Resources & Environment Group
Environment Branch
Climatology Section

SASKATOON SRC CLIMATOLOGICAL REFERENCE STATION

ANNUAL SUMMARY 1997

by

C. Beaulieu
V. Wittrock

SRC Publication No. R-1550-1-E-98

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ACKNOWLEGEMENTS

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

Elaine Wheaton
Lead Scientist
306-933-8179
e-mail wheaton@src.sk.ca

Virginia Wittrock
Research Scientist
306-933-8122
e-mail wittrock@src.sk.ca

Carol Beaulieu
Research Technician
306-933-8182
e-mail beaulieu@src.sk.ca

Climatology Section
Fax 306-933-7817

Saskatchewan Research Council
Web Site Home Page
http://www.src.sk.ca

Cover photograph
SRC, Climate Reference Station, Saskatoon , 1997
photo credit Carol Beaulieu.

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In Memoriam

Joseph Gerard Calvert 1919-1998

Meteorologist with the Saskatchewan Research Council 1968-1983

SRC has made a difference: after three years with the Dept. of Meteorology, at McGill University, I left Montreal in January 1968 to be in Saskatoon for February 1968, when I started to work for the Saskatchewan Research Council. I took the train and arrived in Saskatoon in the midst of winter. My family came later on when I found housing for them. We lived in Saskatoon and enjoyed the city and the people we met and became friends with. I was well received at SRC and soon felt that I was a part of SRC. I enjoyed my work. Being a meteorologist, I felt quite at ease with the weather station that SRC had set up in the middle of a field. My office was located in the main building of the SRC and there I enjoyed the companionship of the staff and all. Throughout my years with SRC, I took pride in my station, seeing that is was always was in good order and well kept. I was proud to show to all who wished to visit it. Throughout the years, I was able to have one of the best weather stations in the area, which was serving not only Saskatchewan but also other provinces and the federal government. Being bilingual, I was able to communicate with the French network CHNS Radio of the area and with whomever came to SRC, French speaking or English speaking. I was proud to participate in many experiments such as: the checking of the water temperatures in certain areas of Saskatoon and measuring the soil temperatures in Duck Lake area. Working with all at the SRC has been a pleasure. I keep fond memory of the years spent at SRC.
Joe Calvert November 1996.

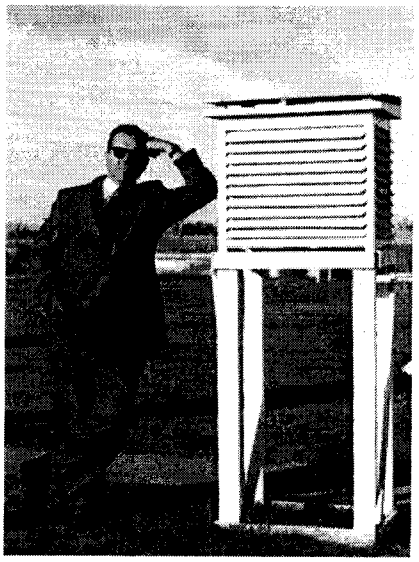
Colleagues' Tributes

When I arrived at SRC in early 1981 as a Research Scientist in the Geology Division, my office at 32 Campus Drive was on the second floor near the stairway up to the 'penthouse' where Joe had some of his climatology equipment and other material. As a new man, I was feeling a bit lost as I wasn't really sure in what direction I was to work and I didn't know anyone at SRC. BUT - Joe always had a 'Good Morning' or a 'What's Up Today?' for me when he went up to the 'penthouse'. This friendliness was a great start in helping me get settled at SRC.
Dave Quirt

I remember Joe most for his undying passion for the Montreal Canadians*(sic)*. Also for the cribbage games we used to play at lunch hour. If memory serves me correctly, I was able to beat him out in the last round of the 1973 SRC Cribbage Championship. He was a wonderful man, friend and employee for SRC!
Kenny Owens

I didn't know Joe very well but I had the impression he was very meticulous in his work. I had a chance to work at the weather station for a few weeks before he retired and observed that he always got everything done on time and very complete. His notes were so neat and precise. Apart from the work, he struck me as being a gentleman.
Rolf Jahren

Joe believed in preparing ahead of time, so much so that when driving down Preston Ave. he would turn his right signal light on for the climate station at 115th street (about 1km away). Joe rarely took a holiday, and visited the climate station each morning (Saturday and Sunday included) for many years.
Charles McKenzie



