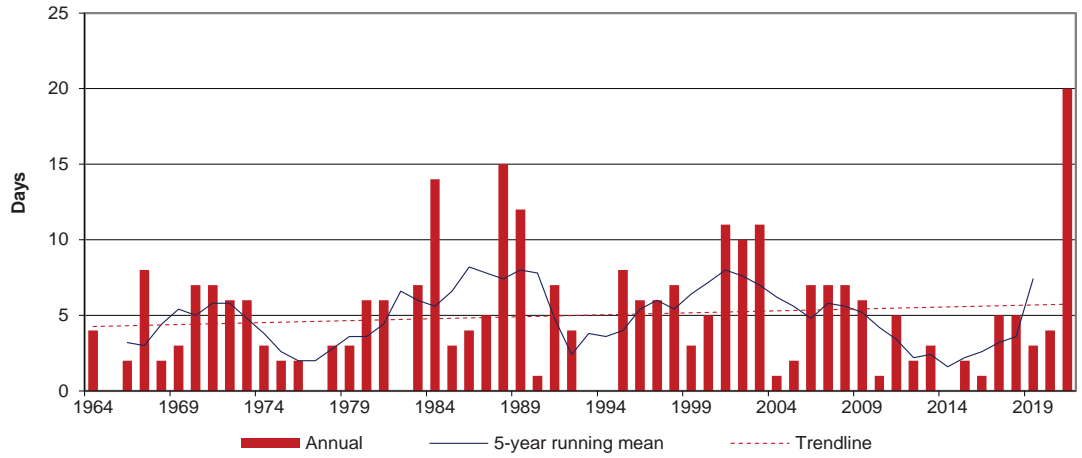
Autumn (SON)

DAYS WITH TEMPERATURES GREATER THAN A SET POINT

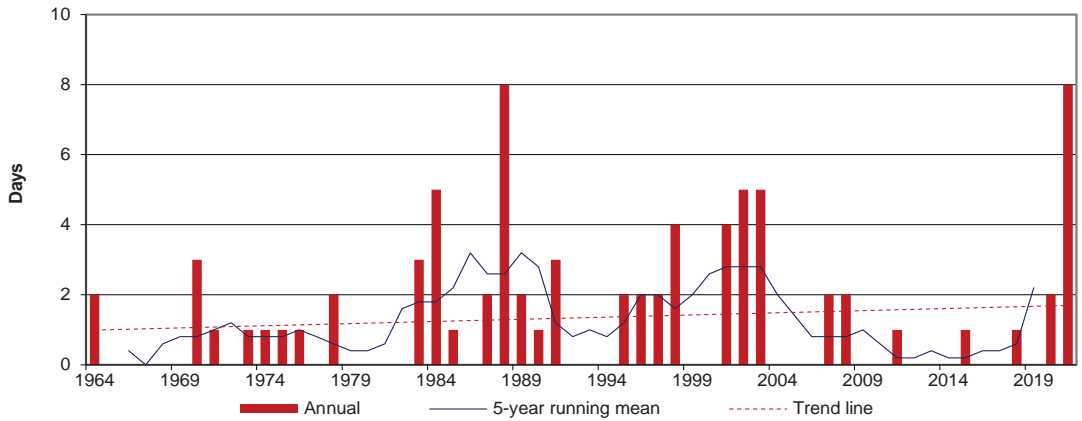
30°C or Greater



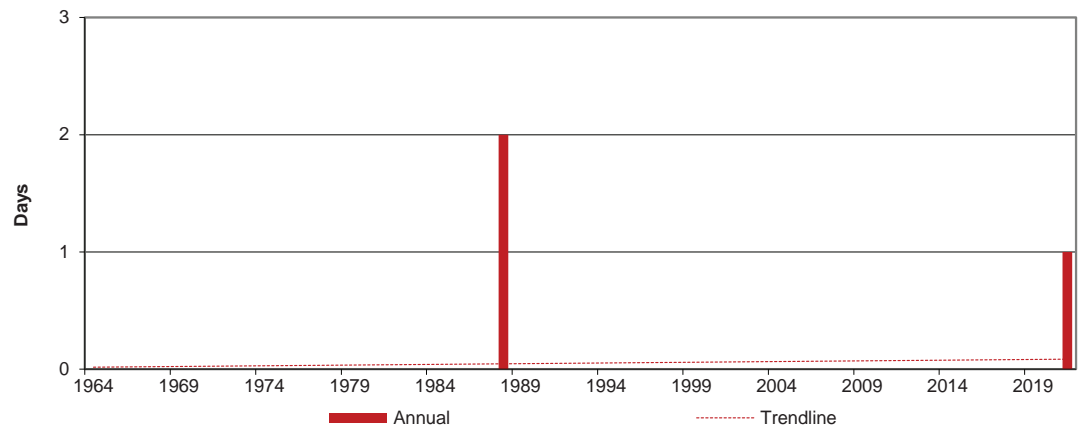
32°C or Greater



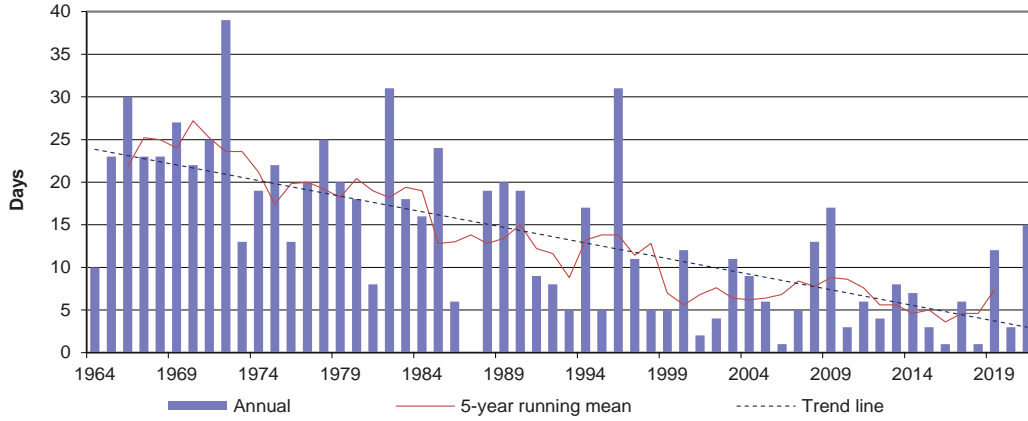
35°C or Greater



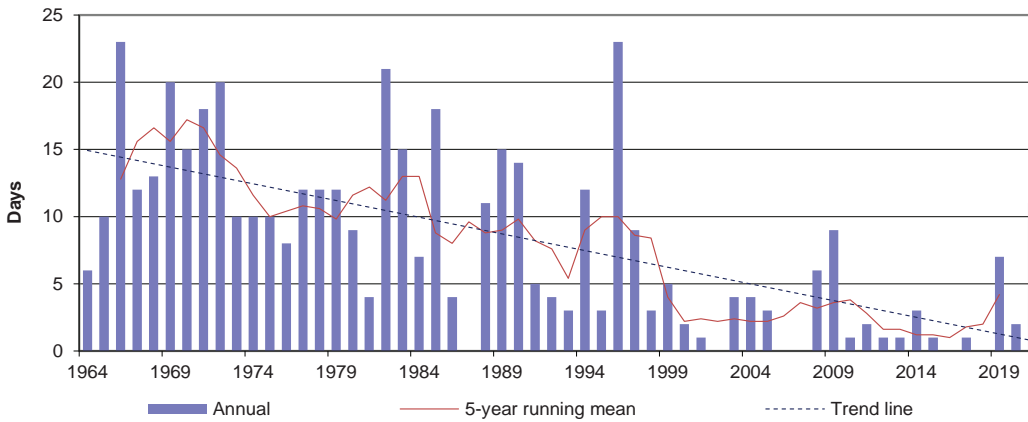
40°C or Greater



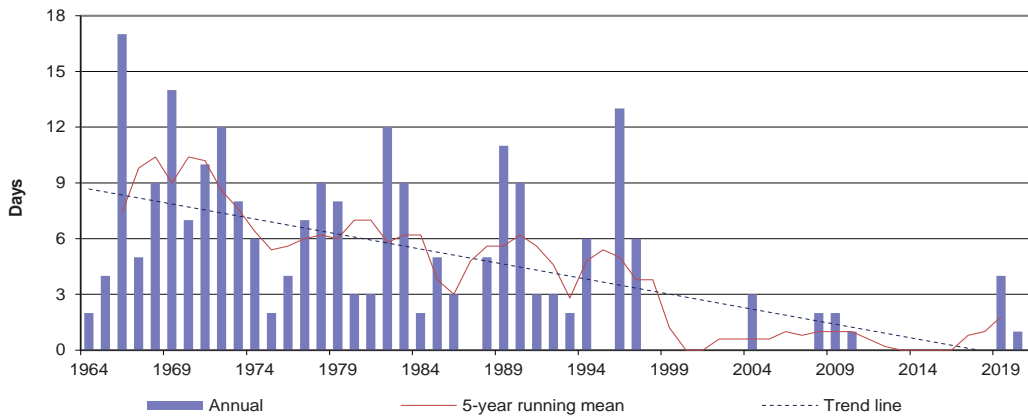
DAYS WITH TEMPERATURES LESS THAN A SET POINT



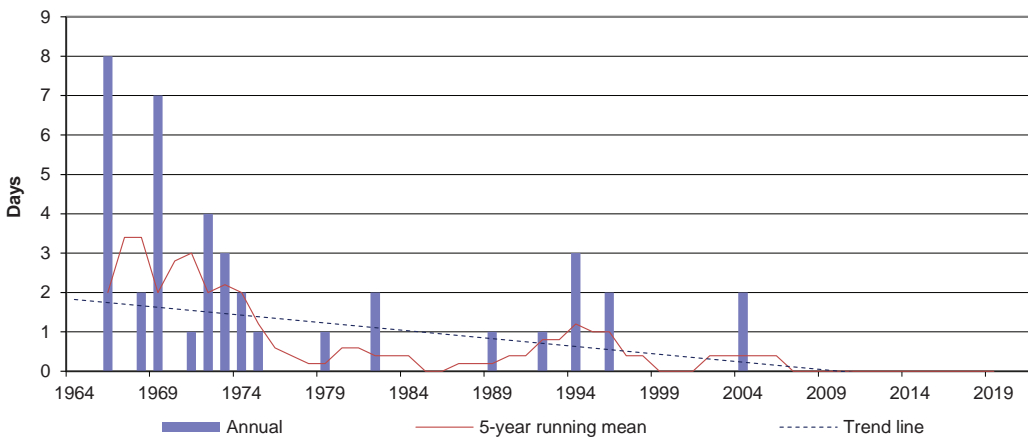
Minus 30°C or Less



Minus 32.5°C or Less



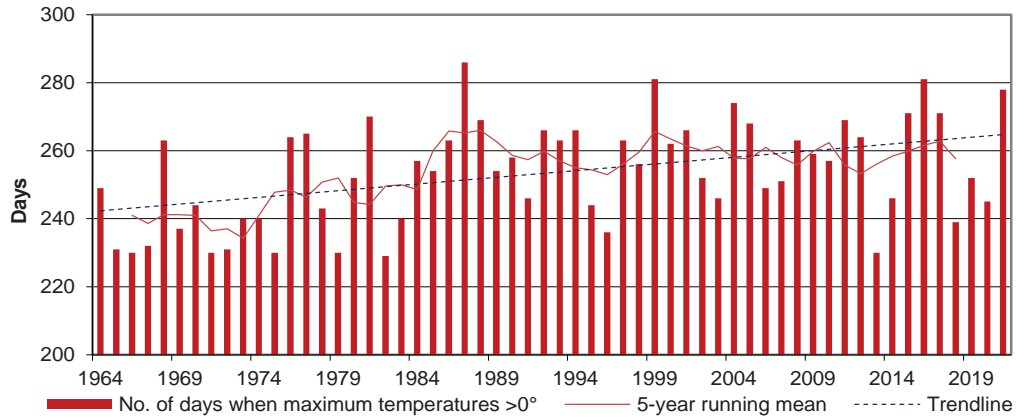
Minus 35°C or Less



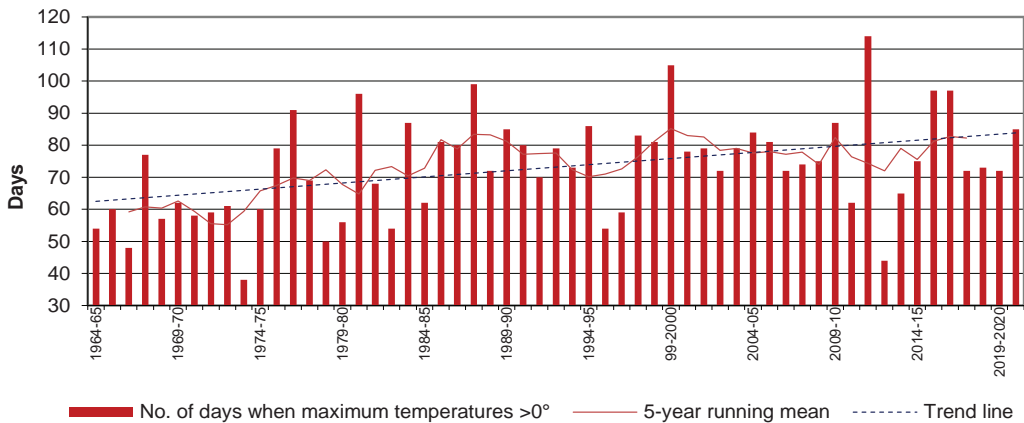
Minus 40°C or Less

DAYS WITH TEMPERATURES GREATER THAN A SET POINT

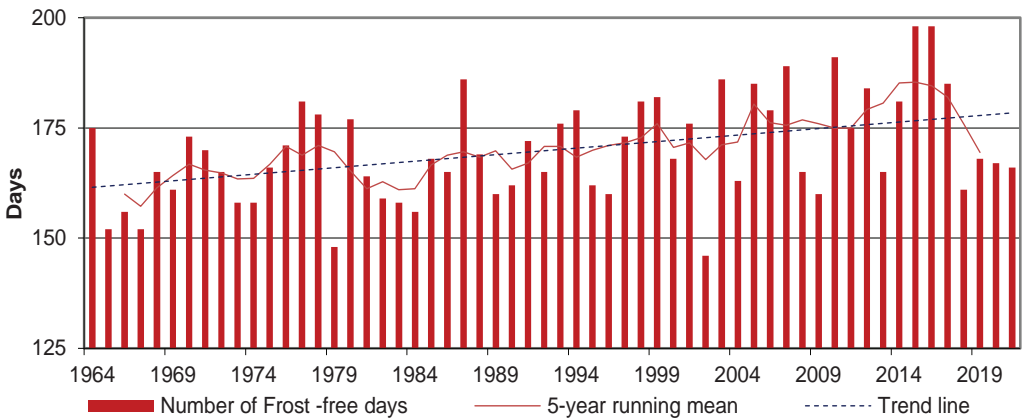
Maximum Temperature greater than 0°C (Thaw Days) Jan 1st to Dec 31st



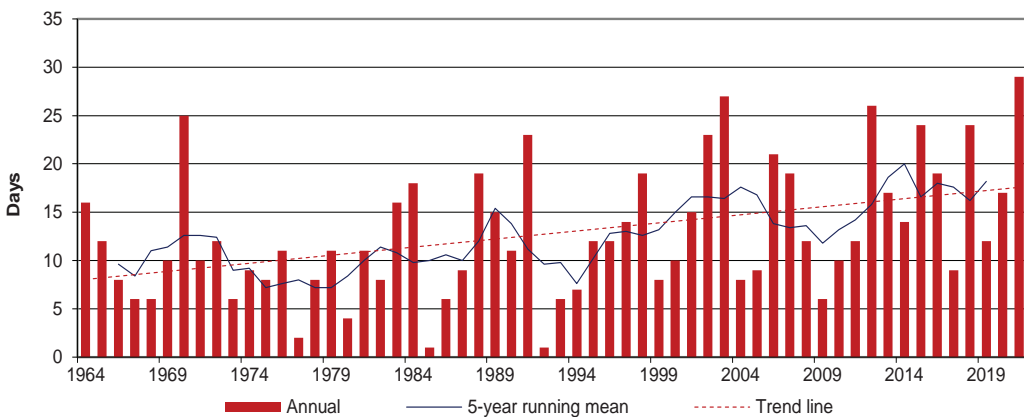
Maximum Temperature greater than 0°C (Thaw Days) Oct 1st to Mar 31st (Cold Season)



Minimum Temperature greater than 0°C (Frost-free Days)



Minimum Temperature 15°C or greater



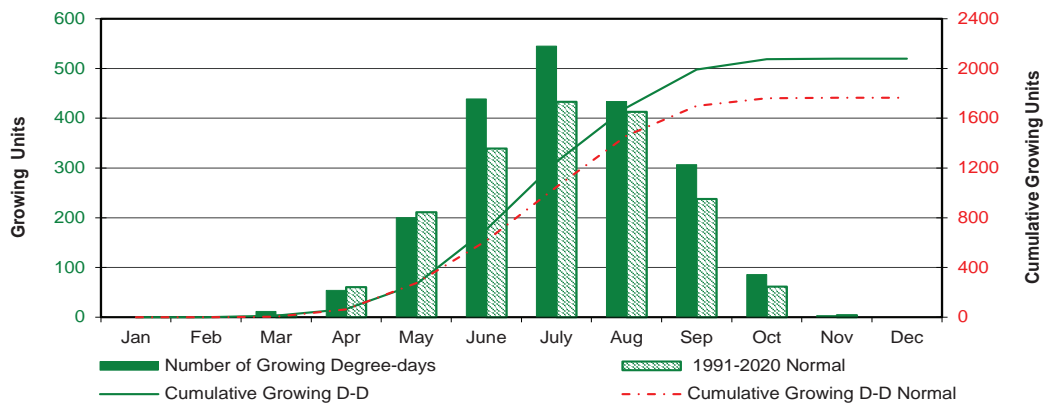
DEGREE-DAYS (Normal 1991-2020)

MONTH	GROWING DEGREE-DAYS Base 5°C			HEATING DEGREE-DAYS Base 18°C			COOLING DEGREE-DAYS Base 18°C			EXTREME COOLING DEGREE-DAYS Base 24°C		
	2021	Cumulative	Normal	2021	Cumulative	Normal	2021	Cumulative	Normal	2021	Cumulative	Normal
January	0.0	0.0	0.0	860.3	860.3	1000.6	0.0	0.0	0.0	0.0	0.0	0.0
February	0.0	0.0	0.0	998.9	1859.2	853.6	0.0	0.0	0.0	0.0	0.0	0.0
March	11.8	11.8	3.5	582.6	2441.8	716.3	0.0	0.0	0.0	0.0	0.0	0.0
April	54.0	65.8	60.6	378.2	2820.0	414.2	0.0	0.0	0.2	0.0	0.0	0.0
May	200.3	266.1	211.0	221.6	3041.6	204.0	9.2	9.2	6.1	0.0	0.0	0.0
June	438.7	704.8	339.1	26.5	3068.1	74.2	75.2	84.4	22.9	9.2	9.2	0.6
July	545.2	1250.0	433.2	4.2	3072.3	25.9	146.4	230.8	56.1	19.7	28.9	2.4
August	433.7	1683.7	413.0	41.4	3113.7	41.6	72.1	302.9	51.6	9.7	38.6	3.1
September	306.7	1990.4	238.0	96.1	3209.8	163.6	12.8	315.7	9.6	0.0	38.6	0.1
October	85.6	2076.0	61.7	351.4	3561.2	413.6	0.0	315.7	0.2	0.0	38.6	0.0
November	3.0	2079.0	3.9	610.9	4172.1	678.7	0.0	315.7	0.0	0.0	38.6	0.0
December	0.0	2079.0	0.0	1041.9	5214.0	925.7	0.0	315.7	0.0	0.0	38.6	0.0

