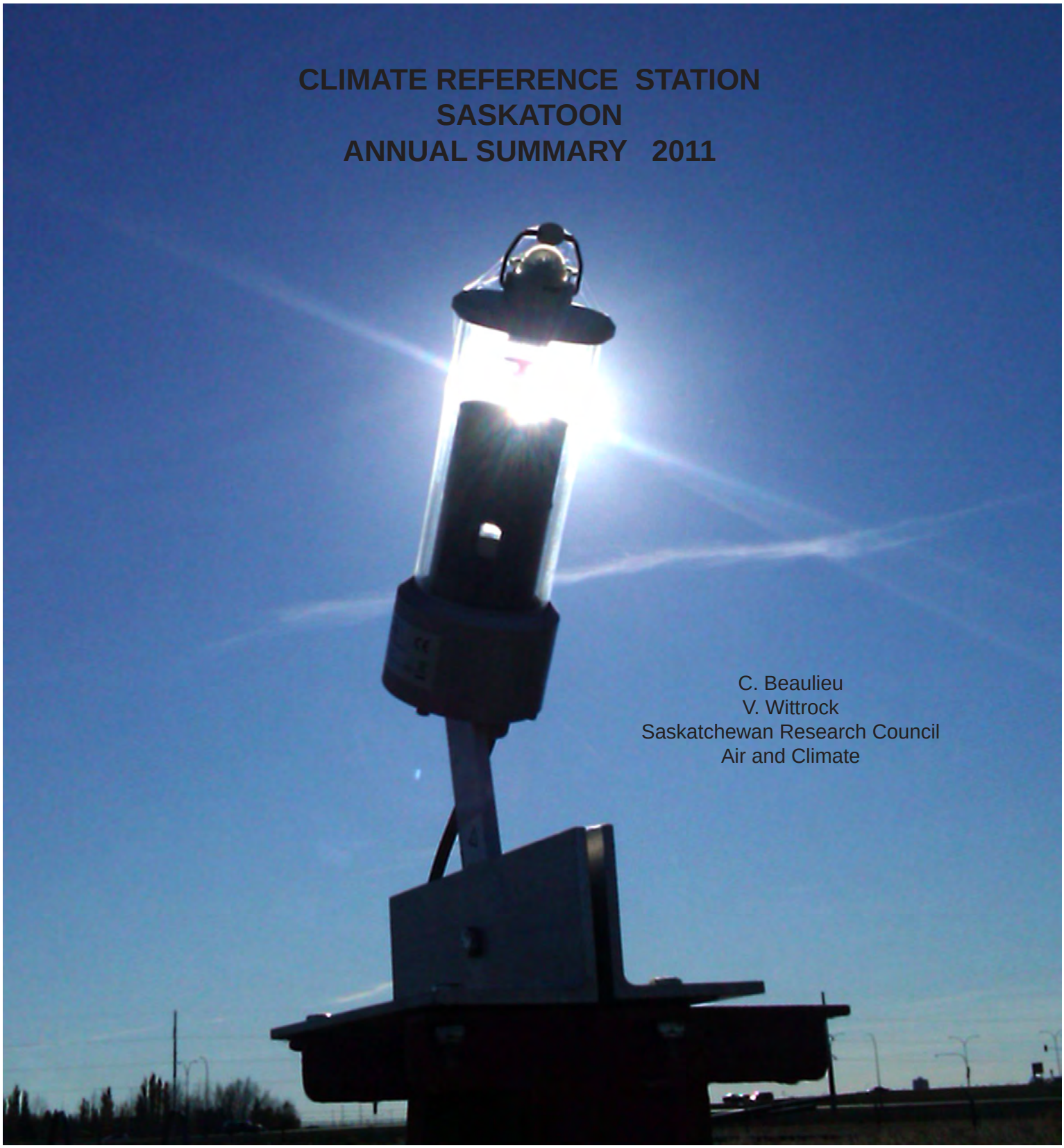
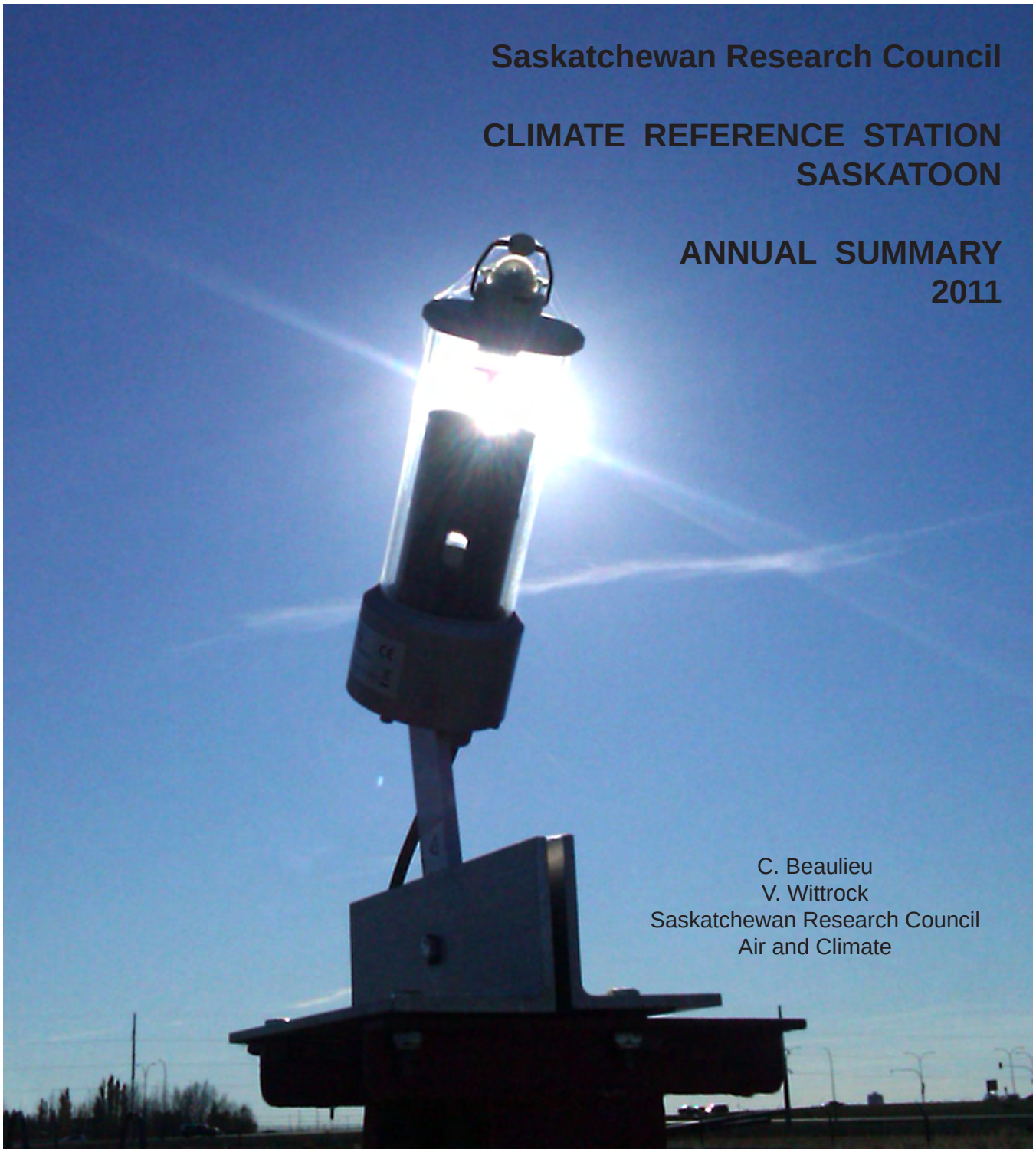
CLIMATE REFERENCE STATION
SASKATOON
ANNUAL SUMMARY 2011



C. Beaulieu
V. Wittrock
Saskatchewan Research Council
Air and Climate

SRC Publication No. 10440 - 1E12
February 2012



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COVER PHOTOGRAPH
Kipp & Zonen Bright Sunshine Recorder
photo credit: V Wittrock

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ACKNOWLEDGEMENTS

The 2011 data was compiled and recorded by Carol Beaulieu with assistance from Virginia Wittrock and others. Miss Beaulieu was responsible for the monitoring of the site while instrument maintenance was carried out by the personnel of the Alternative Energy & Manufacturing/Development Engineering of the Saskatchewan Research Council (SRC). Virginia Wittrock, Elaine Wheaton, and Dale Young assisted with the proofreading and editing of this report. Consultations with Larry Flysak of the Meteorological Service of Canada (MSC), Saskatoon, SK, were most helpful in verifying and comparing data.

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

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SASKATCHEWAN RESEARCH COUNCIL

CLIMATE REFERENCE STATION SUPPORTERS, 2011

WE GRATEFULLY ACKNOWLEDGE THE SUPPORT OF THE FOLLOWING:

Ministry of Energy and Resources

Kipp & Zonen

Saskatchewan Ministry of Agriculture

Agriculture and Agri-Food Canada / Agriculture et Agroalimentaire Canada

SaskPower

Saskatchewan Watershed Authority

CAMPBELL SCIENTIFIC CANADA CORP.

University of Saskatchewan

Prince Albert Model Forest

CLIMATE REFERENCE STATION HISTORY

Meteorological observations at or near Saskatoon were first taken by the Royal 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 programme from 1895 to May 1, 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, Miss E.S. Eby, continued to record the observations. Her brother, Mr. J.M. Eby, recorded the observations beginning in April 1931 until the station closed on October 31, 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 climatological station was established by the Physics Department of the University of Saskatchewan and continuous observations were kept twice daily until January 15, 1965. The longtime observer was Mr. Sidney Cox. The Saskatchewan Research Council inherited the programme in the fall of 1963 and moved it to the newly established Climatological Reference Station at latitude 52°09'N, longitude 106°36'W and elevation 497 m asl[1]. The first observer was Terry Beck followed three years later by Orville Olm.[2] 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. Since 1992, the primary observer has been Carol Beaulieu assisted by Virginia Wittrock.

In the summer of 1992, the 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 will continue during 2012. Elements presently recorded at the site are temperature, precipitation, wind, solar radiation, relative humidity, barometric pressure, soil temperature and snow-on-the-ground (manual recordings). Temperature, precipitation and bright sunshine data are submitted to Environment Canada.

[1]Christiansen 1970; Environment Canada 1975; [2]Olm 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 and James 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]

[1]Ladd, 2008

photo credit: CR 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 observations.[1] A reference climatological 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 climate[2]. At our station, half-hourly readings are taken of elements which include temperature, precipitation amount, humidity, wind, and atmospheric pressure. Our supplemental observations include rainfall intensity, soil temperature, bright sunshine and solar radiation. 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, health and comfort.

The CRS also allows us to:

- evaluate long term climate trends - early warning system for increased frequencies of extreme events such as drought, floods, *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 implications for health;
- do value-added research;
- be part of regional, national and global networks in an important agricultural and ecological area;
- 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 Atmosphere Study (BOREAS), and collaborative research with the Western College of Veterinary Medicine and the College of Agriculture, University of Saskatchewan, for example; and
- provide climate data to accident studies, agricultural sectors, authors, building science, chemical companies, construction firms, governments, insurance agencies, lawyers, media, recreation facilities, schools, tourism groups, transportation studies, universities, wildlife studies, and interested individuals.

Goals

The goals of the Climate Reference Station are first, to maintain the high quality of data gathered over its more than forty-five 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 CRS to be an extremely valuable climate information collection station.

[1]Environment Canada 1992 [2]World Meteorological Organization 1988

ACTIVITIES ASSOCIATED WITH THE SASKATOON CLIMATE REFERENCE STATION, 2011

Beginning in January, the rural school of South Corman park again requested a presentation on weather and climate for their 28 children in grades 3 and 4. In March, Holliston Public Elementary school hosted the sixth year of the SPLIT programme (Schools Plant Legacy in Trees). They requested a presentation on climate for their kindergarten to grade 8 participants as one of their six areas of interest. Approximately 255 students received hands-on experience with the weather instruments or a computer presentation highlighting Saskatoon's climate; past, present and future and why consideration of the climate is necessary for the planning of the urban landscape.

CRS continued the site renovations. New instruments (soil moisture, snow depth), replacement sensors (temperatures) new electrical wiring (gopher proof we hope) and a new data logger have been installed. Projected for 2012 is continued instrument recalibration and if warranted, replacement. Data collection will be further automated.

CRS continues to partner with other organizations. The University of Saskatchewan tested their air monitoring equipment in October and November at our site.

University of Saskatchewan Air Monitoring
photo credit: V. Wittrock Nov. 2011

New Datalogger Station
photo credit: CR Beaulieu

SUMMARIES FOR 2011

Overview

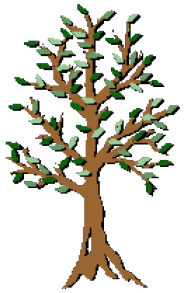
Data concerning temperature, precipitation, wind speed and direction, bright sunshine, solar radiation, and soil temperatures, recorded at the Saskatchewan Research Council (SRC) Climate Reference Station (CRS) (52°09'N, 106°36'W, 497 m asl), are presented for the year 2011 and compared with the long-term (*circa* 1900-2010) and standard-period/normal (1981-2010) records.

January to March 2011 lived up to expectations of bygone winters with six days below minus 30°C and the average temperatures near or below normal. Temperatures, April through to August, were near normal with September and October well above their normal values. In fact, out of 10 days with temperatures above 30°C, seven occurred in September including the yearly extreme of 35.0°C. The growing season of 126 days, began on May 11th and ended on Sept 13th. The garden was cleared and tools were carefully put away; the winter tires were installed and the block heaters checked; the parkas, mitts, toques, scarves and fleece-lined boots were at the ready by the front door; and then we waited and waited and waited some more for winter to arrive. It never did; at least not as die-hard, I-remember-when …. true prairie winter survivors were expecting. The new winter of November and December was one big disappointed for those who like to grumble and carp about Saskatchewan winters. December 2011 was, with an average temperature of -5.4°C, the second warmest December recorded at the station. Only 1997 was warmer with an average temperature of -4.5°C.

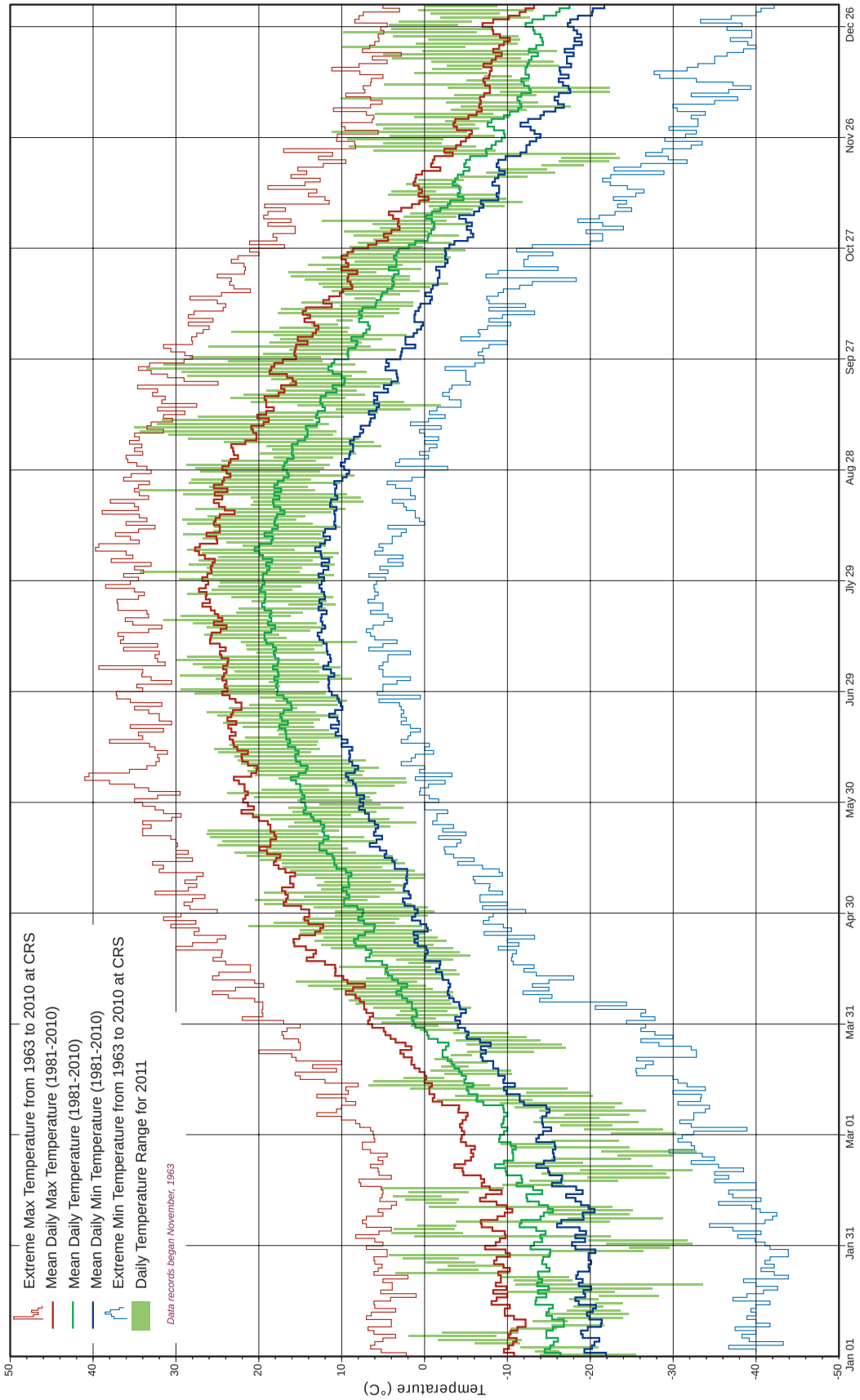
Monthly precipitation was above normal for February, June, July and October. Yearly precipitation was 90% of normal. The greatest daily precipitation occurred on July 12th when 39.5mm was recorded. Snow-on-the-ground lingered until March 31st when there was still enough to be measured. Snowfall was most notable by its absence during the months of November and December. By the end of December, only 2cm had accumulated on the ground. The number of days with precipitation was 11% higher than normal with January and June having more than half their days experiencing some form of precipitation. Seasonally, 2011 was the 5th driest spring since 1964; a pronounced contrast to last year's wettest spring.

2011 produced a record year for bright sunshine. The instruments recorded 2686 hours or almost 60% of possible bright sunshine. All months, except January, were above normal for hours of bright sunshine. September recorded 15 days when the ratio between hours and possible hours was over 90% and 27 days when bright sunshine exceeded the daily normal. With 334 days with bright sunshine, 2011 ranked 4th behind 1979, 1976 & 1978 for the year with the most bright sunshine days. Spring, summer and autumn were in the top ten while winter was in the bottom ten for number of days.

Monthly average peak wind speeds for all months were between 40 and 47 km/h. The highest wind speed was recorded on June 17th at 78.2 km/h; the only occurrence of Strong Gale force winds during the year. Winds were generally from the WNW with the highest average wind speeds also from the WNW. The highest wind chill occurred on February 1st at -45C.

DAILY TEMPERATURE



TEMPERATURE

2011 TEMPERATURE RECORDS °C

TYPE				DATE	NEW RECORD	OLD RECORD/year
DAILY	Maximum	Extreme High		Feb 15	5.3	5.2/2002
				July 31	34.4	33.9/1973
				Sept 7	34.3	31.5/1990
				Sept 8	35.0	33.5/1981
				Sept 10	31.7	30.4/1997
				Sept 27	28.3	28.0/1973
				Nov 23	9.1	2.3/1976
				Nov 27	11.2	5.6/1968
				Dec 6	10.1	6.5/1987
				Dec 18	5.0	2.8/1975
				Dec 20	9.9	6.6/1994&2003
				Dec 24	9.8	4.9/1999
		Low		Feb 24	-23.3	-18.3/1979
				Feb 25	-21.3	-19.6/1996
				April 16	1.9	2.2/1968&1978
				June 4	9.6	10.0/1992
				July 22	16.4	17.8/1968
	Minimum	High		Jan 27	-4.1	-4.5/1989
				Feb 4	-3.6	-6.5/1995
				Feb 12	-4.1	-6.0/1983
				Feb 13	-2.1	-2.8/2006
				June 29	18.0	17.0/1988&2002
				July 8	18.1	17.3/2002
				Sept 26	12.3	11.1/2009
				Sept 27	12.5	12.2/1997&2001
				Oct 6	10.5	7.7/2004
				Oct 7	8.7	7.7/2010
				Nov 25	-2.3	-2.8/1974
		Extreme Low		Feb 25	-32.8	-29.5/1994
	Mean	High		Feb 4	0.1	-2.3/1991&1995
				July 8	23.4	23.1/1970
				July 31	24.8	24.1/2005
				Sept 8	24.0	23.7/2003
				Sept 9	21.9	21.5/1998
				Sept 10	22.6	20.6/1968
				Sept 22	18.7	18.3/1987
				Sept 27	20.4	20.1/2001
				Nov 27	3.1	0.9/1968
				Dec 6	1.7	-1.4/1999
				Dec 20	2.5	2.0/1994
				Dec 24	1.8	0.5/1989
		Low		Feb 24	-26.6	-25.8/2003
				Feb 25	-27.1	-24.5/1994
				June 4	5.9	7.0/1992
Monthly	Max	Ave	Highest	Dec	0.8	0.1/1997
	Min	Ext	Highest	Oct	-4.9/26	-5.6/(1978,22) (1979,22)
		Ave	Highest	Oct	2.0	1.2/2010
Most No. of Days during a month when...	Max Temp >= 30°C			Sept	7	7/2009
	Max Temp >= 10°C			Dec	1	1/1997,2004
	Min Temp <=2°C			Oct	17	17/2003
	Min Temp > 0°C			Oct	22	21/2010

Ave = Average Ext = Extreme

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
1981-2010 Normal	May 18	Sept 20	124

2011 EXTREME TEMPERATURES

COLD SPELL (less than or equal to -30°C)		HOT SPELL (greater than or equal to 30°C)	
DATE	TEMPERATURE °C	DATE	TEMPERATURE °C
January 20	-33.6	July 18	31.5
January 31	-32.3	July 31	34.4
February 1	-31.8	August 22	34.5
February 20	-32.3	September 6	30.9
February 25	-32.8	September 7	34.3
March 1	-30.8	September 8	35.0
		September 9	32.3
		September 10	31.7
		September 24	33.5
		September 25	31.5

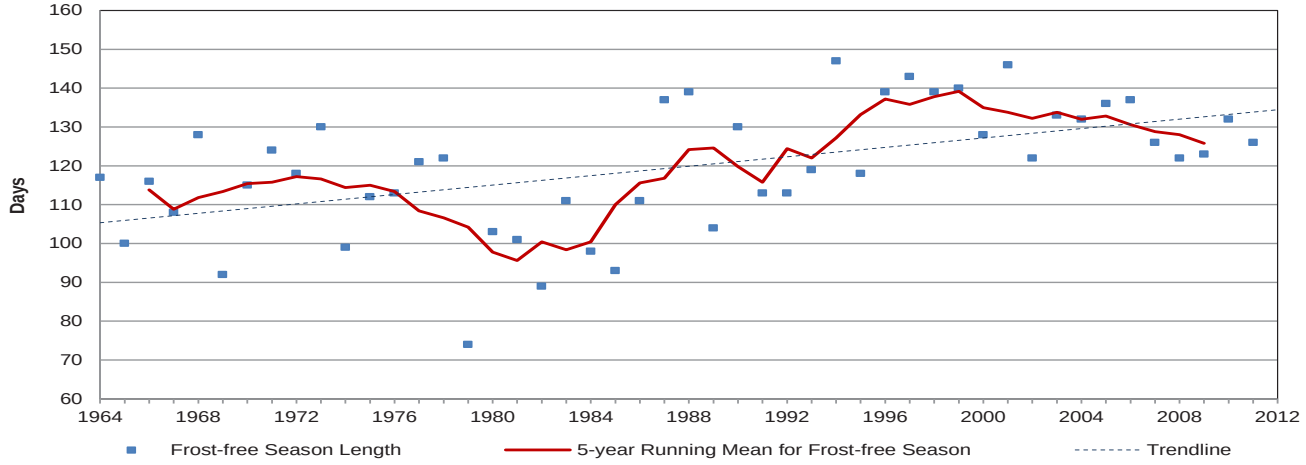
Coloured cells indicate extremes for the year

photo credit: C.R. Beaulieu

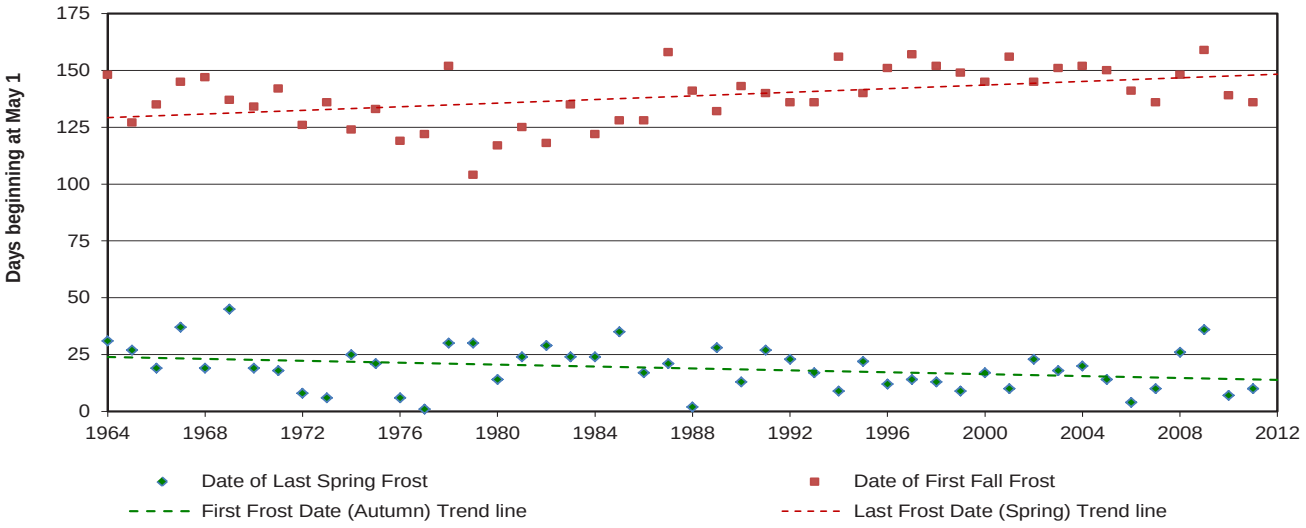
SRC Publication No. 10440-1E12

TEMPERATURE

Frost-free Growing Season Duration



Frost-free Growing Season End Points



Day 1 = May 1 Day 50 = June 19 Day 100 = August 8 Day 150 = September 27

When a person is accustomed to 138 °F in the shade, his ideas about cold weather are not valuable.... in India, "cold weather" is merely a conventional phrase and has come into use through the necessity of having some way to distinguish between weather which will melt a brass door-knob and weather which will only make it mushy.