Joe did have a lot of dedicated years of effort.....like battling his way through mud and slop and snow and ice continually to get his job for us done. And this happened twice a day that he would drive out to CRS and that included 365 days per year of effort for the time of his employment. And if he didn't go then he was responsible for sending someone and getting the job done even on Christmas Day, New Year's Day etc, etc. There is no doubt that he worked hard for SRC and there is equally no doubt that he left a good record here at SRC for our own purposes and for the purposes of atmospheric research people in all of Canada who use our data.
Stan Shewchuk

I had known Joe from 1971 until his retirement in 1983. Joe was quite witty and a stickler for detail (he had all the charts for the climate station prepared for many years ahead). I can recall helping Joe with snow surveys in early January no matter what the weather. This shows Joe's determination to get it done at all costs. I enjoyed working with Joe very much during those earlier years.
Keith Wallace

SUMMARY

Data concerning temperature, precipitation, soil temperature, wind speed and direction, bright sunshine, and solar radiation recorded at the Saskatchewan Research Council (SRC) Climatological Reference Station (CRS), (52°09'N, 106°36'W, 497m asl) are presented for the year 1997 and compared with the long-term (*circa* 1900-1997) and standard-period (1961-1990) records.

January 1997 continued the cold trend started in November/December 1996. Relief from unseasonable temperatures began in February with the average temperatures 3.7°C higher than normal followed by seasonable temperatures until July when temperatures were well above normal for the rest of the months except October. All cold spells (less than -30°C) occurred during January with three episodes totalling 11 days. The coldest day of the year occurred on January 26th at -39.0°C. Hot spells (greater than 30.0°C) occurred eleven times for a total of 18 days; 9 of which were recorded in August. The longest hot spell was 5 days in August ending on the 7th with a record temperature for the year of 39.3°C. This exceeded the 1893 and 1949 record by 0.5°C. December was exceptionally warm with the average temperature 10°C above normal. The yearly average maximum, minimum and mean temperatures were well above their 30-year averages. The year overall was the sixth warmest since 1900, the fourth warmest since 1980 and the warmest since 1990.

The yearly total for growing degree-days (5°C base) was above average with all the relevant months (May - September) above their normals The frost free period began on May 14th; 5 days earlier than usual, and lasted for 143 days ending on October 5th; 20 days later than usual. Growing degree-days for the frost free period were 1682.9.

The usual warm weather for the last half of the year is being attributed to the influence of a Pacific Ocean atmospheric phenomenon named El Niño. This El Niño has been unusually strong and long lasting causing unusual weather patterns world wide.

Annual precipitation was under the 30-year average by 67.8 mm (81% of normal). The only time the cumulative precipitation was above average was during April. November and December were particularly dry with only a trace of snow on the ground by December's end. April garnished all precipitation honours for 1997. It was the rainiest month (54.6 mm) with the rainiest day (22.0 mm) and had the heaviest rainfall (17.8 mm). The total monthly amount was 269% of normal for the month. Fifteen of 30 days in April recorded various forms of precipitation. On October 13th , snow flurries were first observed, but there was not enough snow to cover the ground until the beginning of 1998. It rained trace amounts on December 17th and 23rd . The harvest months of August, September and October had above average precipitation but since it was concentrated on a few days and not spread throughout the months, it generally did not interfere with the harvest.

Annual bright sunshine was 155.9 hours less than the 30-year average. The middle part of the year from April to August was very cloudy especially during May and June. The only months to rise above the 30-year average were March and September.

Saskatoon experienced a very windy year. *Near Gale* winds (51-62 km/h) occurred in all months except January and July. *Gale* winds (63-75 km/h) blew during April, May, July, September and October while *Strong Gale* winds (76-87 km/h) were recorded during August.