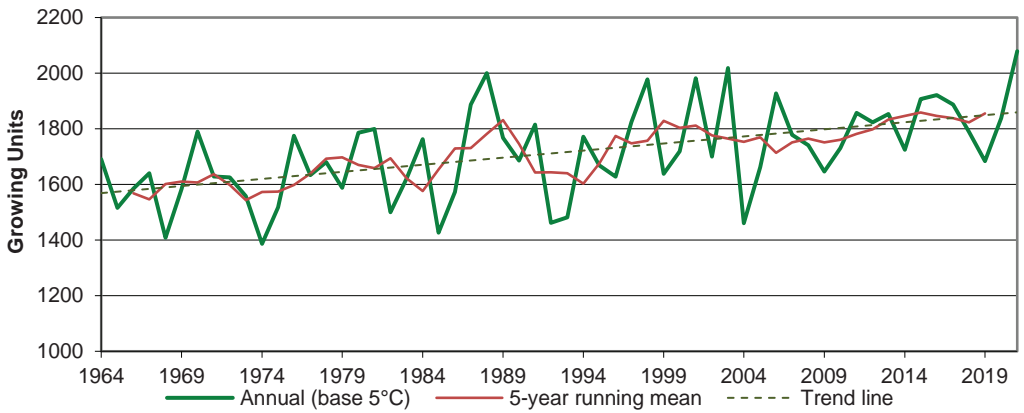
2021 DEGREE-DAYS RECORDS							
TYPE		DATE		NEW RECORD	OLD RECORD	YEAR	
		Month	Day				
Growing Degree-Days	Highest	June	2	19.4	18.4	2006	
			3	20.6	20.0	1970	
			15	20.8	20.0	1987	
			29	20.9	20.3	1984	
			30	22.4	21.3	1989	
		July	1	22.5	18.7	2003	
			2	25.3	17.8	1986	
			3	20.4	19.8	1996	
			9	19.5	19.3	1997	
			11	20.0	19.7	1964	
			15	21.5	19.7	2002	
			17	21.6	20.4	2003	
		August	2	21.6	20.3	1989	
			14	22.3	19.1	2003	
			15	20.1	19.5	1973	
		September	18	17.8	16.8	1994	
28	15.1		13.6	1967			
Highest Total Monthly		July	----	545.2	519.5	2007	
Heating Degree-Days	Lowest	February	10	47.9	47.75	1988	
			January	13	18.2	18.8	1986
		March	22	16.4	17.5	1981	
			18	12	12.1	2012	
			19	7.4	12.3	2017	
			20	12.3	13	2019	
			28	8.5	10	2010	
			17	4.2	3.8	1988	
Cooling Degree-Days (>18°C)	Highest	June	2	6.4	5.4	2006	
			3	7.6	7.0	1970	
			15	7.8	7.0	1987	
			29	7.9	7.3	1984	
			30	9.4	8.3	1989	
		July	1	9.5	5.7	2003	
			2	12.3	4.8	1986	
			3	7.4	6.8	1996	
			9	6.5	6.3	1997	
			11	7.0	6.7	1964	
			15	8.5	6.7	2002	
			17	8.6	7.4	2003	
		August	2	8.6	7.3	1989	
			14	9.3	6.1	2003	
			15	7.1	6.5	1973	
			September	18	4.8	3.8	1994
				28	2.1	0.6	1967
Highest Total Monthly		July	----	146.4	125.6	2007	

DEGREE-DAYS

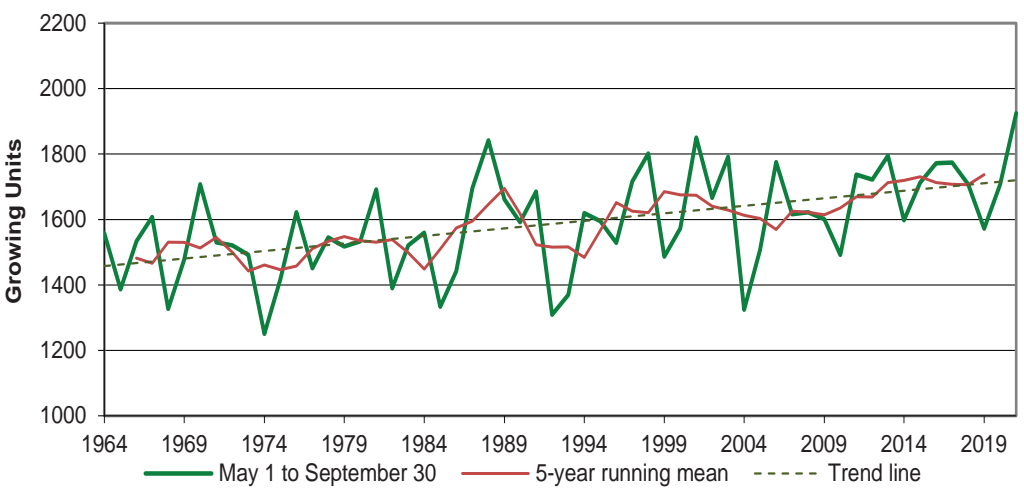
Growing Degree-days Monthly



Growing Degree-days Annual

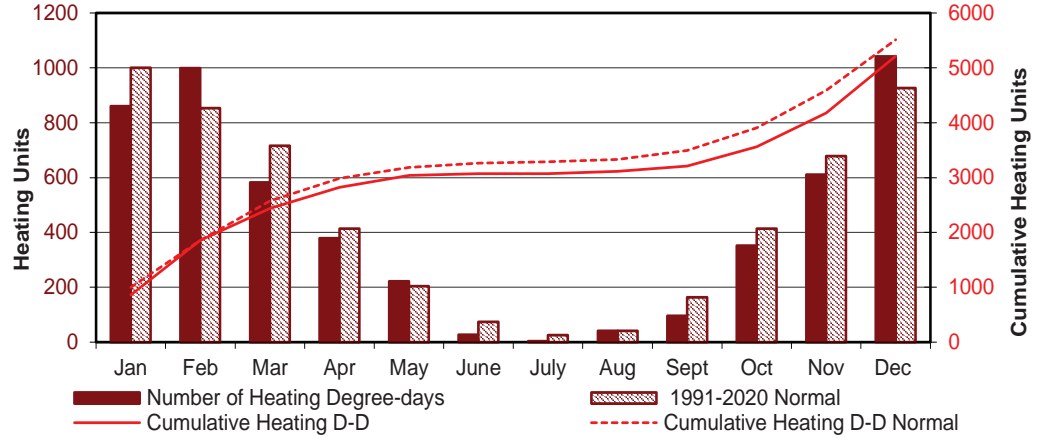


Growing Degree-days May 1 to September 30

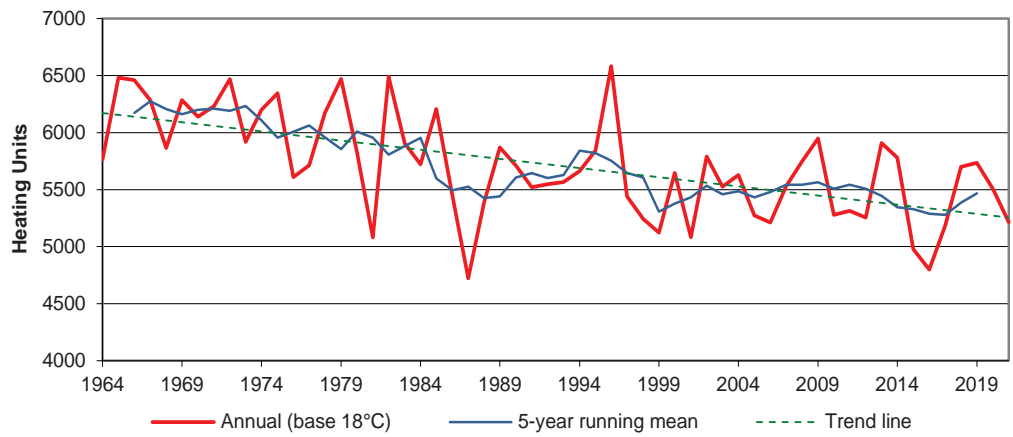


DEGREE-DAYS

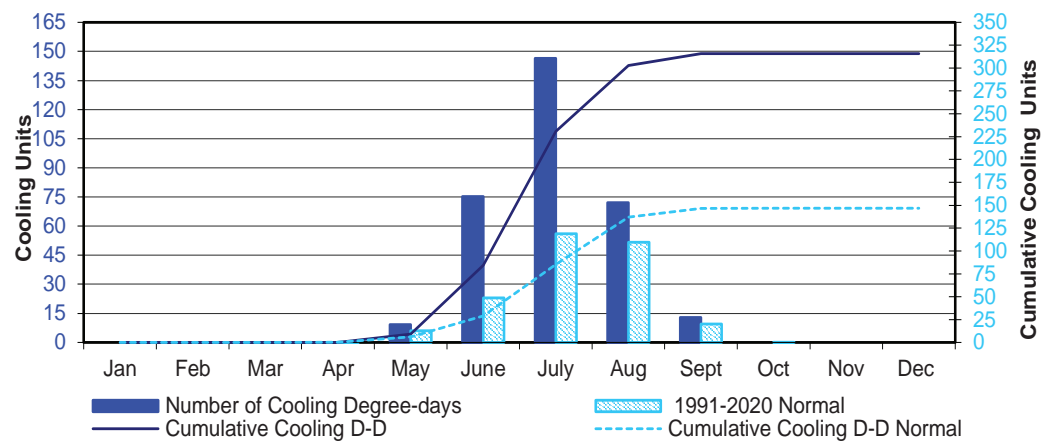
Heating Degree-days Monthly



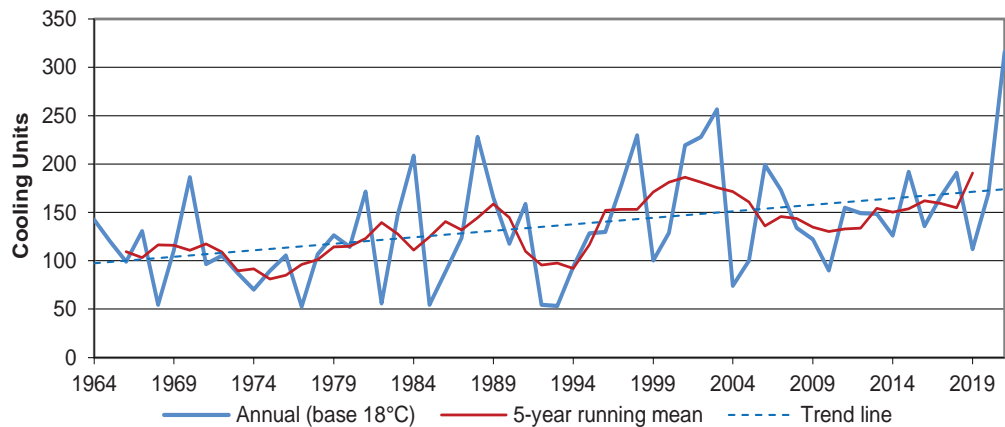
Heating Degree-days Annual



Cooling Degree-days Monthly

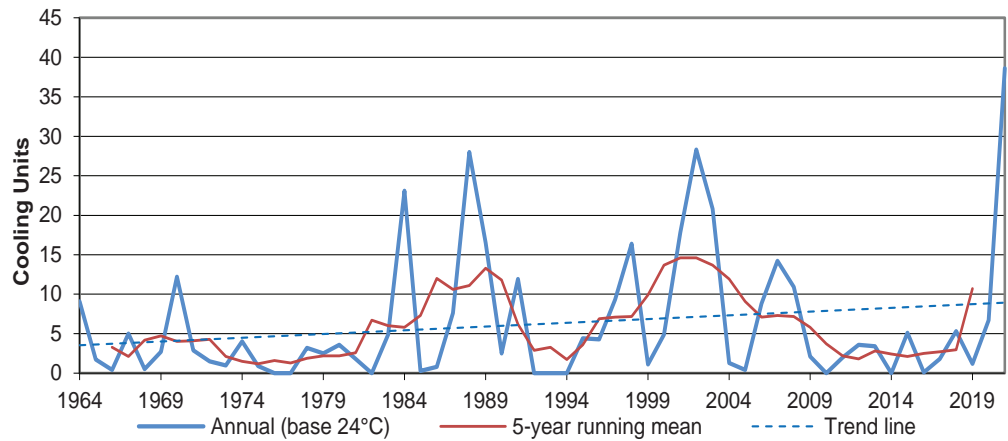


Cooling Degree-days Annual



DEGREE-DAYS

Extreme Cooling Degree-days Annual



2021 DEGREE-DAYS RECORDS					
TYPE	DATE		NEW RECORD	OLD RECORD	YEAR
	Month	Day			
Extreme Cooling Degree-Days (>24C)	June	2	0.4	0.0	1964
		3	1.6	1.0	1970
		15	1.8	1.0	1987
		29	1.9	1.3	1984
		30	3.4	2.3	1989
	July	1	3.5	New Record	
		2	6.3	New Record	
		3	1.4	0.8	1996
		9	0.5	0.3	1997
		11	1.0	0.7	1964
		15	2.5	0.7	2002
		17	2.6	1.4	2003
	August	2	2.6	1.3	1989
		14	3.3	0.1	2003
		15	1.1	0.5	1973



SRC CRS Saskatoon
13 July 2021
Photo: V. Wittrock

TEMPERATURE GRID °C

2021	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	Maximum Temperature °C Daily
1	-6.9	-5.3	2.2	16.2	20.5	27.4	35.6	34.2	21.5	23.8	2.5	6.1	
2	4.3	-2.4	2.0	12.1	11.2	32.8	40.1	35.1	18.3	20.8	7.1	1.3	
3	3.3	-7.7	2.1	13.4	10.1	35.5	30.9	28.5	20.8	23.5	8.6	-3.9	
4	-2.0	-15.3	1.9	17.2	13.8	29.3	25.8	25.7	22.8	16.7	12.9	-4.9	
5	-1.2	-16.1	3.2	12.1	17.2	27.5	24.0	31.0	29.3	22.1	13.3	-13.4	
6	1.7	-23.1	6.0	16.4	16.3	19.0	20.3	33.5	23.5	25.9	6.6	-14.6	
7	0.2	-28.1	5.3	21.8	16.5	22.6	28.0	27.0	23.6	14.4	9.5	-13.6	
8	-4.0	-25.4	3.1	15.2	16.0	24.6	30.0	21.7	25.5	17.7	8.4	-0.5	
9	-5.1	-25.2	1.2	10.7	16.3	20.5	33.1	20.6	27.4	19.7	7.6	-0.9	
10	-6.4	-26.7	1.1	13.3	19.4	21.8	34.3	23.5	21.3	16.3	3.3	-4.2	
11	-2.5	-28.9	-3.9	4.0	20.5	20.0	31.6	24.9	16.1	6.8	-2.0	4.4	
12	-0.2	-22.4	4.2	6.0	20.5	23.9	28.6	23.6	20.7	10.6	-5.1	-0.1	
13	7.3	-22.1	5.9	5.7	23.1	27.8	27.6	30.6	21.1	6.1	0.4	-3.4	
14	-0.2	-20.7	7.6	10.5	23.3	32.2	31.3	37.5	23.2	5.2	-0.1	-2.9	
15	-5.8	-19.0	6.1	15.9	24.7	34.4	36.5	32.1	17.9	14.2	1.5	-10.4	
16	1.1	-18.1	0.2	15.9	24.4	24.2	28.9	24.5	12.3	17.1	5.3	-19.8	
17	-3.1	-15.9	8.4	19.9	33.0	21.1	36.3	19.4	16.6	23.6	-3.2	-14.2	
18	0.2	-13.2	13.4	7.1	28.8	18.0	25.8	20.5	32.7	12.1	-3.3	-14.3	
19	1.8	-3.4	18.0	4.5	14.3	21.7	19.6	21.4	20.0	7.1	-1.7	-14.0	
20	3.6	-2.6	13.6	10.4	4.3	18.5	28.2	20.4	17.4	7.4	-0.2	-11.6	
21	-7.8	4.8	4.5	19.0	7.3	24.8	30.0	22.1	22.5	7.8	-5.4	-9.1	
22	-5.1	5.5	8.3	8.7	13.8	30.8	34.1	15.4	26.0	8.8	3.6	-8.6	
23	-8.7	0.3	-0.1	5.0	19.5	24.4	28.7	16.6	16.1	7.5	0.9	-6.3	
24	-24.8	-1.9	8.5	7.2	11.8	26.4	28.9	14.9	19.0	4.8	-10.0	-13.3	
25	-26.6	0.4	3.1	11.7	10.4	27.8	25.6	20.2	26.0	7.7	-1.8	-23.9	
26	-21.4	-1.9	1.5	15.4	13.9	29.7	27.8	21.9	23.8	10.1	5.0	-24.8	
27	-14.9	-13.5	6.7	8.9	19.2	27.6	33.1	17.8	29.3	10.3	2.8	-25.2	
28	-9.9	-12.7	18.2	14.1	22.4	30.7	30.8	25.0	30.9	11.5	1.3	-26.1	
29	-8.6		10.2	11.3	20.9	34.5	33.8	26.4	21.1	9.6	5.1	-26.5	
30	-7.6		-5.3	25.5	23.7	35.2	31.5	29.4	24.7	5.2	3.2	-28.3	
31	-9.6		8.7		27.3		32.0	27.0		4.4		-27.6	