Mark Twain- Following the Equator

TEMPERATURE RANKINGS

ANNUAL AVERAGE TEMPERATURES °C

MAXIMUM TEMP		MINIMUM TEMP		MEAN TEMP	
1987	11.6	1987	-0.8	1987	5.4
2001	10.8	2006	-1.3	2001	4.6
1981	10.5	1999	-1.4	1981	4.5
1988	10.1	2010	-1.5	1998	4.3
1998	10.1	1981	-1.5	1999	4.2
1999	9.8	1998	-1.5	2006	4.2
2006	9.6	2005	-1.6	1988	3.9
2011	9.6	2001	-1.6	2011	3.8
1976	9.5	2011	-2.1	2005	3.8
1997	9.5	2007	-2.2	2010	3.7
2003	9.3	1988	-2.3	1997	3.5
2005	9.1	1997	-2.4	2003	3.4
1986	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	2004	-2.8	2000	3.0
1977	8.6	2002	-2.9	1984	2.9
1980	8.6	1984	-2.9	1993	2.8
2007	8.6	2000	-2.9	2004	2.8
1992	8.5	1964	-2.9	2002	2.8
2008	8.5	1994	-3.2	1964	2.7
2002	8.5	1983	-3.2	1994	2.7
1994	8.5	2008	-3.3	2008	2.6
2004	8.4	1995	-3.4	1990	2.6
1989	8.3	1968	-3.4	1977	2.5
1964	8.2	1976	-3.5	1980	2.4
1993	8.1	1990	-3.6	1989	2.3
1995	7.9	1977	-3.6	1995	2.3
1973	7.8	1989	-3.8	1983	2.2
1968	7.7	1980	-3.8	1968	2.2
2009	7.7	2009	-3.8	2009	2.0
1983	7.7	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)	
1987	-3.6	1977	12.9	2001	26.5	1987	13.1
2006	-4.7	1987	12.7	2003	26.3	2011	12.6
1998	-4.8	1988	12.6	1984	26.1	2009	12.1
2000	-5.4	1981	12.1	1988	26.0	1994	11.8
1992	-5.7	1998	12.0	1970	25.9	2001	11.8
2002	-6.0	2001	11.9	2006	25.6	2008	11.8
1964	-6.6	1994	11.5	1998	25.6	1999	11.4
1983	-7.1	2010	11.4	1997	25.6	1981	11.1
1988	-7.2	1993	11.4	1981	25.3	1997	11.0
2004	-7.2	1980	11.3	1989	25.3	2005	11.0
1986	-7.3	1986	11.1	2002	25.3	1976	10.8
1976	-7.3	2000	11.0	1983	25.0	1980	10.8
1981	-7.4	1992	10.8	1996	24.9	1974	10.6
1977	-7.4	1991	10.5	1991	24.8	1979	10.6
2007	-7.7	1976	10.4	1964	24.6	2004	10.5
2003	-8.0	1984	10.2	2008	24.5	1998	10.4
2005	-8.0	1999	10.1	2007	24.5	1967	10.4
1975	-8.0	2007	10.1	1979	24.5	2000	10.3
1999	-8.0	2006	10.1	1995	24.4	1988	10.3
1984	-8.1	1968	10.0	2011	24.4	1975	9.9
1995	-8.1	2004	10.0	1967	24.3	1989	9.8
1990	-8.2	1985	10.0	1978	24.2	2007	9.8
1991	-8.6	1990	10.0	1965	24.2	1990	9.7
1989	-8.7	2005	9.9	1969	24.1	1968	9.7
2001	-9.3	1973	9.9	1990	24.1	2010	9.6
1970	-9.3	1978	9.7	1987	24.0	2003	9.4
2011	-9.5	2003	9.4	1972	24.0	1970	9.3
1980	-9.5	2008	9.1	1976	23.8	1983	9.2
2010	-9.8	1972	9.1	1973	23.8	1992	8.8
1968	-9.8	1971	8.6	2000	23.8	1971	8.8
2008	-10.1	1969	8.3	1971	23.6	1964	8.8
1973	-10.3	1995	8.3	1986	23.6	1978	8.7
1997	-11.0	1989	8.2	1994	23.5	1977	8.7
1967	-11.1	1964	8.2	1980	23.5	1966	8.6
1993	-11.5	1966	8.1	1975	23.2	1995	8.6
1985	-11.6	1997	7.6	1999	23.1	1993	8.4
2009	-11.7	2011	7.5	2010	23.0	1982	8.3
1994	-12.1	2009	7.4	1977	23.0	1969	8.0
1996	-12.2	1983	7.0	2009	22.9	2002	7.8
1974	-12.6	1982	6.7	1966	22.8	2006	7.5
1966	-13.1	1996	6.3	1982	22.6	1986	7.3
1982	-13.3	1970	6.1	2005	22.6	1965	7.3
1971	-13.4	2002	5.8	1985	22.4	1973	7.3
1978	-14.5	1965	5.7	1974	22.4	1991	7.0
1965	-14.8	1979	4.8	1992	22.4	1972	6.6
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

WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2006	-13.2	1993	0.3	2006	12.5	2009	1.3
1998	-13.4	2010	0.2	2003	12.5	2005	0.4
1987	-13.6	1987	-0.2	1988	12.3	2011	0.3
1992	-14.9	1977	-0.5	1970	12.3	2008	0.1
1964	-15.0	1999	-0.5	2002	12.2	1998	0.1
2002	-15.5	1985	-0.7	1991	12.2	1981	0.0
1983	-15.6	1994	-0.8	2011	11.8	2001	-0.1
2000	-15.8	1981	-1.0	2001	11.7	1967	-0.2
2004	-16.7	1992	-1.0	2007	11.7	1968	-0.2
1999	-16.8	2006	-1.0	1989	11.6	1997	-0.3
2007	-17.0	1988	-1.0	1998	11.6	1987	-0.3
1981	-17.1	1986	-1.1	2010	11.5	2004	-0.4
1995	-17.2	2000	-1.1	1997	11.5	1994	-0.5
1986	-17.3	2001	-1.2	2008	11.3	1999	-0.6
2003	-17.5	2007	-1.3	1984	11.2	1992	-0.7
1988	-17.8	2005	-1.4	1996	11.2	2010	-0.7
1976	-17.8	1990	-1.5	1983	11.2	1980	-0.9
1984	-17.8	1973	-1.7	1964	11.0	1983	-1.0
2005	-17.8	1978	-1.7	2005	11.0	1970	-1.1
2011	-18.3	1991	-2.0	1972	11.0	2007	-1.1
1975	-18.5	1968	-2.0	2000	11.0	1964	-1.4
1970	-18.7	1998	-2.0	1981	10.9	1988	-1.4
1977	-18.8	1984	-2.2	1995	10.8	1979	-1.4
1989	-18.9	2003	-2.3	1990	10.7	2000	-1.7
2001	-19.0	1972	-2.4	1999	10.7	1989	-1.8
2010	-19.1	2004	-2.5	1987	10.6	1969	-1.9
1990	-19.1	1980	-2.6	1994	10.6	1971	-2.1
1991	-19.3	2008	-3.2	1965	10.5	2002	-2.2
2008	-19.5	1976	-3.3	1976	10.5	2003	-2.2
1980	-19.6	1983	-3.7	1971	10.3	1977	-2.4
1968	-20.0	1969	-3.8	2009	10.3	1974	-2.4
1973	-20.3	1995	-3.8	1973	10.0	1975	-2.5
1993	-20.5	1966	-3.9	1979	10.0	1993	-2.5
1994	-20.8	1964	-3.9	1966	9.9	1995	-2.6
1967	-21.1	2011	-3.9	1993	9.9	1972	-2.7
1997	-21.3	1971	-4.0	1975	9.8	2006	-2.8
2009	-21.4	1997	-4.3	2004	9.7	1978	-2.9
1996	-21.9	1982	-4.3	1978	9.7	1986	-3.1
1974	-22.6	1989	-4.3	1980	9.6	1990	-3.4
1985	-22.9	1996	-4.9	1982	9.6	1976	-3.6
1971	-23.1	1970	-5.0	1986	9.6	1982	-3.7
1982	-23.6	2009	-5.6	1974	9.6	1991	-3.7
1966	-23.6	1965	-5.8	1967	9.5	1984	-3.8
1969	-24.0	1979	-6.1	1969	9.4	1966	-4.3
1965	-24.0	1974	-6.5	1968	9.2	1996	-4.3
1978	-24.5	1975	-6.5	1992	8.8	1965	-4.4
1972	-25.0	1967	-6.9	1977	8.8	1973	-4.6
1979	-25.2	2002	-7.6	1985	8.2	1985	-6.0

SEASONAL MEAN AVERAGE TEMPERATURES °C

WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
1987	-8.6	1987	6.2	2003	19.4	2009	6.7
2006	-8.9	1977	6.2	1988	19.2	2011	6.5
1998	-9.1	1993	5.8	2001	19.1	1987	6.4
1992	-10.3	2010	5.8	1970	19.1	2008	5.9
2000	-10.6	1988	5.8	2006	19.1	2001	5.8
2002	-10.8	1981	5.6	2002	18.8	2005	5.7
1964	-10.8	1994	5.4	1984	18.7	1994	5.7
1983	-11.4	2001	5.4	1998	18.6	1981	5.5
2004	-12.0	1986	5.0	1997	18.5	1999	5.4
1981	-12.3	1998	5.0	1991	18.5	1997	5.4
1986	-12.3	1992	4.9	1989	18.5	1998	5.3
2007	-12.4	2000	4.9	1983	18.1	1967	5.1
1999	-12.4	1999	4.8	1981	18.1	2004	5.0
1988	-12.5	1985	4.7	2011	18.1	1980	5.0
1976	-12.6	2006	4.5	2007	18.1	1968	4.8
1995	-12.7	2007	4.4	1996	18.1	1979	4.6
2003	-12.7	1980	4.4	2008	17.9	1988	4.4
2005	-12.9	1991	4.3	1964	17.8	2010	4.4
1984	-13.0	2005	4.3	1995	17.7	2007	4.4
1977	-13.1	1990	4.3	1972	17.5	2000	4.3
1975	-13.3	1973	4.1	2000	17.4	1970	4.2
1990	-13.7	1978	4.0	1990	17.4	1974	4.1
1989	-13.8	1968	4.0	1965	17.4	1983	4.1
2011	-14.0	1984	4.0	1987	17.3	1992	4.1
1991	-14.0	2004	3.8	1979	17.3	1989	4.0
1970	-14.0	2003	3.6	1976	17.2	1975	3.8
2001	-14.2	1976	3.5	2010	17.2	1964	3.7
2010	-14.5	1972	3.4	1994	17.1	1976	3.6
1980	-14.6	2008	2.9	1978	17.0	2003	3.6
2008	-14.8	1971	2.3	1971	17.0	1971	3.4
1968	-15.0	1969	2.2	1973	17.0	1977	3.2
1973	-15.4	1995	2.2	1999	16.9	1990	3.2
1993	-16.0	1964	2.2	1967	16.9	1969	3.1
1967	-16.1	1966	2.1	2005	16.8	1995	3.0
1997	-16.2	1989	2.0	1969	16.7	1978	2.9
1994	-16.5	2011	1.9	1986	16.6	1993	2.9
2009	-16.6	1997	1.7	2009	16.6	2002	2.8
1996	-17.1	1983	1.6	1980	16.6	2006	2.4
1985	-17.3	1982	1.2	1975	16.5	1982	2.3
1974	-17.6	2009	0.9	1966	16.4	1966	2.2
1971	-18.3	1996	0.7	1982	16.2	1986	2.1
1966	-18.4	1970	0.5	1974	16.0	1972	1.9
1982	-18.5	1965	-0.1	1977	15.9	1991	1.6
1965	-19.4	1979	-0.7	2004	15.7	1965	1.5
1978	-19.5	1974	-0.9	1992	15.6	1973	1.3
1969	-19.6	2002	-0.9	1968	15.6	1984	0.9
1972	-20.0	1975	-1.0	1993	15.5	1996	0.9
1979	-20.4	1967	-1.3	1985	15.3	1985	-0.8

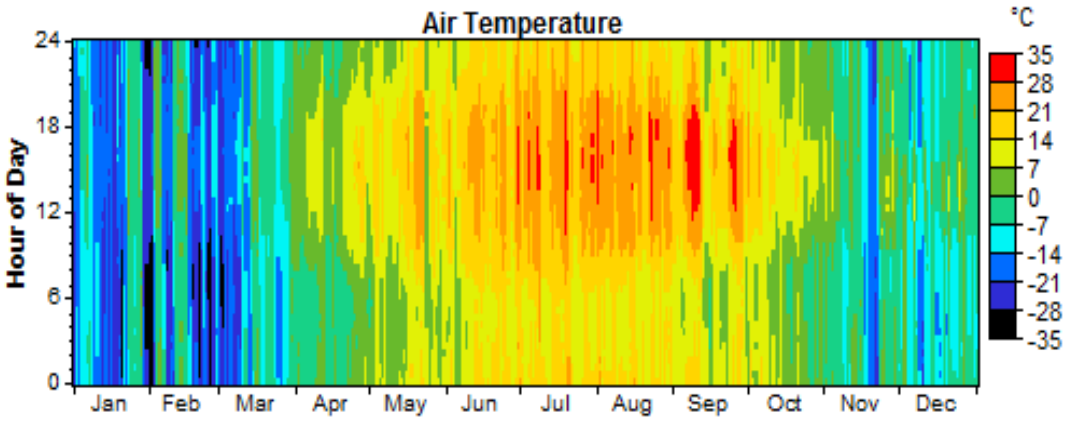
TEMPERATURE

MONTH	AVERAGE MAXIMUM TEMPERATURE (°C)		AVERAGE MINIMUM TEMPERATURE (°C)		AVERAGE TEMPERATURE (°C)		EXTREME VALUES TEMPERATURE (°C)		EXTREME VALUES FOR SASKATOON STATIONS	
	2011	Normal	2011	Normal	2011	Normal	Max/Date	Min/Date	Max/Date	Min/Date
January	-10.4	-9.8	-18.9	-19.7	-14.7	-14.7	4.3/28	-33.6/20	11.0/1980/23$_{SWT}$	-48.9/1893/31$_{SM}$
February	-8.5	-7.1	-19.4	-17.0	-14.0	-12.1	5.3/15	-32.8/25	12.8/1931/19$_{SE}$	-50.0/1893/01$_{SM}$
March	-5.5	0.0	-14.5	-9.7	-10.0	-4.9	6.7/14	-30.3/01	22.8/1910/23$_{SE}$	-43.3/1897/14$_{SM}$
April	9.8	11.2	-1.9	-1.4	4.0	4.9	21.2/26	-5.6/04	33.3/1952/28$_{SA\,US}$	-30.5/1979/01$_{SWT}$
May	18.3	18.3	4.8	4.6	11.6	11.5	26.2/21&22	-0.4/01	37.2/1936/27$_{SE}$	-12.8/1907/06$_{SE}$
June	21.7	22.5	10.4	9.8	16.1	16.2	29.4/29	2.1/04	41.5/1988/06$_{S2}$	-3.9/1917/02$_{US}$
July	25.4	25.2	13.1	12.1	19.3	18.7	34.4/31	8.2/12	40.0/1919,1941,1946$_{SE\,SA\,US}$	-0.6/1918/25$_{SE}$
August	26.1	24.9	11.8	11.0	19.0	18.0	34.5/22	7.4/19	39.7/1998/06$_{SRC}$	-2.8/1901/23SM&1976/28$_{SRC}$
September	24.1	18.7	7.7	5.6	15.9	12.2	35.0/08	-2.0/14	35.6/1978/04$_{SRC}$	-11.1/1908/28$_{SE}$
October	13.0	10.4	2.0	-1.1	7.5	4.6	23.3/04	-4.9/26	32.2/1943/05$_{SA\,US}$	-25.6/1919/26$_{SE\,US}$
November	0.8	-0.6	-8.8	-9.3	-4.0	-5.0	12.4/03	-23.6/20	21.7/1903/03$_{SE}$	-39.4/1893/30$_{SM}$
December	0.8	-8.3	-11.5	-17.4	-5.4	-12.9	10.1/06	-22.4/09	14.4/1939/05$_{SE}$	-43.9/1892/22$_{SM}$
Average	9.6	8.8	-2.1	-2.7	3.8	3.0				

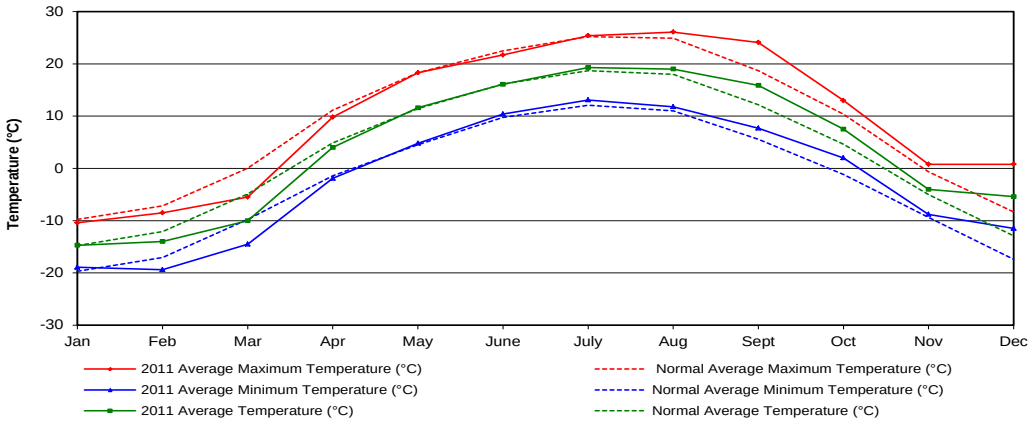
Normal = 1981-2010

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 *etal)*

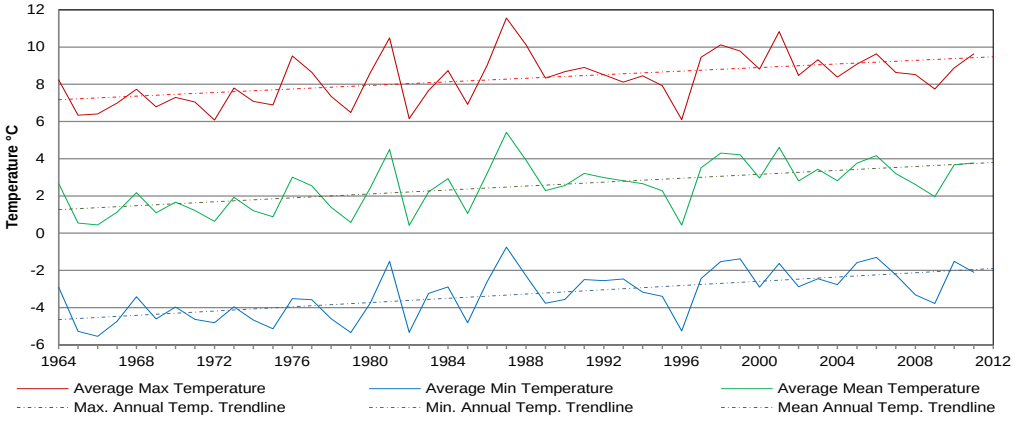
Hourly



Monthly

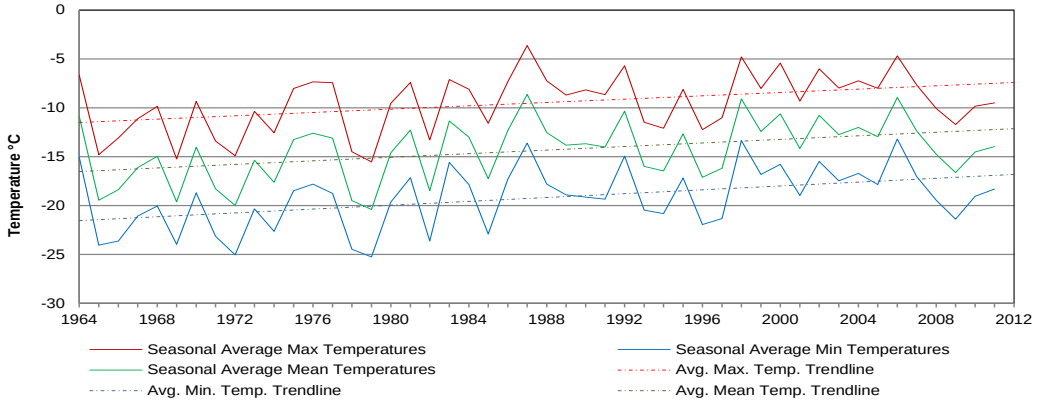


Annual

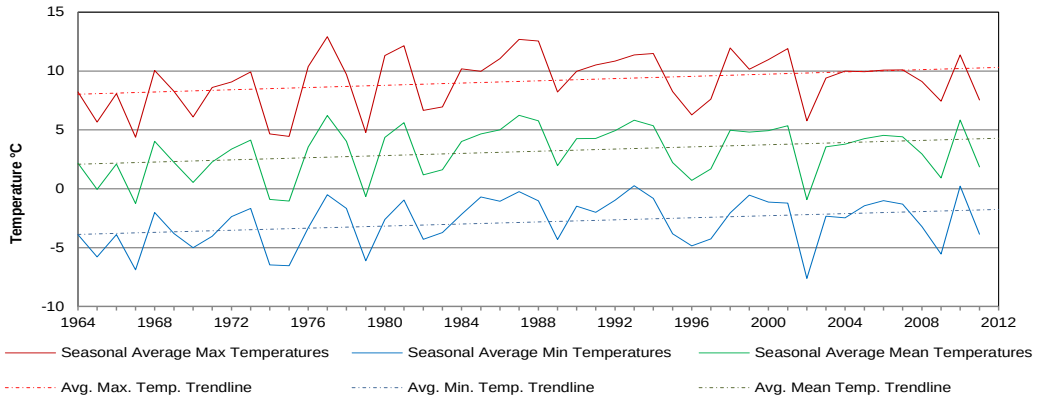


SEASONAL TEMPERATURES for 1964 to 2011

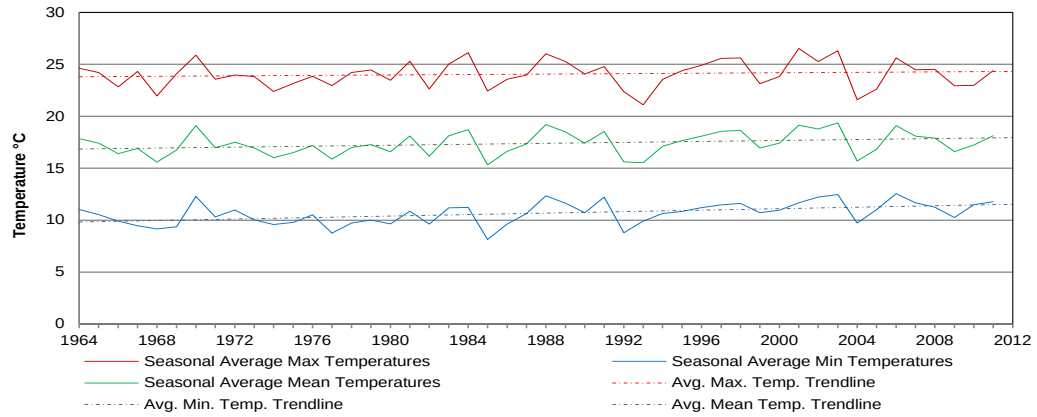
Winter (DJF)



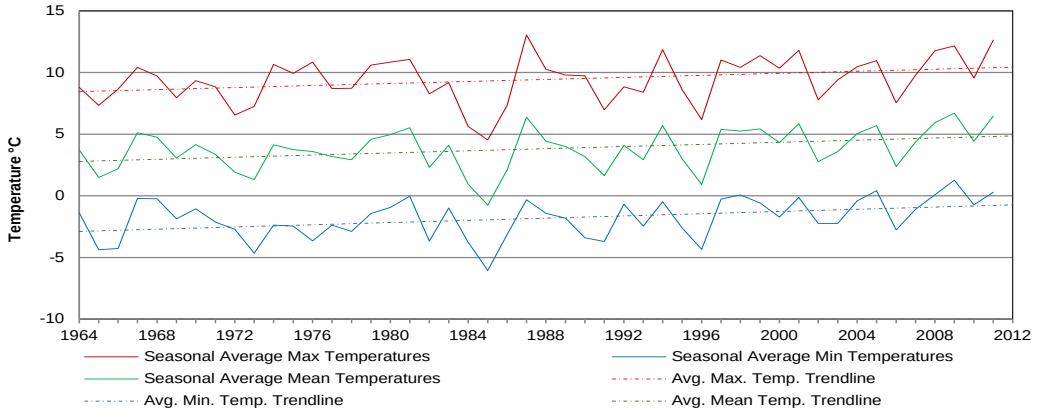
Spring (MAM)



Summer (JJA)

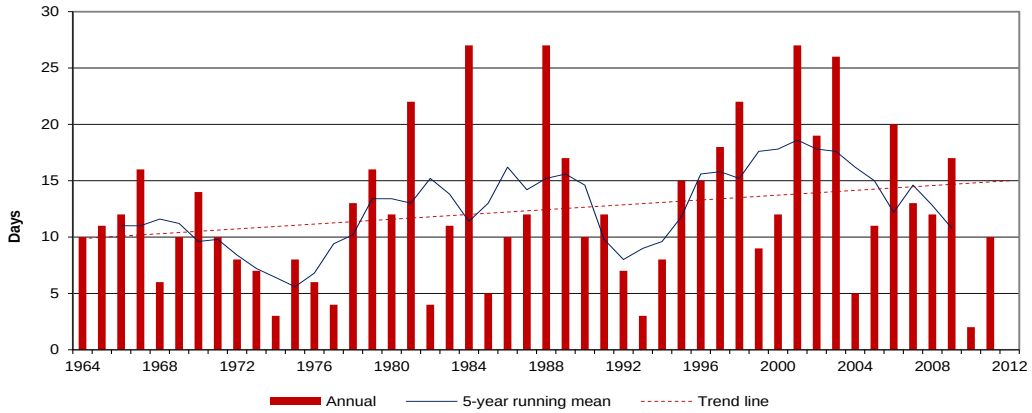


Autumn(SON)