WEATHER EVENTS

Frost Free Season

Last Spring Frost	First Fall Frost	Length of Season
1997 May 14	October 5	143 days
1996 May 12	September 29	139 days
1995 May 22	September 19	119 days
1994 May 9	October 4	147 days
1993 May 17	September 14	119 days
30-year Average		
May 19	September 15	118 days

Extremes

Temperature

Coldest day = January 26th at -29.0°C

Hottest day =August 7th at 39.3°C

Cold Spells (-30.0°C)

January 9 - 12 = 4 days
January 16 - 17 = 2 days
January 24 - 28 = 5 days

Hot Spells (+30.0°C)

May 31 = 1 day
June 26 = 1 day
July 9 -10 = 2 days
July 14 - 15 = 2 days
July 29 = 1 day
August 1 = 1 days
August 3 - 7 = 5 days
August 13 = 1 day
August 23 = 1 day
August 27 = 1 days
September 10 - 11 = 2 days

Precipitation

Rainiest Month	Rainiest Day	Heaviest Rainfall
April	April 23rd	April 23
54.6 mm	22.0 mm	17.8 mm between 3:30pm and 9:30 pm

Usual Occurrences

Hail = April 23

First Snow = October 13 - Trace

Rain = December 17 and 23 - Trace

Tipping Bucket was used to officially record precipitation between May 4th and October 31st, 1997.

Wind

Strong Gale 76-87 km/h	Gale 63-75 km/.h	Near Gale 51-62 km/h			
		Month	Number of Occurences	Month	Number of Occurences
August 1 = 86.3	April 28 = 64.7	February	1	August	3
	May 10 = 69.2 11 = 67.4	March	2	September	4
	July 4 = 63.0 31= 60.6	April	5	October	3
	September 7 = 64.6 28 = 74.8	May	7	November	1
	October 13 = 67.2	June	6	December	1

STATION HISTORY AND LOCATION

The first meteorological observations were taken at or near Saskatoon by the Royal Northwest Mounted Police in 1889 with only temperatures being recorded at the beginning. 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 and 106°20'W, elevation 480 m 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 ten to fifteen families at Saskatoon on either side of the river.

Little is known about the very early observers; however, the records do show that Major T.H. Keenan took the observations from March 1892 until March 1895, and Mr. George Will was the observer from January 1897 until April 1897. It is thought that Thomas H. Copeland was involved in the observational program 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 was closed 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 long-time observer at this site was Mr. Sidney Cox. The Saskatchewan Research Council took over the program in the fall of 1963 at the newly established Climatological Reference Station.

The location of the Saskatchewan Research Council's Climatological Reference Station is latitude 52°09'N and longitude 106°36'W and the elevation is 497 m asl[1].

The long-time observer (16 years) at this present site was Mr. Joe Calvert, who retired from the program in August, 1983. Ray Begrand succeeded Mr. Calvert until September 1988 when Virginia Wittrock became the primary observer. Carol Beaulieu became the primary observer in 1992.

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 following manual data collection duties were turned over to Environment Canada: evaporation, bright sunshine (Campbell-Stokes), snow survey, snow cover, and manual temperature and precipitation programs. Manual temperature, precipitation and snow cover readings at the site are still possible in the event of total, extended power failure.

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[1]From various sources including the *Physical Environment of Saskatoon, Canada* (E.A. Christiansen (ed.) 1970) and 1974 *Annual Meteorological Summary, Saskatoon, Saskatchewan,* (Environment Canada, Atmospheric Environment Service).

SASKATCHEWAN RESEARCH COUNCIL
MONTHLY WEATHER SUMMARY

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Latitude 52°09' N **SASKATOON** **Longitude 106°36' W**

	Annual Summary 1997	1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE (1892-1995)
TEMPERATURE	Annual Average (°C)	3.5	0.4	2.0
	Extreme Annual Maximum (°C)/Date	39.3/Aug 07	35.8/Aug 07	41.0/Jun 1988
	Annual Average Maximum (°C)	9.5	6.1	7.9
	Extreme Annual Minimum (°C)/Date	-39.0/Jan 26	-41.6/Jan 19	-50.0/Feb 1873
	Annual Average Minimum (°C)	-2.5	-5.3	-3.9
	Days with Frost	191	205	198
	Heating Degree-Days (18°C base)	5441.6	6583.0	5954.0
	Growing Degree-Days (5°C base)	1824.5	1627.3	1648.4
	Cooling Degree-Days (18°C base)	177.7	129.0	117.5
PRECIPITATION	Yearly total (mm)	293.0	354.8	360.8
	Greatest 24-h (mm)/Date	22.0/Apr 23	29.4/Jun 17	99.4/Jun 1983
	Days with Precipitation	99	109	113
WIND	Average Speed (km/h)	13.3	12.6	16.6
	Peak Gust Speed (km/h)/Date	86.3/Aug 01	100.8/July 04	151/Aug 1967/14
SUNSHINE	Total Bright Sunshine (h)	2224.9	2149.7	2380.8
	% Possible Bright Sunshine	49.9	55.5	53.8
	Number of days with Bright Sun	325	324	320
	Total Global Radiation (MJ/m^2)	4544.6	4379.1	4391.9
	Total Diffuse Radiation (MJ/m^2)	1707.7	1680.5	1729.6