SRC CRS Saskatoon
13 July 2021
Photo: V. Wittrock

TEMPERATURE GRID °C

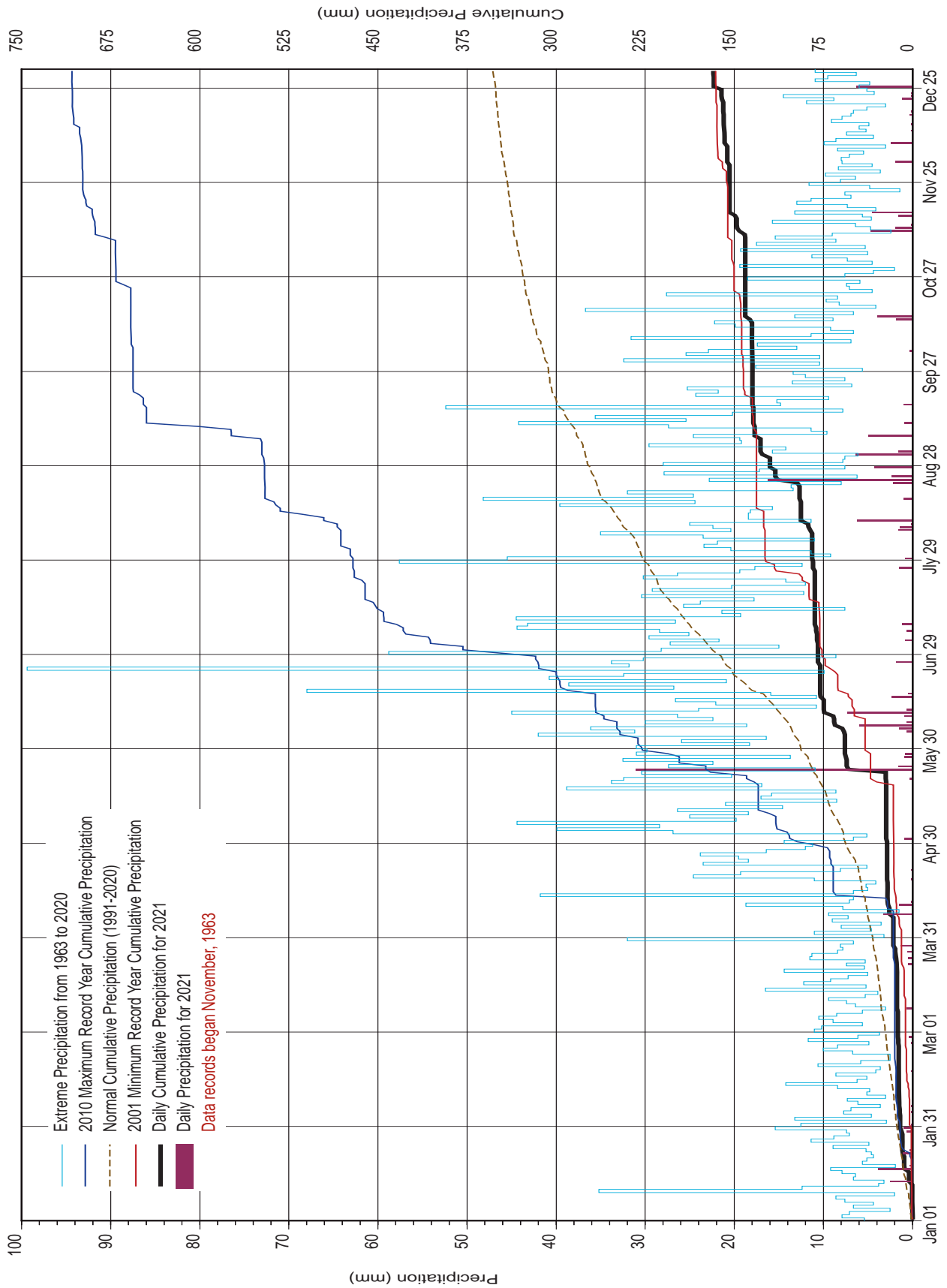
Minimum Temperature °C
Daily

2021	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	-13.5	-12.6	-19.0	1.1	6.5	10.2	19.3	15.7	10.1	8.9	-4.3	-0.4
2	-10.3	-10.6	-8.7	0.4	0.5	15.9	20.4	18.1	10.2	2.7	-7.5	-5.5
3	-2.1	-19.5	-11.7	-0.8	-5.2	15.7	19.8	19.7	13.0	6.3	-7.7	-10.2
4	-9.4	-19.6	-13.8	2.2	-7.5	16.5	14.9	15.5	8.9	0.7	-2.9	-15.6
5	-8.1	-28.9	-5.4	-1.3	-1.3	13.4	14.6	15.3	10.2	4.6	2.6	-22.9
6	-10.6	-32.5	0.5	-0.3	1.0	11.2	9.6	17.7	11.3	6.0	-2.1	-23.5
7	-8.4	-36.1	-2.5	1.8	3.2	10.9	13.8	16.6	10.6	3.7	-4.3	-21.2
8	-12.2	-34.9	-4.5	1.6	5.4	7.8	13.6	14.3	7.4	1.2	-5.4	-17.6
9	-13.8	-28.1	-7.3	-4.3	2.0	12.7	15.9	14.0	12.9	-0.2	-8.2	-11.0
10	-11.8	-33.1	-11.4	1.4	1.4	14.3	16.6	12.7	9.6	-0.4	-2.1	-14.6
11	-12.4	-36.4	-16.2	-1.8	4.0	13.5	18.4	12.9	5.7	0.1	-5.1	-10.8
12	-7.8	-29.6	-8.7	-3.0	6.1	10.0	13.8	10.0	4.9	-2.8	-9.4	-6.9
13	-7.7	-34.6	-5.4	-2.2	3.7	9.7	12.7	12.8	9.5	-4.1	-12.8	-10.1
14	-5.9	-32.4	-1.1	-1.1	7.5	15.9	14.2	17.0	6.5	0.5	-5.8	-10.6
15	-12.7	-28.5	-3.5	-2.7	5.2	17.1	16.4	18.0	9.3	-1.1	-2.3	-23.1
16	-9.9	-25.8	-9.5	-3.5	11.3	14.8	18.0	16.0	5.7	-0.7	-3.3	-25.5
17	-12.1	-22.1	-7.1	2.5	11.4	10.1	16.9	11.1	1.2	3.9	-10.1	-24.4
18	-15.6	-24.2	-1.5	-0.5	13.6	10.9	14.8	10.8	12.8	-0.2	-12.2	-26.4
19	-11.9	-22.4	3.1	-4.7	-0.2	10.2	14.0	9.1	8.9	-5.0	-11.0	-19.3
20	-8.4	-9.7	-2.2	-7.1	-1.0	6.0	15.5	12.8	3.5	-5.4	-11.1	-21.6
21	-13.8	-12.8	-3.8	-0.2	-1.6	4.4	14.7	8.3	2.8	-3.0	-17.3	-16.6
22	-11.0	-2.3	-4.5	-5.9	-0.6	12.2	13.4	11.2	10.1	-2.5	-6.4	-11.8
23	-29.2	-7.8	-8.6	-9.6	8.3	13.9	9.8	7.3	6.0	-1.4	-12.1	-15.2
24	-34.2	-9.2	-4.6	-8.3	9.6	12.0	14.2	9.1	1.7	2.6	-16.2	-26.0
25	-36.2	-10.1	-6.1	-2.6	3.4	12.6	16.2	4.7	9.5	4.4	-11.8	-28.4
26	-31.3	-19.9	-8.6	-0.5	1.3	14.0	14.9	8.7	5.5	2.3	-6.2	-27.0
27	-22.9	-24.5	-7.3	-3.6	3.1	14.1	15.7	12.8	10.2	-0.2	-6.4	-32.2
28	-16.5	-19.6	0.8	-2.4	8.4	14.2	13.3	11.8	9.3	-0.1	-5.3	-32.9
29	-15.9		-10.8	-1.8	9.2	17.2	14.2	11.5	9.2	0.9	-4.4	-31.6
30	-14.2		-12.4	4.7	4.3	19.6	12.6	14.2	3.7	-3.7	-6.4	-35.4
31	-14.7		-13.1		12.2		13.5	14.1		-5.6		-33.2

Average Temperature °C
Daily

2021	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	-10.2	-9.0	-8.4	8.7	13.5	18.8	27.5	25.0	15.8	16.4	-0.9	2.9
2	-3.0	-6.5	-3.4	6.3	5.9	24.4	30.3	26.6	14.3	11.8	-0.2	-2.1
3	0.6	-13.6	-4.8	6.3	2.5	25.6	25.4	24.1	16.9	14.9	0.5	-7.1
4	-5.7	-17.5	-6.0	9.7	3.2	22.9	20.4	20.6	15.9	8.7	5.0	-10.3
5	-4.7	-22.5	-1.1	5.4	8.0	20.5	19.3	23.2	19.8	13.4	8.0	-18.2
6	-4.5	-27.8	3.3	8.1	8.7	15.1	15.0	25.6	17.4	16.0	2.3	-19.1
7	-4.1	-32.1	1.4	11.8	9.9	16.8	20.9	21.8	17.1	9.1	2.6	-17.4
8	-8.1	-30.2	-0.7	8.4	10.7	16.2	21.8	18.0	16.5	9.5	1.5	-9.1
9	-9.5	-26.7	-3.1	3.2	9.2	16.6	24.5	17.3	20.2	9.8	-0.3	-6.0
10	-9.1	-29.9	-5.2	7.4	10.4	18.1	25.5	18.1	15.5	8.0	0.6	-9.4
11	-7.5	-32.7	-10.1	1.1	12.3	16.8	25.0	18.9	10.9	3.5	-3.6	-3.2
12	-4.0	-26.0	-2.3	1.5	13.3	17.0	21.2	16.8	12.8	3.9	-7.3	-3.5
13	-0.2	-28.4	0.3	1.8	13.4	18.8	20.2	21.7	15.3	1.0	-6.2	-6.8
14	-3.1	-26.6	3.3	4.7	15.4	24.1	22.8	27.3	14.9	2.9	-3.0	-6.8
15	-9.3	-23.8	1.3	6.6	15.0	25.8	26.5	25.1	13.6	6.6	-0.4	-16.8
16	-4.4	-22.0	-4.7	6.2	17.9	19.5	23.5	20.3	9.0	8.2	1.0	-22.7
17	-7.6	-19.0	0.7	11.2	22.2	15.6	26.6	15.3	8.9	13.8	-6.7	-19.3
18	-7.7	-18.7	6.0	3.3	21.2	14.5	20.3	15.7	22.8	6.0	-7.8	-20.4
19	-5.1	-12.9	10.6	-0.1	7.1	16.0	16.8	15.3	14.5	1.1	-6.4	-16.7
20	-2.4	-6.2	5.7	1.7	1.7	12.3	21.9	16.6	10.5	1.0	-5.7	-16.6
21	-10.8	-4.0	0.4	9.4	2.9	14.6	22.4	15.2	12.7	2.4	-11.4	-12.9
22	-8.1	1.6	1.9	1.4	6.6	21.5	23.8	13.3	18.1	3.2	-1.4	-10.2
23	-19.0	-3.8	-4.4	-2.3	13.9	19.2	19.3	12.0	11.1	3.1	-5.6	-10.8
24	-29.5	-5.6	2.0	-0.6	10.7	19.2	21.6	12.0	10.4	3.7	-13.1	-19.7
25	-31.4	-4.9	-1.5	4.6	6.9	20.2	20.9	12.5	17.8	6.1	-6.8	-26.2
26	-26.4	-10.9	-3.6	7.5	7.6	21.9	21.4	15.3	14.7	6.2	-0.6	-25.9
27	-18.9	-19.0	-0.3	2.7	11.2	20.9	24.4	15.3	19.8	5.1	-1.8	-28.7
28	-13.2	-16.2	9.5	5.9	15.4	22.5	22.1	18.4	20.1	5.7	-2.0	-29.5
29	-12.3		-0.3	4.8	15.1	25.9	24.0	19.0	15.2	5.3	0.4	-29.1
30	-10.9		-8.9	15.1	14.0	27.4	22.1	21.8	14.2	0.8	-1.6	-31.9
31	-12.2		-2.2		19.8		22.8	20.6		-0.6		-30.4

DAILY PRECIPITATION



PRECIPITATION

2021 PRECIPITATION RECORDS					
TYPE	DATE		NEW RECORD	OLD Record	YEAR
	Month	Day			
Greatest Daily (mm)	April	8	3.3	1.5	1975
	May	24	31.1	27.4	1978
	August	31	6.4	6.1	1971
	November	10	4.7	2.4	2017
	December	26	6.3	6	1984
Lowest Monthly Total (mm)	February		1.7	1.9	2012
	July		5.0	13.0	1984
Number of days with 5mm of precipitation or more	July		0	1	1964,1967, 1975,1984, 1987,1997, 2007
Driest Summer	June July August		69.3	70.2	1984

2021 EXTREME PRECIPITATION EVENTS		
PERIOD	DATE (time)	AMOUNT (mm)
0.5 hour*	Aug 23-24 (23:30-00:00)	4.6
	June 10 (20:00-20:30)	2.6
1 hour*	Aug 23-24 (23:00-00:00)	6.0
	May 24 (02:30-03:30)	3.4
2 hours*	Aug 23-24 (23:00-01:00)	8.0
	May 24 (03:00-05:00)	6.2
6 hours*	May 24 (01:00-07:00)	13.4
	Aug 23-24 (19:00-01:00)	8.0
12 hours*	May 24 (01:00-13:00)	20.4
	Aug 23-24 (13:00-01:00)	14.2
24 hours*	May 24-25 (01:30-01:30)	25.8
	May 23-24 (01:30-01:30)	14.2
Greatest amount over more than one day	May 24-25	32.7
	Aug 23-24	20.7
Longest wet spells	Dec 22-26	5 days (8.0mm)
	Jan 20-23	4 days (1.7mm)
	Jan 28-31	4 days (2.0mm)
	Feb 06-09	4 days (0.5mm)
	June 03-07	4 days (8.9mm)
	Aug 07-10	4 days (9.4mm)
Longest dry spells	Oct 15-Nov 8	25 days
	May 3-20	18 days

**recorded by the tipping bucket gauge*



Snow Rollers
14 Jan 2021
Photo: V. Wittrock

RANKING BY DRIEST MONTH			
% OF NORMAL PRECIPITATION		PRECIPITATION AMOUNT (mm)	
JULY	8.3	FEBRUARY	1.7
FEBRUARY	18.7	MARCH	3.7
APRIL	23.2	JULY	5.0
SEPTEMBER	25.4	APRIL	5.4
OCTOBER	29.9	OCTOBER	6.1
JUNE	30.4	SEPTEMBER	8.5
MARCH	33.0	JANUARY	10.8
JANUARY	81.8	NOVEMBER	13.1
AUGUST	90.1	DECEMBER	13.4
MAY	94.7	JUNE	22.5
NOVEMBER	94.9	MAY	35.6
DECEMBER	135.4	AUGUST	41.8

PRECIPITATION

RANKING BY					
Total Number of Dry Days*	Maximum Length of Dry Spell*		Maximum Length of Wet Spell*		
2001	282	1976	48	2003	21
1964	280	1993	40	1968	14
1984	278	2000	40	1969	14
2021	276	1965	37	1997	12
1988	275	1980	36	2013	11
1965	271	1997	36	2014	11
1966	267	2002	35	1977	10
1986	267	1964	31	1980	10
1997	267	1984	30	1989	10
1981	266	2009	30	2004	10
1987	266	2010	29	2008	10
1967	265	2017	29	1983	9
1994	264	1966	28	1986	9
1968	260	1974	28	2010	9
1990	260	2012	28	1965	8
2015	259	1968	27	1972	8
1998	259	2004	25	1974	8
1985	258	2013	25	2005	8
1993	258	2021	25	2009	8
1995	258	1972	23	2011	8
1999	258	1973	23	2016	8
2002	258	1996	23	1973	7
1996	256	1977	22	1976	7
2003	255	1987	22	1982	7
2018	255	1978	21	1992	7
1976	251	1982	21	1993	7
1992	250	2001	21	2000	7
2000	248	2015	21	2002	7
2009	246	1969	20	2012	7
2008	245	1986	20	2019	7
1980	244	1999	20	1964	6
2012	244	2011	20	1966	6
2014	244	1967	19	1970	6
1971	243	1981	19	1975	6
2013	243	1988	19	1978	6
2017	242	2008	19	1979	6
1989	241	2018	19	1981	6
2020	241	1994	18	1988	6
1970	240	1995	18	1991	6
1979	239	2003	18	1994	6
2011	239	1975	17	1996	6
1972	238	1979	17	2006	6
1977	238	1985	17	2007	6
2007	237	1998	17	2020	6
1975	235	2014	17	1971	5
1991	234	2005	17	1985	5
1983	233	2020	17	1987	5
2010	233	1983	16	1990	5
2019	233	1990	16	1995	5
2005	231	1991	16	1998	5
1974	229	1992	16	1999	5
1982	229	1971	15	2015	5
2006	227	2007	15	2017	5
1978	224	2019	15	2018	5
2016	222	1989	14	2021	5
1969	218	1970	13	1967	4
2004	208	2006	13	1984	4
1973	200	2016	12	2001	4

*For this report, a dry day is defined as a day on which precipitation is not recorded; a dry spell is 2+ consecutive days of no precipitation; a wet spell is 2+ consecutive days of precipitation.



Tipping Bucket rain gauge
13 July 2021
Photo: V. Wittrock

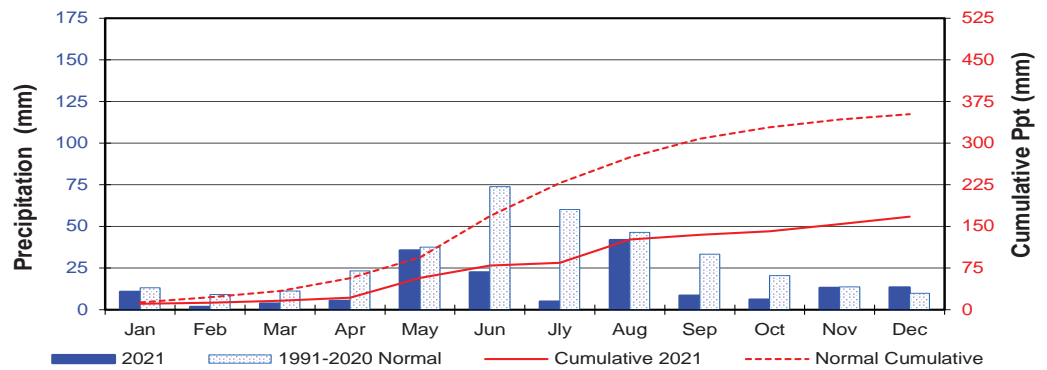


All-Season Precipitation Weighing Gauge
with 2 meter anemometer
13 July 2021
Photo: V. Wittrock

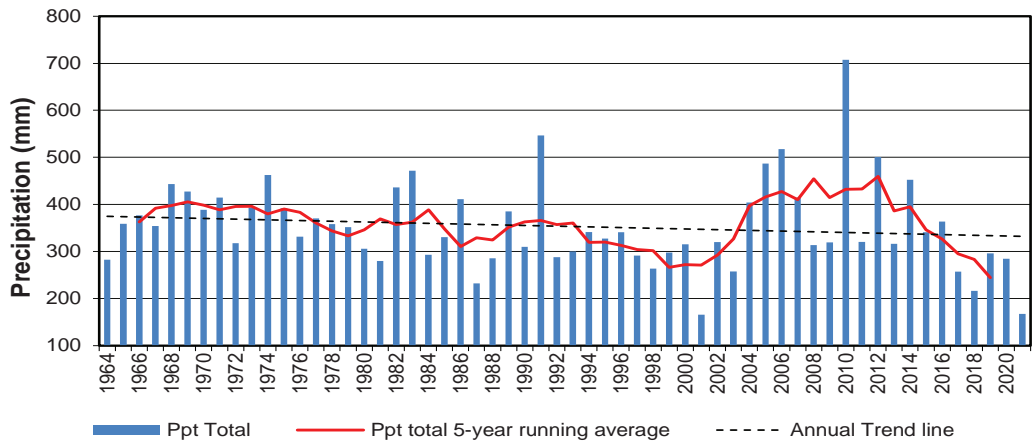
PRECIPITATION

MONTH	MONTHLY PRECIPITATION (mm)				EXTREME VALUES (mm)			
	2021	NORMAL	CUMULATIVE 2021	% OF CUMULATIVE NORMAL	CRS Maximum	CRS Minimum	SASKATOON AREA Maximum	Station Name (Year)
January	10.8	13.2	10.8	81.8	48.6/1969	2.6/2001	66.1/1911 ^{SE}	SM Saskatoon stations circa (N/W/H/P et al) 1889-1901
February	1.7	9.1	12.5	56.1	40.2/1979	1.9/2012	43.7/1924 ^{SE}	SE Saskatoon Eby 1901-42
March	3.7	11.2	16.2	48.4	57.1/1967	0.8/2010	59.0/1927 ^{SE}	US University of Saskatchewan 1915-64
April	5.4	23.3	21.6	38.0	83.5/2014	2.4/1988, 89, 2007	86.1/1955 ^{US}	S Saskatoon 1941-42
May	35.6	37.6	57.2	60.6	145.3/1977	0.2/2002	178.0/1977 ^{SWT}	SA S'toon Diefenbaker In'l Airport 1942-2008
June	22.5	73.9	79.7	47.4	171.0/2005	13.0/1985	186.8/1942 ^S	NRC National Research Council 1952-66
July	5.0	60.1	84.7	37.1	125.9/1971	13.0/1984	162.9/1928 ^{SE}	SRC Sask. Research Council 1963-
August	41.8	46.4	126.5	46.0	105.2/2007	7.0/2001	178.9/1954 ^{NRC}	SWT S'toon Water Treatment Plant 1974-2006
September	8.5	33.4	135.0	43.8	128.4/2006	0.8/1995	128.4/2006 ^{SRC}	SC Saskatoon Central Ave 1974-89
October	6.1	20.4	141.1	42.9	69.8/1969	0.0/2000	69.8/1969 ^{SRC}	S2 Saskatoon 2 1977-90
November	13.1	13.8	154.2	45.0	48.2/1973	0.4/2009	57.3/1940 ^{SE}	K Saskatoon Kernen Farm 1993-2004
December	13.4	9.9	167.6	47.6	43.0/1977	1.2/1997	59.2/1956 ^{SA}	KCS Saskatoon Kernen Farm CS 1996-2008
Total	167.6	352.3			707.4/2010	165.8/2001	707.4/2010 ^{SRC}	RCS Environment Canada 2008-