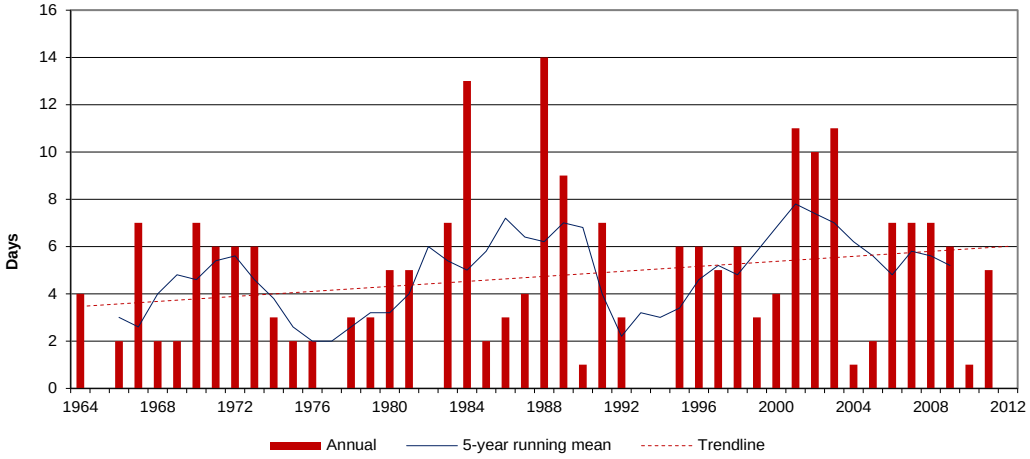


DAYS WITH TEMPERATURES GREATER THAN A SET POINT

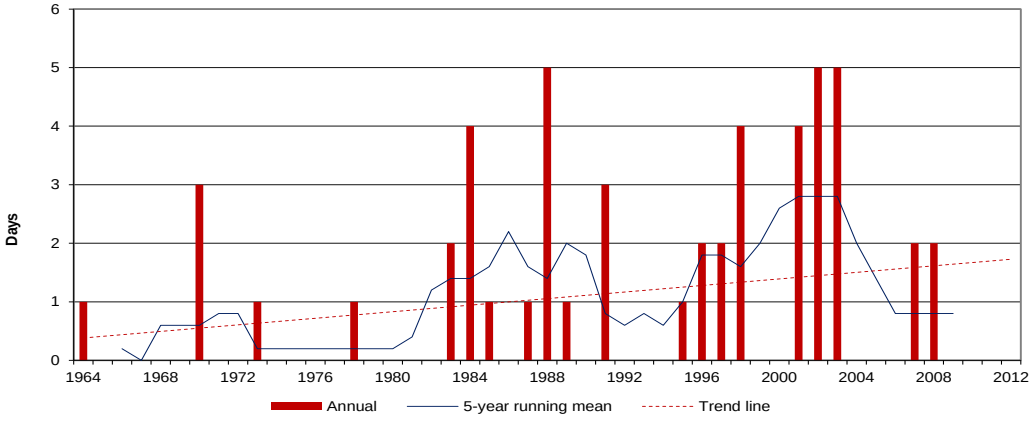
30°C or Greater



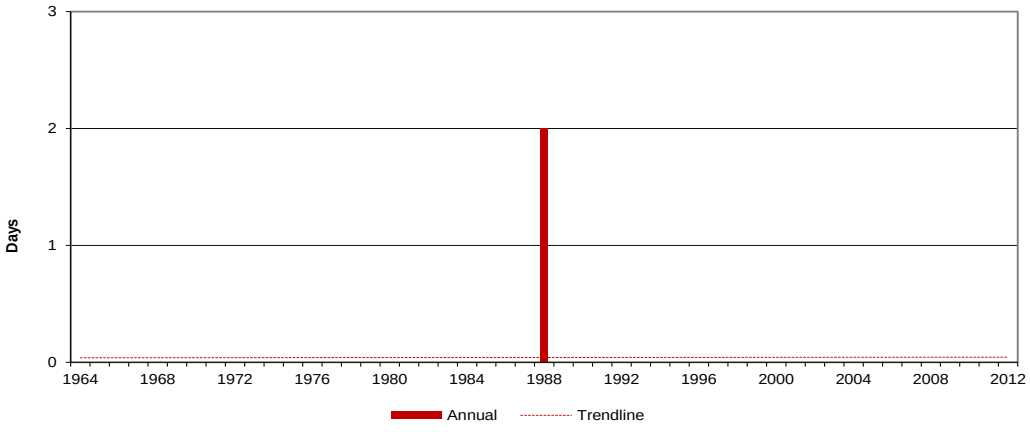
32°C or Greater



35°C or Greater

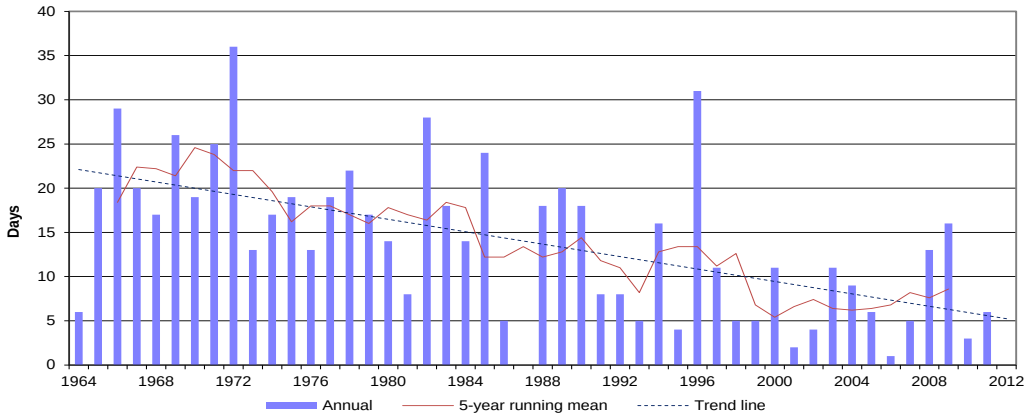


40°C or Greater

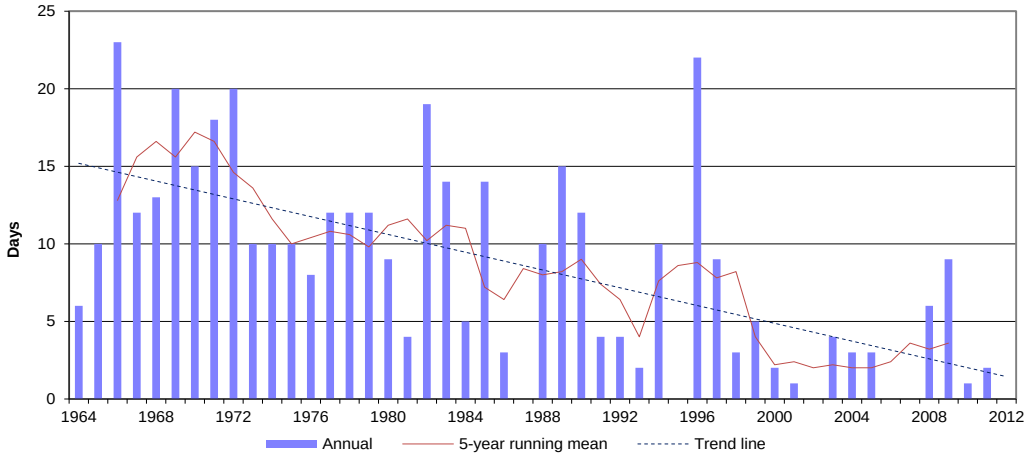


DAYS WITH TEMPERATURES LESS THAN A SET POINT

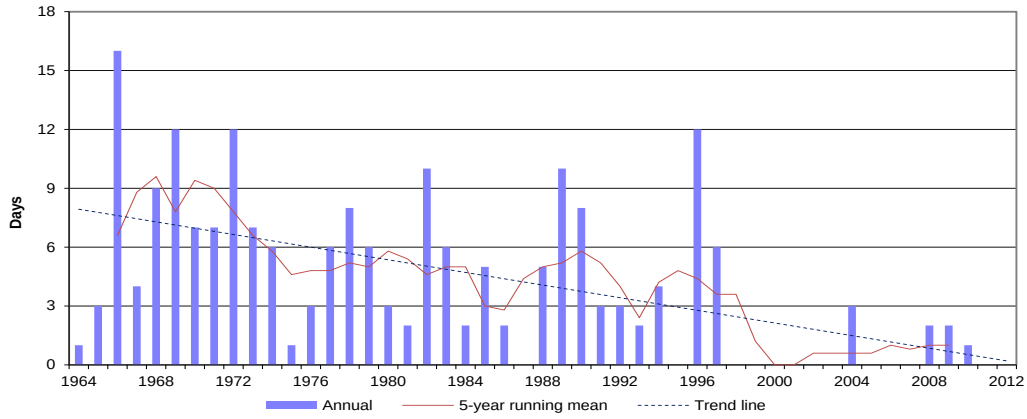
Minus 30°C or Less



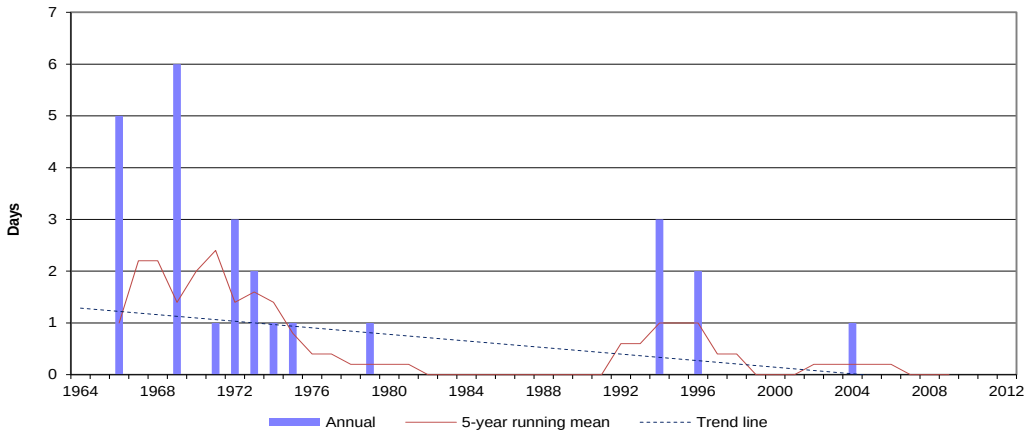
Minus 32°C or Less



Minus 35° or Less

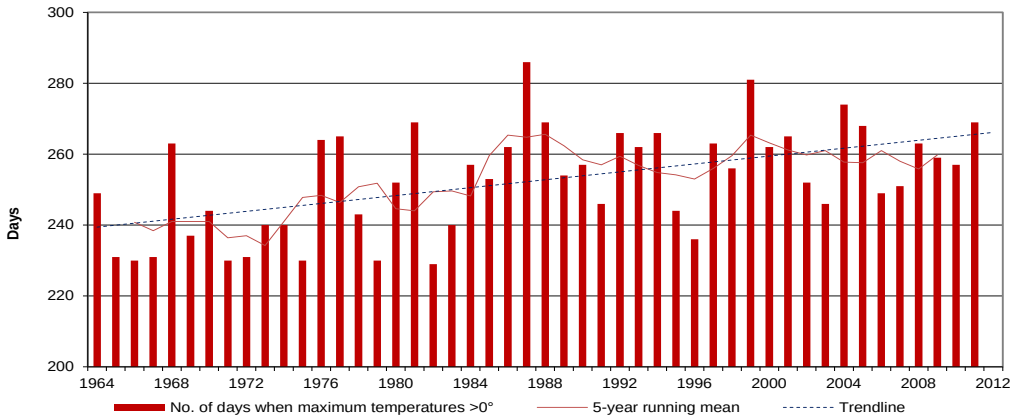


Minus 40°C or Less

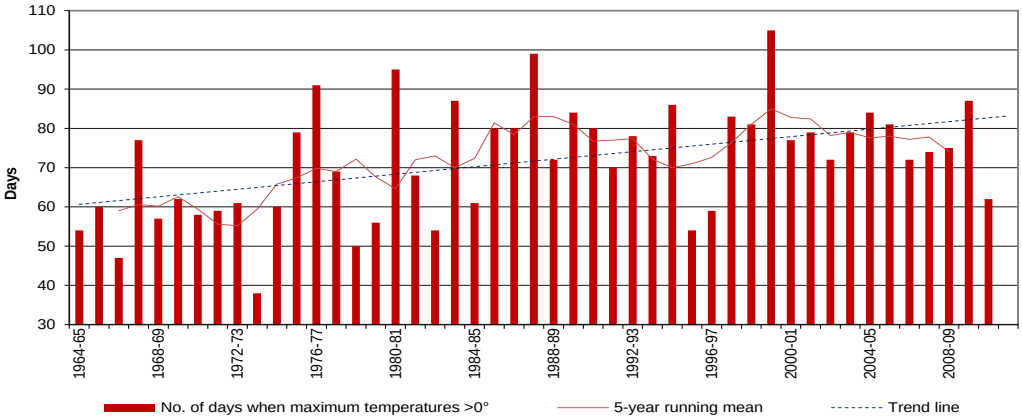


DAYS WITH TEMPERATURES GREATER THAN 0°C

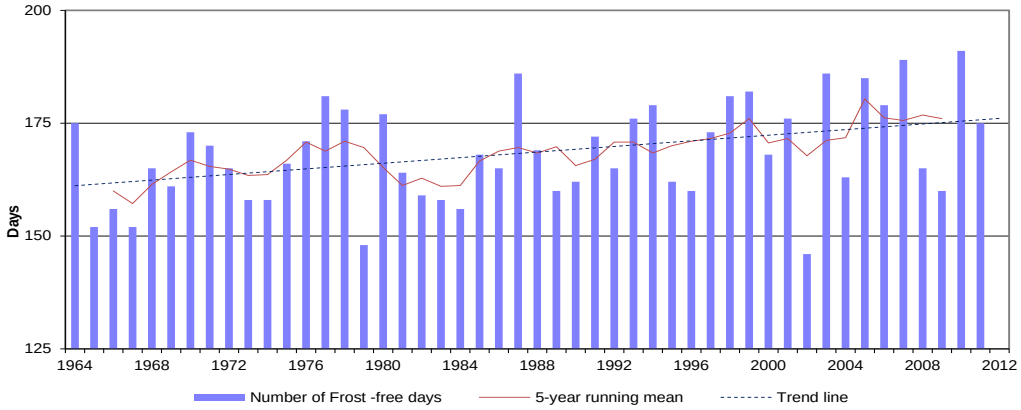
Maximum Temperature greater than 0°C (Thaw Days) Jan 1st to Dec 31st



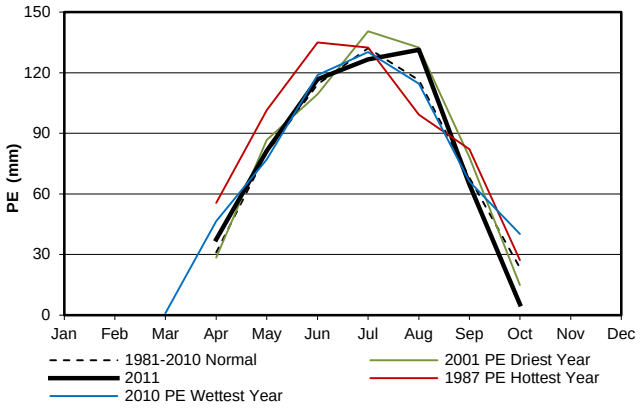
Maximum Temperature greater than 0°C (Thaw Days) Oct 1st to Mar 31st (Cold Season)



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



POTENTIAL EVAPOTRANSPIRATION (PE) using the Thornthwaite Method[1]



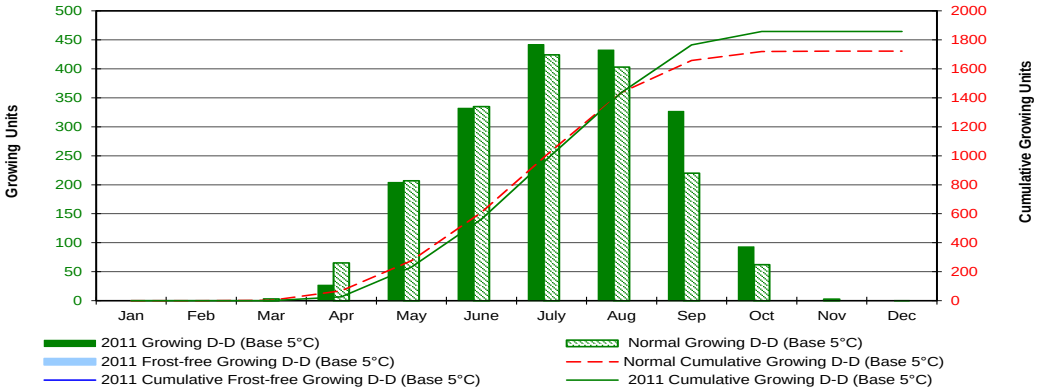
MONTH	PE (mm) 2011	PE (mm) 2010 WettestYear	PE (mm) 2001 Driest Year	PE(mm) 1987 Hottest Year	PE (mm) 1981-2010 Normal
Jan	0	0	0	0	0
Feb	0	0	0	0	0
Mar	0	0.9	0	0	0
Apr	37.5	46.5	28.5	55.5	30.9
May	81.3	77.0	86.8	101.4	80.5
June	116.8	118.8	109.3	135.0	114.2
July	126.7	130.2	140.6	132.5	132.1
Aug	131.3	114.6	132.4	99.2	116.3
Sept	64.8	66.1	78.1	82.1	67.9
Oct	5.4	40.1	14.8	27.3	23.4
Nov	0	0	0	0	0
Dec	0	0	0	0	0
Total	563.7	594.3	590.4	632.9	565.4

[1]*Thornthwaite and Mather 1955*

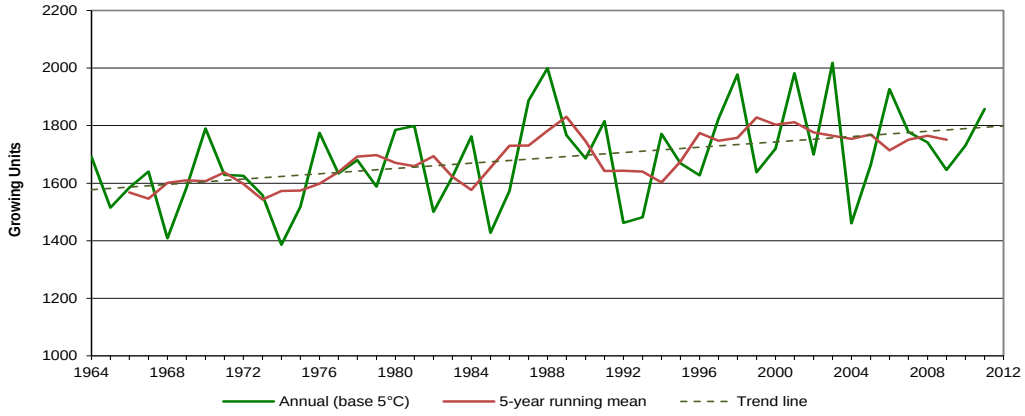
DEGREE-DAYS

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		
	2011	Cumulative	Normal	2011	Cumulative	Normal	2011	Cumulative	Normal	2011	Cumulative	Normal
January	0.0	0.0	0.0	1013.4	1013.4	1015.1	0.0	0.0	0.0	0.0	0.0	0.0
February	0.0	0.0	0.0	894.9	1908.3	848.2	0.0	0.0	0.0	0.0	0.0	0.0
March	0.0	0.0	3.0	868.6	2776.9	708.8	0.0	0.0	0.0	0.0	0.0	0.0
April	27.1	27.1	65.2	421.2	3198.1	402.4	0.0	0.0	0.2	0.0	0.0	0.0
May	204.1	231.2	206.9	200.7	3398.8	209.3	1.8	1.8	6.3	0.0	0.0	0.1
June	332.1	263.3	334.8	75.1	3473.9	81.4	17.2	19.0	24.8	0.0	0.0	1.5
July	441.9	1005.2	424.0	17.5	3491.4	30.7	56.4	75.4	51.7	2.0	2.0	2.9
August	432.6	1437.8	402.8	17.2	3508.6	50.0	46.8	122.2	49.8	0.0	2.0	3.5
September	326.9	1764.7	219.9	95.8	3604.4	182.5	32.7	154.9	7.6	0.0	2.0	0.1
October	93.2	1857.9	62.2	324.8	3929.2	415.1	0.0	154.9	0.1	0.0	2.0	0.0
November	0.0	1857.9	2.9	660.8	4590.0	690.1	0.0	154.9	0.0	0.0	2.0	0.0
December	0.0	1857.9	0.1	724.2	5314.2	957.5	0.0	154.9	0.0	0.0	2.0	0.0

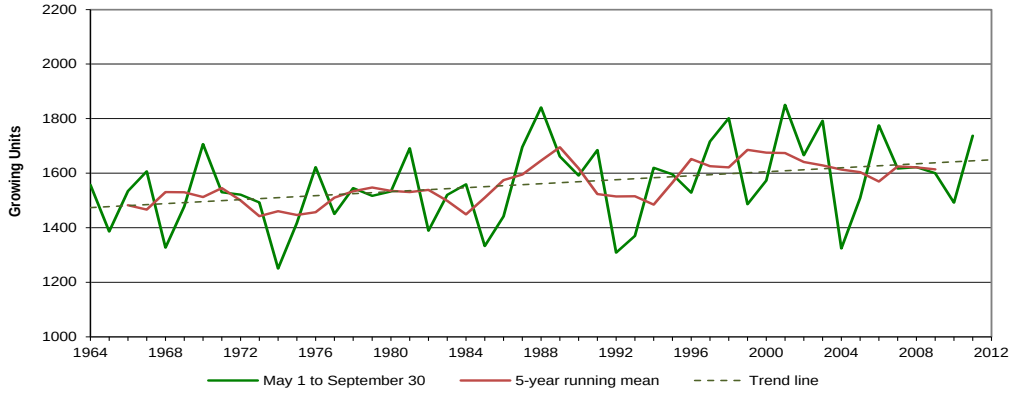
Growing Degree-days Monthly



Growing Degree-days Annual

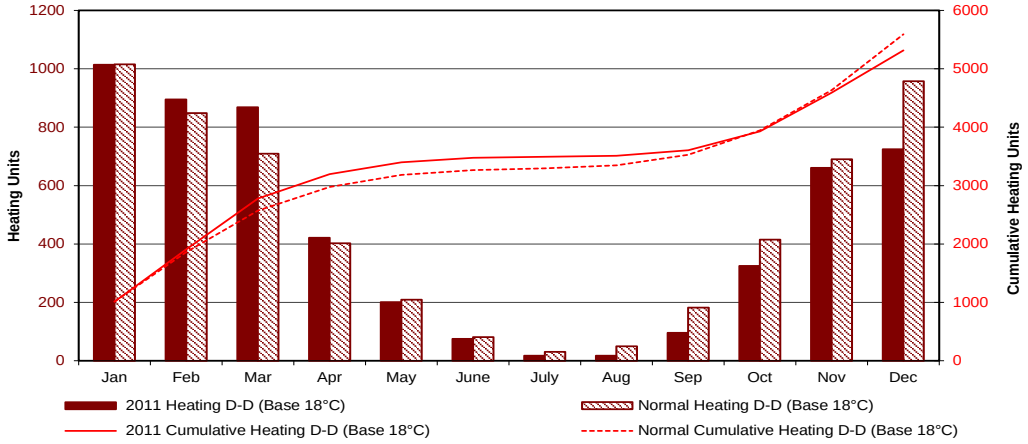


Growing Degree-days May1 to September 30

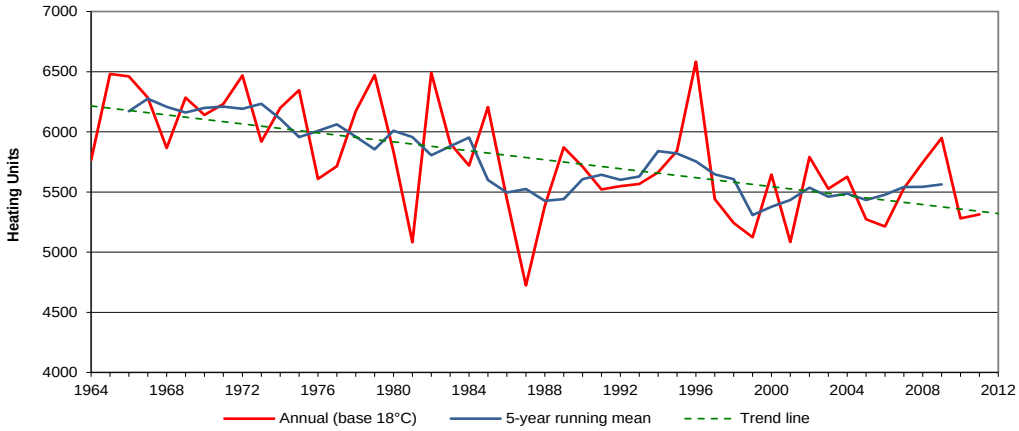


DEGREE-DAYS

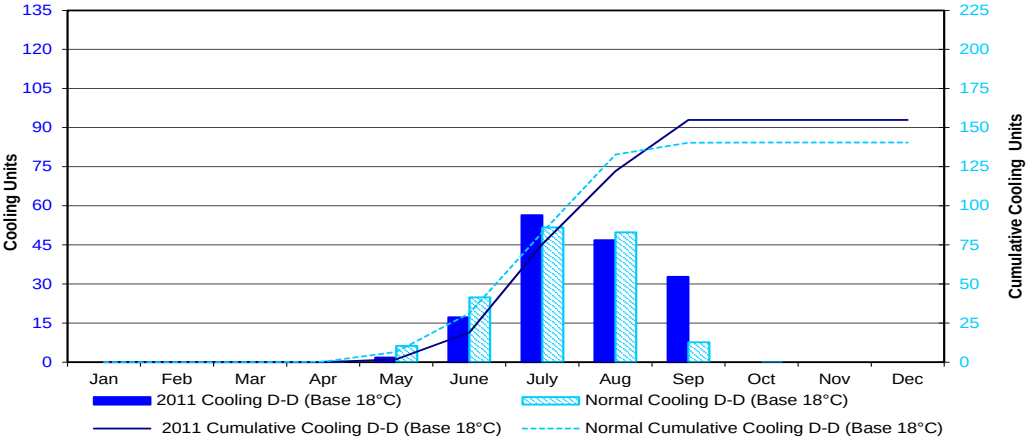
Heating Degree-days Monthly



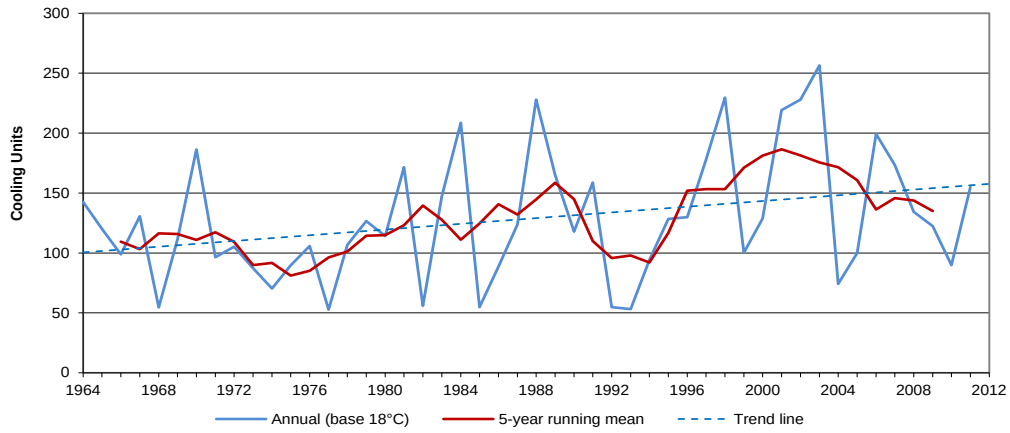
Heating Degree-days Annual



Cooling Degree-days Monthly

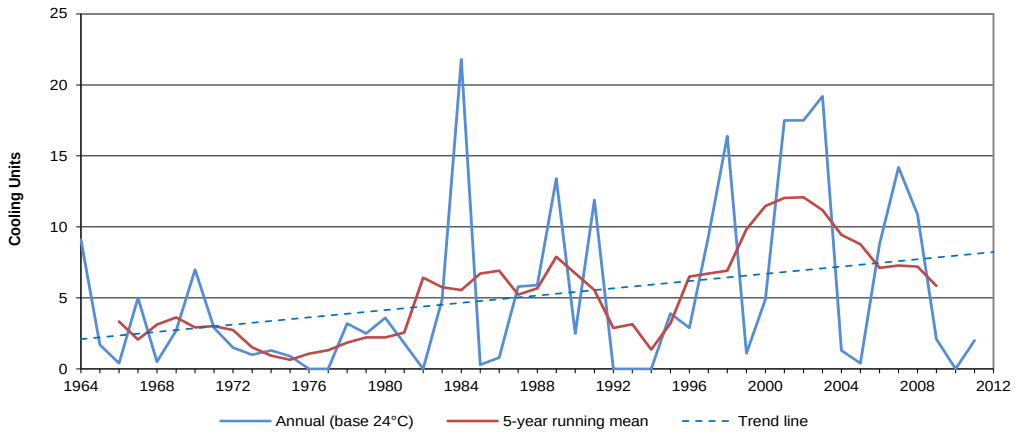


Cooling Degree-days Annual



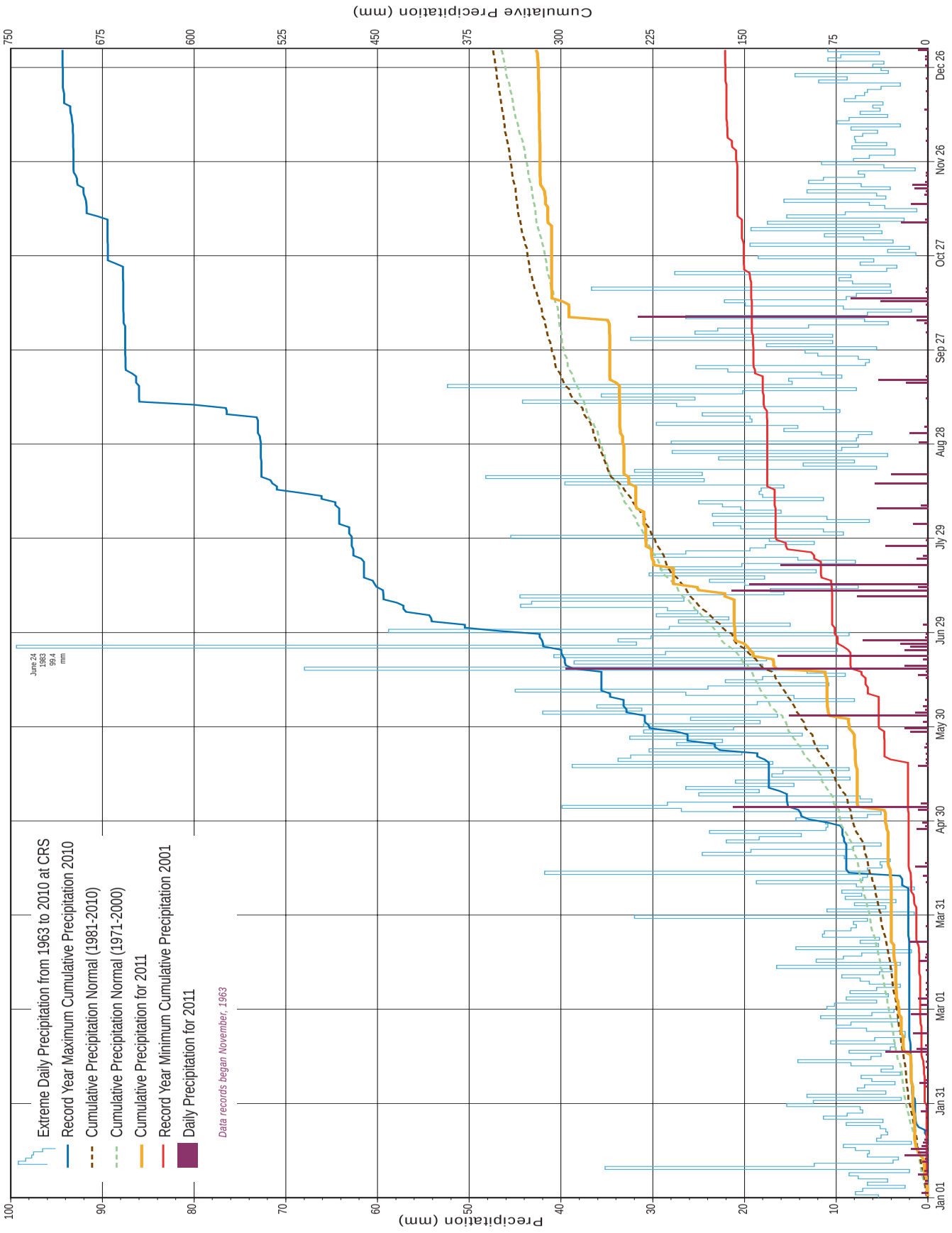
DEGREE-DAYS

Extreme Cooling Degree-days Annual



March 23, 2011 Martensville
photo credit: V Wittrock

DAILY PRECIPITATION



PRECIPITATION

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

photo credit: CR Beaulieu

RANKING BY DRIEST MONTH BY % OF NORMAL PRECIPITATION		RANKING BY DRIEST MONTH BY PRECIPITATION AMOUNT	
APR	19.7	DEC	3.2
SEPT	23.2	APR	4.5
DEC	25.2	MAR	6.4
AUG	44.7	SEPT	8.6
MAR	46.5	NOV	9.5
NOV	71.1	FEB	11.4
MAY	77.2	JAN	12.4
JAN	80.1	AUG	20.8
FEB	122.0	MAY	30.4
JULY	123.5	OCT	47.6
JUNE	139.6	JULY	72.8
OCT	247.7	JUNE	93.0