FOR YOUR INFORMATION

1997

Temperature - July 25-29 supplied by AES - Saskatoon

Precipitation - July 25-29 supplied by AES - Saskatoon

Wind - Value excludes July 25 -29

Sunshine - July 25-29 supplied by Kernan Farm, U of S

Global - Feb 1.25 h missing
July 25-29 power outage

Diffuse - Jan 18 value may be in error due to frost build up on instrument
Feb 1.5 h missing
April 4-7 value may be in error due to instrument problems

1996

Temperature - Aug 1-6 supplied by AES - Saskatoon

Precipitation - Aug 1-6 supplied by AES - Saskatoon

Wind - Value excludes Aug 1-6

Sunshine - May 11-14 supplied by Kernan Farm, U of S
Aug 1-6 supplied by Kernan Farm, U of S

Global Radiation - Aug 1-6 missing or partial data

Normal and Extreme Values

For this year, the normals for CRS are taken from the normals published by Environment Canada for the standard period 1961-1990. Normals used in SRC CRS Annual Summaries 1990 -1996 were hand-calculated values determined before the official normals were published.

Extreme values are from the Saskatoon area weather stations and extend back to 1892. The earlier records from 1982 to 1901 have major gaps.

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MONTHLY WEATHER SUMMARY

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Latitude 52°09' N **SASKATOON** **Longitude 106°36' W**

JANUARY 1997

		1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE FOR CRS	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Monthly Average (°C)	-20.1	-23.1	-17.4	
	Extreme Monthly Maximum (°C)/Date	4.3/31	6.4/12	7.0/1986/11	10.0/1931/30
	Monthly Average Maximum (°C)	-14.1	-17.9	-12.4	
	Number of recording years			27	99
	Extreme Monthly Minimum (°C)/Date	-39.0/26	-42.6/19	-43.9/1966/22&1969/29	-48.9/1893/31
	Monthly Average Minimum (°C)	-26.1	-28.2	-22.6	
	Number of recording years			27	99
	Days with Frost	31	31	31	
	Heating Degree-Days (18°C base)	1192.4	1273.3	1114.8	
	Growing Degree-Days (5°C base)	0.0	0.0	0.0	
	Cooling Degree-Days (18°C base)	0.0	0.0	0.0	
PRECIPITATION	Monthly total (mm)	17.0	13.0	20.5	
	Greatest 24-h (mm)/Date	4.0/21	3/15 &16	15.4/1989/30	30.5/1893 /23
	Number of recording years			27	99
	Days with Precipitation	10	7	11	
	Total Year - to - Date	17.0	13.0	20.5	
WIND	Average Speed (km/h)	4.1	11.0	15.7	
	Peak Gust Speed (km/h)/Date	18.8/15	43.6/3	111.0/1986/11	
SUNSHINE	Total Bright Sunshine (h)	100.1	142.6	104.9	
	% Possible Bright Sunshine	39.1	55.7	41.0	
	Number of days with Bright Sun	24	26	24	
	Total Global Radiation (MJ/m^2)	125.9	153.6	129.9	
	Total Diffuse Radiation (MJ/m^2)	67.3	61.6	71.4	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	-10.0/-9.9	-11.0/-10.9	-8.8/-8.3	
	20 cm / 50 cm	-8.1/-3.8	-9.2/-4.4	-7.6/-3.8	
	100cm /150cm	0.1/1.8	-0.2/1.5	-0.2/1.8	
	300 cm	4.2	4.0	4.5	

FOR YOUR INFORMATION

The New Year arrived with above freezing temperatures only to plunge into the deep freeze for the duration of January. We had 11 days of below -30°C temperatures compared to 4 days of above zero temperatures. The monthly average was 2.7°C below the 30-year average while the maximum was 1.7°C below and the minimum was 3.5°C below. The unusually cold January was reflected in the increased heating degree-days total. Days with precipitation were near average but the amount was 3.5 mm below average. Bright sunshine and soil temperatures were generally close to the 30-year average.