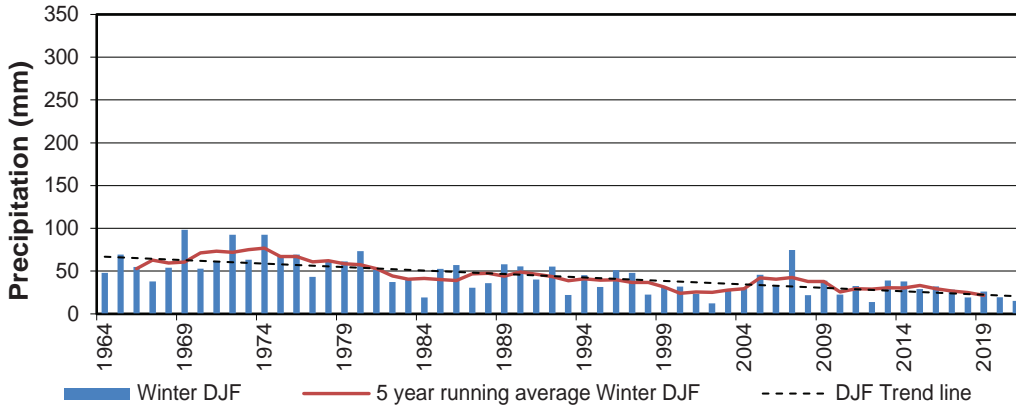
Monthly



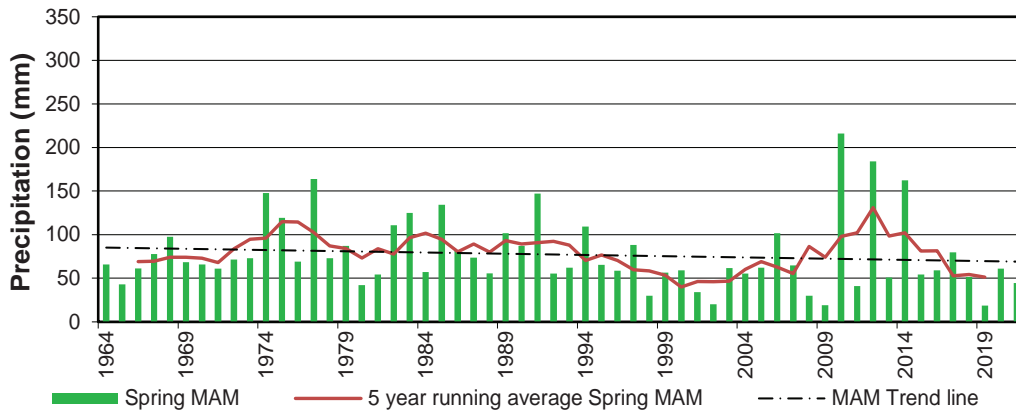
Annual



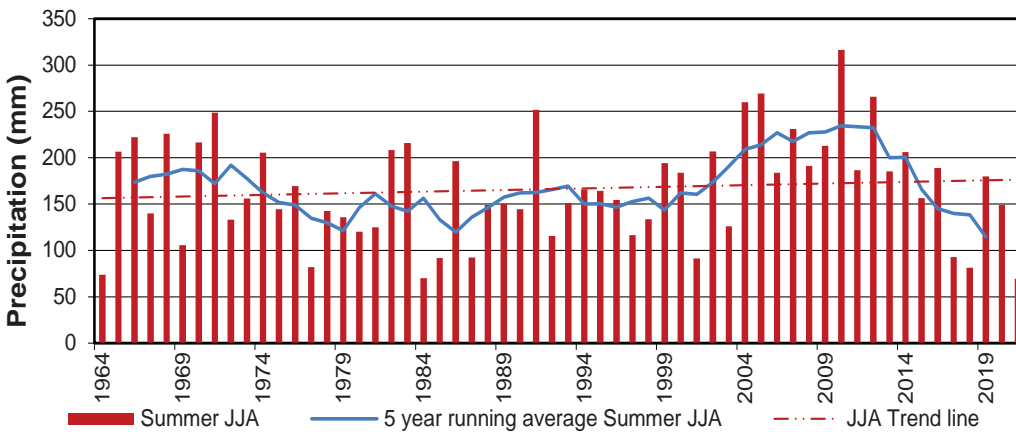
SEASONAL PRECIPITATION for 1964 to 2021



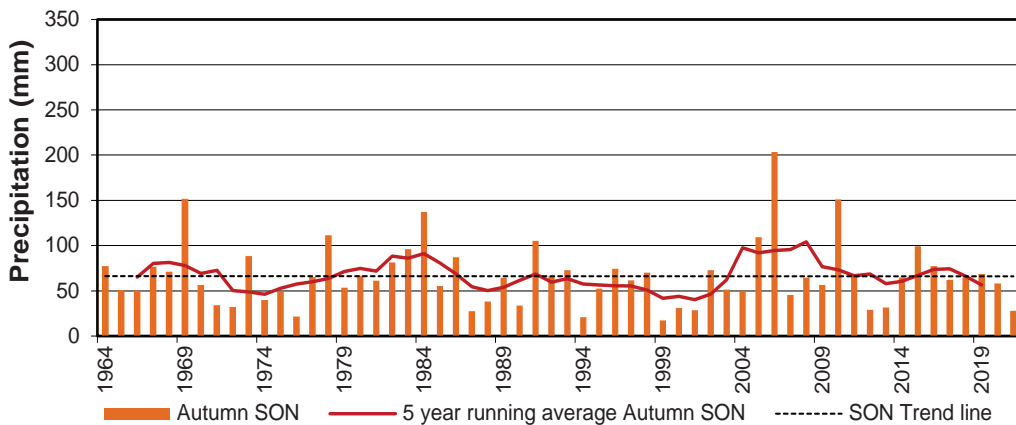
Winter



Spring



Summer

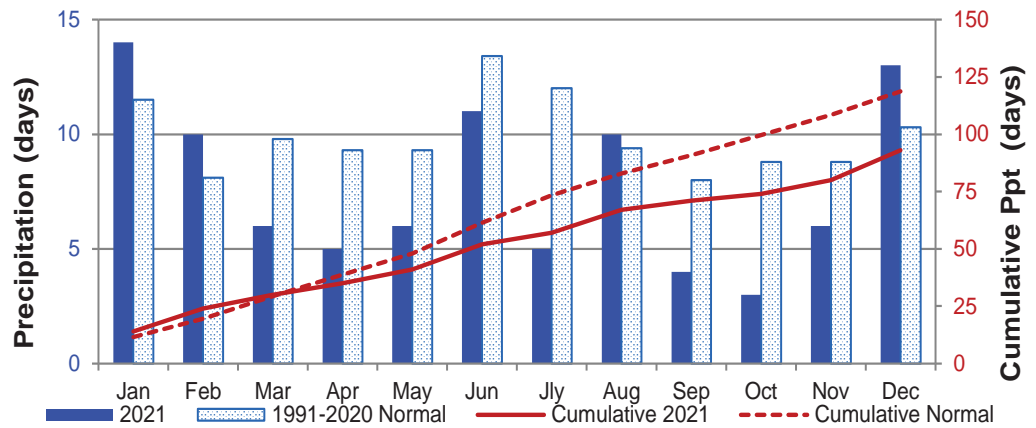


Autumn

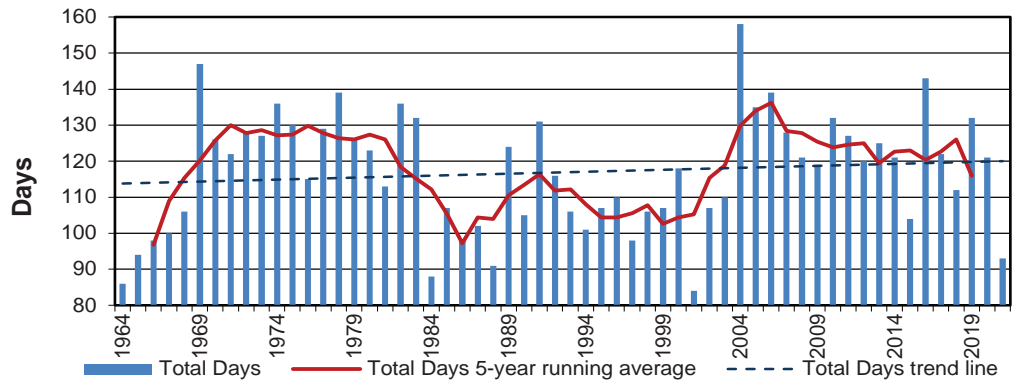
PRECIPITATION

MONTH	NUMBER OF DAYS WITH MEASURABLE PRECIPITATION					EXTREME VALUES	
	2021	CUMULATIVE 2021	Normal	CUMULATIVE NORMAL	% OF CUMULATIVE NORMAL	CRS Maximum	CRS Minimum
January	14	14	11.5	11.5	121.7	25/1974	3/2001
February	10	24	8.1	19.6	122.4	20/1969	2/1984
March	6	30	9.8	29.4	102.0	19/2004	2/1990,92,94 2007, 2010
April	5	35	9.3	38.7	90.4	17/2003	2/1964
May	6	41	9.3	48.0	85.4	19/1989	1/2002
June	11	52	13.4	61.4	84.7	21/1991	7/1964&1968
July	5	57	12.0	73.4	77.7	19/1986	4/1984
August	10	67	9.4	82.8	80.9	18/2002	2/2001
September	4	71	8.0	90.8	78.2	19/1977	2/1995, 2012, 13, 17
October	3	74	8.8	99.6	74.3	16/2004	0/2000
November	0	74	8.8	108.4	68.3	18/1970	1/1986,74,76, 90, 2009
December	0	74	10.3	118.7	62.3	21/2013	2/1997
Total	74		118.7			158/2004	84/2001

Monthly Days



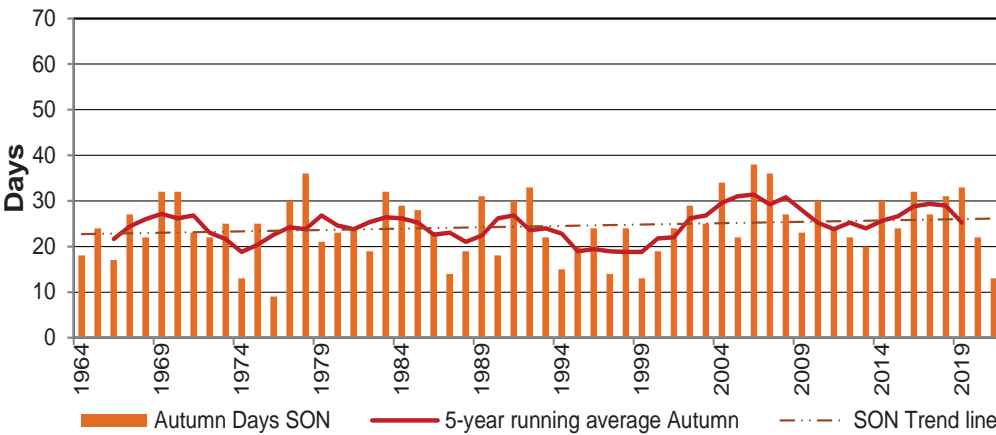
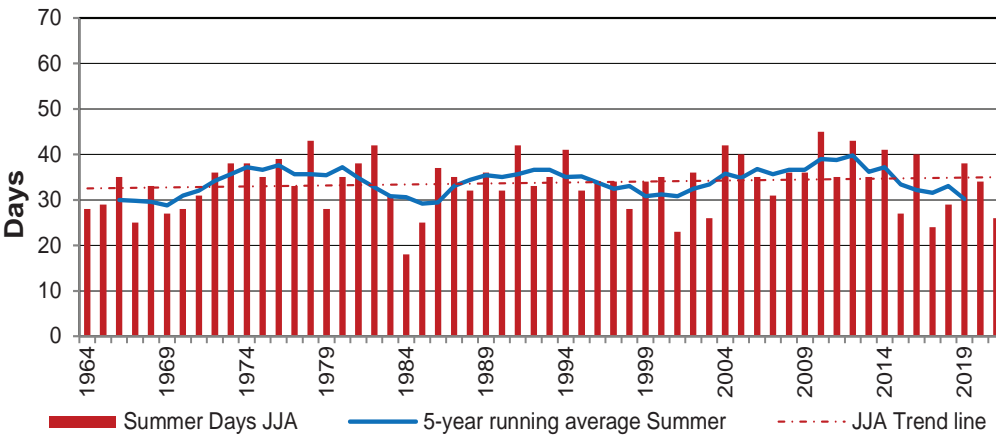
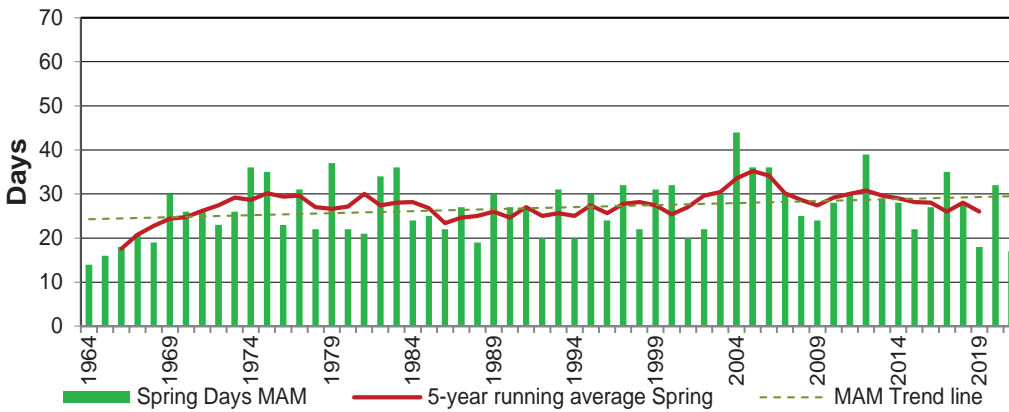
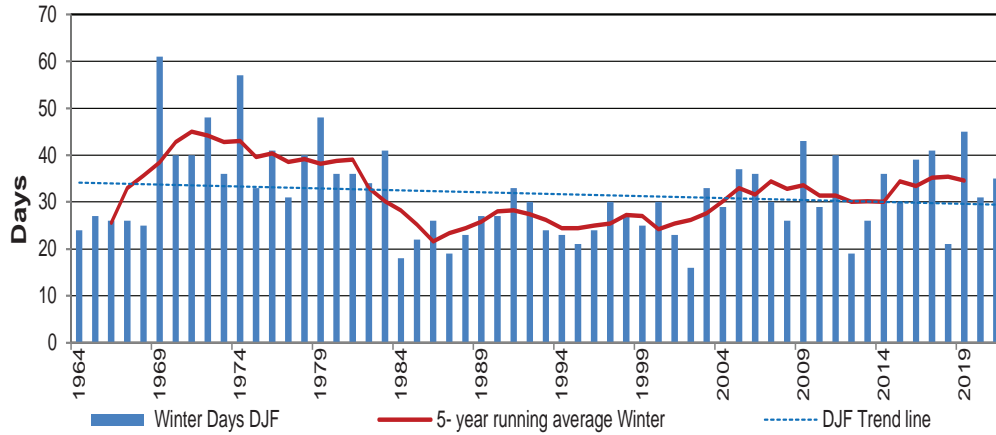
Annual Days



Snow cover disappearance
March 2021.
Left photo: March 10
Right photo: March 24
Photo: V. Wittrock



SEASONAL PRECIPITATION DAYS for 1964 to 2021

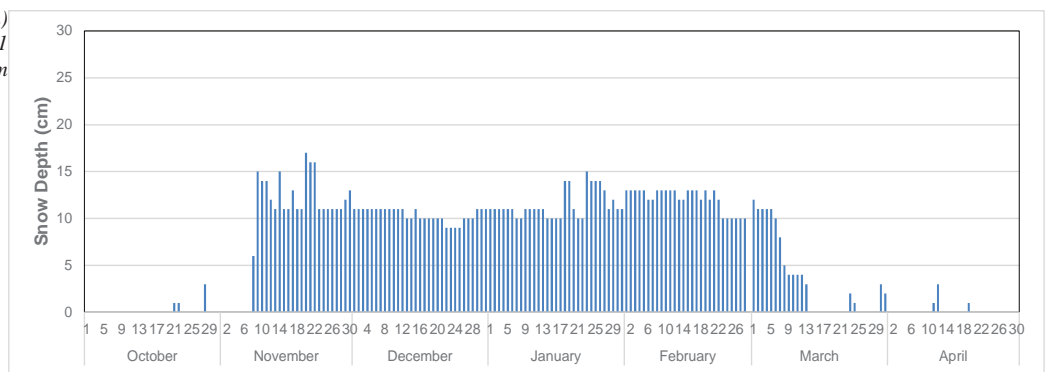


PRECIPITATION GRID (mm)