2009 PRECIPITATION RECORDS

TYPE	DATE	NEW RECORD	OLD RECORD/year
Greatest Daily Precipitation (mm)	July 12	21.4	17.2/1986
	October 7	31.6	26.4/2006
Most number of Days with Monthly Precipitation >25 mm	October	1	1/1969, 1984, 1991, 2006

EXTREME PRECIPITATION EVENTS *

PERIOD	DATE	AMOUNT
Daily	June 17	39.5 mm
Daily	October 7	31.6 mm
More than one day	June 14 - 18	43.5 mm
More than one day	July 12 - 14	42.0 mm
Longest wet spell	January 12 - 19	8 days
Longest wet spell	June 23 - 28	6 days
Longest dry spell	October 15 - November 5	20 days
Longest dry spell	March 27 - April 9	13 days

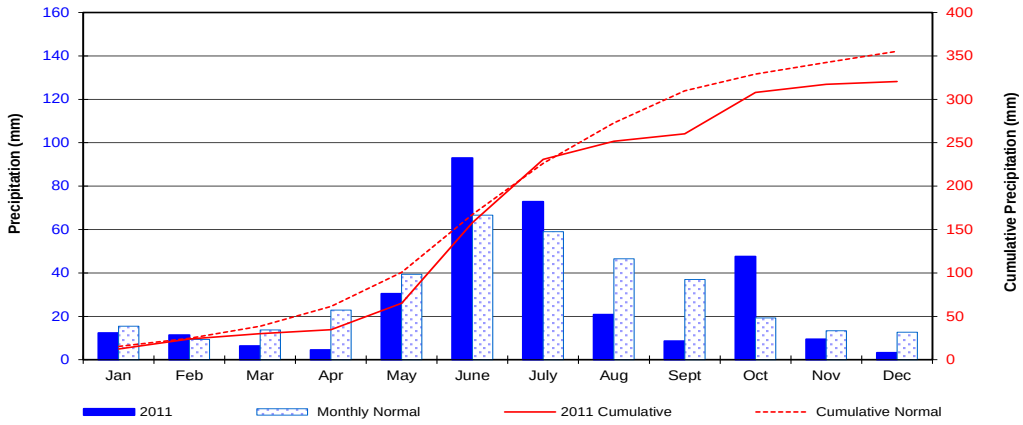
**as recorded by the weighing gauge*

photo credit: CR Beaulieu

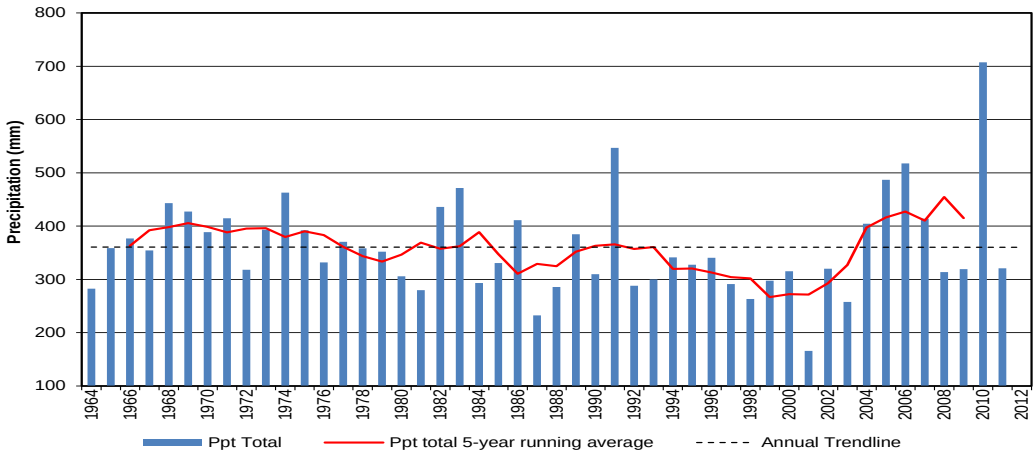
PRECIPITATION

MONTH	MONTHLY PRECIPITATION (mm)				EXTREME VALUES (mm)					
	2011	NORMAL	CUMULATIVE 2011	% OF CUMULATIVE NORMAL	CRS Maximum	CRS Minimum	SASKATOON AREA Maximum	SE	Saskatoon Eby	1901-1942
January	12.4	15.5	12.4	80.1	48.6/1969	2.6/2001	66.1/1911SE	US	University of Saskatchewan	1915-1964
February	11.4	9.3	23.8	95.9	40.2/1979	2.5/1984	43.7/1924SE			
March	6.4	13.8	30.2	78.3	57.1/1967	2.4/1992, 1994, 2008	59.0/1927SE	SWT	S'toon Water Treatment Plant	1974-
April	4.5	22.9	34.7	56.5	55.9/1985	2.4/1988, 89	86.1/1955US			
May	30.4	39.4	65.1	64.6	145.3/1977	0.2/2002	178.0/1977SWT	S	Saskatoon	1941-1942
June	93.0	66.6	158.1	94.4	171.0/2005	13.0/1985	186.8/1942S	NRC	National Res. Council	1952-1966
July	72.8	59.0	230.9	102.0	125.9/1971	13.0/1984	162.9/1928SE			
August	20.8	46.5	251.7	92.2	105.2/2007	7.0/2001	178.9/1954NRC	SRC	Sask. Research Council	1963-
September	8.6	37.0	260.3	84.0	128.4/2006	0.8/1995	128.4/2006SRC			
October	47.6	19.2	307.9	93.6	69.8/1969	0.0/2000	69.8/1969SRC	SA	S'toon Diefenbaker Intl. Airport	1942-2009
November	9.5	13.4	317.4	92.7	48.2/1973	0.4/2009	57.3/1940SE			
December	3.2	12.7	320.6	90.3	43.0/1977	1.2/1997	59.2/1956SA			
Total	320.6	355.2			707.4/2010	165.8/2001	707.4/2010SRC			

Monthly

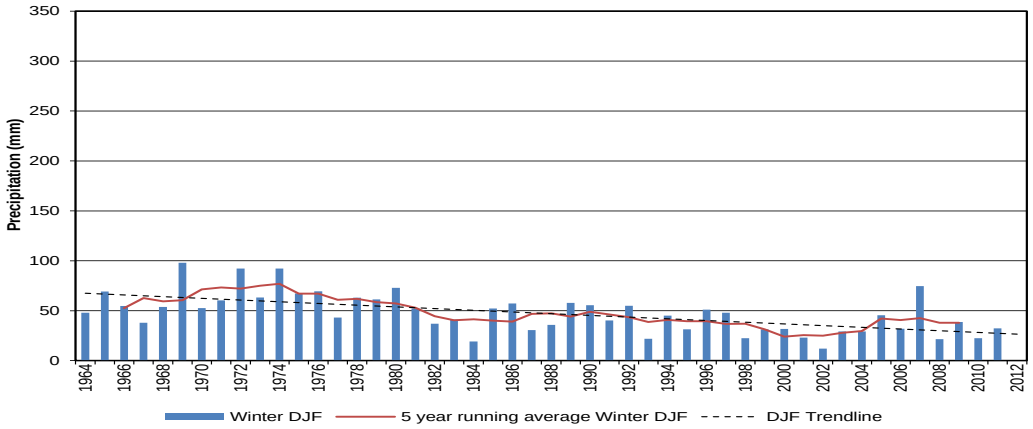


Annual

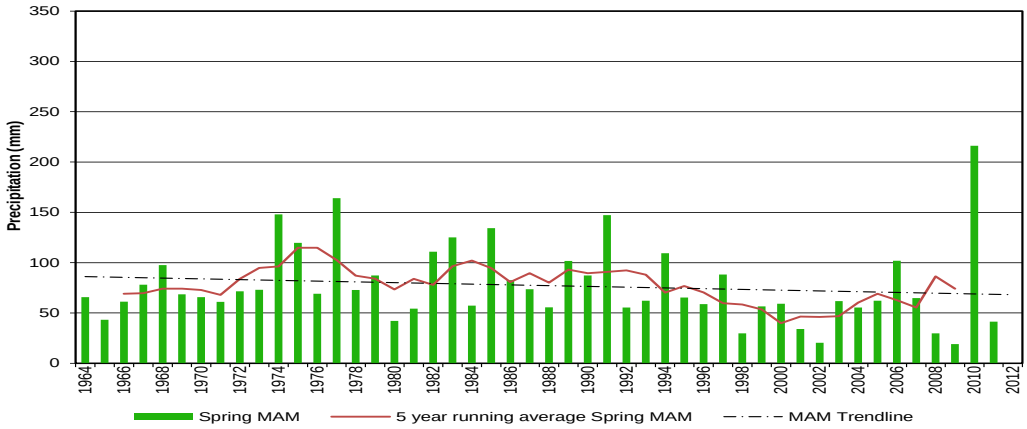


SEASONAL PRECIPITATION for 1964 to 2011

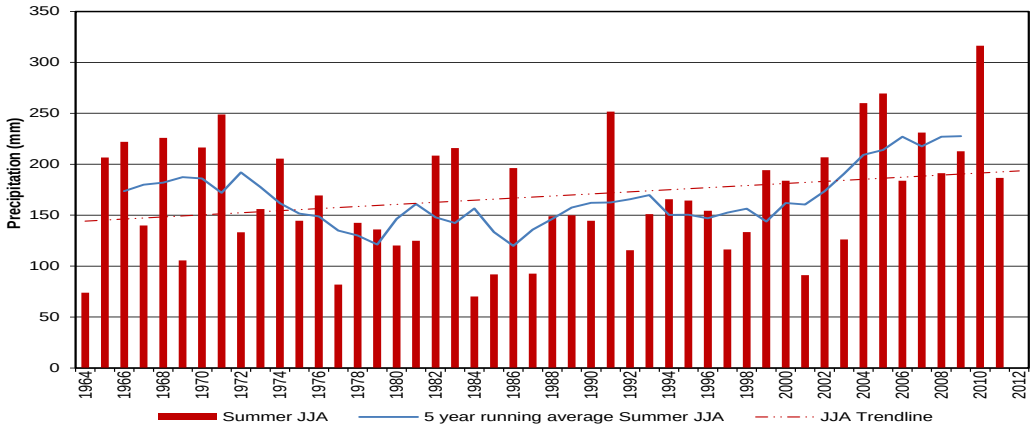
Winter



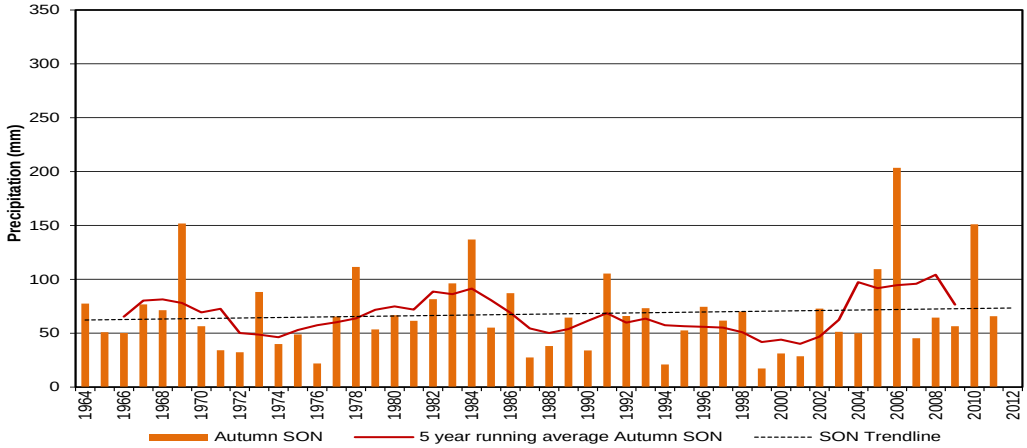
Spring



Summer



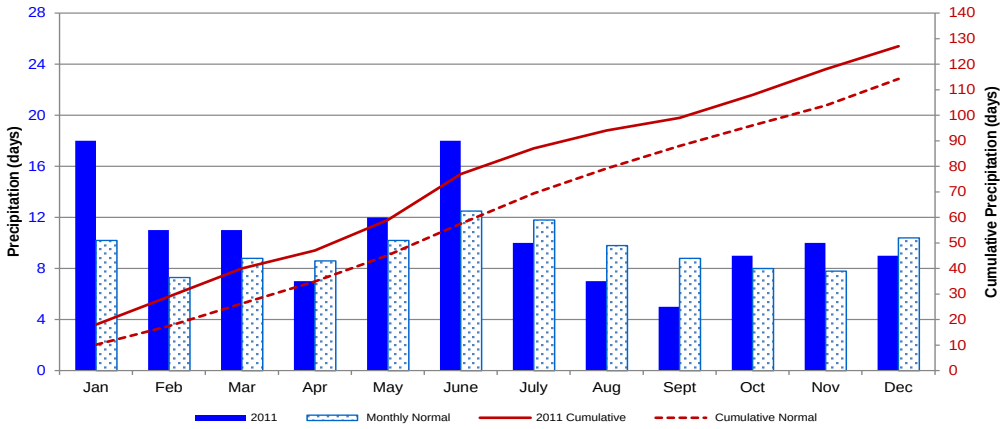
Autumn



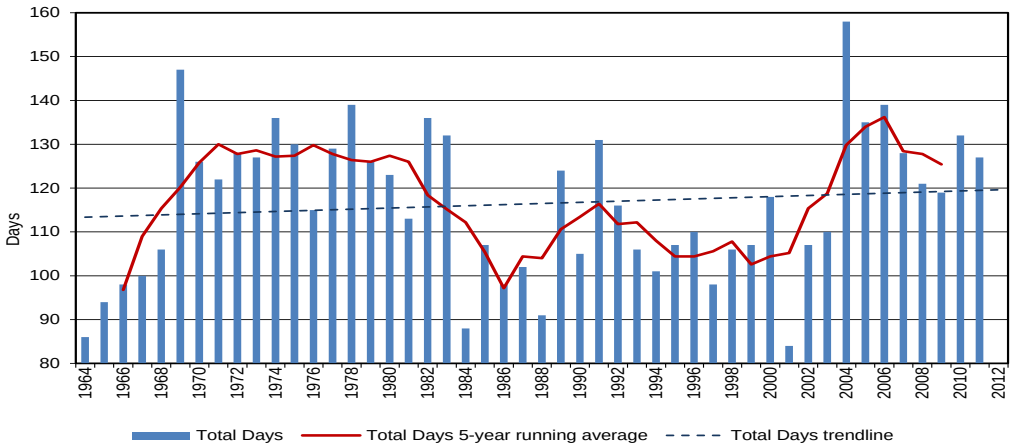
PRECIPITATION

MONTH	NUMBER OF DAYS WITH MEASURABLE PRECIPITATION				EXTREME VALUES	
	2011	NORMAL	CUMULATIVE 2011	% OF CUMULATIVE NORMAL	CRS Maximum	CRS Minimum
January	18	10.2	18	176.5	25/1974	3/2001
February	11	7.3	29	165.7	20/1696	2/1984
March	11	8.8	40	152.1	19/2004	2/1990,92,94 2007
April	7	8.6	47	134.7	17/2003	2/1964
May	12	10.2	59	130.8	19/1989	1/2002
June	18	12.5	77	133.7	21/1991	7/1964&1968
July	10	11.8	87	125.4	19/1986	4/1984
August	7	9.8	94	118.7	18/2002	2/2001
September	5	8.8	99	112.5	19/1977	2/1995
October	9	8.0	108	112.5	16/2004	0/2000
November	10	7.8	118	113.7	18/1970	1/1986,74,76, 90
December	9	10.4	127	111.2	19/1977	2/1997
Total	127	114.3			158/2004	84/2001

Monthly Days

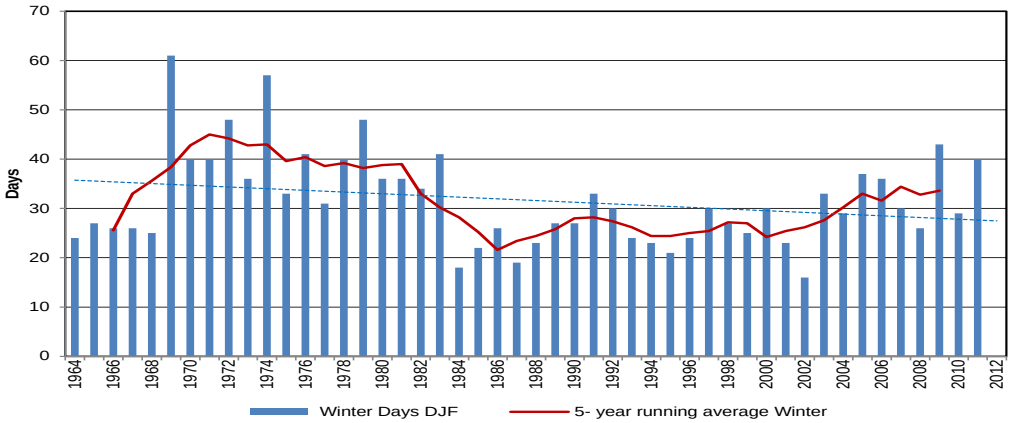


Annual Days

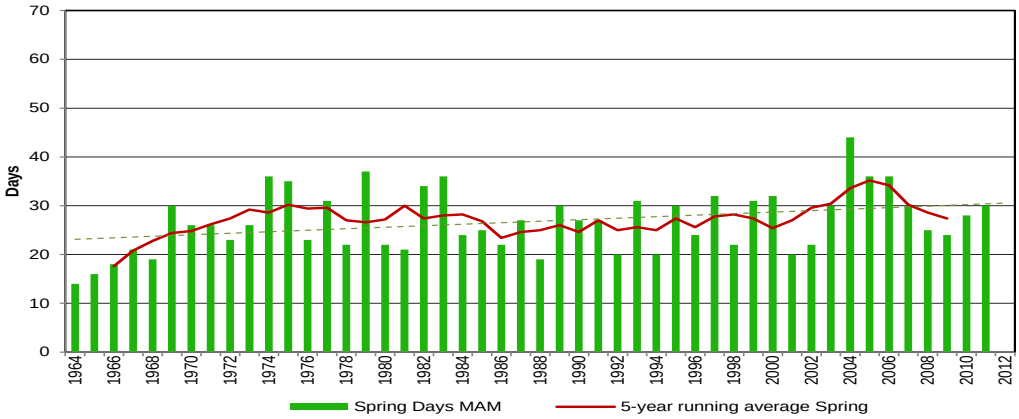


SEASONAL PRECIPITATION DAYS for 1964 to 2011

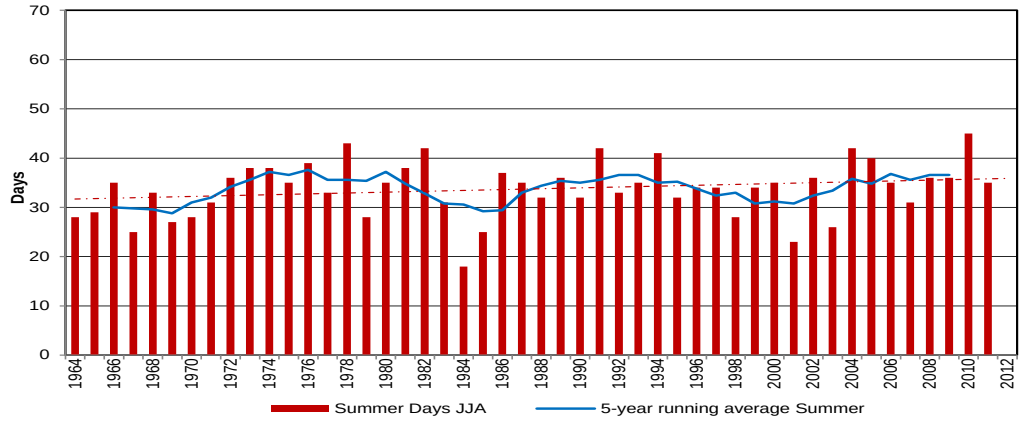
Winter Days



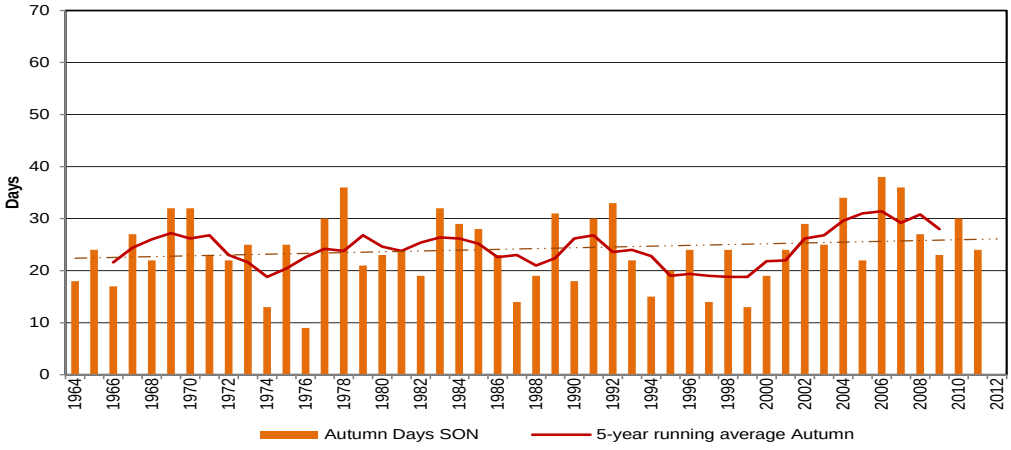
Spring Days



Summer Days



Autumn Days



PRECIPITATION RANKINGS

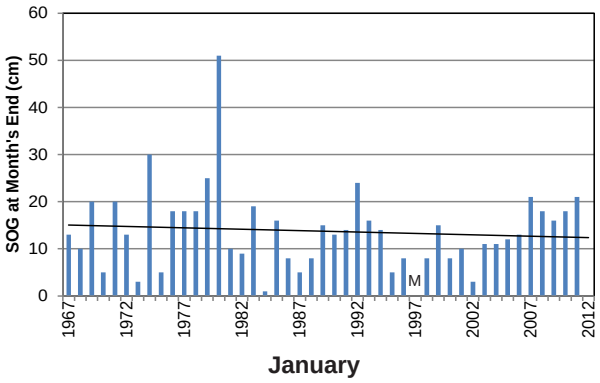
RANKING BY DRIEST YEAR (mm)

ANNUAL		WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2001	165.8	2002	12.1	2009	19.0	1984	70.2	1999	17.2
1987	232.4	1984	19.2	2002	20.3	1964	73.9	1994	21.0
2003	257.7	2008	21.6	2008	29.8	1977	81.9	1976	21.8
1998	263.3	1993	22.0	1998	29.8	2001	91.2	1987	27.4
1981	279.8	1998	22.4	2001	34.0	1985	91.8	2001	28.5
1964	282.7	2010	22.5	2011	41.3	1987	92.6	2000	31.2
1988	285.7	2001	23.1	1980	42.2	1969	105.5	1972	32.3
1992	288.1	2003	29.2	1965	43.2	1992	115.6	1990	33.9
1997	291.4	2004	29.3	1981	54.3	1997	116.4	1971	34.2
1984	293.1	1987	30.6	2004	55.4	1980	120.3	1988	38.1
1999	297.7	1999	31.3	1992	55.5	1981	124.9	1974	40.0
1993	300.0	1995	31.3	1988	55.6	2003	126.2	2007	45.3
1980	305.9	2000	31.7	1999	56.5	1972	133.3	1975	48.8
1990	309.8	2006	32.0	1984	57.2	1998	133.4	2004	50.0
2008	313.8	2011	32.3	1996	58.8	1979	135.9	1966	50.2
2000	315.4	1988	35.9	2000	59.2	1967	139.9	1965	50.9
1972	317.9	1982	37.0	1971	61.1	1978	142.5	2003	51.2
2009	319.3	1967	37.9	1966	61.2	1975	144.5	1995	52.6
2002	320.0	2009	38.8	2003	61.8	1990	144.5	1979	53.4
2011	320.6	1991	40.3	2005	62.1	1988	148.9	1985	55.2
1995	327.7	1983	41.1	1993	62.2	1989	149.9	1970	56.4
1985	330.6	1977	43.1	2007	64.7	1993	151.0	2009	56.5
1976	331.8	1994	45.1	1995	65.4	1996	154.4	1981	61.4
1996	340.6	2005	45.4	1970	65.7	1973	156.1	1997	61.6
1994	341.4	1964	47.9	1964	65.8	1995	164.4	2008	64.4
1979	352.0	1997	48.0	1969	68.5	1994	165.6	1989	64.5
1967	354.3	1996	51.0	1976	69.1	1976	169.4	1977	65.4
1978	358.1	1981	52.2	1972	71.6	2000	183.8	2011	65.7
1965	358.8	1985	52.3	1978	72.8	2006	183.8	1992	65.9
1977	370.5	1970	52.7	1973	73.1	2011	186.6	1980	66.6
1966	376.9	1968	53.8	1987	73.6	2008	191.2	1998	70.0
1989	384.8	1966	54.7	1967	78.0	1999	194.2	1968	71.3
1970	388.8	1992	55.0	1986	82.5	1986	196.2	2002	72.8
1975	392.3	1990	55.6	1990	87.2	1974	205.5	1993	73.1
1973	393.3	1986	57.2	1979	87.3	1965	206.6	1996	74.4
2004	404.5	1989	57.9	1997	88.2	2002	206.8	1967	76.8
1986	411.3	1971	60.4	1968	97.6	1982	208.4	1964	77.4
2007	413.9	1979	61.3	1989	101.7	2009	212.8	1982	81.5
1971	414.6	1978	63.0	2006	101.8	1983	215.8	1986	87.2
1969	427.4	1973	63.2	1994	109.4	1970	216.5	1973	88.2
1982	436.2	1975	67.3	1982	110.8	1966	222.0	1983	96.2
1968	443.1	1965	69.3	1975	119.6	1968	225.9	1991	105.4
1974	462.7	1976	69.5	1983	125.2	2007	231	2005	109.4
1983	471.6	1980	73.0	1985	134.3	1971	248.8	1978	111.4
2005	486.8	2007	74.7	1991	147.3	1991	251.6	2010	115.1
2006	517.5	1974	92.2	1974	148.0	2004	260.0	1984	137.0
1991	546.9	1972	92.2	1977	164.1	2005	269.4	1969	151.8
2010	707.4	1969	98.1	2010	216.1	2010	316.4	2006	203.4