This January may have seemed extreme but January 1996 was worse. Last year the monthly average temperature was 3°C colder than this year due to a near record breaking, 18 day cold spell near the end of the month. 50 years ago, the "big blizzard" of 1947 raged for 10 days beginning January 30th burying a Regina train under snowdrifts 1 km long and 8 m deep. The deep snow forced a dairy farmer in Moose Jaw, SK to cut a hole in his barn roof and to scale down inside in order to milk his cows.[1] We just have short memories!

1 Phillips 1996a

SASKATCHEWAN RESEARCH COUNCIL
MONTHLY WEATHER SUMMARY

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Latitude 52°09' N **SASKATOON** **Longitude 106°36' W**

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	FEBRUARY 1997	1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE FOR CRS	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Monthly Average (°C)	-10.0	-12.5	-13.7	
	Extreme Monthly Maximum (°C)/Date	4.3/24	6.5/21	7.5/ 1988/26&1991/06	12.8/1931/19
	Monthly Average Maximum (°C)	-5.1	-7.0	-8.6	
	Number of recording years			27	101
	Extreme Monthly Minimum (°C)/Date	-25.6/23	-39.9/01	-41.1/1972/6	-50.0 /1893/1
	Monthly Average Minimum (°C)	-15.0	-18.0	-18.9	
	Number of recording years			27	101
	Days with Frost	28	29	28	
	Heating Degree-Days (18°C base)	784.5	915.0	909.9	
	Growing Degree-Days (5°C base)	0.0	0	0.0	
	Cooling Degree-Days (18°C base)	0.0	0	0.0	
PRECIPITATION	Monthly total (mm)	8.0	16.0	14.6	
	Greatest 24-h (mm)/Date	2.0/13	8.0/13	14.2/1979/13	20.3/1918 /7
	Number of recording years			27	101
	Days with Precipitation	7	7	10	
	Total Year - to - Date	25.0	29.0	35.1	
WIND	Average Speed (km/h)	8.9	14.6	15.8	
	Peak Gust Speed (km/h)/Date	55.3/25	54.2/15	106.0/1988/22	
SUNSHINE	Total Bright Sunshine (h)	112.3	147.7	134.1	
	% Possible Bright Sunshine	41.0	53.9	48.6	
	Number of days with Bright Sun	21	26	25	
	Total Global Radiation (MJ/m^2)	359.6[a]	214.2	210.1	
	Total Diffuse Radiation (MJ/m^2)	107.4[b]	102.2	105.3	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	-7.5/-5.5	-8.6/-8.3	-7.7/-7.3	
	20 cm / 50 cm	-4.5/-2.5	-7.3/-4.6	-6.8/-4.1	
	100cm /150cm	-0.5/0.5	-1.6/0.5	-1.0/0.8	
	300 cm	2.5	2.7	3.3	

FOR YOUR INFORMATION

February's extreme maximum and minimum temperatures were only one day apart due to Chinook winds blowing across the prairies. During the Chinook, winds, generally moderate during February, were at *Near Gale* (55.3 km/h) on the 25th. The 3.7°C higher average monthly temperature is reflected in the 14% lower heating degree-days. The latter half of February had 4 days with above zero temperatures. Soil temperatures near the surface were warmer than usual but colder at the 300 cm level. Precipitation total was slightly greater than half the normal amount causing the yearly total to fall further behind the 30-year average. With 10 days having less than 1 hour of sunshine, the bright sunshine value was 21.8 hours less than usual.

In 1947, Snag YT recorded the lowest temperature ever in Canada at -63°C. The freezing of one's breath produced hissing, and dental fillings popped out.[1] Forty years later Rick Hansen's "Man in Motion" tour was met by no wind, snowless fields, grazing cattle and T-shirted spectators as he crossed the Prairies during the mild El Niño winter of 1987.[1]

[1]Phillips, 1995

[a] 1.25 h missing data

[b] 1.5 h missing data

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MONTHLY WEATHER SUMMARY

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Latitude 52°09' N **SASKATOON** **Longitude 106°36' W**