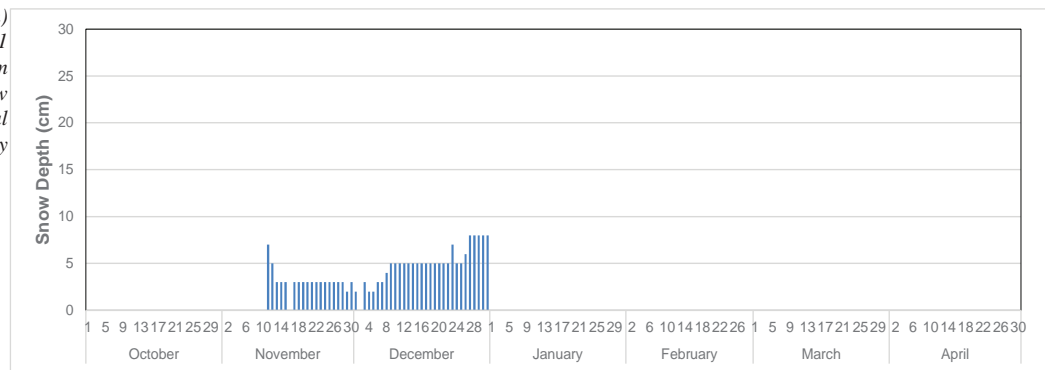
Precipitation Daily

2021	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.3	0.0	0.0
4	0.1	0.2	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
5	0.2	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.2	0.0	0.0	0.0	6.0	0.7	0.0	5.0	0.0	0.0	0.0
7	0.0	0.1	0.0	0.0	0.0	0.7	0.0	1.6	0.0	0.0	0.0	0.0
8	0.0	0.1	0.0	3.3	0.0	0.0	1.2	1.4	0.0	0.0	0.0	2.4
9	0.1	0.1	0.7	0.0	0.0	0.9	0.0	0.2	0.0	0.0	0.1	0.0
10	0.0	0.0	0.0	0.0	0.0	7.3	0.0	6.2	0.9	0.0	4.7	0.0
11	0.0	0.1	0.0	1.5	0.0	0.7	0.0	0.0	0.0	0.0	1.9	0.0
12	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
13	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.2
15	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	1.6	0.0
16	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	1.0	0.0	4.6	0.0
17	3.9	0.2	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.3
18	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
19	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.1	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	1.1	0.0	0.0	0.2	0.0	0.0	0.0	2.2	0.0	0.0	0.0	1.2
23	0.3	0.0	0.5	0.0	0.0	0.0	0.0	16.2	0.0	0.0	0.0	0.2
24	0.0	0.0	0.0	0.0	31.1	0.1	0.0	2.3	0.0	0.0	0.0	0.2
25	0.0	0.0	0.5	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1
26	0.0	0.2	0.1	0.0	0.0	1.8	1.5	0.0	0.0	0.0	0.0	6.3
27	0.0	0.0	0.6	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0	0.0
28	0.1	0.4	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.7		1.3	0.0	0.8	0.0	0.8	0.0	0.0	0.0	0.0	0.1
30	1.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
31	0.2		0.0		0.0		0.0	6.4		0.0		0.0

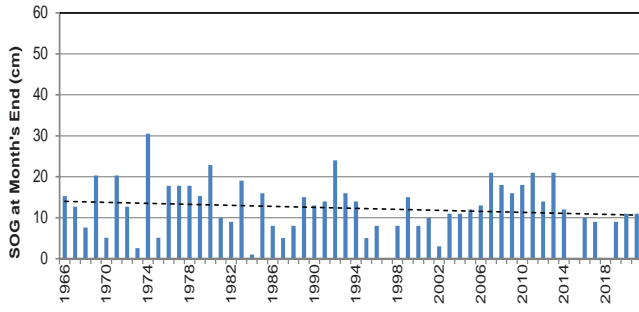
*Snow-on-the-Ground (cm)
October 2020 to April 2021
Daily, 9am*



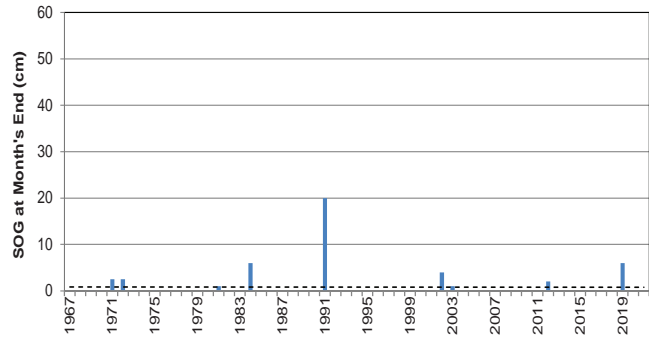
*Snow-on-the-Ground (cm)
October 2021 to December 2021
Daily, 9am
Note: January to April 2022 snow depths are in the 2022 annual summary*



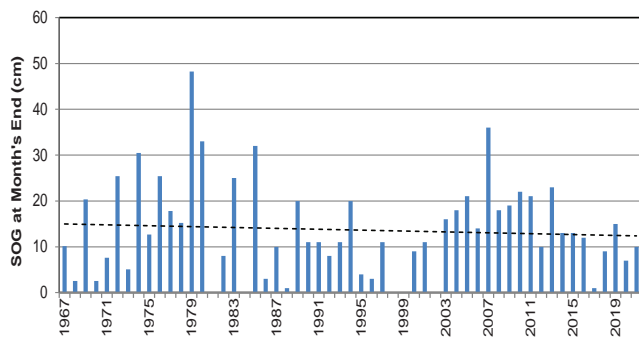
SNOW-ON-THE-GROUND (SOG) ON LAST DAY OF MONTH



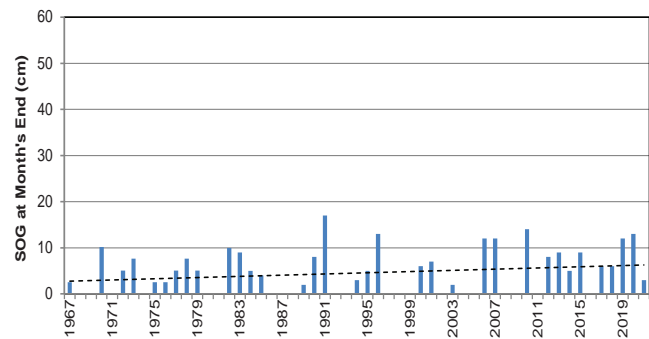
January



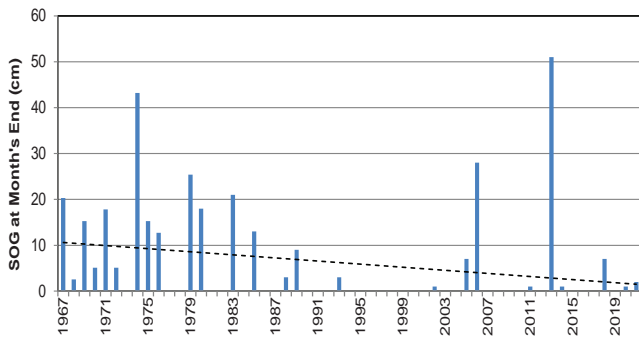
October



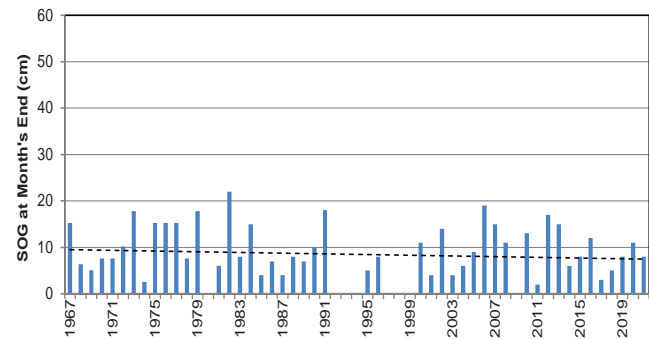
February



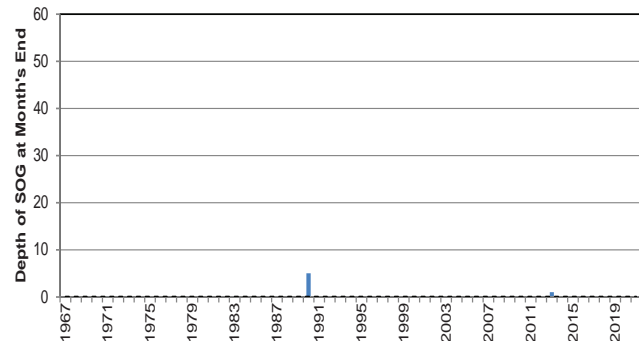
November



March



December



April



Automated Snow Depth Sensor 09 December 2021
Photo: V. Wittrock

RADIATION

MONTH	BRIGHT SUNSHINE (HOURS)					BRIGHT SUNSHINE DAYS						
	2021	NORMAL	% OF NORMAL	POSSIBLE SUNSHINE*	% OF POSSIBLE	2021 CUMULATIVE (HOURS)	NORMAL CUMULATIVE (HOURS)	2021 NUMBER OF DAYS	NORMAL NUMBER OF DAYS	2021 CUMULATIVE (DAYS)	NORMAL CUMULATIVE (DAYS)	2021 WITH MORE THAN 1 HOUR
JAN	123.1	105.3	116.9	259.6	47.4	123.1	105.3	26	24.0	26	24.0	23
FEB	191.5	139.6	137.2	279.5	68.5	314.6	244.9	28	24.1	54	48.1	27
MAR	265.5	204.0	130.1	370.1	71.7	580.1	448.9	29	28.3	83	76.4	29
APR	258.4	231.4	111.7	419.2	61.6	838.5	680.3	27	27.6	110	104.0	27
MAY	314.1	274.7	114.3	488.3	64.3	1152.6	955.0	29	29.5	139	133.5	29
JUNE	314.9	253.0	124.5	500.4	62.9	1467.5	1208.0	30	28.0	169	161.5	29
JULY	342.8	305.5	112.2	501.5	68.3	1810.3	1513.5	30	30.4	199	191.9	30
AUG	210.3	276.9	75.9	451.9	46.5	2020.6	1790.4	31	30.0	230	221.9	27
SEP	264.3	214.7	123.1	378.5	69.8	2284.9	2005.1	30	27.8	260	249.7	29
OCT	154.1	158.7	97.1	328.4	46.9	2439.0	2163.8	20	26.4	280	276.1	18
NOV	122.8	97.4	126.1	263.4	46.6	2561.8	2261.2	22	22.2	302	298.3	20
DEC	97.9	89.2	109.8	242.1	40.4	2659.7	2350.4	27	22.7	329	321.0	22
TOTAL	2659.7	2350.4	113.2	4482.9	59.3			329	321.0			310

* National Research Council, Canada, Hertzberg Institute of Astrophysics

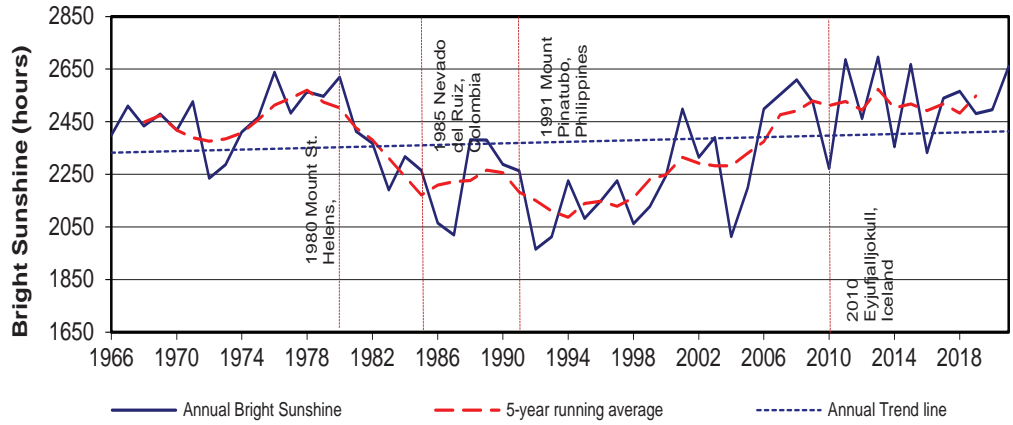
Global and Diffuse Radiation (MJ/m²)

DATE	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse
1	3.7	0.9	6.3	2.2	10.4	6.0	16.1	5.4	21.0	6.2	23.7	8.0	29.1	5.2	20.6	7.5	13.6	4.5	12.7	2.3	6.9	1.6	1.6	1.6
2	3.3	1.2	5.1	3.4	10.5	3.8	16.9	3.8	17.2	7.0	25.6	7.4	26.9	4.8	14.3	8.7	9.4	6.1	11.9	2.7	7.8	1.8	1.7	1.6
3	2.7	1.7	6.8	1.6	12.8	3.5	18.9	3.0	26.9	2.8	27.8	4.8	18.8	9.5	5.9	4.3	11.9	6.4	12.0	2.3	7.9	1.2	4.2	4.4
4	3.9	0.7	6.4	2.9	13.4	2.7	13.1	7.5	26.5	3.5	24.9	9.1	20.4	9.1	15.5	8.8	17.7	4.1	8.9	4.3	6.8	1.4	2.5	2.4
5	1.7	1.4	7.8	1.8	12.3	4.3	19.8	2.6	23.1	5.9	23.1	9.1	18.6	8.8	21.6	7.5	16.6	5.0	9.1	3.6	6.6	1.2	4.7	4.5
6	2.9	2.1	8.7	2.1	9.6	5.3	18.7	4.0	26.0	6.6	17.3	8.5	12.5	8.2	16.7	9.0	10.7	3.5	5.1	3.5	6.2	1.6	3.2	3.0
7	3.0	1.1	9.6	2.0	13.4	1.8			21.3	9.4	22.7	7.6	23.5	8.0	13.5	8.3	19.3	1.9	11.2	1.9	6.8	1.1	2.5	2.4
8	5.6	0.9	9.4	2.1	13.3	1.8			23.9	8.6	17.6	9.9	24.7	7.3	14.2	8.5	17.3	2.6	11.8	2.0	6.4	1.2	1.9	1.9
9	5.7	1.0	6.1	3.6	13.1	2.8	20.9	3.5	27.3	5.9	9.2	6.5	25.4	6.2	7.9	5.0	15.7	4.7	11.4	2.3	5.2	2.4	3.9	2.5
10	3.0	1.8	8.1	2.8	9.5	3.6	15.5	3.6	26.3	6.4	13.1	7.4	27.5	6.4	13.5	4.8	15.9	2.4	10.0	4.6	1.0	1.0	2.5	2.1
11	2.8	1.8	9.7	2.1	13.2	4.7	6.9	5.3	22.9	7.3	10.7	7.3	24.6	7.6	17.3	5.2	4.9	3.7	4.0	3.1	3.3	3.3	3.9	0.9
12	3.9	1.1	9.5	2.6	13.1	4.3	16.1	8.0	20.4	7.6	23.9	8.5	26.5	8.7	24.0	3.3	15.0	4.8	11.9	5.8	2.8	2.8	3.3	1.5
13	2.9	1.3	9.6	2.3	14.8	1.9	10.9	8.0	24.1	9.4	30.6	4.4	24.0	9.1	24.0	2.6	17.6	3.4	2.9	2.3	5.1	3.0	2.2	1.9
14	1.8	1.4	9.4	2.2	14.4	2.0	16.4	6.9	19.8	7.5	30.1	4.5	20.6	10.1	19.6	6.7	15.4	4.7	2.9	2.3	2.5	2.5	1.5	1.5
15	2.4	1.8	10.9	2.0	13.8	3.9	22.0	2.6	20.5	7.2	27.6	4.0	24.9	9.2	18.5	6.1	12.9	6.9	10.7	1.2	2.5	2.4	3.1	1.7
16	4.1	1.4	9.4	2.2	15.5	2.0	22.8	2.5	19.5	9.4	25.9	5.7	21.8	9.2	11.0	6.6	8.3	5.7	10.4	1.3	0.9	0.9	4.5	1.5
17	2.4	2.0	10.1	1.8	15.1	1.9	19.1	5.1	24.8	8.4	23.8	7.7	21.3	8.3	5.6	4.0	13.3	5.0	10.2	1.5	2.5	2.5	4.7	1.4
18	1.7	1.4	11.1	1.9	15.0	2.5	17.8	7.1	23.1	8.2	10.8	7.3	20.0	8.9	15.3	7.8	13.8	4.9			4.3	4.0	2.8	2.1
19	3.8	2.3	10.3	3.4	13.2	3.2	13.4	7.9	21.1	7.1	16.7	9.1	6.6	4.9	13.3	8.4	13.8	4.4			6.3	5.0	3.3	1.6
20	4.8	1.6	10.5	1.7	14.1	3.3	23.3	4.0	9.6	7.2	25.5	8.8	11.7	7.1	8.5	6.0	13.8	3.0			4.3	4.0	1.4	1.5
21	2.7	2.2	6.9	5.0	15.9	2.0	23.9	2.9	14.0	9.5	27.3	7.8	22.4	8.3	20.3	4.2	15.6	2.1			3.0	2.8	2.4	2.0
22	3.0	2.4	10.5	1.7	11.8	5.8	17.5	5.4	20.2	9.8	22.4	6.8	25.4	7.2	4.5	3.2	12.9	4.2			2.6	2.5	1.6	1.7
23	6.3	1.3	10.4	3.3	9.9	6.4	18.5	5.7	19.1	9.6	19.0	7.4	26.9	6.9	6.6	4.0	15.0	2.5			3.4	3.1	2.7	2.4
24	7.6	1.3	8.9	4.4	12.8	5.5	19.9	5.1	6.5	4.8	24.4	6.9	26.5	6.3	7.5	5.4	14.2	3.2			2.6	2.6	3.9	1.1
25	7.4	1.7	6.4	5.1	4.8	3.7	17.5	8.0	9.3	6.9	20.8	8.1	14.8	9.4	17.7	6.0	12.8	3.3			2.6	2.5	3.7	1.6
26	6.9	2.4	6.6	5.0	13.0	5.9	17.4	5.9	27.4	8.8	26.4	5.5	22.7	7.5	16.2	4.3	11.8	4.1			2.7	2.6	1.1	1.1
27	6.6	1.6	7.9	5.7	16.7	2.4	23.9	4.3	29.3	5.9	27.1	6.8	22.9	8.0	7.3	5.2	13.3	2.0	5.2	0.7	4.4	4.3	4.0	1.9
28	6.1	1.5	8.5	5.8	16.3	3.0	21.3	6.5	19.1	6.4	29.5	4.4	25.9	6.4	18.9	5.1	11.2	3.8	8.2	1.4	2.8	2.7	2.8	2.7
29	5.1	3.5			3.1	2.4	15.8	7.6	24.1	8.8	28.1	4.8	18.2	8.5	19.0	4.1	13.2	2.5	4.8	2.9	4.0	3.9	3.8	2.6
30	3.7	3.1			15.1	5.9	21.9	5.3	30.2	5.1	28.7	5.5	23.0	5.4	19.4	3.2	14.1	1.5	8.0	1.2	3.6	3.6	2.8	2.4
31	5.2	2.8			18.4	3.3			21.0	11.3			24.1	5.1	9.8	3.7			6.9	1.7			4.7	1.6
TOTAL	126.7	52.7	240.9	82.7	398.3	111.6	506.2	147.5	665.5	228.5	684.3	209.6	682.2	235.6	448.0	177.5	411.0	116.9			127.8	75.5	127.8	75.5
1971-2000 NORMAL	129.9	71.4	210.1	105.3	362.4	173.9	492.2	178.5	586.3	222.2	638.7	228.1	633.5	216.5	529.0	185.6	351.8	127.6	239.1	92.6	123.7	73.6	95.2	54.3
1981-2010 NORMAL	126.9	68.7	213.0	104.0	371.9	162.9	486.9	186.2	603.5	218.5	625.7	224.4	650.6	209.9	542.1	179.0	374.1	123.2	239.0	96.7	127.2	63.4	100.0	50.0
1991-2020 NORMAL	121.8	65.6	209.1	100.9	378.7	156.3	487.2	180.1	634.1	214	612.6	218.3	662.0	203.3	542.2	172.5	373.1	120.9	226.5	92.8	118.5	60.8	92.1	47.6

* Diffuse Ring misaligned

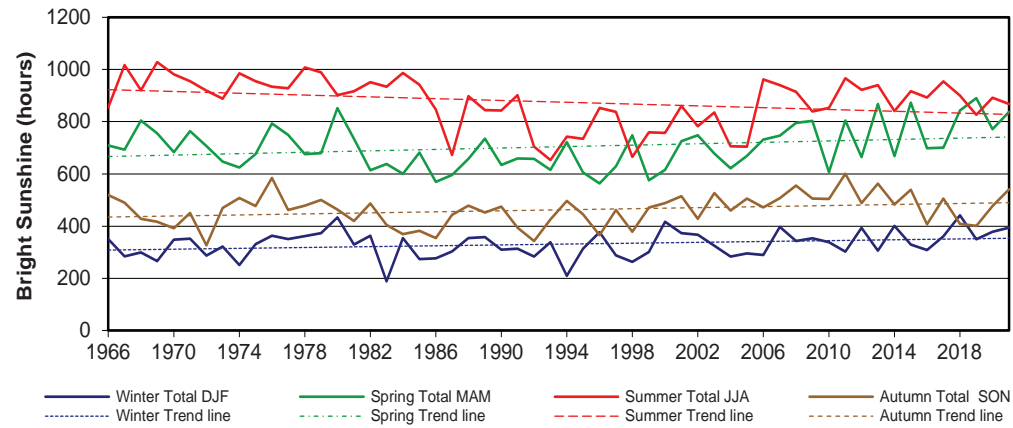
RADIATION

Annual Bright Sunshine Hours

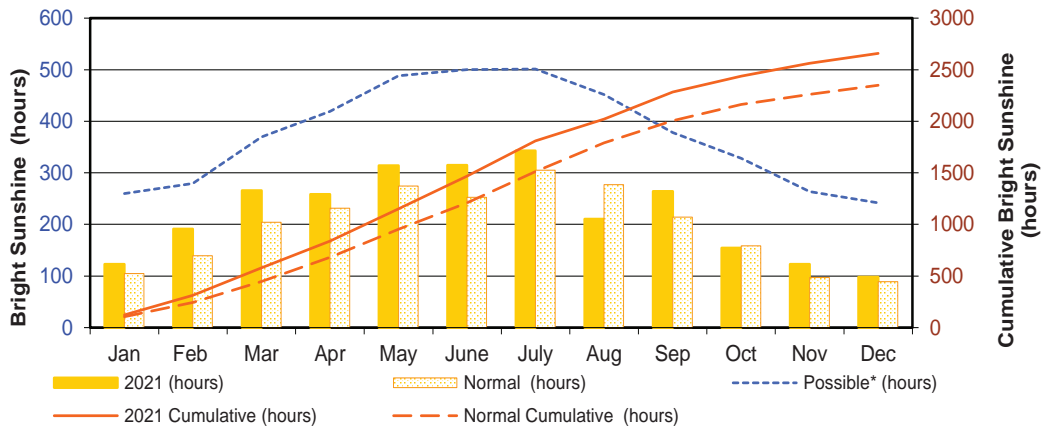


Goble, 2002; U.S. Geological Survey, n.d.