ANNUAL RANKING BY DAYS WITH PRECIPITATION

ANNUAL		WINTER (DJF)		SPRING (MAM)		SUMMER (JJA)		AUTUMN (SON)	
2001	84	2002	16	1964	14	1984	18	1976	9
1964	86	1984	18	1965	16	2001	23	1974	13
1984	88	1987	19	1966	18	1967	25	1999	13
1988	91	1995	21	1968	19	1985	25	1987	14
1965	94	1985	22	1988	19	2011	25	1997	14
1966	98	1988	23	1992	20	2003	26	1994	15
1986	98	1994	23	1994	20	1969	27	1966	17
1997	98	2001	23	2001	20	1964	28	1964	18
1967	100	1964	24	1967	21	1970	28	1990	18
1994	101	1993	24	1981	21	1979	28	1982	19
1987	102	1996	24	1978	22	1998	28	1988	19
1990	105	1968	25	1980	22	1965	29	2000	19
1968	106	1999	25	1986	22	1971	31	1995	20
1993	106	1966	26	1998	22	1983	31	1979	21
1998	106	1967	26	2002	22	2007	31	1968	22
1985	107	1986	26	1972	23	1988	32	1972	22
1995	107	2008	26	1976	23	1990	32	1993	22
1999	107	1965	27	1984	24	1995	32	2005	22
2002	107	1989	27	1996	24	1968	33	1971	23
1996	110	1990	27	2009	24	1977	33	1980	23
2003	110	1998	27	1985	25	1992	33	1986	23
1981	113	2004	29	2008	25	1996	34	2009	23
1976	115	2010	29	1970	26	1997	34	1965	24
1992	116	1992	30	1971	26	1999	34	1981	24
2000	118	1997	30	1973	26	1966	35	1996	24
2009	119	2000	30	1987	27	1975	35	1998	24
2008	121	2007	30	1990	27	1980	35	2001	24
1971	122	1977	31	1991	27	1987	35	2011	24
1980	123	1975	33	2010	28	1993	35	1973	25
1989	124	1991	33	1969	30	2000	35	1975	25
1970	126	2003	33	1989	30	2006	35	2003	25
1979	126	1982	34	1995	30	1972	36	1967	27
1973	127	1973	36	2003	30	1989	36	2008	27
2011	127	1980	36	2007	30	2002	36	1985	28
1972	128	1981	36	2011	30	2008	36	1984	29
2007	128	2006	36	1977	31	2009	36	2002	29
1977	129	2005	37	1993	31	1986	37	1977	30
1975	130	1970	40	1999	31	1973	38	1991	30
1991	131	1971	40	1997	32	1974	38	2010	30
1983	132	1978	40	2000	32	1981	38	1989	31
2010	132	2011	40	1982	34	1976	39	1969	32
2005	135	1976	41	1975	35	2005	40	1970	32
1974	136	1983	41	1974	36	1994	41	1983	32
1982	136	2009	43	1983	36	1982	42	1992	33
1978	139	1972	48	2005	36	1991	42	2004	34
2006	139	1979	48	2006	36	2004	42	1978	36
1969	147	1974	57	1979	37	1978	43	2007	36
2004	158	1969	61	2004	44	2010	45	2006	38

SNOW-ON-THE-GROUND (SOG)



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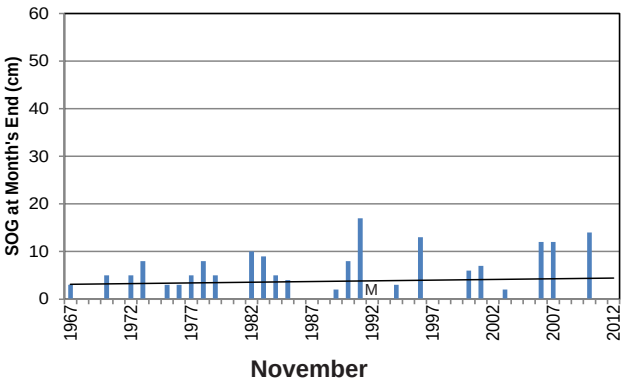

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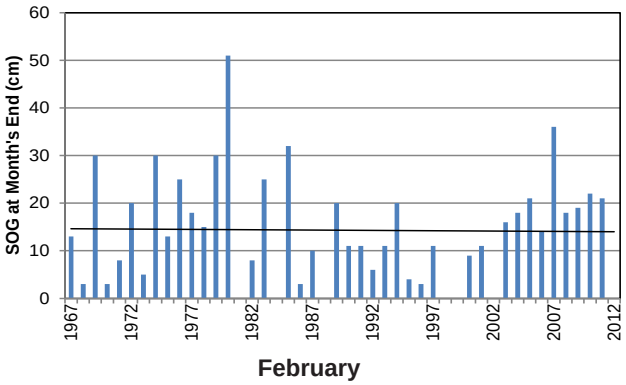

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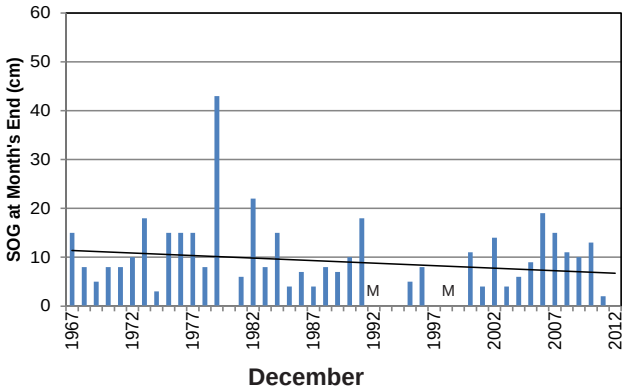
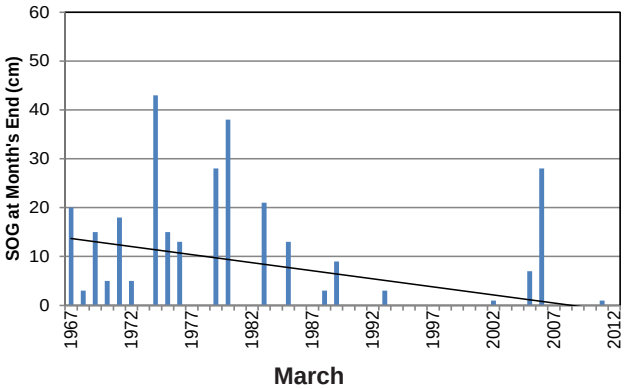
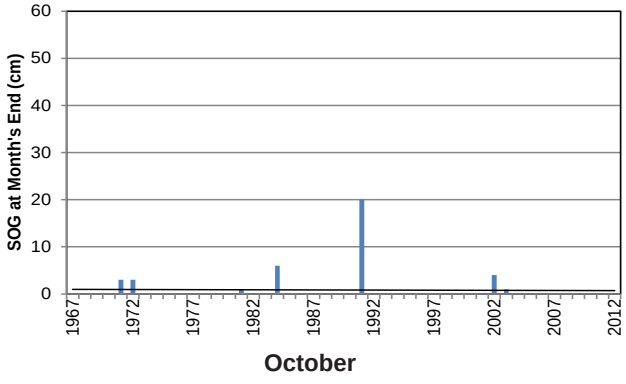


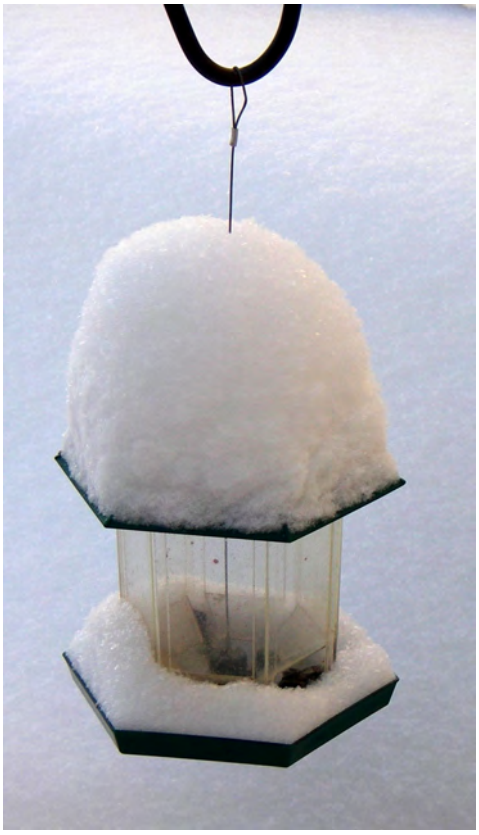
December



March



October



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RADIATION

Sunrise/Sunset Tables for Saskatoon, 2011 & 2012[1]

2011	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
DATE	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET
1	9:15	17:05	8:47	17:54	7:53	18:46	6:42	19:40	5:37	20:32	4:52	21:17	4:50	21:30	5:28	20:57	6:18	19:54	7:07	18:44	8:02	17:38	8:53	16:58
2	9:15	17:06	8:45	17:56	7:50	18:48	6:39	19:42	5:35	20:33	4:51	21:19	4:51	21:30	5:29	20:55	6:19	19:52	7:09	18:42	8:03	17:36	8:54	16:58
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31	8:49	17:52			6:44	19:39			4:53	21:16			5:26	20:59	6:16	19:57			8:00	17:40			9:15	17:04

2012	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
DATE	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET	RISE	SET
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2	9:15	17:06	8:46	17:55	7:49	18:49	6:37	19:43	5:33	20:35	4:51	21:19	4:51	21:30	5:30	20:54	6:21	19:50	7:10	18:40	8:05	17:35	8:55	16:57
3	9:15	17:07	8:44	17:57	7:47	18:51	6:35	19:45	5:31	20:36	4:50	21:20	4:52	21:29	5:32	20:52	6:22	19:48	7:12	18:38	8:06	17:33	8:56	16:57
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30	8:50	17:50			6:44	19:38	5:37	20:31	4:53	21:16	4:50	21:30	5:26	20:59	6:16	19:57	7:07	18:45	7:59	17:40	8:52	16:58	9:15	17:04
31	8:49	17:52			6:42	19:40			4:52	21:17			5:27	20:58	6:17	19:55			8:01	17:39			9:15	17:05

[1]National Research Council, Canada, Hertzberg Institute of Astrophysics

Sunrise/set corresponds to the upper limb of the sun appearing at the horizon

RADIATION

MONTH	BRIGHT SUNSHINE (HOURS)					BRIGHT SUNSHINE DAYS				
	2011	NORMAL	% OF NORMAL	POSSIBLE HOURS	% OF POSSIBLE	2011	NORMAL	WITH MORE THAN 1 HOUR	WHEN EXCEEDS 100% OF NORMAL	WHEN EXCEEDS 90% OF POSSIBLE
JAN	75.0	101.0	74.3	259.0	29.0	22	23.4	16	12	2
FEB	148.7	132.6	112.1	278.5	53.4	25	23.9	23	16	6
MAR	198.5	182.0	109.1	368.9	53.8	28	27.4	25	19	5
APR	304.7	227.2	134.1	418.0	72.9	30	27.6	30	26	9
MAY	301.4	256.9	117.3	487.3	61.9	30	29.3	30	18	8
JUNE	281.4	258.2	109.0	500.1	56.3	30	28.0	28	20	2
JULY	346.9	298.8	116.1	502.0	69.1	31	30.3	30	22	8
AUG	338.2	271.3	124.7	453.0	74.7	31	29.9	31	26	8
SEP	302.2	197.4	153.1	379.5	79.6	30	27.3	29	27	15
OCT	194.1	156.1	124.3	329.7	58.9	29	26.7	26	21	8
NOV	104.2	97.0	107.4	264.4	39.4	24	22.5	20	15	3
DEC	90.7	85.7	105.4	242.4	37.4	24	22.6	21	15	2
TOTAL	2686.0	2264.0	118.6	4482.7	59.9	334	318.7	309	237	76

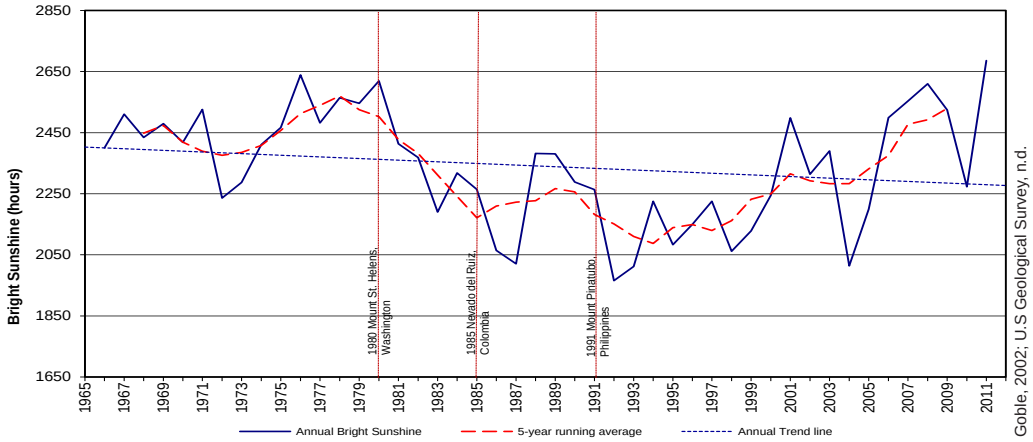
Global and Diffuse Radiation (MJ/m^2)

DATE	JAN		FEB		MAR		APR		MAY		JUN		JULY		AUG		SEPT		OCT		NOV		DEC	
	G	D	G	D	G	D	G	D	G	D	G	D	G	D	G	D	G	D	G	D	G	D	G	D
1	4.5	1.5	7.4	1.6	13.1	2.6	19.6	2.2	25.1	2.6	24.1	7.5	23.6	9.5	22.5	7.6	14.3	6.1	8.7	4.4	4.2	2.7	4.0	2.1
2	2.1	2.1	6.2	2.7	9.5	6.1	14.0	9.5	21.1	6.5	12.4	7.1	27.8	4.1	22.6	4.3	10.2	7.6	4.8	4.3	5.9	2.8	1.9	1.4
3	3.2	1.2	5.0	3.6	8.8	7.9	27.4	11.5	18.2	9.1	10.5	9.0	25.1	4.2	23.7	3.6	19.9	2.3	10.5	4.0	5.1	3.1	1.7	1.4
4	1.9	1.9	3.1	2.7	8.3	5.9	19.8	8.2	12.0	8.8	20.9	12.5	28.5	2.9	25.2	4.2	19.1	2.6	11.4	2.2	4.1	3.2	3.2	1.7
5	1.8	1.8	2.9	2.9	6.6	6.1	19.9	5.2	19.8	7.4	18.7	9.8	25.8	4.8	22.5	6.9	18.6	2.1	4.8	3.9	3.1	2.9	4.0	1.3
6	1.9	1.3	6.8	1.6	15.9	3.2	21.0	4.3	13.0	9.7	25.7	7.5	27.6	4.4	21.6	5.5	18.1	2.4	3.5	3.5	2.7	2.7	2.8	1.6
7	1.5	1.5	8.9	2.1	11.7	6.2	19.5	6.2	17.6	10.7	21.9	11.7	23.9	6.4	15.9	7.9	18.3	2.2	1.1	1.6	7.5	1.9	3.5	1.4
8	2.2	2.2	9.1	2.5	14.2	4.0	22.0	2.6	21.7	6.4	27.3	7.1	25.0	5.4	20.0	4.9	18.0	2.2	12.3	1.9	4.8	3.2	3.7	1.1
9	3.4	2.3	8.8	1.5	13.2	3.3	20.5	6.2	23.5	7.2	25.3	6.5	18.7	7.9	23.8	2.9	16.6	3.4	10.9	2.0	6.3	1.3	2.4	2.0
10	1.9	1.9	5.2	4.0	9.6	8.0	21.0	4.4	27.0	3.3	29.2	2.9	14.1	8.3	19.1	5.1	16.7	2.2	11.0	1.8	3.8	3.3	3.5	2.3
11	2.7	2.3	6.4	3.5	12.1	7.6	15.7	9.8	18.7	6.2	23.8	7.5	25.4	7.6	17.8	6.6	14.1	5.7	5.3	5.0	2.9	2.8	1.0	1.0
12	2.4	2.2	7.7	2.9	15.5	3.5	17.3	6.3	26.3	4.2	21.3	6.0	16.1	7.2	18.3	5.5	14.6	4.3	9.8	2.6	2.5	2.5	0.8	0.8
13	4.0	2.7	5.5	3.4	14.7	3.0	22.4	3.8	27.6	2.7	28.1	3.8	18.0	12.6	21.9	3.5	17.4	2.6	1.7	1.9	2.6	2.5	3.3	1.2
14	3.2	3.0	5.2	5.1	13.2	3.9	16.2	8.8	27.8	2.7	13.8	8.2	17.2	7.6	15.1	7.9	17.7	2.2	4.2	4.2	1.8	1.7	1.0	1.0
15	3.0	2.9	6.5	4.7	14.4	3.2	15.0	8.5	27.9	2.7	24.9	8.0	28.4	3.0	15.7	7.2	16.1	2.6	9.5	2.1	4.4	2.9	2.3	1.8
16	2.9	2.8	3.8	3.6	12.2	4.8	6.7	5.9	25.7	5.6	23.0	7.3	27.5	2.9	22.3	3.2	9.4	5.6	10.1	1.7	6.2	1.5	1.6	1.5
17	5.2	1.7	5.7	5.4	13.8	7.2	18.5	8.6	11.3	7.2	5.5	4.5	24.1	5.6	22.5	2.6	15.2	4.7	9.9	1.7	1.4	1.4	2.5	1.4
18	5.0	2.3	8.9	5.1	7.4	6.8	20.0	5.6	22.3	8.4	13.6	11.1	25.5	5.0	19.6	4.9	15.6	3.2	6.8	3.0	3.4	3.2	3.0	1.3
19	3.4	2.9	9.5	1.7	9.8	9.1	18.5	6.2	26.7	5.6	18.9	11.9	26.7	3.8	17.3	4.9	5.7	5.3	7.8	3.0	3.7	3.2	3.1	1.3
20	3.8	2.8	10.7	3.0	8.9	7.5	22.2	4.5	23.3	9.5	20.7	9.4	14.0	8.6	14.5	8.2	10.8	4.6	8.3	2.0	6.6	2.0	2.3	1.3
21	4.9	1.7	7.8	5.2	5.1	4.9	20.7	6.1	18.2	10.6	8.0	6.4	27.6	3.0	21.7	2.4	15.3	2.5	8.7	2.2	6.7	2.0	3.3	1.4
22	2.3	2.3	7.3	5.9	7.2	6.9	21.9	6.4	24.3	5.8	24.9	6.4	9.7	8.6	20.9	2.5	13.2	4.5	7.8	2.6	4.1	3.1	2.2	1.7
23	4.8	2.8	10.1	2.2	17.0	4.9	19.6	7.0	6.4	5.8	25.8	6.7	14.3	10.0	18.4	3.8	11.5	5.8	5.1	3.6	3.4	2.3	3.3	1.6
24	4.9	3.3	11.8	2.2	16.8	6.4	21.7	6.0	28.8	3.6	26.6	8.0	21.7	6.4	20.5	3.4	14.1	1.9	8.2	1.6	1.7	1.7	2.7	1.1
25	5.1	1.7	11.8	2.9	19.0	3.3	23.8	8.0	24.8	8.4	23.1	7.5	25.0	4.5	18.8	4.4	13.4	2.5	8.5	1.6	4.3	1.4	1.6	1.5
26	4.1	3.6	6.8	6.1	18.1	3.3	19.1	4.6	24.7	11.1	14.5	9.2	15.8	8.8	20.8	2.4	12.2	3.9	8.9	1.6	3.9	1.8	1.2	1.1
27	3.0	2.9	10.3	6.9	11.6	6.1	15.7	8.0	15.1	11.6	26.7	7.5	22.6	8.1	15.0	6.7	11.0	4.2	8.2	1.6	2.7	2.1	1.8	1.7
28	2.7	2.7	5.3	5.2	17.2	5.4	18.0	8.8	19.1	6.4	26.9	5.4	23.0	7.1	20.4	2.4	13.7	2.3	6.4	2.9	4.2	1.1	1.2	1.2
29	4.6	2.4			7.8	6.9	10.2	6.1	11.9	9.1	27.9	3.7	24.5	4.1	19.5	3.0	13.2	2.0	3.5	2.7	2.7	1.9	1.4	1.4
30	3.5	3.3			11.1	9.6	22.3	6.7	18.9	11.3	26.0	6.3	25.8	2.8	12.5	7.8	13.0	3.3	4.1	3.1	1.6	1.5	1.1	1.1
31	6.9	1.4			19.7	2.3			18.2	10.0			25.6	2.6	6.5	5.6			5.3	3.5			1.8	1.4
TOTAL	106.8	71.4	204.5	100.2	383.5	169.9	570.2	196.0	647.0	220.2	640.0	226.4	698.6	187.8	596.9	151.8	437.0	106.8	227.1	83.8	118.3	69.7	73.2	44.1
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

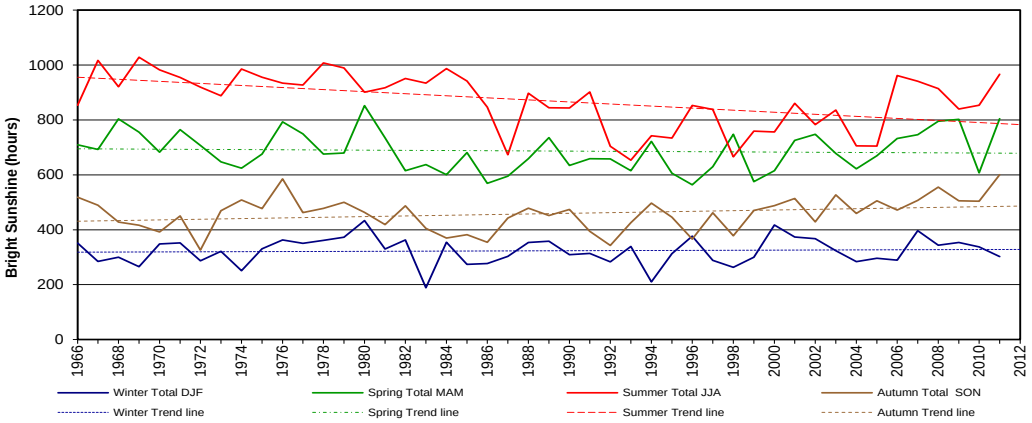
April 3, May 3 & 4; readings are corrected values due to instrument malfunction
October 7 & 13; Diffuse ring maladjusted

RADIATION

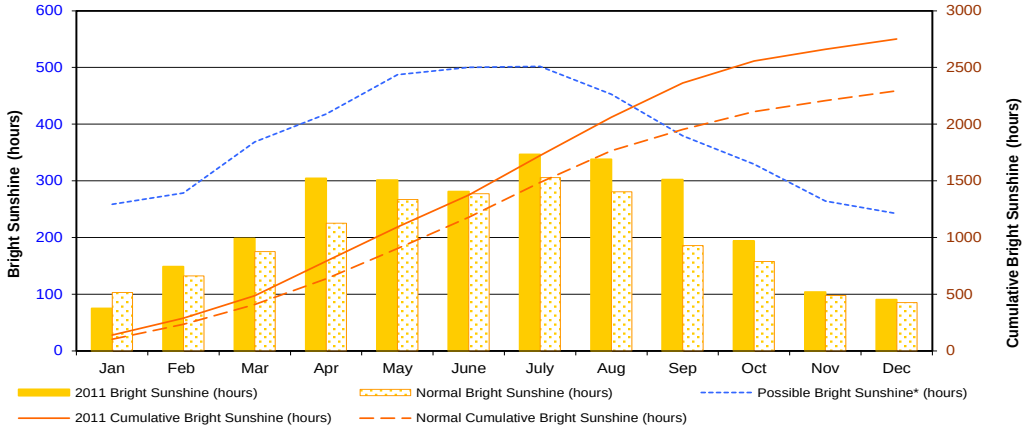
Annual Bright Sunshine Hours



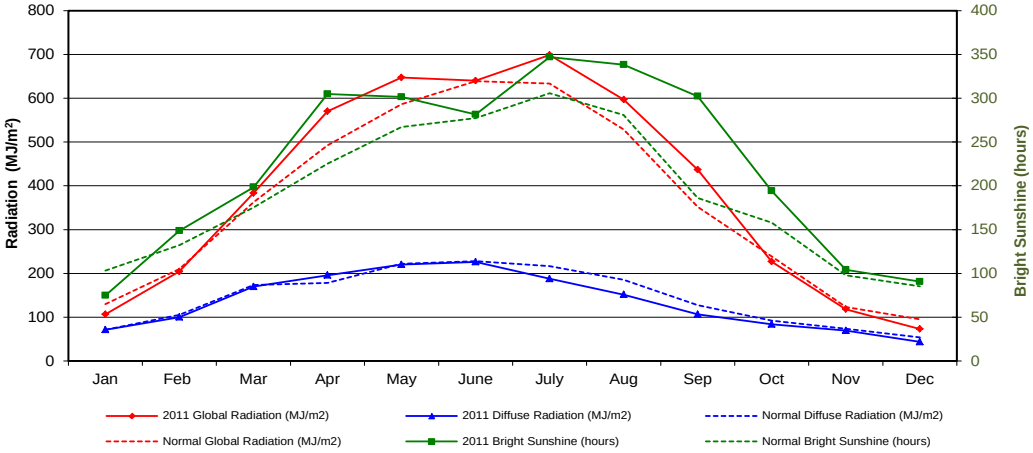
Seasonal Bright Sunshine Hours



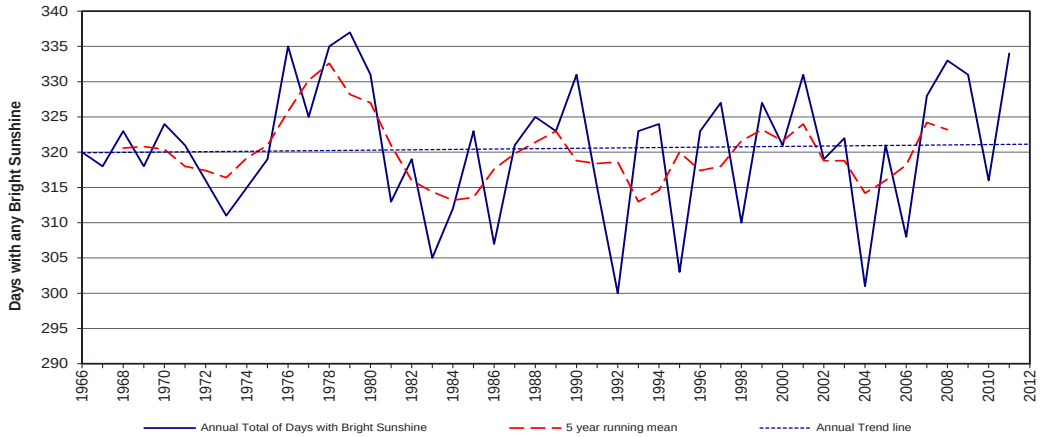
Monthly Bright Sunshine Hours



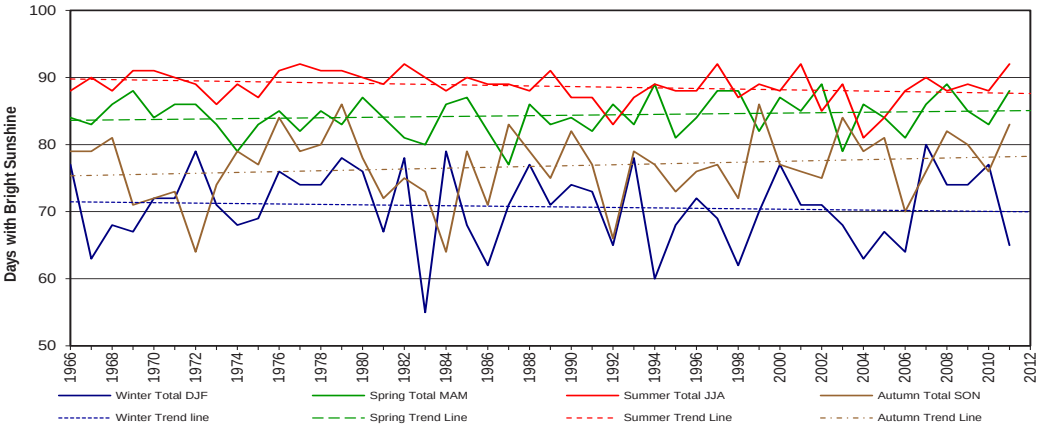
Monthly Comparison Bright Sunshine Hours, Global & Diffuse Radiation



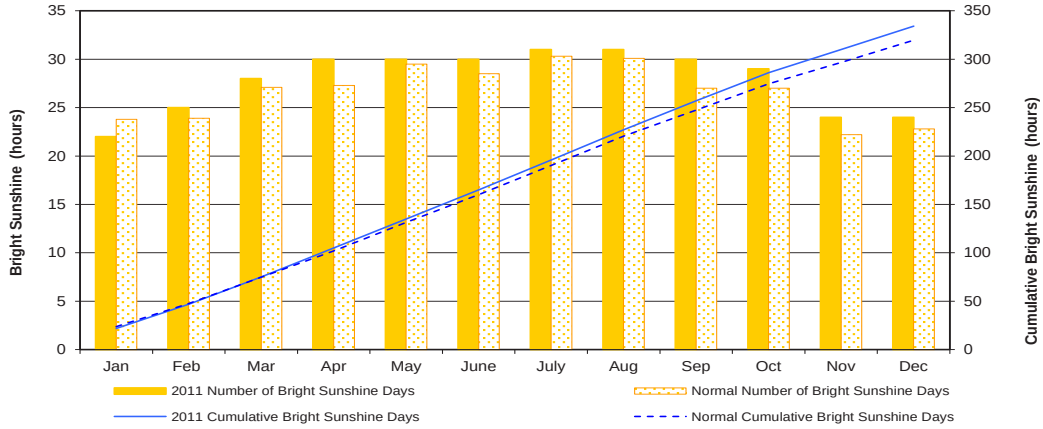
RADIATION



Annual
Bright Sunshine Days



Seasonal
Bright Sunshine Days



Monthly
Bright Sunshine Days

Saskatoon is.....