MARCH 1997

		1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE FOR CRS	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Monthly Average (°C)	-8.4	-10.1	-7.0	
	Extreme Monthly Maximum (°C)/Date	13.5/31	11.3/15	17.0/1986/27	22.8/1910/23
	Monthly Average Maximum (°C)	-3.0	-4.7	-2.1	
	Number of recording years			27	101
	Extreme Monthly Minimum (°C)/Date	-28.3/06	-32.5/5	-38.9/1972/02	-43.3/1897/14
	Monthly Average Minimum (°C)	-13.8	-15.5	-12.1	
	Number of recording years			27	101
	Days with Frost	31	30	30	
	Heating Degree-Days (18°C base)	818.6	872.8	784.1	
	Growing Degree-Days (5°C base)	1.1	0.8	1.2	
	Cooling Degree-Days (18°C base)	0.0	0.0	0.0	
PRECIPITATION	Monthly total (mm)	14.0	5.0	19.9	
	Greatest 24-h (mm)/Date	3.0/08&28	3.0/15	32.0/1967/30	32.0/1967/30
	Number of recording years			27	101
	Days with Precipitation	9	3	9	
	Total Year - to - Date	39.0	34.0	55.0	
WIND	Average Speed (km/h)	13.6	14.0	16.6	
	Peak Gust Speed (km/h)/Date	57.7/08	72.8/16	93.0/1959/18	
SUNSHINE	Total Bright Sunshine (h)	205.8	245.3	174.6	
	% Possible Bright Sunshine	56.2	67.0	48.3	
	Number of days with Bright Sun	30	31	27	
	Total Global Radiation (MJ/m^2)	417.1	448.6	362.4	
	Total Diffuse Radiation (MJ/m^2)	174.6	155.7	173.9	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	-4.9/-4.1	-5.9/-4.3	-3.4/-3.1	
	20 cm / 50 cm	-3.2/-2.3	-3.0/-1.8	-2.8/-1.8	
	100cm /150cm	-0.8/0.4	-0.9/0.1	-0.6/0.4	
	300 cm	2.3	1.8	2.5	

FOR YOUR INFORMATION

March fulfilled the old folklore rhyme of "in like a lion; out like a lamb." With the expected return of the Canada geese and gophers, the arrival of spring was right on schedule. Although the last half of the month produced daily maximum temperatures above 0°C values, the monthly average was more than a degree below normal. This is reflected in the high heating degree-days and colder than normal soil temperatures for the upper 4 levels. March, with only 5 days of less than 1 hour of sunshine, recorded a total bright sunshine value of 31.2 hours above normal. Precipitation was 5.9mm below normal. Normal precipitation for the traditional winter months of November through March is 91.8mm. This winter season's precipitation at 87 mm, slightly less than normal, was a surprise. Our askew perception of over abundant snow is the result of having over half of it fall in Nov./Dec. and by the proceeding two winters' below normal snowfall of 75mm (1995-96) and 62mm (1994-95).

SASKATCHEWAN RESEARCH COUNCIL
MONTHLY WEATHER SUMMARY

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Latitude 52°09' N **SASKATOON** **Longitude 106°36' W**

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APRIL 1997

		1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE FOR CRS	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Monthly Average (°C)	2.9	3.5	4.0	
	Extreme Monthly Maximum (°C)/Date	22.4/16	23.9/16	30.6/1977/26	33.0/1952/28
	Monthly Average Maximum (°C)	8.3	9.2	9.9	
	Number of recording years			27	100
	Extreme Monthly Minimum (°C)/Date	-15.4/07	-11.6/3	-27.8/1979/01	-28.3/1893/5&1954/2
	Monthly Average Minimum (°C)	-2.4	-2.2	-2.0	
	Number of recording years			27	100
	Days with Frost	17	25	20	
	Heating Degree-Days (18°C base)	452.0	433.1	420.9	
	Growing Degree-Days (5°C base)	54.1	39.3	54.8	
	Cooling Degree-Days (18°C base)	0.0	0.0	0.2	
PRECIPITATION	Monthly total (mm)	54.6	26.0	20.3	
	Greatest 24-h (mm)/Date	22.0/23	5.0/18&25	24.6/1985/19	30.2/1955/19
	Number of recording years			27	100
	Days with Precipitation	15	10	7	
	Total Year - to - Date	93.6	60.0	75.3	
WIND	Average Speed (km/h)	16.6	15.0	17.6	
	Peak Gust Speed (km/h)/Date	64.7/28	54.0/24	108.0/1959/06	
SUNSHINE	Total Bright Sunshine (h)	205.9	165.7	229.4	
	% Possible Bright Sunshine	49.6	39.9	55.0	
	Number of days with Bright Sun	28	26	27	
	Total Global Radiation (MJ/m^2)	488.8	454.7	492.2	
	Total Diffuse Radiation (MJ/m^2)	266.0	207.3	178.5	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	1.7/3.2	0.9/1.7	2.8/3.1	
	20 cm / 50 cm	3.8/1.4	1.9/0.6	3.5/2.5	
	100cm /150cm	0.8/0.8	0.1/0.3	1.2/1.2	
	300 cm	1.8	1.6	2.2	