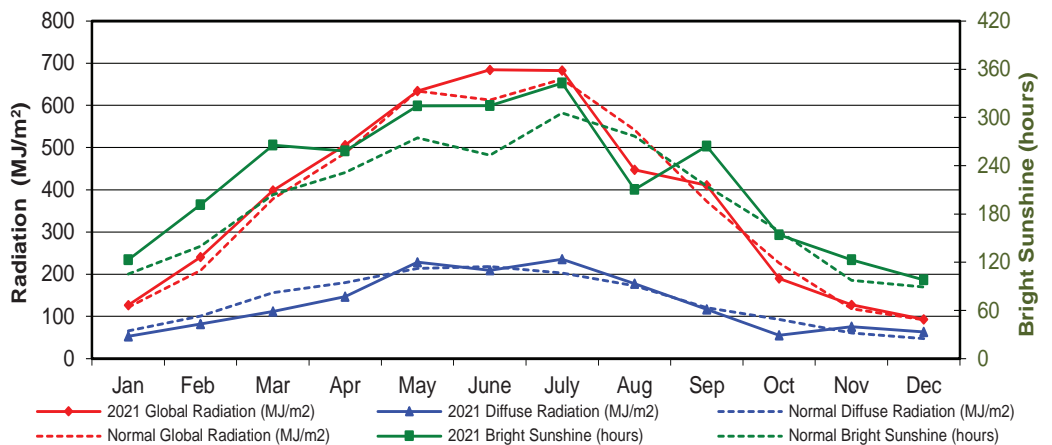
Seasonal Bright Sunshine Hours



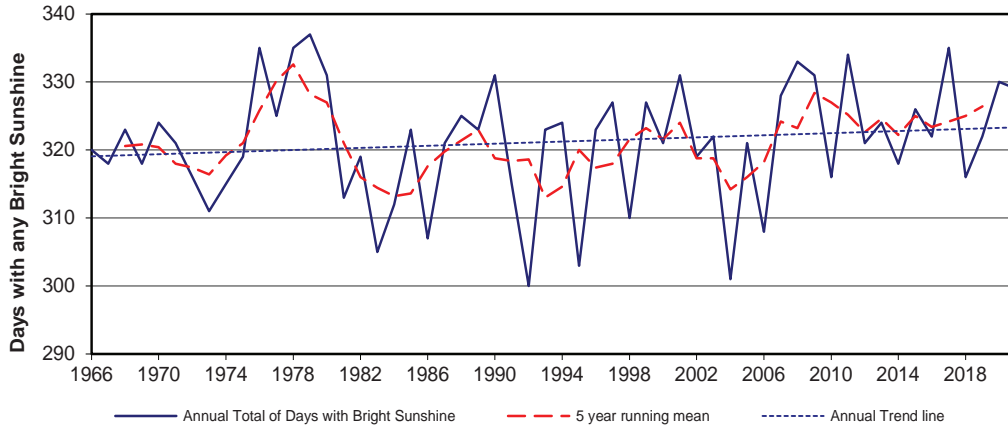
Monthly Bright Sunshine Hours



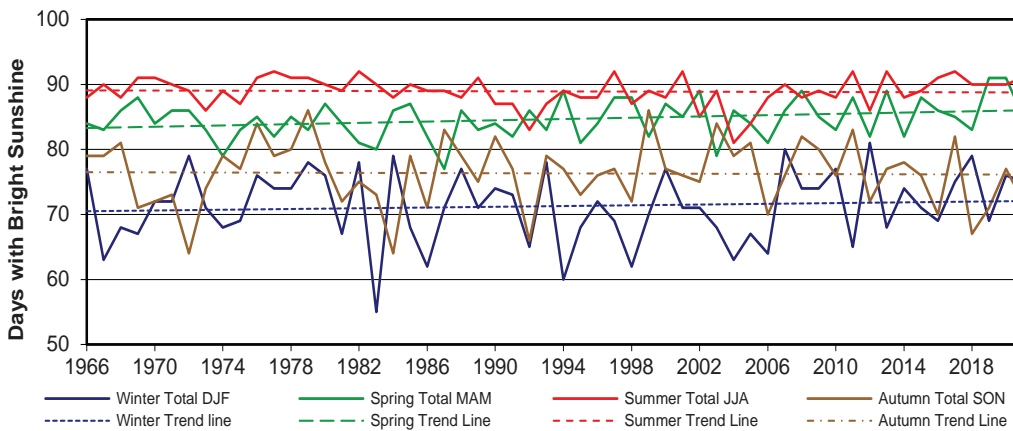
Monthly Comparison Bright Sunshine Hours, Global & Diffuse Radiation



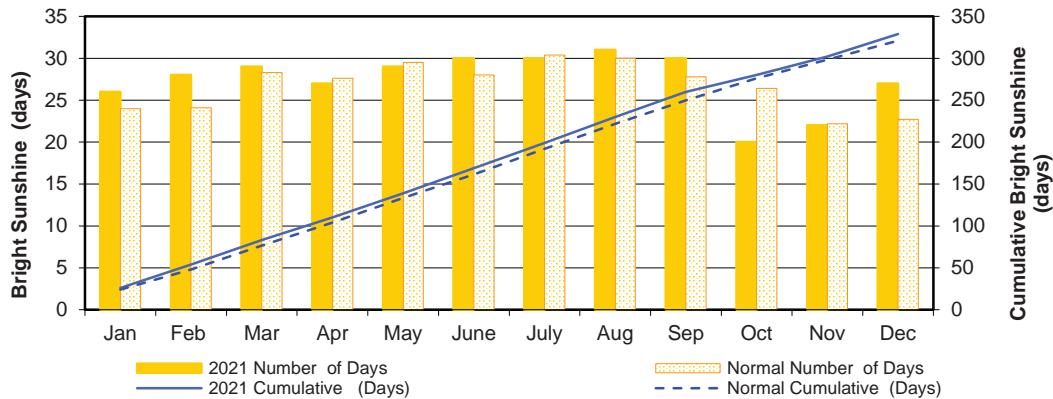
RADIATION



Annual Bright Sunshine Days



Seasonal Bright Sunshine Days



Monthly Bright Sunshine Days

2021 BRIGHT SUNSHINE RECORDS				
TYPE	DATE	NEW RECORD	OLD Record	YEAR
Bright Sunshine (hrs)	February	191.5	190.8	2018
No. of days with Bright Sunshine greater or equal 1 hour	February	27	27	2020
No. of days with Less than 1 hour but greater than 0	August	4	4	2010
Greatest Number of Bright Sunshine days	December	27	27	1994

RADIATION Bright Sunshine Ranking

% OF ACTUAL TO POSSIBLE HOURS BRIGHT SUNSHINE					
% ANNUAL	WINTER % DJF	SPRING % MAM	SUMMER % JJA	AUTUMN % SON	
2011	59.9	2018 56.6	2019 69.9	1969 70.7	2011 61.7
2013	59.9	1980 55.0	2015 68.5	1967 69.8	1976 60.3
2015	59.5	2000 52.8	1980 66.7	1978 69.2	2013 58
2021	59.3	2014 51.4	2018 66.1	1979 67.9	2008 57.3
1976	58.8	2007 50.9	2021 65.6	1984 67.9	2021 55.8
1980	58.3	2021 50.5	2013 64	1974 67.7	2015 55.5
2008	58.1	2012 49.7	2011 63.1	1970 67.5	1966 53.3
2018	57.2	1979 47.9	1968 63.0	2011 66.4	2001 52.9
1978	57.2	2001 47.8	2009 62.8	2006 66.1	1974 52.2
2007	57.0	2020 47.8	2008 62.2	2017 65.6	2017 52.1
1979	56.8	1996 47.7	1976 62.1	1975 65.6	2007 52.1
2017	56.7	2002 47.1	2020 60.4	1971 65.6	2009 52.1
1971	56.3	1982 46.6	1971 60.1	1982 65.4	2005 52.1
2009	56.3	1978 46.4	1969 59.2	1985 64.8	2010 51.8
1967	56.0	2017 46.1	1977 58.8	2013 64.7	1979 51.3
2006	55.7	1976 46.0	2002 58.6	2007 64.7	1994 51.1
2001	55.7	1989 45.8	1998 58.6	1976 64.2	2012 50.4
2020	55.6	2009 45.3	2007 58.6	1983 64.2	2000 50.3
1977	55.4	1971 45.2	1989 57.6	1977 63.8	1967 50.2
2019	55.3	1966 45.1	1981 57.6	2012 63.5	1982 50.0
1969	55.3	1977 45.0	2006 57.4	1968 63.3	2014 49.7
1975	55.0	1984 44.9	2001 56.9	1972 63.3	1988 49.3
2012	54.8	1988 44.8	1994 56.6	1981 63.1	2020 49.2
1968	54.2	2019 44.8	1966 55.7	2015 63.0	1978 49.1
1970	53.9	1970 44.6	1972 55.4	2008 62.9	2003 49.1
1981	53.8	2008 43.5	2017 54.9	1980 62.0	1975 48.9
1974	53.8	1993 43.4	2016 54.6	2018 62.0	1990 48.7
1966	53.5	2010 43.3	1967 54.4	1991 61.9	2006 48.5
1989	53.1	1975 42.4	1970 53.6	1988 61.8	1973 48.3
1988	53.0	2015 42.3	1979 53.4	2016 61.4	1980 47.7
1982	52.8	1981 42.2	1985 53.4	2020 61.4	1977 47.6
2014	52.5	2003 41.6	2003 53.3	1973 61.1	1997 47.5
2003	52.1	1973 41.2	1975 53.1	2021 59.7	2004 47.4
2016	51.9	1991 40.2	1978 53.0	2001 59.2	1989 46.5
2002	51.6	1995 40.2	2005 52.4	2010 58.7	1971 46.2
1984	51.6	1990 39.7	2014 52.4	1996 58.7	1995 45.8
1990	51.0	2013 39.1	2012 52	1966 58.7	1987 45.5
1973	51.0	2016 39.1	1991 51.7	1986 58.2	1999 44.2
2010	50.7	1987 38.9	1988 51.6	1989 58.1	2002 44.1
1985	50.5	2011 38.8	1992 51.5	1990 58.0	1968 44.0
1991	50.5	1999 38.5	1973 50.8	2009 57.8	1993 43.8
2000	50.0	1968 38.0	1983 50.1	2014 57.8	1981 43.1
1972	49.8	2005 37.9	1990 49.8	1997 57.7	1969 42.9
1997	49.6	2006 37.1	1997 49.3	2003 57.4	2016 42.0
1994	49.6	1997 37.0	1974 49.0	2019 56.8	2018 42.0
2005	49.1	1967 36.5	2004 48.7	2002 53.8	1983 41.5
1983	48.9	1972 36.3	1982 48.3	1999 52.2	2019 41.2
1996	47.9	2004 35.9	1993 48.2	2000 52.1	1991 40.4
1999	46.5	1992 35.9	2000 48.1	1994 51.0	1970 40.2
1995	46.5	1986 35.6	2010 47.6	1995 50.5	1985 39.3
1986	46.0	1985 35.1	1995 47.6	2004 48.5	1998 38.9
1998	46.0	1969 34.0	1984 47.0	2005 48.5	1984 38.1
1987	45.1	1998 33.7	1987 46.8	1992 48.4	1996 37.7
1993	44.9	1974 32.2	1999 45.2	1987 46.3	1986 36.4
2004	44.8	1994 26.9	1986 44.7	1998 45.8	1992 35.3
1992	43.8	1983 24.2	1996 44.1	1993 44.9	1972 33.6

DAYS WITH BRIGHT SUNSHINE					
ANNUAL	WINTER DJF	SPRING MAM	SUMMER JJA	AUTUMN SON	
1979	337	2012 81	2019 91	1977 92	1979 86
1976	335	2007 80	2020 91	1982 92	1999 86
1978	335	1972 79	1994 89	1997 92	1976 84
2017	335	1984 79	2002 89	2001 92	2003 84
2011	334	2018 79	2008 89	2011 92	1987 83
2008	333	1979 78	2014 86	2013 92	2011 83
1980	331	1982 78	1969 88	2017 92	1990 82
1990	331	1993 78	1997 88	1969 91	2008 82
2001	331	1966 77	1998 88	1970 91	2017 82
2009	331	1988 77	2011 88	1976 91	1968 81
2020	330	2000 77	2013 88	1978 91	2005 81
2021	329	1976 76	2015 88	1979 91	1978 80
2007	328	1980 76	1980 87	1989 91	2009 80
1997	327	2020 76	1985 87	2016 91	1966 79
1999	327	2017 75	2000 87	2021 91	1967 79
2015	326	2021 75	1968 86	1967 90	1974 79
1977	325	1977 74	1971 86	1971 90	1977 79
1988	325	1978 74	1972 86	1980 90	1985 79
1970	324	1990 74	1984 86	1983 90	1988 79
1994	324	2008 74	1988 86	1985 90	1993 79
2014	307	2009 74	1992 86	2007 90	2004 79
1968	323	1991 73	2004 86	2018 90	1980 78
1985	323	1970 72	2007 86	2019 90	2014 79
1989	323	1971 72	2016 86	2020 90	1975 77
1993	323	1996 72	1976 85	1972 89	1991 77
1996	323	1973 71	1978 85	1974 89	1994 77
2013	323	1987 71	2001 85	1981 89	1997 77
2003	322	1989 71	2009 85	1986 89	2000 77
2016	322	2001 71	2017 85	1987 89	2013 77
2019	322	2002 71	2021 85	1994 89	2020 77
1971	321	2015 71	1966 84	1999 89	1996 76
1987	321	2014 69	1970 84	2003 89	2001 76
2000	321	1999 70	1981 84	2009 89	2007 76
2005	321	1975 69	1990 84	2015 89	2010 76
2012	321	1997 69	1996 84	1966 88	2015 76
1966	320	2016 69	2005 84	1968 88	1982 75
1975	319	2019 69	1967 83	1984 88	1989 75
1982	319	1968 68	1973 83	1988 88	2002 75
2002	319	1974 68	1975 83	1995 88	1973 74
1967	318	1985 68	1979 83	1996 88	1971 73
1969	318	1995 68	1989 83	2000 88	1983 73
1972	316	2003 68	1993 83	2006 88	1995 73
2010	316	2013 68	2010 83	2008 88	1970 72
2018	316	1969 67	2018 83	2010 88	1981 72
1974	315	1981 67	1977 82	2014 88	1998 72
1991	315	2005 67	1986 82	1975 87	2012 72
1981	313	1992 65	1991 82	1990 87	2021 72
1984	312	2011 65	1999 82	1991 87	1969 71
1973	311	2006 64	2012 82	1993 87	1986 71
1998	310	1967 63	1982 81	1998 87	2019 71
2006	308	2004 63	1995 81	1973 86	2006 70
1986	307	1986 62	2006 81	2012 86	2016 70
1983	305	1998 62	1983 80	2002 85	2018 67
1995	303	1994 60	1974 79	2005 84	1992 66
2004	301	1983 55	2003 79	1992 83	1972 64
1992	300	2010 44	1987 77	2004 81	1984 64

WIND

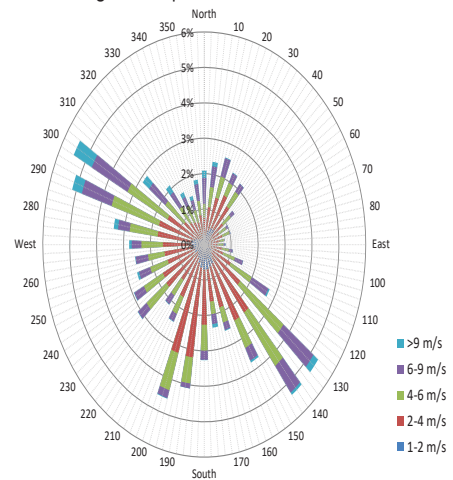
MONTH	AVERAGE WIND SPEED (km/h)			HIGHEST INSTANTANEOUS WIND SPEED (km/h)						
	2021 Average	Normal*	2021 1/2 Hr. Max Average	2021 for CRS (Speed / direction / date)			Since 1953 (Saskatoon Diefenbaker Int'l. Airport) (Speed / direction / day / year)			
January	14.8	16	21.4	87.3	NNW	13	111	W	11	1986
February	14.7	16	21.1	57.5	WNW	22	106	N	22	1988
March	15.4	17	23.2	69.8	N	29	93	W	18	1959
April	15.8	18	24.5	57.2	SSW	7	108	W	06	1959
May	16.2	18	25.8	75.1	WNW	29	132	SW	17	1965
June	14.9	17	24.0	68.7	WNW	17	117	SW	01	1986
July	14.5	16	23.3	81.6	WNW	22	113	E	05	1955
August	12.8	16	20.4	72.1	NW	11	151	W	14	1967
September	14.8	17	23.1	66.4	WNW	16	148	W	22	1967
October	14.7	17	22.4	64.3	WNW	11	138	NW	16	1967
November	13.9	16	20.9	64.6	NW	16	100	W	17	1967
December	14.6	16	21.1	48.3	WNW	24	121	W	12	1955