10th out of 82 cities with the clearest skies year-round
70th out of 82 cities with the most hours with low visibility
8th out of 100 cities with the most sunny days in cold months
19th out of 100 cities with the most sunny days in warm months
10th out of 100 cities with sunny days year-round
13th out of 100 cities with the sunniest fall
17th out of 100 cities with the sunniest spring
8th out of 100 cities with the sunniest summer
18th out of 100 cities with the sunniest winter
10th out of 100 cities with the sunniest year-round

Environment Canada, 2012

RADIATION

Bright Sunshine Ranking

% OF ACTUAL TO POSSIBLE BRIGHT SUNSHINE

% ANNUAL		WINTER % DJF		SPRING % MAM		SUMMER % JJA		AUTUMN % SON	
2011	59.9	1980	55.0	1980	66.7	1969	70.7	2011	61.7
1976	58.8	2000	52.8	2011	63.1	1967	69.8	1976	60.3
1980	58.3	2007	50.9	1968	63.0	1978	69.2	2008	57.3
2008	58.1	1979	47.9	2009	62.8	1979	67.9	1966	53.3
1978	57.2	2001	47.8	2008	62.2	1984	67.9	2001	52.9
2007	57.0	1996	47.7	1976	62.1	1974	67.7	1974	52.2
1979	56.8	2002	47.1	1971	60.1	1970	67.5	2007	52.1
1971	56.3	1982	46.6	1969	59.2	2011	66.4	2009	52.1
2009	56.3	1978	46.4	1977	58.8	2006	66.1	2005	52.1
1967	56.0	1976	46.0	2002	58.6	1975	65.6	2010	51.8
2006	55.7	1989	45.8	1998	58.6	1971	65.6	1979	51.3
2001	55.7	2009	45.3	2007	58.6	1982	65.4	1994	51.1
1977	55.4	1971	45.2	1989	57.6	1985	64.8	2000	50.3
1969	55.3	1966	45.1	1981	57.6	2007	64.7	1967	50.2
1975	55.0	1977	45.0	2006	57.4	1976	64.2	1982	50.0
1968	54.2	1984	44.9	2001	56.9	1983	64.2	1988	49.3
1970	53.9	1988	44.8	1994	56.6	1977	63.8	1978	49.1
1981	53.8	1970	44.6	1966	55.7	1968	63.3	2003	49.1
1974	53.8	2008	43.5	1972	55.4	1972	63.3	1975	48.9
1966	53.5	1993	43.4	1967	54.4	1981	63.1	1990	48.7
1989	53.1	2010	43.3	1970	53.6	2008	62.9	2006	48.5
1988	53.0	1975	42.4	1979	53.4	1980	62.0	1973	48.3
1982	52.8	1981	42.2	1985	53.4	1991	61.9	1980	47.7
2003	52.1	2003	41.6	2003	53.3	1988	61.8	1977	47.6
2002	51.6	1973	41.2	1975	53.1	1973	61.1	1997	47.5
1984	51.6	1991	40.2	1978	53.0	2001	59.2	2004	47.4
1990	51.0	1995	40.2	2005	52.4	2010	58.7	1989	46.5
1973	51.0	1990	39.7	1991	51.7	1996	58.7	1971	46.2
2010	50.7	1987	38.9	1988	51.6	1966	58.7	1995	45.8
1985	50.5	2011	38.8	1992	51.5	1986	58.2	1987	45.5
1991	50.5	1999	38.5	1973	50.8	1989	58.1	1999	44.2
2000	50.0	1968	38.0	1983	50.1	1990	58.0	2002	44.1
1972	49.8	2005	37.9	1990	49.8	2009	57.8	1968	44.0
1997	49.6	2006	37.1	1997	49.3	1997	57.7	1993	43.8
1994	49.6	1997	37.0	1974	49.0	2003	57.4	1981	43.1
2005	49.1	1967	36.5	2004	48.7	2002	53.8	1969	42.9
1983	48.9	1972	36.3	1982	48.3	1999	52.2	1983	41.5
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

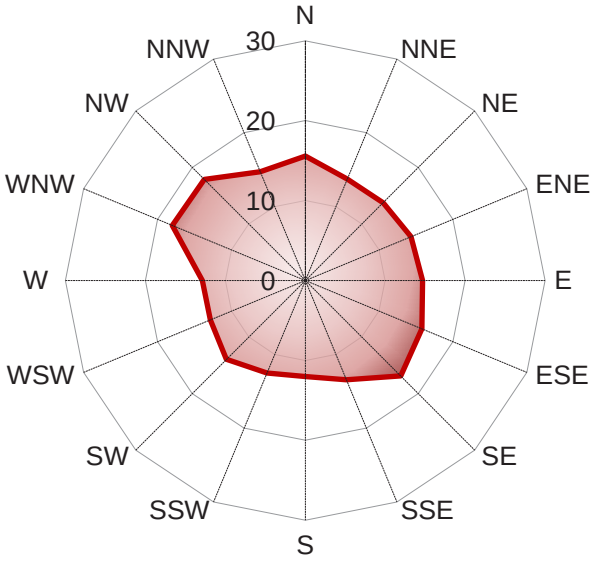
ANNUAL		WINTER DJF		SPRING MAM		SUMMER JJA		AUTUMN SON	
1979	337	2007	80	1994	89	1977	92	1979	86
1976	335	1972	79	2002	89	1982	92	1999	86
1978	335	1984	79	2008	89	1997	92	1976	84
2011	334	1979	78	1969	88	2001	92	2003	84
2008	333	1982	78	1997	88	2011	92	1987	83
1980	331	1993	78	1998	88	1969	91	2011	83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

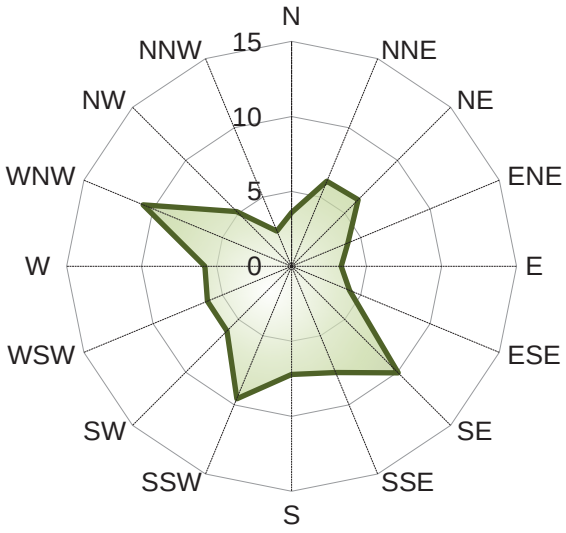
MONTH	AVERAGE WIND SPEED (km/h)			HIGHEST INSTANTANEOUS WIND SPEED (km/h)							
	2011 Average	Normal*	2011 Peak Speed Average	2011 for CRS (Speed / direction / date)			Since 1953 (Saskatoon Diefenbaker Int'l. Airport) (Speed / direction / day / year)				
January	13.1	16	47.1	61.9	N	28	111	W	11		1986
February	14.7	16	40.3	58.7	WNW	15	106	N	22		1988
March	15.5	17	41.2	52.7	NE	17	93	W	18		1959
April	14.9	18	43.2	60.8	N	29	108	W	06		1959
May	15.5	18	42.2	66.0	SE	16	132	SW	17		1965
June	14.1	17	44.5	78.2	E	17	117	S	01		1986
July	15.5	16	46.6	68.0	NW	20	113	E	05		1955
August	13.0	16	41.5	59.8	WNW	16	151	W	14		1967
September	12.7	17	44.3	62.7	NW	28	148	W	22		1967
October	14.5	17	41.7	61.8	SSE	4	138	NW	16		1967
November	15.5	16	44.6	60.9	NW	25	100	W	17		1967
December	16.3	16	45.9	63.8	NW	24	121	W	12		1955

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

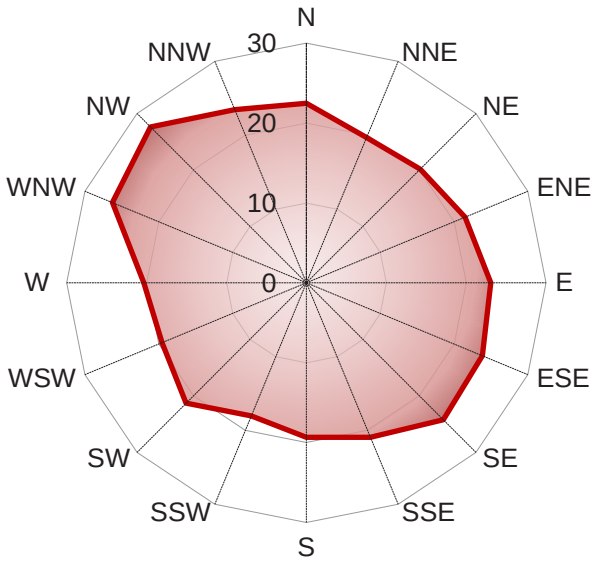
½ Hour Averaged Wind Speeds by Direction for 2011 (km/h)



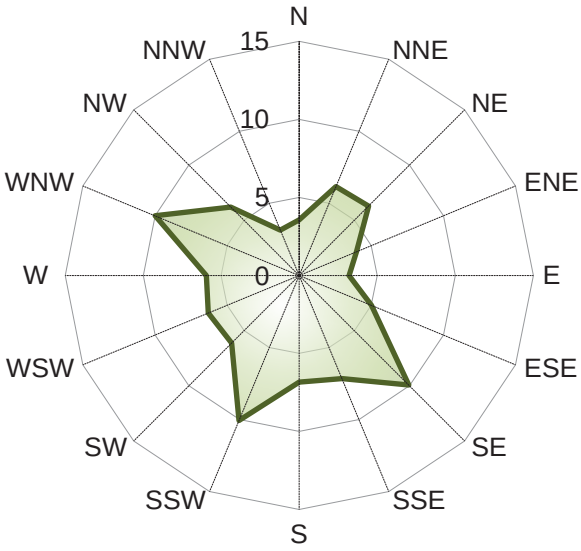
Wind Frequency by Direction for 2011 (%)



½ Hour Averaged Peak Wind Speeds by Direction for 2011 (km/h)



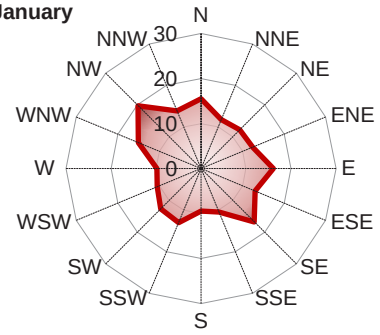
Peak Wind Frequency by Direction for 2011 (%)



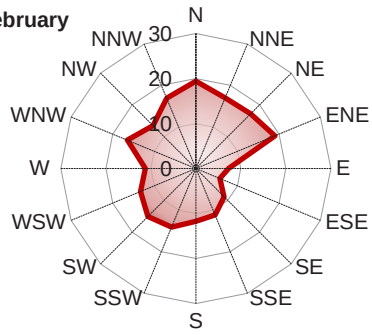
WIND

Average Wind Speed by Direction (km/h)

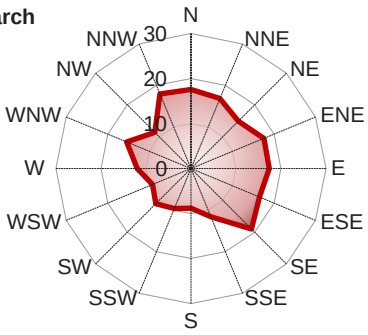
January



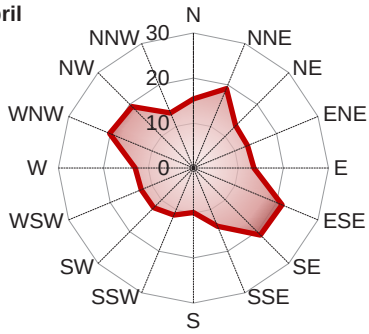
February



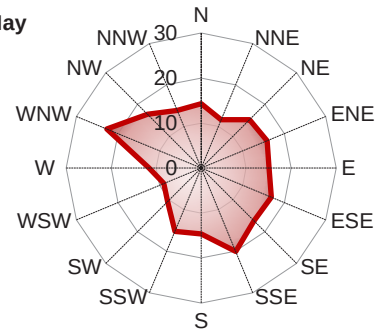
March



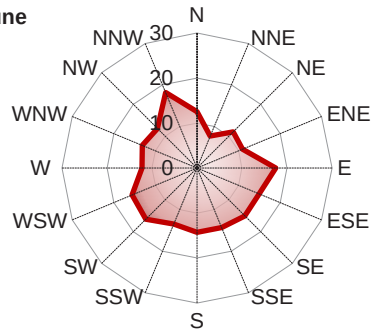
April



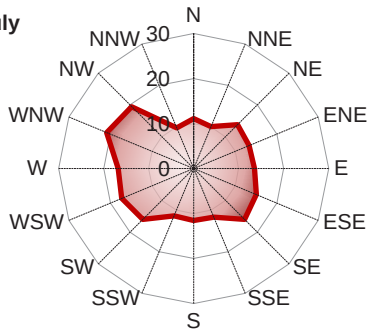
May



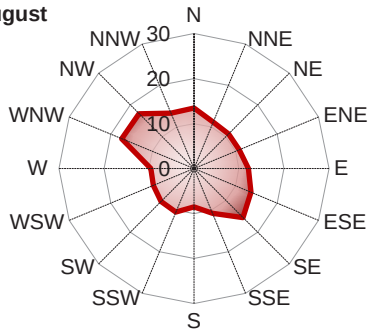
June



July



August



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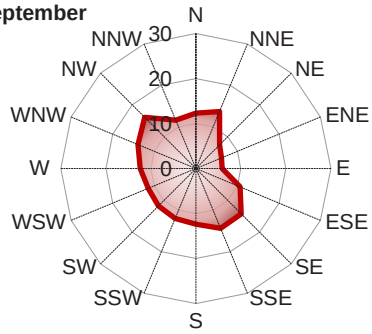

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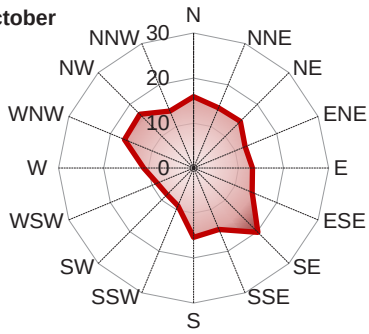
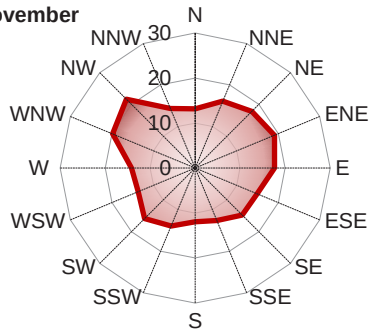
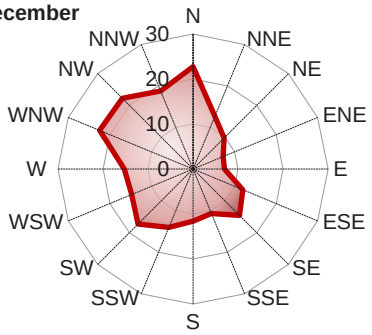


November

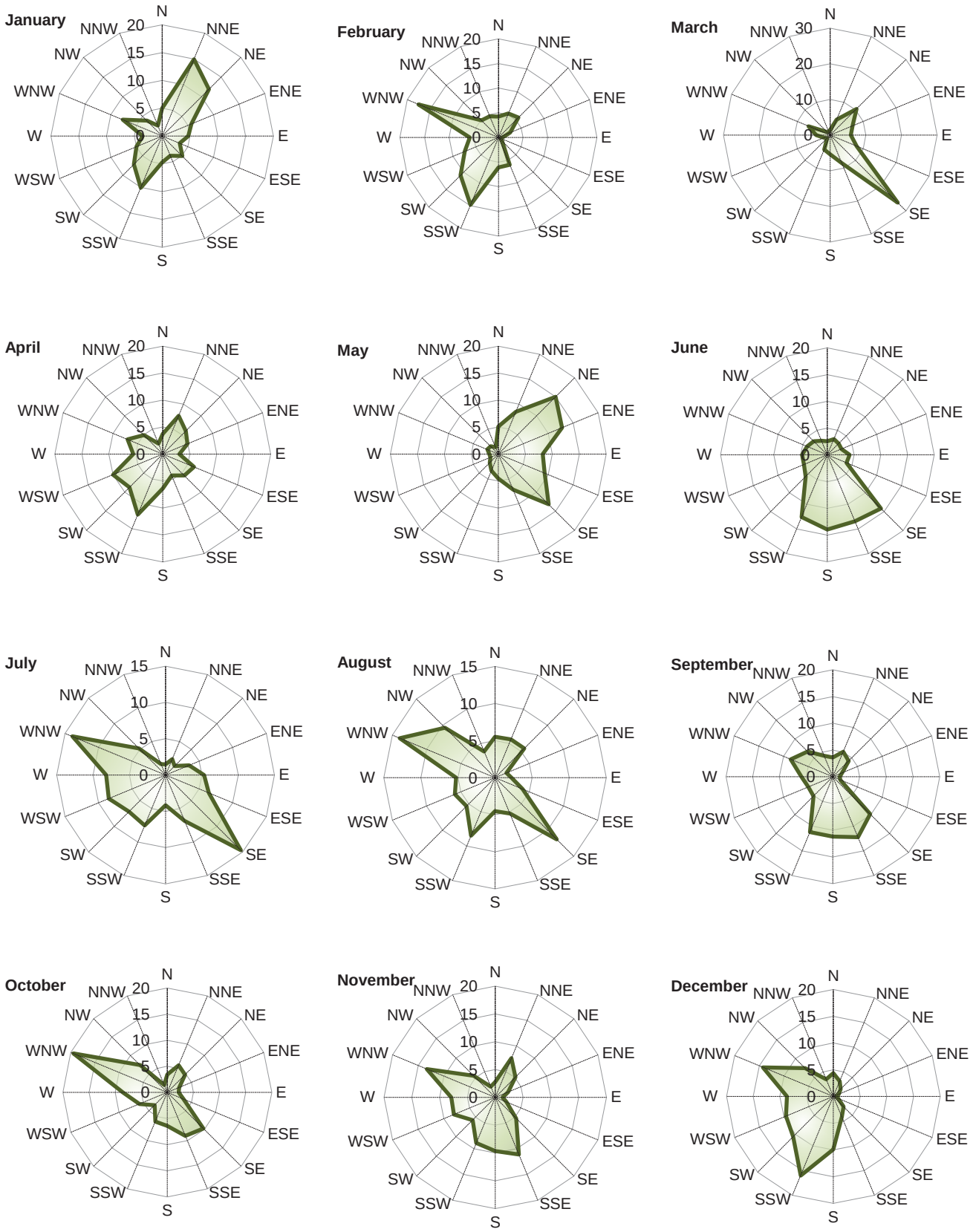


December



WIND

Average Wind Frequency by Direction (%)



WIND

EXTREME DAILY WINDS (km/h)

DATE	WIND SPEED/ DIRECTION	BEAUFORT WIND SCALE DESIGNATION*
January 6	60.5 NW	Near Gale
January 23	56.2 WNW	Near Gale
January 28	61.9 N	Near Gale
February 15	58.7 WNW	Near Gale
February 28	54.1 NE	Near Gale
March 17	52.7 NE	Near Gale
April 12	60.3 SSW	Near Gale
April 14	53.7 SE	Near Gale
April 28	55.8 S	Near Gale
April 29	60.8 N	Near Gale
May 4	59.5 NNW	Near Gale
May 16	66.0 SE	Gale
May 1	59.3 NNW	Near Gale
May 3	62.5 ESE	Near Gale
May 26	54.7 SSE	Near Gale
June 2	57.9 SE	Near Gale
June 3	53.1 NNW	Near Gale
June 17	78.2 E	Strong Gale
June 18	54.1 S	Near Gale
July 1	53.3 NW	Near Gale
July 8	56.9 WSW	Near Gale
July 9	60.4 WSW	Near Gale
July 15	56.6 WSW	Near Gale
July 20	68.0 NW	Gale
July 23	51.9 SE	Near Gale
July 26	58.1 SW	Near Gale
August 6	52.6 NNW	Near Gale
August 10	54.3 SW	Near Gale
August 16	59.8 WNW	Near Gale
August 23	57.4 WNW	Near Gale
September 17	57.9 WNW	Near Gale
September 18	51.7 WNW	Near Gale
September 28	62.7 NW	Near Gale
October 4	61.8 SSE	Near Gale
October 9	53.7 SSW	Near Gale
October 27	51.2 NW	Near Gale
November 17	57.5 NE	Near Gale
November 18	51.6 ENE	Near Gale
November 22	55.0 WSW	Near Gale
November 25	60.9 NW	Near Gale
November 26	55.7 WNW	Near Gale
November 28	51.5 WNW	Near Gale
December 2	62.7 NNW	Near Gale
December 4	51.2 NNE	Near Gale
December 6	51.7 NNE	Near Gale
December 7	55.0 WNW	Near Gale
December 14	59.3 WNW	Near Gale
December 19	54.1 SW	Near Gale
December 24	63.8 NW	Gale
December 26	54.6 NNW	Near Gale
December 31	59.1 NW	Near Gale

*Near Gale >=51 but < 63 *Gale >=63 but <76
*Strong Gale >=76 but <88 *Storm >=88 but <102

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	-31	-37	-43	-49	**-56**	**-62**	**-68**
25	1	-6	-12	-19	-25	-32	-38	-45	-51	**-57**	**-64**	**-70**
30	0	-7	-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	-9	-15	-22	-29	-36	-43	-50	**-57**	**-63**	**-70**	**-77**
60	-2	-9	-16	-23	-30	-37	-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	**-59**	**-66**	**-73**	**-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

-28	Increasing risk of frostbite for most people within 30 minutes of exposure
-36	High risk for most people in 5 to 10 minutes of exposure
-48	High risk for most people in 2 to 5 minutes of exposure
-55	High risk for most people in 2 minutes of exposure or less

1: Environment Canada, 2004b

MAXIMUM DAILY WIND CHILL VALUE WHEN TEMPERATURE <0°C

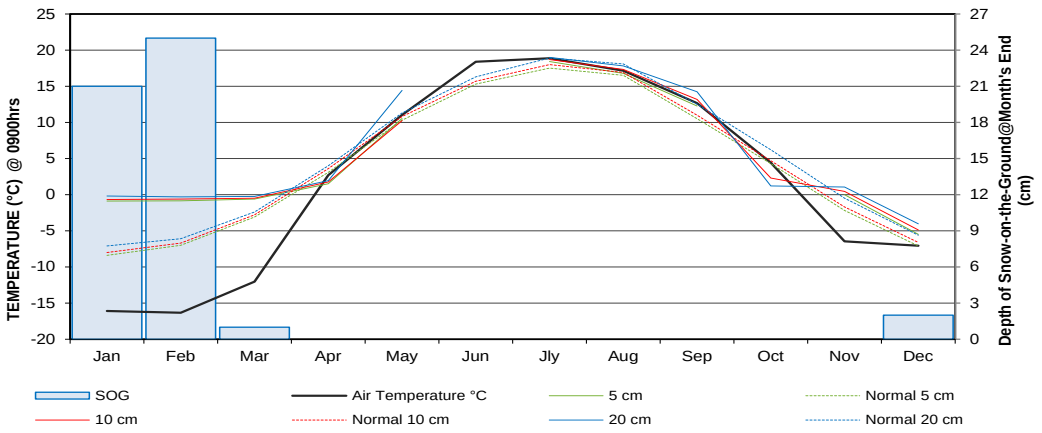
	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC
1	-36	-45	-43	-7							-8	-19
2	-24	-35	-38	-8							-12	-18
3	-32	-10	-32	-9							-8	-20
4	-18	-9	-33	-11							-8	-23
5	-15	-12	-30	-8							-10	-23
6	-15	-31	-33	-8							-11	-13
7	-21	-36	-37	-5							-16	-26
8	-28	-35	-32	-6							-18	-30
9	-30	-35	-32	-6							-16	-30
10	-24	-32	-21								-14	-17
11	-32	-11	-29								-5	-17
12	-37	-10	-29	-7							-12	-17
13	-34	-9	-28	-10							-11	-16
14	-32	-11	-14	-12					-4		-13	-14
15	-33	-19	-11	-9							-21	-22
16	-34	-27	-11	-9							-23	-20
17	-37	-35	-18	-8						-7	-27	-17
18	-34	-41	-18	-10							-31	-19
19	-38	-36	-13	-9							-32	-23
20	-42	-40	-16	-8							-36	-9
21	-29	-39	-12	-5							-32	-19
22	-29	-26	-14	-5							-15	-19
23	-17	-37	-22	-5						-6	-11	-18
24	-12	-43	-27							-7	-9	-12
25	-16	-43	-26							-8	-10	-13
26	-12	-38	-26							-9	-17	-10
27	-9	-26	-23								-11	-12
28	-26	-39	-20							-8	-11	-18
29	-36		-11								-11	-14
30	-42		-7	-7						-9	-12	-19
31	-41		-9									-16