FOR YOUR INFORMATION

Mother Nature entered the spirit of April's Fools Day with a vengeance. The 5 cm of wet snow was only a warning. By April's end, the SRC climate station had received 54.6 mm of precipitation in the form of snow, graupel and rain; 269% of normal for the month. 15 days out of 30 recorded precipitation; over twice the usual number of days. The rainy month resulted in 23.5 hours less bright sunshine. Meanwhile, the monthly temperatures remained under the normal values and are reflected in the higher heating degree-days and lower growing degree-days. The good news is, we had 3 days less frost than usual. The wind reached *Near Gale* (51-62km/h) 5 times and Gale (63-75kph) once during the month.

Although our extraordinary high precipitation level did not cause undue flooding here, many parts of Saskatchewan, the Northern States and Manitoba have been on flood alert for floods expected once in one hundred years. Exactly 100 years ago Fargo ND experienced record 40 ft (12m) flood levels - only one foot more than this year[1]. So do we expect another record flood in 2097 or next year?

[1]North Dakota State University 1997

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SASKATCHEWAN RESEARCH COUNCIL
MONTHLY WEATHER SUMMARY

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Latitude 52°09' N SASKATOON Longitude 106°36' W

MAY 1997

		1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE FOR CRS	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Monthly Average (°C)	10.7	8.7	11.6	
	Extreme Monthly Maximum (°C)/Date	30.2/31	24.4/31	35.0/1988/30	37.2/1936/27
	Monthly Average Maximum (°C)	17.5	14.3	18.5	
	Number of recording years			27	100
	Extreme Monthly Minimum (°C)/Date	-3.6/14	-5.9/09	-10.0/1967/02	-19.8/1907/6
	Monthly Average Minimum (°C)	3.8	3.1	4.5	
	Number of recording years			27	100
	Days with Frost	5	8	6	
	Heating Degree-Days (18°C base)	231.3	287.2	206.9	
	Growing Degree-Days (5°C base)	180.0	134.2	209.4	
	Cooling Degree-Days (18°C base)	4.1	0	7.0	
PRECIPITATION	Monthly total (mm)	19.6	27.8	43.7	
	Greatest 24-h (mm)/Date	7.4/07	7.0/15	39.9/1985/04	51.3/1909/30
	Number of recording years			27	100
	Days with Precipitation	8	11	9	
	Total Year - to - Date	113.2	87.8	119.0	
WIND	Average Speed (km/h)	16.7	13.6	17.6	
	Peak Gust Speed (km/h)/Date	69.2/10	54.0/7	132.0/1965/17	
SUNSHINE	Total Bright Sunshine (h)	219.1	153.0[a]	285.7	
	% Possible Bright Sunshine	45.2	31.5	59.0	
	Number of days with Bright Sun	29	27	29	
	Total Global Radiation (MJ/m^2)	625.3	505.2	586.3	
	Total Diffuse Radiation (MJ/m^2)	237.9	276.0	222.2	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	7.8/9.2	6.6/7.7	10.1/10.6	
	20 cm / 50 cm	10.5/6.8	8.2/5.5	10.9/8.9	
	100cm /150cm	5.4/4.2	3.8/2.6	5.9/4.4	
	300 cm	2.7	1.8	3.1	

FOR YOUR INFORMATION

This May was nothing to cheer about but at least it was better than last May when we experienced one of the coldest and cloudiest on record. Temperatures, this year, were about 0.7° to 1°C colder than normal. This is reflected in the 10% more heating degree-days and 14% less growing degree-days than normal. We did have 1 frost day less than normal. Precipitation was 45% of normal and came as snow on the 18th and 21st; an unwelcome guest to gardeners. Bright sunshine was 66.6 hours less than normal although every day except one received some sunshine. Soil temperatures are recovering slowly from the late spring.