*1961-90 Normals used are from the Environment Canada, Saskatoon Diefenbaker International Airport station, 1993

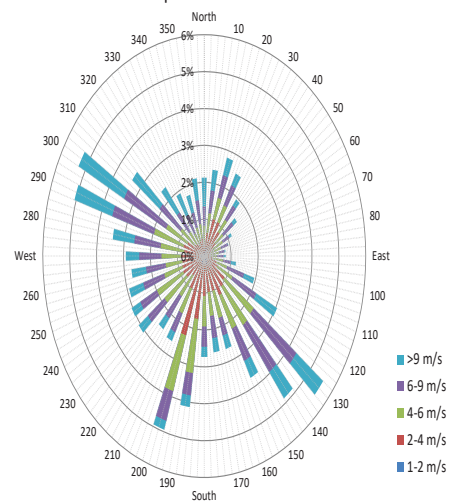


10 Metre Tower with Wind Speed and Direction on a very smoky day
16 August 2021
photo: V. Wittrock

10 minute Average Wind Speed and Direction Saskatoon 2021



1/2 hr Maximum Wind Speed and Direction Saskatoon 2021



**Wind Speed
Daily Average (km/h)**

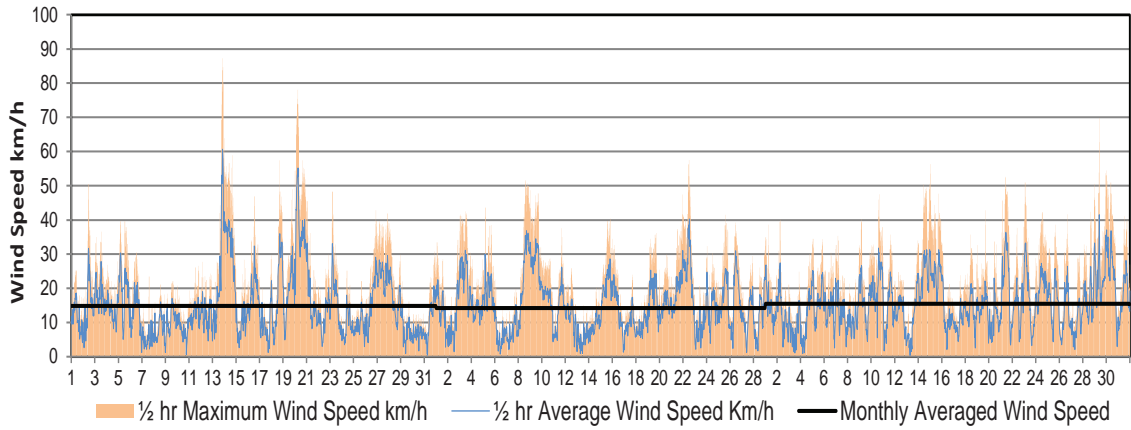
2021	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	11.1	13.4	15.1	20.0	14.2	20.0	17.8	8.6	12.7	15.6	6.3	19.3
2	15.1	10.0	12.5	14.1	21.1	14.1	22.0	7.9	23.9	10.0	9.1	11.2
3	17.8	23.3	8.0	11.8	11.6	11.8	20.3	12.8	16.1	10.0	6.6	18.6
4	13.3	13.6	10.8	23.8	10.3	23.8	16.1	14.0	6.6	14.3	6.0	8.5
5	19.1	18.5	16.6	16.8	9.5	16.8	12.6	8.9	14.5	11.3	14.4	20.4
6	13.2	6.3	13.8	10.2	11.5	10.2	12.7	15.0	12.7	13.3	11.1	12.6
7	5.1	7.7	13.1	13.4	24.7	13.4	17.1	11.6	18.3	12.0	14.9	9.6
8	8.1	24.4	11.4	10.3	24.5	10.3	11.2	16.1	8.1	9.8	14.5	17.7
9	10.7	27.7	16.1	13.1	14.2	13.1	6.3	6.8	14.2	8.2	17.4	19.3
10	7.9	16.8	21.1	17.4	8.8	17.4	12.7	21.6	13.0	9.6	21.9	14.5
11	12.3	13.8	13.6	30.0	11.6	30.0	16.1	25.0	4.5	29.4	17.5	19.2
12	12.2	11.5	12.9	24.2	9.4	24.2	16.9	20.9	10.2	8.8	18.1	10.5
13	23.8	5.2	10.1	23.3	7.2	23.3	9.2	11.6	16.7	8.0	8.5	11.8
14	32.4	8.9	24.1	7.8	9.7	7.8	12.8	14.3	11.7	12.4	7.0	15.9
15	9.3	20.4	24.5	8.1	10.5	8.1	14.4	7.3	22.5	12.2	14.6	24.8
16	19.1	14.0	11.4	9.5	12.4	9.5	17.9	15.1	28.0	11.0	32.2	10.5
17	8.5	9.5	10.2	16.2	21.4	16.2	17.3	12.5	18.0	12.8	28.2	8.8
18	18.9	8.8	13.3	21.1	23.2	21.1	19.3	7.6	19.8	19.4	13.5	10.7
19	18.4	17.7	14.9	15.0	27.8	15.0	15.3	6.6	15.9	9.3	10.3	21.1
20	37.2	15.0	10.3	9.3	20.7	9.3	12.7	8.9	13.1	16.3	19.2	13.3
21	16.2	19.4	21.6	19.2	12.5	19.2	13.4	10.1	12.6	20.1	11.5	13.7
22	11.7	25.4	14.8	29.0	10.6	29.0	19.1	14.3	12.2	20.3	10.7	11.3
23	16.7	8.4	16.9	10.8	13.9	10.8	23.6	14.5	21.7	31.4	18.4	16.8
24	9.3	14.1	20.4	8.8	19.1	8.8	24.9	12.4	16.8	22.2	13.1	24.8
25	9.2	16.8	16.8	15.4	26.2	15.4	8.3	7.5	9.5	29.9	11.1	11.1
26	16.2	16.9	12.3	17.0	12.3	17.0	7.8	19.1	12.6	10.0	8.5	13.9
27	23.8	11.9	9.7	20.1	25.5	20.1	13.3	14.4	13.4	9.1	12.8	13.7
28	16.9	11.3	17.6	14.2	26.2	14.2	9.1	10.8	13.6	14.5	14.6	11.8
29	7.6		24.0	8.1	27.4	8.1	13.5	8.1	14.9	10.3	11.6	16.2
30	6.7		23.9	15.7	7.7	15.7	9.7	14.0	16.1	19.9	13.1	8.2
31	11.1		16.9		17.0		7.5	19.9		15.9		13.6

**Wind Speed
Daily Gust (km/h)**

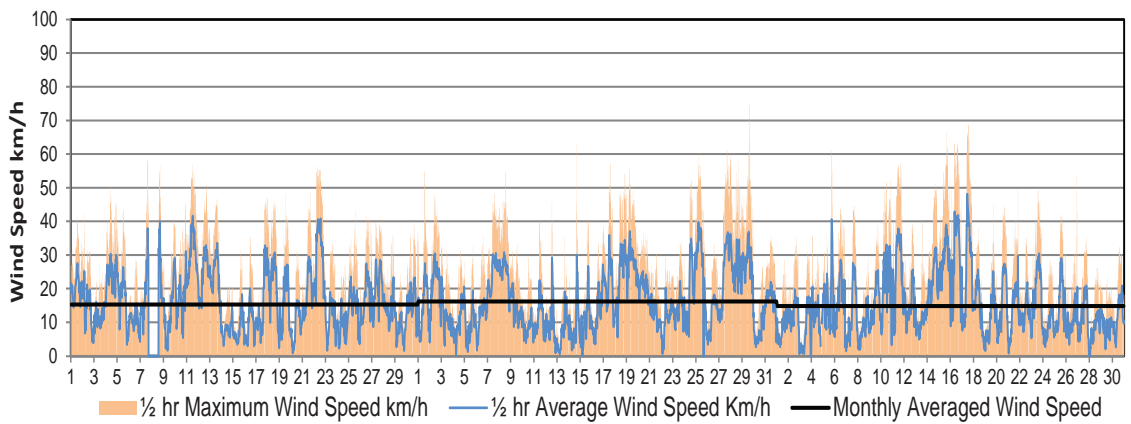
2021	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	25.3	33.4	38.6	42.0	55.0	28.4	45.6	22.0	41.0	33.7	19.2	39.7
2	50.5	34.2	40.1	42.2	47.8	35.4	48.7	21.0	53.4	31.3	25.3	44.0
3	36.5	42.6	24.9	27.4	33.5	30.9	56.0	50.5	37.1	31.4	17.3	38.4
4	27.9	28.5	32.9	50.4	31.2	35.6	38.0	40.6	23.8	33.6	16.4	19.9
5	39.6	43.6	34.4	43.3	32.8	61.0	34.2	26.4	32.9	26.7	45.1	42.1
6	30.6	22.6	31.5	28.3	35.7	44.3	28.4	35.9	45.7	44.6	32.4	26.9
7	23.4	19.8	35.3	57.2	48.1	44.5	38.4	37.0	55.2	37.5	37.8	22.2
8	21.2	51.6	31.9	57.0	54.6	28.8	39.7	45.8	26.4	25.1	39.4	42.4
9	22.2	48.7	40.3	41.2	33.2	39.0	20.7	20.7	37.0	33.5	48.5	42.8
10	20.8	28.8	47.6	45.3	29.2	52.3	36.3	60.6	44.5	28.5	50.6	34.1
11	26.6	37.5	35.7	57.0	40.2	57.2	56.5	72.1	15.6	64.3	32.5	47.2
12	27.7	25.8	24.8	51.1	45.7	39.2	41.5	51.2	31.2	23.1	51.9	45.1
13	87.3	15.1	33.9	46.7	35.5	40.0	26.2	37.7	45.9	20.7	28.8	35.1
14	58.9	20.3	50.6	20.7	62.9	51.2	39.7	32.7	44.7	28.9	18.9	39.4
15	28.4	40.4	56.4	31.6	40.6	66.7	42.6	23.2	55.3	30.7	57.7	46.1
16	46.9	32.7	33.1	35.4	38.1	63.5	36.3	52.2	66.4	21.4	64.6	23.7
17	28.5	24.0	23.8	47.0	57.2	68.7	49.2	29.7	44.0	27.7	64.2	24.2
18	57.4	18.3	35.6	45.8	54.0	37.9	35.4	22.7	58.4	47.4	36.8	27.4
19	49.0	36.1	42.8	48.1	56.2	45.0	32.7	19.1	38.6	22.2	26.5	46.7
20	78.1	29.8	33.7	31.1	36.8	44.2	30.0	30.6	34.2	33.6	50.4	31.2
21	45.5	47.4	52.6	48.9	30.4	49.8	34.7	25.3	42.3	38.3	28.1	29.9
22	29.8	57.5	37.9	56.4	29.2	35.1	81.6	32.9	29.0	49.8	25.0	31.5
23	48.3	28.7	50.9	33.5	34.0	49.2	64.8	46.8	60.8	59.0	49.5	42.7
24	25.2	32.3	42.2	26.7	52.1	28.3	68.9	41.5	36.4	42.5	32.1	48.3
25	22.2	41.5	38.6	43.4	60.5	42.0	26.0	21.7	29.8	61.7	26.7	29.1
26	42.8	39.2	41.7	41.6	33.1	53.8	37.0	41.3	42.4	26.7	36.5	34.4
27	41.8	29.4	29.7	41.9	61.1	35.1	35.6	45.7	40.5	21.9	34.2	27.6
28	39.0	31.2	50.6	35.9	58.1	26.2	29.2	45.1	46.6	42.0	37.5	20.4
29	22.0		69.8	24.4	75.1	23.4	64.1	23.6	37.9	28.1	26.4	29.9
30	12.5		54.5	40.2	26.7	32.3	34.3	31.2	43.3	44.7	38.8	25.4
31	30.7		41.1		35.8		26.5	46.9		33.8		27.4

WIND Daily Wind Speed and Maximum Gust Wind Speed

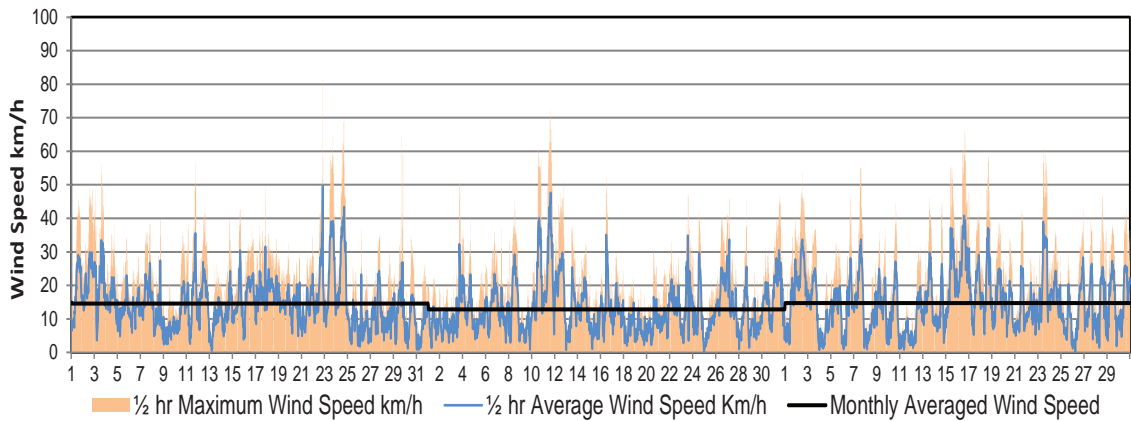
January
February
March



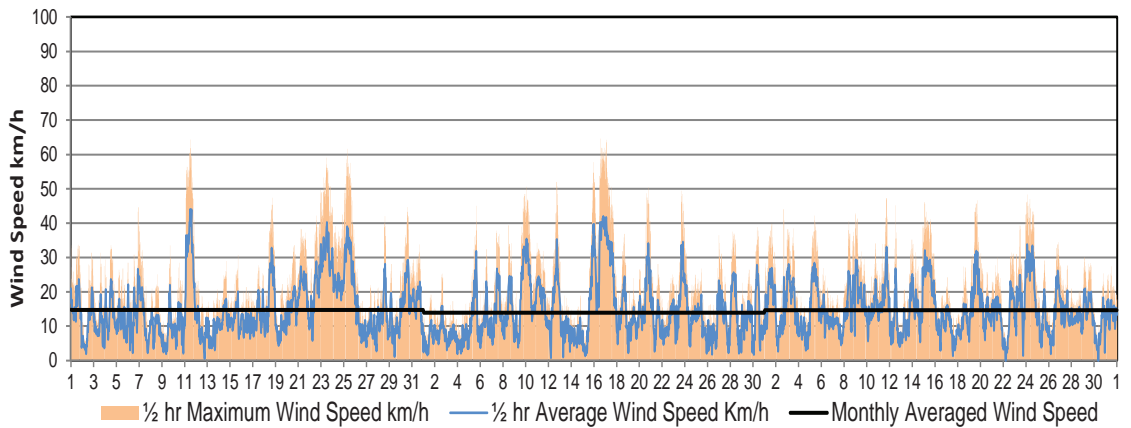
April
May
June



July
August
September



October
November
December



WIND

EXTREME DAILY WINDS (km/h) 2021			
Month	Day	WIND SPEED/ DIRECTION	BEAUFORT WIND SCALE DESIGNATION*
January	2	50.5 WSW	Near Gale
	13	87.3 NNW	Strong Gale
	14	58.9 NNW	Near Gale
	18	57.4 N	Near Gale
February	20	78.1 WNW	Strong Gale
	8	51.6 WNW	Near Gale
	22	57.5 WNW	Near Gale
March	14	50.6 S	Near Gale
	15	56.4 S	Near Gale
	21	52.6 NW	Near Gale
	23	50.9 NNE	Near Gale
	28	50.6 SSW	Near Gale
	29	69.8 N	Gale
April	30	54.5 NNW	Near Gale
	4	50.4 SSE	Near Gale
	7	57.2 SSW	Near Gale
	8	57.0 NNW	Near Gale
	11	57.0 NNE	Near Gale
	12	51.1 NNE	Near Gale
May	22	56.4 N	Near Gale
	1	55.0 NNW	Near Gale
	8	54.6 E	Near Gale
	14	62.9 W	Gale
	17	57.2 SSW	Near Gale
	18	54.0 W	Near Gale
	19	56.2 W	Near Gale
	24	52.1 SSW	Near Gale
	25	60.5 N	Near Gale
	27	61.1 SSE	Near Gale
June	28	58.1 S	Near Gale
	29	75.1 WNW	Strong Gale
	5	61.0 NW	Near Gale
	10	52.3 E	Near Gale
	11	57.2 WNW	Near Gale
	14	51.2 SE	Near Gale
	15	66.7 SSE	Gale
July	16	63.5 WNW	Gale
	17	68.7 WNW	Gale
	26	53.8 NNW	Near Gale
	3	56.0 WSW	Near Gale
	11	56.5 NW	Near Gale
	22	81.6 WNW	Strong Gale
August	23	64.8 W	Gale
	24	68.9 WNW	Gale
	29	64.1 NW	Gale
	3	50.5 SSW	Near Gale
	10	60.6 WNW	Near Gale
September	11	72.1 NW	Gale
	12	51.2 NW	Near Gale
	16	52.2 NNE	Near Gale
	2	53.4 WSW	Near Gale
October	7	55.2 NW	Near Gale
	15	55.3 WNW	Near Gale
	16	66.4 WNW	Gale
	18	58.4 WSW	Near Gale
	23	60.8 WNW	Near Gale
	11	64.3 WNW	Gale
November	23	59.0 ESE	Near Gale
	25	61.7 SSE	Near Gale
	10	50.6 ESE	Near Gale
	12	51.9 SE	Near Gale
December	15	57.7 SE	Near Gale
	16	64.6 NW	Gale
	17	64.2 NW	Gale
	20	50.4 N	Near Gale

*Near Gale >=50 but < 62 *Gale >=62 but <75
 *Strong Gale >=75 but <89 *Storm >=89 but <103
 *Violent Storm >=103 but <117

WINDCHILL CALCULATION CHART ¹														
T°C km/h Speed	°													
	5°	0°	-5°	-10°	-15°	-20°	-25°	-30°	-35°	-40°	-45°	-50°		
5	4	-2	-7	-13	-19	-24	-30	-36	-41	-47	-53	-58		
10	3	-3	-9	-15	-21	-27	-33	-39	-45	-51	-57	-63		
15	2	-4	-11	-17	-23	-29	-35	-41	-48	-54	-60	-66		
20	1	-5	-12	-18	-24	-30	-37	-43	-49	-56	-62	-67		
25	1	-6	-12	-19	-25	-32	-38	-44	-51	-57	-64	-70		
30	0	-6	-13	-20	-26	-33	-39	-46	-52	-59	-65	-72		
35	0	-7	-14	-20	-27	-33	-40	-47	-53	-60	-66	-73		
40	-1	-7	-14	-21	-27	-34	-41	-48	-54	-61	-68	-74		
45	-1	-8	-15	-21	-28	-35	-42	-48	-55	-62	-69	-75		
50	-1	-8	-15	-22	-29	-35	-42	-49	-56	-63	-70	-76		
55	-2	-8	-15	-22	-29	-36	-43	-50	-57	-63	-70	-77		
60	-2	-9	-16	-23	-30	-36	-43	-50	-57	-64	-71	-78		
65	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79		
70	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-80		
75	-3	-10	-17	-24	-31	-38	-45	-52	-59	-66	-73	-80		
80	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81		

Approximate Thresholds		
-10	Low	Risk of hypothermia if outside for long periods without adequate protection.
-28	Risky	Risk of frostnip/frostbite on extremities. Exposed skin can freeze in 10 - 30 min.
-40	High Risk	High risk of frostbite. Exposed skin can freeze in 5 - 10 minutes.
-48	Very High Risk	Serious risk of frostbite. Exposed skin can freeze in 2 - 5 minutes.
-55	Extreme Risk	Outdoor conditions are hazardous. Exposed skin can freeze in 2 minutes or less.