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

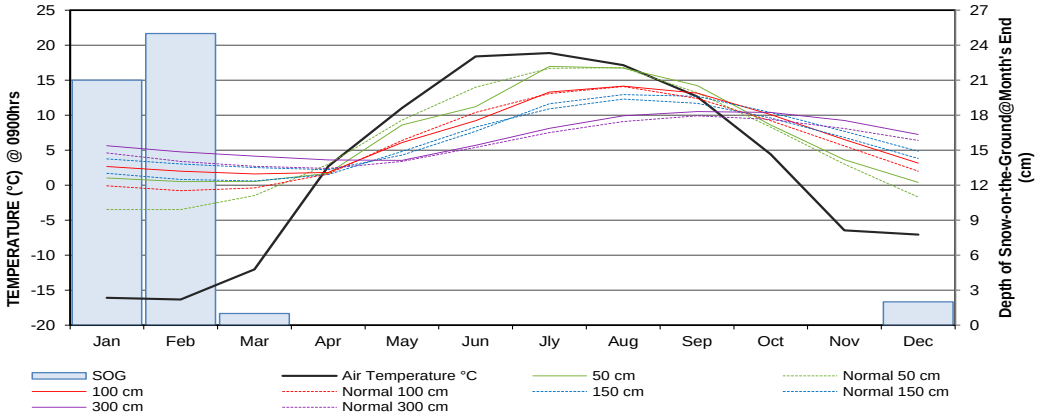
MONTH	Mean Air Temp @ 0900h (°C)	SOIL TEMPERATURES (C°) @ 0900h														Mean Air Temp @ 1600h (°C)	SOIL TEMPERATURES @ 1600h					
		5cm		10cm		20cm		50cm		100cm		150cm		300cm			5cm		10cm		20cm	
		2011	NORM	2011	NORM	2011	NORM	2011	NORM	2011	NORM	2011	NORM	2011	NORM		2011	NORM	2011	NORM	2011	NORM
January**	-16.1	-0.9	-8.4	-0.7	-8.0	-0.2	-7.1	1.0	-3.5	2.7	-0.1	3.8	1.7	5.6	4.6	-13.3	-0.9	-8.4	-0.7	-7.8	-0.2	-6.2
February**	-16.3	-0.8	-7.0	-0.6	-6.7	-0.3	-6.1	0.5	-3.5	2.0	-0.8	3.0	0.8	4.8	3.4	-10.6	-0.8	-7.1	-0.6	-6.6	-0.3	-5.2
March**	-12.1	-0.6	-3.1	-0.5	-2.8	-0.3	-2.4	0.5	-1.5	1.6	-0.4	2.5	0.6	4.1	2.7	-6.9	-0.6	-2.9	-0.5	-2.6	-0.3	-1.8
April**	2.7	1.5	3.1	1.8	3.6	1.9	4.0	1.7	3.0	1.8	1.6	2.2	1.5	3.6	2.4	8.6	4.9	6.0	3.7	5.5	2.3	4.6
May	11	10.5	10.3	10.2	10.8	14.4	11.3	8.6	9.3	6.1	6.4	4.3	4.8	3.5	3.4	16.8	15.4	14.2	13.3	13.6	12.5	12.0
June*	18.4		15.3		15.7		16.3		14.0		10.4		8.3		5.4	24.6		20.0		19.0		17.1
July	18.9	18.4	17.5	18.7	18.0	19.0	18.9	17.0	16.7	13.3	13.1	11.6	10.9	8.1	7.5	24.4	22.7	22.1	21.0	21.3	18.6	19.5
August	17.2	16.8	16.5	17.3	16.9	17.8	18.1	16.7	16.8	14.1	14.1	12.9	12.3	9.9	9.1	24.9	22.2	20.6	20.8	20.0	18.7	18.6
September	12.7	12.3	10.5	13.2	11.0	14.2	12.5	14.3	13.2	13.2	12.4	12.7	11.7	10.5	9.9	23.4	17.8	13.9	16.8	13.4	14.9	13.1
October**	4.4	11.1	4.3	12.2	4.7	12.9	6.2	13.8	8.3	14.7	9.2	15.3	9.6	13.3	9.4	12.2	12.1	6.1	12.9	6.4	12.9	6.9
November	-6.5	0.0	-2.2	0.4	-1.7	1.1	-0.5	3.6	3.0	6.5	5.6	7.7	6.8	9.2	8.1	-1.3	0.2	-1.4	0.5	-1.2	1.1	0.3
December	-7.1	-5.5	-7.1	-4.9	-6.6	-4.0	-5.6	0.4	-1.7	3.1	2.0	4.8	3.8	7.2	6.4	-1.9	-4.3	-6.6	-4.2	-6.3	-3.8	-4.6

*June temperatures are not available due to equipment installation and maintenance, **temperatures are from the old soil probes
Normal temperatures (1971-2000) for our site are provided by Environment Canada 2004a

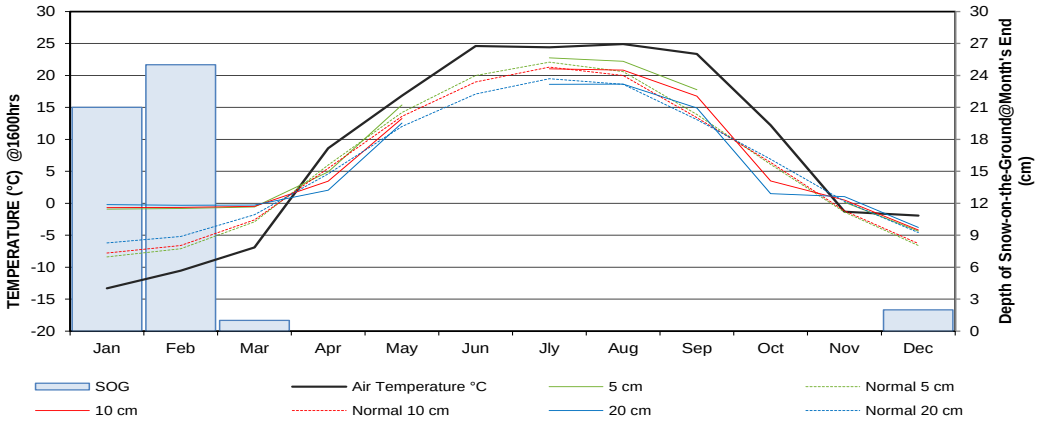
Monthly Soil Temperatures at@0900h *



Monthly Soil Temperatures at@0900h *



Monthly Soil Temperatures at@1600h *



Saskatchewan Research Council

Annual Weather Summary

latitude 52°09'N Longitude 106°36W asl 497 m Saskatoon

CRS estab. 1963

		2011 VALUE	2010 VALUE	NORMAL (1971-2000) OR EXTREME (1892-2010)[1 4]
TEMPERATURE	Average annual maximum (°C)	9.6	8.9	8.3
	Extreme annual maximum (°C/date)	35.0 September 8	33.6 August 26	41.0 June 1988
	Average annual minimum (°C)	-2.1	-1.5	-3.4
	Extreme annual minimum (°C/date)	-33.8 January 20	-35.2 January 1	-50.0 Feb. 1893
	Annual **average** (°C)	3.8	3.7	2.5
	No.of Frost-free days (Temperature > 0°C)	175	191	197.1
	% of Frost-free days for the year	47.9%	52.3%	54.0%
DEGREE-DAYS	Annual growing (5°C base)	1857.9	1730.9	1672.9
	Annual frost-free growing (5°C base)	1529.2	1409.4	1345.3
	Annual heating (18°C base)	5314.2	5279.9	5809.0
	Annual cooling (18°C base)	154.9	89.9	119.1
	Annual extreme cooling (24°C base)	2.0	0.0	
PRECIPITATION	Annual total (mm)	320.6	707.4	348.2
	Greatest Daily (mm/date)	39.5 June17	44.2 September 10	99.4 June 24, 1983
	Greatest Monthly (mm/date)	93.0 June	147.2 June	160.1/June 1991
	Measurable precipitation days (≥ 0.2mm)	127	132	115.7
	% of Precipitation days for the year	34.8%	36.2%	31.7%
WIND	Average Annual wind speed (km/h)	14.6	14.1	W16.6[2]
	Prevailing direction	WNW 10.7%[5]	SE 11.9%[5]	
	Peak gust (speed/direction/date)	78.2[E]June 17	91.2[W]April 9	151.0 [W]Aug 14, 1967[2]
	Prevailing direction for Peak Winds	SSW & WNW 9.9%[5]	SE 11.1%[5]	
RADIATION	Total annual bright sunshine (hours)	2686.0	2272.8[6]	2294.1
	% possible bright sunshine	59.9%	50.7%[6]	51.2%
	% normal bright sunshine	117.1%	99.1%[6]	
	Bright Sunshine days	334	316[6]	319.9
	% of normal Bright Sunshine days	104.5%	98.8%[6]	
	Total annual global radiation(MJ/m^2)	4703.1	4180.0	4391.9[3]
	Total annual diffuse radiation (MJ/m^2)	1628.1	1639.1	1729.6[3]

For Your Information

1. The 1971-2000 normals for CRS have been calculated from original data entered on computerized spread sheets and checked for correctness. Where suitable, missing data has been replaced with data from the University of Saskatchewan, Kernen Farm station (2.5 km E of SRC) and/or the Saskatoon Diefenbaker International Airport (DIA) station (10km WNW of CRS).
2. Wind normals are from the Saskatoon DIA station.
3. Global and Diffuse radiation normals are from 1961-1990 period.
4. Extreme values for temperature and precipitation are from the Saskatoon area weather stations extending back to 1882. The earlier records from 1882 to 1901 have several large gaps.
5. Data from the wind roses have been compiled using Mistaya's "Windographer™".
6. The bright sunshine recorder was calibrated during January - March period therefore, the values for those months have been estimated using the Global/Diffuse values. (see *Glossary of Terms; Bright Sunshine* for methodology)

Saskatchewan Research Council

Monthly Weather Summary

latitude 52°09'N Longitude 106°36'W asl 497 m Saskatoon

CRS estab. 1963

January 2011

		2011 VALUE	2010 VALUE	NORMAL OR EXTREME FOR CRS 1981-2010	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Average monthly **maximum** (°C)	-10.4	-7.6	-9.8	
	Extreme monthly maximum (°C/date)	4.3/28	5.9/12	7.0/1986/11&1993/30	11.0/1980/23$_{SWT}$
	Average monthly **minimum** (°C)	-18.9	-16.3	-19.7	
	Extreme monthly minimum (°C/date)	-33.6/20	-35.2/01	-43.9/1966/22&1969/29	-48.9/1893/31$_{SM}$
	Monthly **average** (°C)	-14.7	-12.0	-14.7	
	No. of Frost-free days (Temp. > 0°C)	0	0	0.1	
DEGREE-DAYS	Monthly growing (5°C base)	0.0	0.0	0.0	
	Yearly total-to-date growing	0.0	0.0	0.0	
	Monthly heating (18°C base)	1013.4	930.4	1015.1	
	Yearly total-to-date heating	1013.4	930.4	1015.1	
	Monthly cooling (18°C base)	0.0	0.0	0.0	
	Yearly total-to-date cooling	0.0	0.0	0.0	
PRECIPITATION	Monthly total (mm)	12.4	10.4	15.5	66.1/1911$_{SE}$
	Yearly total-to-date (mm)	12.4	10.4	15.5	
	Greatest daily (mm/date)	2.5/14	5.2/23	35.2/2007/10	36.0/2007/10$_{SA}$
	Measurable precipitation days (≥ 0.2mm)	18	9	10.2	
WIND	Average monthly speed (km/h)	13.1	13.7	W15.0$_{SA}$	
	Peak gust (speed/direction/date)	61.9^{N}28	56.0^{NNW}24		111^{W}1986/11$_{SA}$
RADIATION	Monthly bright sunshine (hours)	75.0	na	101.0	
	% possible bright sunshine	29.0	na	39.0	
	% normal bright sunshine	74.3	na		
	Bright Sunshine days	22	na	23.4	
	Monthly global radiation(MJ/m^2)	106.8	121.5	129.9	
	Monthly diffuse radiation (MJ/m^2)	71.4	63.9	71.4	
SOIL	Average temperature (°C) @ 9:00am — grass level	3.6	-5.7		
	10 cm/20 cm	-1.8/-0.4	-5.4/-3.8	-8.0/-7.1	
	50 cm/100cm	0.3/2.3	-3.2/-0.3	-3.5/-0.1	
	150 cm/300cm	3.5/5.6	1.5/4.4	1.7/4.6	

Saskatoon Stations
SM=interrupted readings (NWMP) about 1892-1900
SE= Eby (pioneer) 1901-41
SA= S'toon DIA 1942-
SWT= S'toon Water Treatment Plant 1974-

Normals
Global and diffuse radiation = 1961-1990
Soil Temp. = 1971-2000 calculated by Env. Canada
Wind Normal and Extreme are from Saskatoon DIA

For Your Information

The start of the new decade ushers in the shifting of the 30-year normals from 1971-2000 to 1981-2010. For January, the average temperatures are about 2°C warmer than the old normals while precipitation is slightly less. With this in mind, this January's average temperatures are less than 1°C above or below the new normals. On the 20th and 31st minimum temperatures drop below -30°C but were offset by four days of maximum temperature above 0°C. Precipitation was below normal even though there were 8 days more than usual that saw snow accumulations. This caused snow shovellers to wonder if it was ever going to quit. With 18 days of snow, it was surprising that the bright sunshine days were only 1 less than normal. The bright sunshine hours, however, were 25% or 26 hours less than normal. The snow depth of 21 cm is keeping the soil temperatures well above average, especially in the upper levels.

Weather Words for the Weatherwise

The January of 1980 saw the deepest average snow pack recorded at SRC's CRS. The 51 cm was sustained through February and did not disappear until April.

Saskatchewan Research Council

Monthly Weather Summary

latitude 52°09'N Longitude 106°36'W asl 497 m Saskatoon

CRS estab. 1963

February 2011

		2011 VALUE	2010 VALUE	NORMAL OR EXTREME FOR CRS 1981-2010	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Average monthly **maximum** (°C)	-8.5	-8.1	-7.1	
	Extreme monthly maximum (°C/date)	5.3/15	-2.5/28	8.3/2005/02	12.8/1931/19$_{SE}$
	Average monthly **minimum** (°C)	-19.4	-18.3	-17.0	
	Extreme monthly minimum (°C/date)	-32.8/25	-30.3/08	-41.1/1972/06	-50.0/1893/01$_{SM}$
	Monthly **average** (°C)	-14.0	-13.2	-12.1	
	No.of Frost-free days (Temp. > 0°C)	0	0	0.2	
DEGREE-DAYS	Monthly growing (5°C base)	0.0	0.0	0.0	
	Yearly total-to-date growing	0.0	0.0	0.0	
	Monthly heating (18°C base)	894.9	874.9	848.2	
	Yearly total-to-date heating	1908.3	1805.3	1863.3	
	Monthly cooling (18°C base)	0.0	0.0	0.0	
	Yearly total-to-date cooling	0.0	0.0	0.0	
PRECIPITATION	Monthly total (mm)	11.4	4.9	9.3	43.7/1924$_{SE}$
	Yearly total-to-date (mm)	23.8	15.3	24.8	
	Greatest daily (mm/date)	4.6/16	1.7/02	14.2/1979/13	30.0/1962/03$_{SA}$
	Measurable precipitation days (≥ 0.2mm)	11	9	7.3	
WIND	Average monthly speed (km/h)	14.7	10.5	W15.3$_{SA}$	
	Peak gust (speed/direction/date)	58.7^{WNW}15	43.8^{SE}27		106^{N}1988/22$_{SA}$
RADIATION	Monthly bright sunshine (hours)	148.7	na	132.6	
	% possible bright sunshine	53.4	na	47.1	
	% normal bright sunshine	112.1	na		
	Bright Sunshine days	25	na	23.9	
	Monthly global radiation(MJ/m^2)	204.5	193.5	210.1	
	Monthly diffuse radiation (MJ/m^2)	100.2	101.3	105.3	
SOIL	Average temperature (°C) @ 9:00am — grass level	3.6	-4.4		
	10 cm/20 cm	-1.9/-0.6	-4.4/-2.8	-6.7/-6.1	
	50 cm/100cm	-0.3/1.5	-2.8/-0.4	-3.5/-0.8	
	150 cm/300cm	2.6/4.5	1.0/3.3	0.8/3.4	

Normals
Global and diffuse radiation = 1961-1990
Soil Temp. = 1971-2000 calculated by Env. Canada
Wind Normal and Extreme are from Saskatoon Airport

Saskatoon Stations
SM=interrupted readings (NWMP) about 1892-1900
SE= Eby (pioneer) 1901-41
SA= S'toon Airport 1942-Present

For Your Information

February started with a low of -31.8°C and in a matter of only three days rose to a high of 4.0°C. This roller coaster continued throughout the month leaving people wondering whether shorts or snowsuits would be needed for any given day. Eight maximum temperatures rose above freezing while balancing this were an equal number of minimum temperatures less than -27°C including three below -30°C. On average the temperatures were one to two degrees below normal. Snow blowers and shovels were again in regular use to remove the 25cm of snow that accumulated on the ground. Snow fall was above normal. Even with eleven days of snow fall, the bright sunshine hours were above normal by 12%. The month ended with blizzard like conditions.

Weather Words for the Weatherwise

Blizzard- When winds of 40 km/hr or greater are expected to cause widespread reductions in visibility to 400 metres or less, due to blowing snow, or blowing snow in combination with falling snow, for at least 4 hours.

Blowing snow- When snow, caused by winds of at least 30 km/h, is expected to reduce visibility to 800 metres or less for at least 3 hours.

Environment Canada, 2010

Saskatchewan Research Council

Monthly Weather Summary

latitude 52°09'N Longitude 106°36'W asl 497 m Saskatoon

CRS estab. 1963

March 2011

		2011 VALUE	2010 VALUE	NORMAL OR EXTREME FOR CRS 1981-2010	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Average monthly **maximum** (°C)	-5.5	5.1	0.0	
	Extreme monthly maximum (°C/date)	6.7/14	17.2/28	20.0/1993/23	22.8/1910/23$_{SE}$
	Average monthly **minimum** (°C)	-14.5	-5.0	-9.7	
	Extreme monthly minimum (°C/date)	-30.3/01	-15.5/02	-38.9/1972/02	-43.3/1897/14$_{SM}$
	Monthly **average** (°C)	-10.0	0.1	-4.9	
	No. of Frost-free days (Temp. > 0°C)	0	4	1.4	
DEGREE-DAYS	Monthly growing (5°C base)	0.0	16.0	3.0	
	Yearly total-to-date growing	0.0	16.0	3.0	
	Monthly heating (18°C base)	868.6	555.7	708.8	
	Yearly total-to-date heating	2776.9	2361.0	2572.1	
	Monthly cooling (18°C base)	0.0	0.0	0.0	
	Yearly total-to-date cooling	0.0	0.0	0.0	
PRECIPITATION	Monthly total (mm)	6.4	0.8	13.8	59.0/1927$_{SE}$
	Yearly total-to-date (mm)	30.2	16.1	38.6	
	Greatest daily (mm/date)	2.0/22	0.6/24	32.0/1967/30	32.0/1967/30$_{SRC}$
	Measurable precipitation days (≥ 0.2mm)	11	2	8.8	
WIND	Average monthly speed (km/h)	15.5	14.6	E15.8$_{SA}$	
	Peak gust (speed/direction/date)	52.7^{NE}17	70.4^{W}17		93^{W}1959/18
RADIATION	Monthly bright sunshine (hours)	198.5	na	182.0	
	% possible bright sunshine	53.8	na	49.3	
	% normal bright sunshine	109.1	na		
	Bright Sunshine days	28	na	27.4	
	Monthly global radiation(MJ/m^2)	383.5	335.7	362.4	
	Monthly diffuse radiation (MJ/m^2)	169.9	154.2	173.9	
SOIL	Average temperature (°C) @ 9:00am — grass level	-12.1	5.0	-2.8/-2.4	
	10 cm/20 cm	-0.5/-0.3	-1.7/-1.1	-1.5/-0.4	
	50 cm/100cm	0.5/1.6	-1.7/-0.3	0.6/2.7	
	150 cm/300cm	2.5/4.1	0.6/2.6		

Saskatoon Stations
SM=interrupted readings (NWMP) about 1892-1900
SE= Eby (pioneer) 1901-41
SRC= SK Res. Council 1963-

Normals
Global and diffuse radiation = 1961-1990
Soil Temp. = 1971-2000 calculated by Env. Canada
Wind Normal and Extreme are from Saskatoon Airport

For Your Information

Like the old adage, March roared in like a lion and left like a lamb. Monthly temperature averages were 5°C colder than normal due to the extreme cold temperatures (-30°C)at the beginning of the month. By month's end the temperature had risen sufficiently to be near the daily normal. There were no extreme temperature records set during March. Typical of March, precipitation came as both snow and rain on eleven occasions producing a below average month end total. The official start of spring on March 20th brought nothing but complaints of below average temperatures, unmelted snow banks, and icy streets. The only positive event during the month was the 16.5 hours of 'extra' bright sunshine. In fact, 10 days recorded at least 85% or more of possible bright sunshine.

Mild weather is not always welcomed in March. For Northern communities that rely on ice roads to bring in much needed supplies, a warm March can be disastrous. Record warm temperatures last March closed Manitoba ice roads after being open for less than a month. Previous years the northern residents had 60 days to bring in supplies but last year the ice roads were only usable for 20.

Phillips, 2010

Saskatchewan Research Council

Monthly Weather Summary

latitude 52°09'N Longitude 106°36'W asl 497 m Saskatoon

CRS estab. 1963

April 2011

		2011 VALUE	2010 VALUE	NORMAL OR EXTREME FOR CRS 1981-2010	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Average monthly **maximum** (°C)	9.8	13.0	11.2	
	Extreme monthly maximum (°C/date)	21.2/26	23.3/22	31.5/2001/28	33.3/1952/28$_{SA\ US}$
	Average monthly **minimum** (°C)	-1.9	1.0	-1.4	
	Extreme monthly minimum (°C/date)	-5.6/04	-5.3/06	-27.8/1979/01	-30.5/1979/01$_{SWT}$
	Monthly **average** (°C)	4.0	7.0	4.9	
	No.of Frost-free days (Temp. > 0°C)	4	16	10.9	
DEGREE-DAYS	Monthly growing (5°C base)	27.1	91.4	65.2	
	Yearly total-to-date growing	27.1	107.4	68.2	
	Monthly heating (18°C base)	421.2	328.9	402.4	
	Yearly total-to-date heating	3198.1	2689.9	2974.5	
	Monthly cooling (18°C base)	0.0	0.0	0.2	
	Yearly total-to-date cooling	0.0	0.0	0.2	
PRECIPITATION	Monthly total (mm)	4.5	81.1	22.9	86.1/1955$_{US}$
	Yearly total-to-date (mm)	34.7	97.2	61.5	
	Greatest daily (mm/date)	1.4/15	41.8	41.8/2010/13	30.2/1955/19$_{US}$
	Measurable precipitation days (≥ 0.2mm)	7	9	8.6	
WIND	Average monthly speed (km/h)	14.9	17.9	SE17.2$_{SA}$	
	Peak gust (speed/direction/date)	60.8^{N}29	91.2^{W}09		108^{W}1959/06
RADIATION	Monthly bright sunshine (hours)	304.7	215.5	227.2	
	% possible bright sunshine	72.9	51.5	54.3	
	% normal bright sunshine	134.2	95.7		
	Bright Sunshine days	30	26	27.6	
	Monthly global radiation(MJ/m^2)	570.2	431.7	492.2	
	Monthly diffuse radiation (MJ/m^2)	196.0	159.3	178.5	
SOIL*	Average temperature (°C) @ 9:00am — 5cm	1.5		3.1	
	10 cm/20 cm	1.8/1.9	1.3/-0.2	3.6/4.0	
	50 cm/100cm	1.7/1.8	2.8/2.3	3.0/1.6	
	150 cm/300cm	2.2/3.6	1.9/2.6	1.5/2.4	

Saskatoon Stations
SA= S'toon Airport 1942-
US= Univ. of SK 1915-64
SWT= S'toon Water Treatment Plant 1974-

Normals
Global and diffuse radiation = 1961-1990
Soil Temp. = 1971-2000 calculated by Env. Canada
Wind Normal and Extreme are from Saskatoon Airport

**Soil temperature values for 2011 are from the newly installed 2009 probes.*

For Your Information

Even though April temperatures were just slightly below normal, the perception was a much colder month. Half the days recorded temperatures above 10°C as their maximum but the minimum temperatures only remained above 0°C for four nights. An early start to gardening was foiled with only 27.1 growing degree-day units; less than half of the normal monthly value. Early spring flowers struggled to bloom by month's end. The snow cover had generally disappeared by April 4th, with the first robins arriving by April 7th. Rain was sparse with thunderstorms observed on the 26th and 27th. Pea-sized hail was reported with the later storm. Average wind speeds were strongest from the WNW/NW, NNE and ESE/SE with the most frequent winds coming from SSW and WSW. The strongest wind of 60.8km/h from the north occurred on the 29th midst an afternoon of Strong and Near Gale winds prevailing from the north to the northeast directions. Not even about 80 hours above the normal Bright Sunshine value could produce sunny dispositions among the gloomy gardeners this month.

Weather Word for the Weatherwise

Faffering:
of the wind, blowing with cold chilly gusts.

The April faffering winds made kite flying wretchly uncomfortable as well as frustrating.
Kacirk, 2011

Saskatchewan Research Council

Monthly Weather Summary

latitude 52°09'N Longitude 106°36'W asl 497 m Saskatoon

CRS estab. 1963

May 2011

		2011 VALUE	2010 VALUE	NORMAL OR EXTREME FOR CRS 1981-2010	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Average monthly **maximum** (°C)	18.3	16.0	18.3	
	Extreme monthly maximum (°C/date)	26.2/21&22	30.0/19	35.0/1988/30	37.2/1936/27$_{SE}$
	Average monthly **minimum** (°C)	4.8	4.7	4.6	
	Extreme monthly minimum (°C/date)	-0.4/01	-3.0/07	-10.0/1967/02	-12.8/1907/06$_{SE}$
	Monthly **average** (°C)	11.6	10.4	11.5	
	No. of Frost-free days (Temp. > 0°C)	28	26	25.2	
DEGREE-DAYS	Monthly growing (5°C base)	204.1	172.1	206.9	
	Yearly total-to-date growing	231.2	279.5	275.1	
	Monthly heating (18°C base)	200.7	249.7	209.3	
	Yearly total-to-date heating	3398.8	2939.6	3183.8	
	Monthly cooling (18°C base)	1.8	13.3	6.3	
	Yearly total-to-date cooling	1.8	13.3	6.5	
PRECIPITATION	Monthly total (mm)	30.4	134.2	39.4	178.0/1977$_{SWT}$
	Yearly total-to-date (mm)	64.2	231.4	100.9	
	Greatest daily (mm/date)	21.3/04	30.4/22	39.9/1985/04	59.0/1999/18$_{SA}$
	Measurable precipitation days (≥ 0.2mm)	12	17	10.2	
WIND	Average monthly speed (km/h)	15.5	17.9	S16.9$_{SA}$	
	Peak gust (speed/direction/date)	66.0^{SE}16	70.2^{W}23		132^{SW}1965/17$_{SA}$
RADIATION	Monthly bright sunshine (hours)	301.4	221.9	256.9	
	% possible bright sunshine	65.1	45.5	52.7	
	% normal bright sunshine	117.3	83.1		
	Bright Sunshine days	30	26	29.3	
	Monthly global radiation(MJ/m^2)	647.0	516.5	586.3	
	Monthly diffuse radiation (MJ/m^2)	220.2	210.7	222.2	
SOIL	Average temperature (°C) @ 9:00am — grass level	10.5		10.3	
	10 cm/20 cm	10.2/14.4	5.5/3.7	10.8/11.3	
	50 cm/100cm	8.6/6.1	7.1/6.2	9.3/6.4	
	150 cm/300cm	4.3/3.5	5.0/3.9	4.8/3.4	

Saskatoon Stations
SE= Eby (pioneer) 1901-41
SA= S'toon Airport 1942-
SWT= S'toon Water Treatment Plant 1974-

Normals
Global and diffuse radiation = 1961-1990
Soil Temp. = 1971-2000 calculated by Env. Canada
Wind Normal and Extreme are from Saskatoon Airport

For Your Information

Whether the daily weather was warm or wintry, the average monthly temperatures for May were very close to normal. Gardens were planted, yards raked, bedding plants bought and installed. Of course, then came the frost warnings. Rainfall, although frequent, was not plentiful with the monthly total below normal; the yearly amount is 65% of normal. Bright sunshine values were 17% above normal with 12 days receiving more than 80% of the possible daily bright sunshine. Daily wind speeds measured above 40 km/hr 14 times, above 51 km/hr thrice and over 63 km/hr once during the month. The prevailing wind directions were from the NNE to the SE.