1: Environment Canada, 2004b

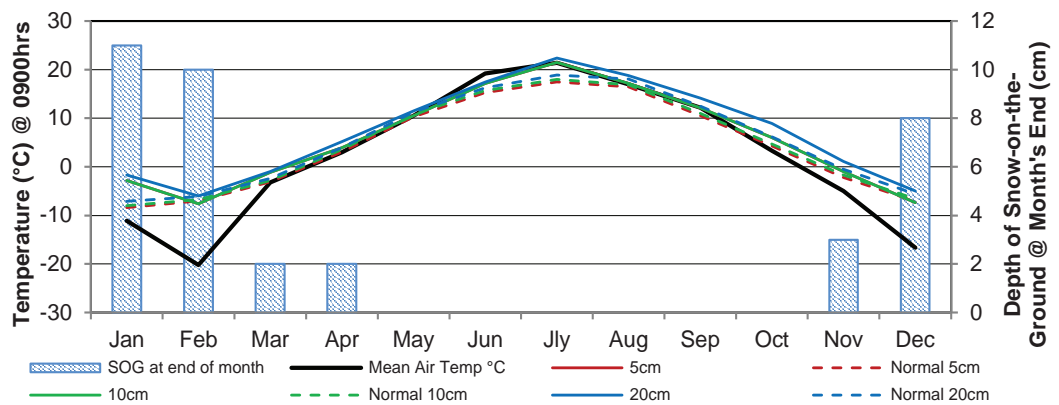
EXTREME DAILY WIND CHILL 2021												
	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC
1	-23	-23	-32								-10	-5
2	-16	-19	-13								-12	-14
3	-8	-31	-17	-5							-13	-17
4	-18	-31	-19								-6	-24
5	-16	-41	-13	-6							0	-33
6	-19	-42		-5							-7	-36
7	-13	-47	-8								-8	-30
8	-17	-51	-11								-11	-27
9	-19	-44	-15	-8							-13	-18
10	-19	-44	-21								-9	-23
11	-20	-50	-24	-9							-12	-19
12	-15	-40	-16	-10						-8	-19	-12
13	-14	-43	-10	-9						-7	-20	-18
14	-13	-44	-8	-4							-10	-21
15	-20	-43	-11	-5						-6	-6	-35
16	-16	-39	-15	-6						-5	-13	-36
17	-22	-31	-12								-18	-34
18	-25	-34	-6	-6						-5	-21	-36
19	-19	-33		-10						-10	-18	-32
20	-18	-18	-5	-9						-13	-21	-32
21	-24	-21	-9	-5						-11	-25	-27
22	-18	-7	-11	-13						-9	-11	-20
23	-38	-14	-18	-14						-9	-23	-26
24	-45	-15	-12	-12							-25	-38
25	-48	-18	-12	-10							-20	-39
26	-40	-31	-13	-5							-11	-40
27	-38	-34	-13	-11						-5	-12	-46
28	-28	-30		-9							-12	-45
29	-23		-23	-6							-8	-47
30	-18		-24							-11	-12	-46
31	-25		-21							-12		-47

SOIL TEMPERATURES AND DEPTH OF SNOW-ON-THE-GROUND @ MONTH END

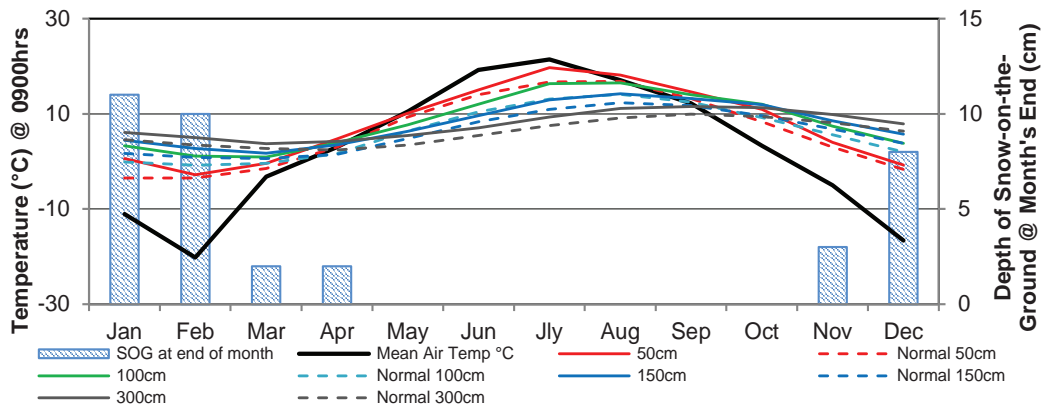
MONTH	Mean Air Temp @ 0900h (°C)	SOIL TEMPERATURES (°C) @ 0900h														Mean Air Temp @ 1600h (°C)	SOIL TEMPERATURES (°C) @ 1600h					
		5cm		10cm		20cm		50cm		100cm		150cm		300cm			5cm		10cm		20cm	
		2021	NORM	2021	NORM	2021	NORM	2021	NORM	2021	NORM	2021	NORM	2021	NORM		2021	NORM	2021	NORM	2021	NORM
January	-11.1	-2.8	-8.4	-2.8	-8.0	-1.7	-7.1	0.6	-3.5	3.3	-0.1	4.4	1.7	6.1	4.6	-6.7	-2.9	-8.4	-2.2	-7.8	-1.8	-6.2
February	-20.2	-7.6	-7.0	-7.6	-6.7	-6.0	-6.1	-2.8	-3.5	1.1	-0.8	2.7	0.8	5.0	3.4	-14.8	-7.6	-7.1	-6.9	-6.6	-6.0	-5.2
March	-3.2	-1.1	-3.1	-1.1	-2.8	-1.0	-2.4	-0.4	-1.5	0.9	-0.4	1.7	0.6	3.7	2.7	3.5	-0.9	-2.9	-0.8	-2.6	-1.0	-1.8
April	3.0	3.9	3.1	3.9	3.6	5.2	4.0	4.7	3.0	3.9	1.6	3.5	1.5	4.2	2.4	11.1	9.4	6.0	7.7	5.5	5.6	4.6
May	10.5	10.5	10.3	10.5	10.8	11.5	11.3	10.1	9.3	7.7	6.4	6.3	4.8	5.4	3.4	16.8	16.2	14.2	14.4	13.6	11.8	12.0
June	19.2	17.2	15.3	17.2	15.7	17.5	16.3	15.0	14.0	12.0	10.4	9.6	8.3	7.0	5.4	25.3	23.5	20.0	21.3	19.0	17.9	17.1
July	21.4	21.5	17.5	21.5	18.0	22.4	18.9	19.7	16.7	16.3	13.1	12.9	10.9	9.3	7.5	29.0	28.5	22.0	26.0	21.3	22.6	19.5
August	17.0	17.2	16.5	17.2	16.9	18.8	18.1	18.1	16.8	16.5	14.1	14.2	12.3	11.1	9.1	23.3	22.4	20.6	20.9	20.0	18.8	18.6
September	12.2	12.1	10.5	12.1	11.0	14.2	12.5	14.6	13.2	14.0	12.4	13.2	11.7	11.5	9.9	21.4	17.1	13.9	15.8	13.4	14.1	13.1
October	3.3	6.0	4.3	6.0	4.7	8.9	6.2	10.9	8.3	12.0	9.2	11.9	9.6	11.3	9.4	12.3	9.8	6.1	9.0	6.4	8.5	6.9
November	-5.0	-1.0	-2.2	-1.0	-1.7	1.1	-0.5	4.0	3.0	7.4	5.6	8.5	6.8	9.8	8.1	0.9	-0.2	-1.4	0.2	-1.2	1.0	0.3
December	-16.6	-7.4	-7.1	-7.4	-6.6	-5.0	-5.6	-0.8	-1.7	3.8	2.0	5.7	3.8	7.9	6.4	-13.5	-7.2	-6.6	-6.5	-6.3	-5.0	-4.6

Normal temperatures (1971-2000) for our site are provided by Environment Canada 2004a

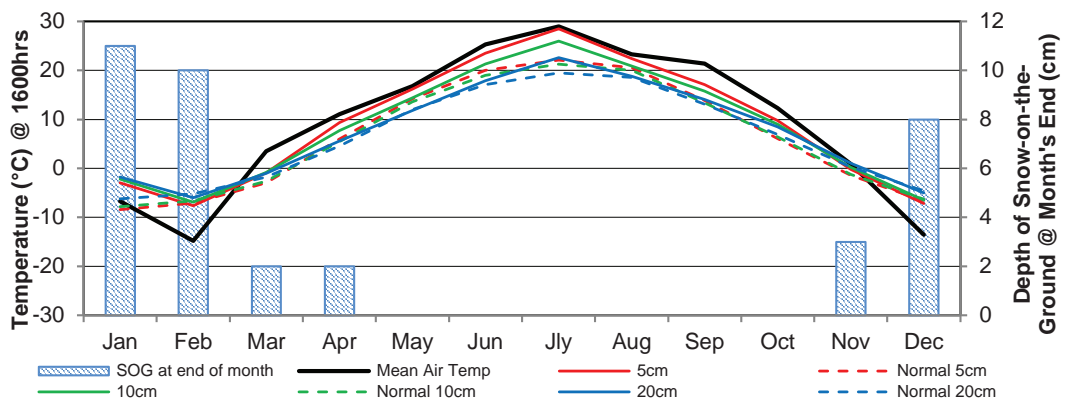
Monthly Soil Temperatures @ 0900h



Monthly Soil Temperatures @ 0900h



Monthly Soil Temperatures @ 1600h



GLOSSARY OF TERMS

(Unless otherwise stated, source for definitions of terms is Environment Canada, 1978)

BEAUFORT WIND SCALE was developed by Admiral Sir Francis Beaufort in 1805 and adopted by the British Navy in 1838. It consisted of 13 degrees of wind strength, from calm to hurricane, based upon the effects of various wind strengths upon the amount of canvas carried by the fully rigged frigates of the period. Over the years it has been modified as needed and in 1946 the scale values (Force Numbers) were defined by ranges of wind speed as measured at a height of 10 meters above the surface. In effect, this transformed the 'Beaufort Wind Force Scale' into the 'Beaufort Wind Speed Scale'. This scale is the current standard scale for visual observations of the wind (Heidorn, 1998).

BRIGHT SUNSHINE is the unobstructed direct radiation from the sun, as opposed to the shading of a location by clouds or by other atmospheric obstructions.

Number of Days is defined as the total number of days when at least 0.1 of an hour of bright sunshine was recorded.

Percentage Possible refers to the ratio of measured bright sunshine hours to the total possible daylight hours in a given period, expressed as a percentage.

Possible daylight hours (hours of illumination) are taken from the sunrise/set tables provided by the National Research Council of Canada, Herzberg Institute of Astrophysics, Victoria, BC.

Total is the sum of the daily bright sunshine values in hours and tenths of hours as measured by an automated sunshine recorder using voltaic cells.

DEGREE-DAY is an index for various temperature related calculations.

Cooling (CDD) is the cooling requirement to achieve a stipulated comfort value in an indoor environment. For most purposes, a temperature of greater than 18°C is considered uncomfortable and supplementary cooling is required. On a specific day, the amount by which 18°C is less than the daily average temperature defines the number of cooling degree-days for that day. A temperature base of 24° C is sometimes used as an index of extreme cooling degree-days to indicate potential heat stress. (Environment Canada 2012)

Mathematically: $CDD = (T - 18^{\circ}\text{C})$, for that day, where T = daily mean temperature in °C if T is equal to or less than 18°C, CDD = 0.

Monthly and annual values of CDD are obtained by summing daily values.

Growing (GDD) is the growing requirement in order for plant growth to proceed. The air temperature must exceed a critical value appropriate to the plant species in question. For many members of the grass family, including most commercial cereals grown on the prairies, a base temperature of 5.0°C has been established. On a specified day, the difference between the daily average temperature and the 5.0°C base temperature defines the number of growing degree-days.

Mathematically: $GDD = (T - 5.0^{\circ}\text{C})$, for that day, where T = daily mean temperature in °C if T is equal to or less than 5.0°C, GDD = 0.

Daily GDD values are summed to provide totals for the appropriate month, growing season or year.

Heating (HDD) is the heating requirement to achieve a stipulated comfort value in an indoor environment. For most purposes, a temperature of less than 18°C is considered uncomfortable and supplementary heating is required. On a specific day, the amount by which 18°C exceeds the daily average temperature defines the number of heating degree-days for that day.

Mathematically:

$HDD = (18^{\circ}\text{C} - T)$, for that day, where T = daily mean temperature in °C if T is equal to or greater than 18°C, HDD = 0.

Monthly and annual values of HDD are obtained by summing daily values.

EXTREME is the highest or lowest value of a particular element recorded during the period in question.

EXTREME ALL YEARS Temporal comparisons at a point are also of value in some types of climatic studies. Therefore, it is desirable to produce the maximum length of reliable climatic record to carry out studies over a period of time. Data are drawn mainly from the following data sets:

SRC: 1963 to present

Saskatoon Airport: 1942 to present

University of Saskatchewan: 1916 to 1963

Eby station: 1901-1941

NWMP: circa 1892 to circa 1900 (sporadic)

Station locations, exposures and measurement procedures were subject to change during this time period. Data are not adjusted and users are cautioned accordingly.

FROST is recorded on each occasion when the daily minimum temperature is equal to or less than 0°C.

NORMAL VALUE (1981-2010) In climatology it is often useful to make spatial comparisons of particular element values over a common time period. At an interior continental site such as Saskatoon, a period of 30 years is required to produce statistically stable estimates of the more variable elements. To facilitate spatial comparisons, the World Meteorological Organization recommends the standard normal (average) period of thirty years. The current normal period for data analysis at CRS is from January 1st, 1981 to December 31st, 2010. Data derived from CRS conform to this standard, except where noted. The normals for CRS have been calculated using the data collected during this standard period. Where gaps existed, data from the nearest climate station were used and referenced as to being used. (Environment Canada, 1993, 2002, 2004a)

POTENTIAL EVAPOTRANSPIRATION (Thornthwaite Method) is the amount of water which will be lost from a surface completely covered with vegetation if there is sufficient water in the soil at all times for the use of the vegetation. It is computed by means of an empirical formula involving mean monthly temperature and average length of day.

Mathematically: $PET = mT^a$ where PET = Potential of Evapotranspiration; m = % of day length for the month as compared to the year; T = Temperature °C when T is less than or equal to 0; otherwise T = 0; and a = yearly heat index. (Thornthwaite and Mather, 1955)

PRECIPITATION

Day is recorded on occasions when the amount of precipitation in a 24-hour period equals or exceeds 0.2 mm water. An asterisk (*) appearing in the average column denotes the occurrence of measurable precipitation on one or more occasions, and that the calculated 30-year average amounts to less than a trace. The so-called climatological day, beginning at 9 a.m. standard time on the date of reference and ending at 9 a.m. the next morning, was employed in record keeping up to January 1994. On February 1, 1994, after consultation with Environment Canada, record keeping was changed to the 24-hour period of 0000 hours - 2400 hours to conform to their reporting of climatological statistics.

Total is the sum of the daily recorded precipitation. The snowfall component of precipitation is recorded as an equivalent amount of liquid water. The notation "T" refers to a trace of precipitation (less than 0.2 mm water equivalent). As of August 7, 1993, total precipitation was measured using a weighing gauge for the winter season and the tipping bucket during frost-free period.

SEASONS Meteorologists prefer to divide the year into four 3-month periods based primarily on temperature. Thus winter is defined as December (previous year), January, and February (DJF); spring as March, April and May (MAM); summer as June, July and August (JJA); and fall as September, October and November (SON). (Lutgens and Tarbuck, 1992)

SOIL TEMPERATURE under a short grass surface with normal snow accumulation, is measured according to procedures outlined in the Environment Canada publication "*Soil Temperature*" January 1, 1976. Depths below surface at which soil temperature measurements are made are: 5 cm, 10 cm, 20 cm, 50 cm, 100 cm, 150 cm and 300 cm. Since soil temperature is affected by profile structure and water content, extrapolation of the measured data is difficult.

SOLAR RADIATION

Diffuse - Total is radiation reaching the earth's surface after having been scattered from the direct solar beam. The instrument used is an Eppley pyranometer with a shade ring (See SOLAR RADIATION-Global- Total).

Global - Total is the sum of the direct solar and diffuse radiation during the period in question. Measurements are carried out on a horizontal surface near ground level and integrated over the whole celestial dome, summing the diffuse and direct components of the solar beam. The temperature-compensated Eppley pyranometer is used. The standard metric unit of measurement is the megajoule per square metre (MJ/m²). (To facilitate comparison with past years' data: 1.0 MJ/m² = 23.895 langley). Comparison is provided with a provisional average based on 16 years of data (1975-1990).

SPELLS Temperature spells are defined as days when the daily maximum temperature is higher than or equal to 30°C (hot spell) or the daily minimum temperature is lower than or equal to -30°C (cold spell).

SUNRISE/SUNSET times have been included in this report. They have been acquired from the National Research Council, Canada, Herzberg Institute of Astrophysics.

TEMPERATURE

Average Annual is the average of the daily average temperatures in degrees Celsius (°C) for one year.

Average Daily is defined as the arithmetic mean of the daily maximum temperature in degrees Celsius (°C) and the daily minimum temperature in degrees Celsius (°C) for the day in question.

Average Maximum is the average of the daily maximum temperatures in degrees Celsius (°C) average over the appropriate time periods.

Average Minimum is the average of the daily minimum temperatures in degrees Celsius (°C) averaged over the appropriate time periods. Refer to TEMPERATURE-Average Maximum concerning measurement procedures.

Average Monthly is the average of the daily average temperatures in degrees Celsius (°C) for the month under consideration.

WIND CHILL describes a sensation, the way we feel as a result of the combined cooling effect of temperature and wind. This feeling can't be measured using an instrument, so a mathematical formula was developed in 1939 that related air temperature and wind speed to the cooling sensation. This formula was revised in 2001 by a team of scientists and medical experts from Canada and the U.S. with the Canadian Department of National Defence contributing human volunteers. The new index is based on the loss of heat from the face.

Mathematically: $WC = 13.12 + (0.6215 \times T) - (11.37 \times V^{0.16}) + (0.3965 \times T \times V^{0.16})$; where WC = wind chill; T= air temperature °C; V= standard wind speed km/h. (Environment Canada 2004b).

WAVES Temperature waves are defined as a sequence of three or more days when the daily maximum/minimum temperatures are higher/lower than, or equal to, a set temperature. For a heat wave the temperature is 32°C. (Environment Canada 2005).

WIND SPEED

Average is the average of the hourly wind speeds for the period in question measured in kilometres per hour (km/h). Average hourly wind speeds are obtained from a RM Young Wind Monitor anemometer at a height of 10 m.

Peak Gust refers to the highest instantaneous value recorded by the anemometer system for the period of reference, irrespective of direction and/or duration. Comparison is with published data for Environment Canada, Saskatoon Airport station.

see also **Beaufort Wind Scale**

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