Spring is synonymous with kite flying due to favourable, steady winds. They have been used to gain an understanding of the atmosphere as early as 1749 when Alexander Wilson flew a kite to record air temperatures at different altitudes. Ben Franklin proved there was electricity in lightning with the aid of a kite and a key. In 1847, a kite was used to fly across the 244m Niagara Gorge. The kite's string was the beginning of the first suspension bridge as a light cord, then a heavier cord, and then a rope and finally a wire cable were pulled across in succession.[1]

[1] American Kitefliers Association, nd

Saskatchewan Research Council

Monthly Weather Summary

latitude 52°09'N Longitude 106°36'W asl 497 m Saskatoon

CRS estab. 1963

June 2011

		2011 VALUE	2010 VALUE	NORMAL OR EXTREME FOR CRS 1981-2010	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Average monthly **maximum** (°C)	21.7	21.8	22.5	
	Extreme monthly maximum (°C/date)	29.4/29	28.1/30	41.0/1988/05	41.5/1988/06$_{S2}$
	Average monthly **minimum** (°C)	10.4	11.0	9.8	
	Extreme monthly minimum (°C/date)	2.1/04	2.5/01	-3.3/1967/06	-3.9/1917/02$_{US}$
	Monthly **average** (°C)	16.1	16.4	16.2	
	No.of Frost-free days (Temp. > 0°C)	30	30	29.9	
DEGREE-DAYS	Monthly growing (5°C base)	332.1	343.2	334.8	
	Yearly total-to-date growing	563.3	622.7	609.9	
	Monthly heating (18°C base)	75.1	67.0	81.4	
	Yearly total-to-date heating	3473.9	3006.6	3265.2	
	Monthly cooling (18°C base)	17.2	20.2	24.8	
	Yearly total-to-date cooling	19.0	33.5	31.3	
PRECIPITATION	Monthly total (mm)	93.0	147.2	66.6	186.8/1942$_{S}$
	Yearly total-to-date (mm)	158.1	378.6	167.5	
	Greatest daily (mm/date)	39.5/17	33.0	99.4/1983/24	99.4/1983/24$_{SRC}$
	Measurable precipitation days (≥ 0.2mm)	18	16	12.5	
WIND	Average monthly speed (km/h)	14.1	14.4	W16.6$_{SA}$	
	Peak gust (speed/direction/date)	48.2^{E}17	71.6^{ESE}29		117^{S}1986/01$_{SA}$
RADIATION	Monthly bright sunshine (hours)	281.4	265.7	258.2	
	% possible bright sunshine	56.3	53.1	51.6	
	% normal bright sunshine	109.0	95.9		
	Bright Sunshine days	30	28	28.50638.7	
	Monthly global radiation(MJ/m^2)	640.0	601.4	228.1	
	Monthly diffuse radiation (MJ/m^2)	226.4	205.6		
SOIL	Average temperature (°C) @ 9:00am — grass level	not available at this time	23.7	15.3	
	10 cm/20 cm		10.1/7.5	15.7/16.3	
	50 cm/100cm		11.0/9.4	14.0/10.4	
	150 cm/300cm		7.9/5.8	8.3/5.4	

Saskatoon Stations
SA= S'toon Airport 1942-
US= Univ. of SK 1915-64
SRC= SK Res. Council 1963-
S= Saskatoon 1941-42
S2=Saskatoon 2 1977-90

Normals
Global and diffuse radiation = 1961-1990
Soil Temp. = 1971-2000 calculated by Env. Canada
Wind Normal and Extreme are from Saskatoon Airport

For Your Information

While it's relatively easy to keep away from tornadoes in Canada, hailstorms are a entirely different matter. Hailstorm weather is far more common than tornadoes. The hailstorm season runs from May-September but you can expect hailstorms almost daily somewhere during July and August.[1]

Southern inland British Columbia and southern Alberta experience far more frequent and severe hail storms than anywhere else in Canada. While that may be encouraging if you're not planning to travel to those areas, just be aware hail occurs anywhere in southern Canada.[1]

[1]Copeland, 2011

Weather Word for the Weatherwise Hailstone Size Categories[2]

6 mm	0.25"	Pea
12 mm	0.5"	Mothball, Hazelnut
19 mm	0.75"	Cherry, Grape
25 mm	1"	Quarter
32 mm	1.25"	Loonie
38 mm	1.5"	Walnut
45 mm	1.75"	Golf Ball
50 mm	2"	Hen's Egg
64 mm	2.5"	Tennis Ball
70 mm	2.75"	Baseball
76 mm	3"	Teacup
101 mm	4"	Grapefruit
114 mm	4.5"	Softball

[2] Heidorn, 2002

Saskatchewan Research Council

Monthly Weather Summary

latitude 52°09'N Longitude 106°36'W asl 497 m Saskatoon

CRS estab. 1963

July 2011

		2011 VALUE	2010 VALUE	NORMAL OR EXTREME FOR CRS 1981-2010	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Average monthly **maximum** (°C)	25.4	24.0	25.2	
	Extreme monthly maximum (°C/date)	34.4/31	29.0/29	39.3/ 2001/05	40.0/1919/17&1941/19&1946/30 SEUSSA
	Average monthly **minimum** (°C)	13.1	12.0	12.1	
	Extreme monthly minimum (°C/date)	8.2/12	9.1/11	1.7/1967/02&1978/09	-0.6/1918/25 SE
	Monthly **average** (°C)	19.3	18.0	18.7	
	No. of Frost-free days (Temp. > 0°C)	31	31	31	
DEGREE-DAYS	Monthly growing (5°C base)	441.9	403.9	424.0	
	Yearly total-to-date growing	1005.2	1026.6	1033.9	
	Monthly heating (18°C base)	17.5	23.6	30.7	
	Yearly total-to-date heating	3491.4	3030.2	3295.9	
	Monthly cooling (18°C base)	56.4	24.5	51.7	
	Yearly total-to-date cooling	75.4	58.0	83.0	
PRECIPITATION	Monthly total (mm)	72.8	94.6	59.0	162.9/1928 SE
	Yearly total-to-date (mm)	230.9	473.2	226.5	
	Greatest daily (mm/date)	21.4/12	27.2/02	45.5/1968/29	79.2/1946/03 US
	Measurable precipitation days (≥ 0.2mm)	10	17	11.8	
WIND	Average monthly speed (km/h)	15.5	12.2	W14.8 SA	
	Peak gust (speed/direction/date)	68.0 NW 20	80.4 NNW 16		113 E 1955/05 SA
RADIATION	Monthly bright sunshine (hours)	346.9	326.7	298.8	
	% possible bright sunshine	69.1	65.1	59.5	
	% normal bright sunshine	116.1	106.9	30.3	
	Bright Sunshine days	31	30	633.5	
	Monthly global radiation(MJ/m²)	698.6	672.7	216.5	
	Monthly diffuse radiation (MJ/m²)	187.8	220.7		
SOIL	Average temperature (°C) @ 9:00am — 5 cm	18.4	23.9	17.5	
	10 cm/20 cm	18.7/19.0	12.1/9.5	18.0/18.9	
	50 cm/100cm	17.0/13.3	15.0/13.3	16.7/13.1	
	150 cm/300cm	11.6/8.1	11.4/8.1	10.9/7.5	

Saskatoon Stations

SE= Eby (pioneer) 1901-41
SA= S'toon Airport 1942-
US= Univ. of SK 1915-64

Normals

Global and diffuse radiation = 1961-1990
Soil Temp. = 1971-2000 calculated by Env. Canada
Wind Normal and Extreme are from Saskatoon Airport

For Your Information

Temperatures, this July, climbed above 30°C on two occasions; July 18th to 31.5°C and July 31st to 34.4°C. Four maximum temperature records were set during the month. The 8th recorded a high minimum of 18.1°C (previous; 17.3°C/2002) as well as a high average of 23.4°C (previous; 23.1°C/1970). The 31st recorded a high maximum of 34.4°C (previous; 33.9°C/1973) as well as high average of 24.8°C (previous; 24.1°C/2005). Only one minimum temperature was recorded; on the 22nd a low maximum was set with 16.4°C (previous; 17.8°C/1968). Over all, temperatures were near normal. With the above monthly average of 72.8mm of rain recorded, precipitation total for the year is near normal. A daily record was broken on the 12th when 21.4mm surpassed the 1986 mark of 17.2mm. Near Gale winds (51-62km/h) or over occurred eight times with the highest measured from the NW at 68 km/h on the 20th during thunderstorm activity.

Throughout ancient history, thunder and lightning has been attributed to the gods. To the Greeks, it was Zeus and Brontes; to the Romans, it was Jupiter and Summanus. In northern Europe, it was the German Donar, Norwegian Thor or the Finnish Perkele who controlled thunder and lightning. The Native Americans assigned the phenomenon to the Thunderbird.[1] The most unusual explanation comes from the Catskill Mountains region of New York as recounted by Washington Irving in his tale of Rip Van Winkle. Thunder and lightning result when ninepin bowling is played up in the mountains by the spirits of the area's explorer Henry Hudson and crew. Thunder is the rumble of rolling balls while lightning is pins being knocked down.[2]

[1]Wikimedia Foundation Inc., 2011. [2] Cummings, 2006

Saskatchewan Research Council

Monthly Weather Summary

latitude 52°09'N Longitude 106°36'W asl 497 m Saskatoon

CRS estab. 1963

August 2011

		2011 VALUE	2010 VALUE	NORMAL OR EXTREME FOR CRS 1981-2010	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Average monthly **maximum** (°C)	26.1	23.1	24.9	
	Extreme monthly maximum (°C/date)	34.5/22	33.6/26	39.7/1998/06	39.7/1998/06$_{SRC}$
	Average monthly **minimum** (°C)	11.8	11.5	11.0	
	Extreme monthly minimum (°C/date)	7.4/19	5.9/30	-2.8/1976/28	-2.8/1901/23&1976/28$_{SM\ SRC}$
	Monthly **average** (°C)	19.0	17.3	18.0	
	No.of Frost-free days (Temp. > 0°C)	31	31	30.9	
DEGREE-DAYS	Monthly growing (5°C base)	432.6	382.3	402.8	
	Yearly total-to-date growing	1437.8	1408.9	1436.87	
	Monthly heating (18°C base)	17.2	51.0	50.0	
	Yearly total-to-date heating	3508.6	3081.2	3345.9	
	Monthly cooling (18°C base)	46.8	30.3	49.8	
	Yearly total-to-date cooling	122.2	88.3	132.8	
PRECIPITATION	Monthly total (mm)	20.8	74.6	46.5	178.9/1954$_{NRC}$
	Yearly total-to-date (mm)	251.7	547.8	273.0	
	Greatest daily (mm/date)	5.8/15	18.4/12	48.2/2007/17	84.3/1945/03$_{SA}$
	Measurable precipitation days (≥ 0.2mm)	7	12	9.8	
WIND	Average monthly speed (km/h)	13.0	12.4	W14.5$_{SA}$	
	Peak gust (speed/direction/date)	59.8^{WNW}16	65.8^{NNE}12		151^{W}1967/14$_{SA}$
RADIATION	Monthly bright sunshine (hours)	338.2	261.1	271.8	
	% possible bright sunshine	74.7	57.7	60.0	
	% normal bright sunshine	124.9	93.0		
	Bright Sunshine days	31	30	29.9	
	Monthly global radiation(MJ/m^2)	596.9	517.9	529.0	
	Monthly diffuse radiation (MJ/m^2)	151.8	200.2	185.6	
SOIL	Average temperature (°C) @ 9:00am — 5 cm level	16.8		16.5	
	10 cm/20 cm	17.3/17.8	7.6/10.9	16.9/18.1	
	50 cm/100cm	16.7/14.1	8.7/15.0	16.8/14.1	
	150 cm/300cm	12.9/9.9	14.0/12.6	12.3/9.1	

Saskatoon Stations
SM=interrupted readings (NWMP) about 1892-1901
SA= S'toon Airport 1942-
NRC= Nat. Res. Council 1952-66
SRC= SK Res. Council 1963-

Normals
Global and diffuse radiation = 1961-1990
Soil Temp. = 1971-2000
calculated by Env. Canada
Wind Normal and Extreme are from Saskatoon Airport

For Your Information

August 2011 was warm but not hot with only one recorded temperature value over 30°C. On average, temperatures were only 1°C above normal. The August total precipitation recorded at CRS was well below normal with 20.8mm. Throughout the city, as reported by colleagues, rainfall was very variable. On the 15th, along with large hail stones, up to 35mm of precipitation was observed while at CRS only 5.8 mm was recorded. Bright sunshine radiation was 25% above normal (338.2 hours) with all days recording bright sunshine. Winds were most frequent from WNW with the strongest average wind speeds coming from the WNW and NW directions. Only seven days had wind speeds over 40 km/hr.

Weather Words for the Weatherwise

Hot Spong

A sudden power of heat from the sun emerging from a cloud.

Gleeamy

Showery weather with bright intervals. From 'gleam', a hot interval of sunshine between showers; a ray of sunshine.[1]

[1]Kacirk, 2011

Saskatchewan Research Council

Monthly Weather Summary

latitude 52°09'N Longitude 106°36'W asl 497 m Saskatoon

CRS estab. 1963

	September 2011	2011 VALUE	2010 VALUE	NORMAL OR EXTREME FOR CRS 1981-2010	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Average monthly **maximum** (°C)	24.1	16.6	18.7	
	Extreme monthly maximum (°C/date)	35.0/08	27.5/05	35.6/1978/04	35.6/1978/04$_{SRC}$
	Average monthly **minimum** (°C)	7.7	6.0	5.6	
	Extreme monthly minimum (°C/date)	-2.0/14	-2.1/18	-7.8/1974/30	-11.1/1908/28$_{SE}$
	Monthly **average** (°C)	15.9	11.3	12.2	
	No. of Frost-free days (Temp. > 0°C)	29	28	26.6	
DEGREE-DAYS	Monthly growing (5°C base)	326.9	190.2	219.9	
	Yearly total-to-date growing	1764.7	1599.1	1656.6	
	Monthly heating (18°C base)	95.8	202.3	182.5	
	Yearly total-to-date heating	3604.4	3283.5	3528.4	
	Monthly cooling (18°C base)	32.7	1.6	7.6	
	Yearly total-to-date cooling	154.9	89.9	140.4	
PRECIPITATION	Monthly total (mm)	8.6	108.6	37.0	128.4/2006$_{SRC\ KCS}$
	Yearly total-to-date (mm)	260.3	656.4	310.0	
	Greatest daily (mm/date)	5.4/17	44.2/10	52.4/2006/15	44.2/1931/12$_{US}$
	Measurable precipitation days (≥ 0.2mm)	5	11	8.8	
WIND	Average monthly speed (km/h)	12.7	14.4	W15.9$_{SA}$	
	Peak gust (speed/direction/date)	62.7^{NW}28	54.3^{NW}17		148^{W}1967/22$_{SA}$
RADIATION	Monthly bright sunshine (hours)	302.2	191.2	197.4	
	% possible bright sunshine	79.6	50.4	52.1	
	% normal bright sunshine	153.1	102.8		
	Bright Sunshine days	30	27	27.3	
	Monthly global radiation(MJ/m^2)	437.0	335.3	351.8	
	Monthly diffuse radiation (MJ/m^2)	106.8	126.4	127.6	
SOIL	Average temperature (°C) @ 9:00am — 5 cm	12.3		10.5	
	10 cm/20 cm	13.2/14.2	6.2/4.9	11.0/12.5	
	50 cm/100cm	14.3/13.2	11.3/11.7	13.2/12.4	
	150 cm/300cm	12.7/10.5	11.6/10.4	11.7/9.9	

Saskatoon Stations
SE= Eby (pioneer) 1901-41
SA= S'toon Airport 1942-
US= Univ. of SK 1915-64
SRC= SK Res. Council 1963-

Normals
Global and diffuse radiation = 1961-1990
Soil Temp. = 1971-2000 calculated by Env. Canada
Wind Normal and Extreme are from Saskatoon Airport

For Your Information

Sun, soleil or sol, no matter what you call it, September had a record abundance. Every day experienced some bright sunshine with 15 days recording over 90% of possible bright sunshine. With a monthly total of 302.2 hours, it easily outshone the previous 2009 record of 266.4 hours. September also overshadowed previous records set for days with greater than 5 hours (28 days) and days with greater than 10 hours (18 days) of bright sunshine. Complimenting these brilliant days were unseasonable temperatures soaring to over 30°C on seven occasions setting four new extreme maximum temperature records along with two high daily minimum temperature records. Frost occurred on the 14th ending the frost free season at 126 days. Precipitation was well below normal allowing for a perfect month for harvest. Harvesters were able to work well into the night reaping this year's various crops under a beaming harvest moon.

The Harvest Moon is the full moon closest to the autumnal equinox and occurs in September two out of three years. When it occurs in October, the September moon is then referred to as the Corn Moon, a folkloric connection indicating the time when corn, pumpkins, squash, beans and wild rice were traditionally ready to be harvested.[1]

[1]Almanac Publishing Co., 2011

Saskatchewan Research Council

Monthly Weather Summary

latitude 52°09'N Longitude 106°36'W asl 497 m Saskatoon

CRS estab. 1963

October 2011

		2011 VALUE	2010 VALUE	NORMAL OR EXTREME FOR CRS 1981-2010	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Average monthly **maximum** (°C)	13.0	13.9	10.4	
	Extreme monthly maximum (°C/date)	23.3/04	24.4/08	28.5/1980/06&1984/08	32.2/1943/05$_{SAUS}$
	Average monthly **minimum** (°C)	2.0	1.2	-1.1	
	Extreme monthly minimum (°C/date)	-4.9/26	-11.2/28	-21.5/1991/29,30	-25.6/1919/26$_{SEUS}$
	Monthly **average** (°C)	7.5	7.6	4.6	
	No.of Frost-free days (Temp. > 0°C)	22	21	12.1	
DEGREE-DAYS	Monthly growing (5°C base)	93.2	123.6	62.2	
	Yearly total-to-date growing	1857.9	1722.7	1718.8	
	Monthly heating (18°C base)	324.8	322.8	415.1	
	Yearly total-to-date heating	3929.2	3606.3	3943.5	
	Monthly cooling (18°C base)	0.0	0.0	0.1	
	Yearly total-to-date cooling	154.9	89.9	140.5	
PRECIPITATION	Monthly total (mm)	47.6	14.4	19.2	69.8/1969$_{SRC}$
	Yearly total-to-date (mm)	307.9	670.8	329.2	
	Greatest daily (mm/date)	31.6/07	6.4/24	36.7/1984/16	41.7/1924/12&1969/03$_{SESA}$
	Measurable precipitation days (≥ 0.2mm)	9	6	8.0	
WIND	Average monthly speed (km/h)	14.5	14.0	W16.2$_{SA}$	
	Peak gust (speed/direction/date)	61.8^{SSE}04	62.3^{N}26		138^{NW}1967/16$_{SA}$
RADIATION	Monthly bright sunshine (hours)	194.1	231.3	156.1	
	% possible bright sunshine	58.9	70.3	47.4	
	% normal bright sunshine	124.3	146.5		
	Bright Sunshine days	29	28	26.7	
	Monthly global radiation(MJ/m^2)	227.1	260.3	239.1	
	Monthly diffuse radiation (MJ/m^2)	83.8	79.7	92.6	
SOIL	Average temperature (°C) @ 9:00am — 5cm	Old Soil Temp	4.2	4.3	
	10 cm/20 cm	2.3/1.2	3.1/2.2	4.7/6.2	
	50 cm/100cm	8.6/10.1	8.4/9.6	8.3/9.2	
	150 cm/300cm	10.4/10.4	9.7/9.8	9.6/9.4	

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For Your Information

October's temperatures were above average as was the precipitation. Temperatures generally remained in the double digits until the 26th when the maximum temperature slowly began to succumb to the season and slipped below 10°C. Every day enjoyed temperatures above freezing and only nine nights dipped below the freezing point. Hallowe'en was snow free and mild which encouraged ghouls, goblins and other ghastly creatures to be out in full force. Precipitation was above normal due to the heavy afternoon rain on the 7th when 31.6 mm or 66% of the monthly total occurred. The above average bright sunshine hours contributed to everyone's enjoyment of the fall colours as they spent as much time as possible outside.

October's Party

"October gave a party;
The leaves by hundreds came-
The Chestnuts, Oaks, and Maples,
And leaves of every name.
The Sunshine spread a carpet,
And everything was grand,
Miss Weather led the dancing,
Professor Wind the band."

George Cooper (US poet 1838-1927)

Saskatchewan Research Council

Monthly Weather Summary

latitude 52°09'N Longitude 106°36'W asl 497 m Saskatoon

CRS estab. 1963

November 2011

		2011 VALUE	2010 VALUE	NORMAL OR EXTREME FOR CRS 1981-2010	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Average monthly **maximum** (°C)	0.8	-1.8	-0.6	
	Extreme monthly maximum (°C/date)	12.4/03	16.1/05	19.4/1975/04	21.7/1903/03$_{SE}$
	Average monthly **minimum** (°C)	-8.8	-9.4	-9.3	
	Extreme monthly minimum (°C/date)	-23.6/20	-26.4/25	-33.5/1985/24	-39.4/1893/30$_{SM}$
	Monthly **average** (°C)	-4.0	-5.6	-5.0	
	No. of Frost-free days (Temp. > 0°C)	0	3	1.6	
DEGREE-DAYS	Monthly growing (5°C base)	0.0	8.1	2.9	
	Yearly total-to-date growing	1857.9	1730.8	1721.7	
	Monthly heating (18°C base)	660.8	707.6	690.1	
	Yearly total-to-date heating	4590.1	4313.9	4633.6	
	Monthly cooling (18°C base)	0.0	0.0	0.0	
	Yearly total-to-date cooling	154.9	89.9	140.5	
PRECIPITATION	Monthly total (mm)	9.5	28.2	13.4	57.3/1940$_{SE}$
	Yearly total-to-date (mm)	316.6	699.0	342.6	
	Greatest daily (mm/date)	2.9/06	9.0/09	19.3/1978/04	27.9/1938/01$_{US}$
	Measurable precipitation days (≥ 0.2mm)	10	13	7.8	
WIND	Average monthly speed (km/h)	15.5	12.6	W14.8$_{SA}$	
	Peak gust (speed/direction/date)	60.9^{NW}25	54.6^{N}16		100^{W}1976/17$_{SA}$
RADIATION	Monthly bright sunshine (hours)	104.2	81.5	97.0	
	% possible bright sunshine	39.4	30.9	35.8	
	% normal bright sunshine	107.4	83.2		
	Bright Sunshine days	24	21	22.5	
	Monthly global radiation(MJ/m^2)	118.3	106.9	123.7	
	Monthly diffuse radiation (MJ/m^2)	69.7	60.7	73.6	
SOIL	Average temperature (°C) @ 9:00am — 5 cm	0.0	3.1	-2.2	
	10 cm/20 cm	0.4/1.1	-1.0/-1.0	-1.7/-0.5	
	50 cm/100cm	3.6/6.5	3.5/5.7	3.0/5.6	
	150 cm/300cm	7.7/9.2	7.0/8.6	6.8/8.1	

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For Your Information

Averaging the November temperatures produced a mean almost 2°C above the monthly normal but that does not give a true picture of the variation experienced. The extreme high of 12.4°C on the 3rd was negated by the extreme low -23.6°C on the 20th. The month began with temperatures near normal until the 15th when they began their slide to the extreme minimum. By the 21st, a recovery had begun, ending the last third of the month well above normal. During this period two maximum temperatures were set; on the 23rd, 9.1°C surpassed the old 1976 record of 8.3°C and on the 27th 11.2°C doubled the previous record of 5.6°C set in 1968. Twenty days recorded temperatures above 0°C but there were no frost-free days or growing degree-days. Precipitation was below normal allowing the yearly total to slip to 92.7% of normal. The site recorded Near Gale winds on six occasions with the peak wind occurring on November 25th at 60.9 km/h. Bright sunshine was above normal with 20 days reporting more than one hour of bright sunshine.

National security was stepped up a notch during this month in 1941. The powers-that-be decreed that all newspapers were not to publish any reference to weather conditions. Editors of a Winnipeg paper complained "When you confront one of those old-fashioned blizzards that stall trains and leave motorists stranded, what are we going to do if we can't talk about it?"[1]

[1]Phillips, 2010

Saskatchewan Research Council

Monthly Weather Summary

latitude 52°09'N Longitude 106°36'W asl 497 m Saskatoon

CRS estab. 1963

December 2011

		2011 VALUE	2010 VALUE	NORMAL OR EXTREME FOR CRS 1981-2010	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Average monthly **maximum** (°C)	0.8	-9.6	-8.3	
	Extreme monthly maximum (°C/date)	10.1/06	0.4/27	11.2/1997/14	14.4/1939/05$_{SE}$
	Average monthly **minimum** (°C)	-11.5	-16.6	-17.4	
	Extreme monthly minimum (°C/date)	-22.4/09	-24.3/31	-42.2/1973/31	-43.9/1892/22$_{SM}$
	Monthly **average** (°C)	-5.4	-13.2	-12.9	
	No.of Frost-free days (Temp. > 0°C)	0	0	0.1	
DEGREE-DAYS	Monthly growing (5°C base)	0.0	0.0	0.1	
	Yearly total-to-date growing	1857.9	1730.8	1721.8	
	Monthly heating (18°C base)	724.2	966.1	957.5	
	Yearly total-to-date heating	5314.2	5280.0	5591.1	
	Monthly cooling (18°C base)	0.0	0.0	0.0	
	Yearly total-to-date cooling	154.9	89.9	140.5	
PRECIPITATION	Monthly total (mm)	3.2	8.5	12.7	59.2/1956$_{SA}$
	Yearly total-to-date (mm)	320.6	707.5	355.3	
	Greatest daily (mm/date)	1.1/31	4.9/14	14.5/1973/23	28.4/1936/02$_{SE}$
	Measurable precipitation days (≥ 0.2mm)	9	11	10.4	
WIND	Average monthly speed (km/h)	16.3	14.3	W15.1$_{SA}$	
	Peak gust (speed/direction/date)	63.8^{NW}24	60.3^{SE}14		121^{W}1955/12$_{SA}$
RADIATION	Monthly bright sunshine (hours)	90.7	78.8	85.7	
	% possible bright sunshine	37.4	32.5	35.3	
	% normal bright sunshine	105.8	92.3		
	Bright Sunshine days	24	18	22.6	
	Monthly global radiation(MJ/m^2)	73.2	86.5	95.2	
	Monthly diffuse radiation (MJ/m^2)	44.1	56.3	54.3	
SOIL	Average temperature (°C) @ 9:00am — 5cm	-5.5	2.9	-7.1	
	10 cm/20 cm	-4.9/-4.0	-1.5/0.0	-6.6/-5.6	
	50 cm/100cm	0.4/3.1	1.1/3.2	-1.7/2.0	
	150 cm/300cm	4.8/7.2	4.5/6.5	3.8/6.4	

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SM=interrupted readings (NWMP) about 1892-1900
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For Your Information

December 2011 was very reminiscent of December 1997 when snow was absent and temperatures were also well above normal. Four new daily maximum records broke the old records by as much as 5°C. Sixteen days posted temperatures above freezing of which 11 were in the last half of the month. A ground cover of snow was generally lacking throughout the month due to the warm weather and dearth of new snow. The monthly precipitation total was well below normal concluding the year with a 10% shortfall from normal. All soil levels showed temperatures 1 to 2°C above normal with the frost penetrating the soil to the 50cm level by the latter half of the month. Bright sunshine was evident throughout the month with only six days devoid of any bright sunshine. Unfortunately, the majority of those days occurred during the last week when children were on the holiday break.

When snow is lacking, ski hill operators are forced to make the stuff artificially for their die-hard clients. One of the earliest ventures was in Canada when 75 tonnes of "snow" were shaved off a skating rink and used to cover a ski jump and hill allowing for the 1934 ski jump competition to go forward.[1]

[1]Phillips, 2010

INSTRUMENTS USED AT SASKATOON SRC CRS AND 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 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.

Mathematically:CDD = (T - 18°C), for that day, where T = daily mean temperature in °C if T is equal to or less than18°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°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°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: circa1892 to circa 1900 (sporadic)

Station locations, exposures and measurement procedures were subject to change during this time period. Data are <u>not adjusted</u> 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 Evaportranspiration; 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 = O; 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 l, 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/m^2). (To facilitate comparison with past years' data: 1.0 MJ/m^2 = 23.895 langleys). Comparison is provided with a provisional average based on 16 years of data (l975-1990).

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 (Environment Canada 2004b).

WAVES - Temperature waves are defined as a sequence of three or more days when the daily maxiumum/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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