Manitoba is slowly recovering from this year's flood disaster. It is the worst since 1950 when the Red River crested 9.2 m above normal. The 1950 Flood was described as the greatest flood disaster in Canadian history at that time. In all, 100,000 people were evacuated, 5,000 homes and buildings damaged, 1,600 km^2 of farmland submerged and a quarter of Winnipeg inundated.[1] The damage total for the 1997 flood is still being totalled.

[1] Phillips 1996a

[a] Sunshine data from May 11-14 provided by Kernan Farm, U of S

SASKATCHEWAN RESEARCH COUNCIL
MONTHLY WEATHER SUMMARY

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Latitude 52°09' N **SASKATOON** **Longitude 106°36' W**

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JUNE 1997

		1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE FOR CRS	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Monthly Average (°C)	17.4	16.6	15.9	
	Extreme Monthly Maximum (°C)/Date	30.3/26	33.5/08	41.0/1988/5	41.0/1988/5
	Monthly Average Maximum (°C)	23.4	22.8	22.6	
	Number of recording years			27	101
	Extreme Monthly Minimum (°C)/Date	6.4/24	2.8/24	-3.3/1967/6	-3.9/1903/9&1917/2
	Monthly Average Minimum (°C)	11.3	10.4	9.2	
	Number of recording years			27	101
	Days with Frost	0	0	0	
	Heating Degree-Days (18°C base)	42.1	76.6	84.0	
	Growing Degree-Days (5°C base)	371.8	348.7	327.3	
	Cooling Degree-Days (18°C base)	23.9	35.3	21.2	
PRECIPITATION	Monthly total (mm)	50.8	66.6	63.6	
	Greatest 24-h (mm)/Date	14.6/08	29.4/17	99.4/1983/24	99.4/1983/24
	Number of recording years			27	101
	Days with Precipitation	16	11	12	
	Total Year - to - Date	164.2	154.4	182.6	
WIND	Average Speed (km/h)	15.8	16.2	17.0	
	Peak Gust Speed (km/h)/Date	58.2/02	84.5/17	117.0/1986/10	
SUNSHINE	Total Bright Sunshine (h)	245.2	251.1	297.2	
	% Possible Bright Sunshine	49.3	50.5	59.0	
	Number of days with Bright Sun	30	26	29	
	Total Global Radiation (MJ/m^2)	661.5	623.4	638.7	
	Total Diffuse Radiation (MJ/m^2)	219.6	215.2	228.1	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	15.1/16.7	14.2/15.2	15.3/15.7	
	20 cm / 50 cm	17.7/12.7	15.6/12.6	16.2/14.0	
	100cm /150cm	9.8/7.8	9.1/7.0	10.4/8.2	
	300 cm	4.6	3.6	5.2	

FOR YOUR INFORMATION

June average temperatures were all above normal; 1.5°C for the monthly average, 0.8°C for the average maximum and 2.1°C for the average minimum. There was one day of above 30°C temperature and 8 days where the temperature dipped below 10°C. By the end of June, 47 continuous frost free-days had produced 486.1 growing degree-days. Even though there were 52.0 hours less sunshine and 4 more days with rain than normal, the amount of rain was 12.8 mm below the monthly normal. Precipitation total for the year is 19.6 mm less than normal. The station also recorded 7 days with *Near Gale* (51-62 km/h) force winds.

From April to October, it is tornado season in Canada. June wins the gold medal for the month with the most severe tornadoes. The preferred time of day for tornadoes to strike is 3 to 7 pm. During tornado season, an average of 1 tornado every 5 days is reported in Canada, compared to 5 tornadoes every day in the United States.[1]

[1]Phillips 1990

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SASKATCHEWAN RESEARCH COUNCIL
MONTHLY WEATHER SUMMARY

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Latitude 52°09' N **SASKATOON** **Longitude 106°36' W**

JULY 1997

		1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE FOR CRS	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Monthly Average (°C)	19.2[a]	18.5	18.3	
	Extreme Monthly Maximum (°C)/Date	34.7/22	34.1/03	38.5/1984/27	40.0/1919/17&1941/19
	Monthly Average Maximum (°C)	26.8[a]	24.8	25.1	
	Number of recording years			27	101
	Extreme Monthly Minimum (°C)/Date	3.6/01	7.9/08	1.7/1967/2&1978/09	-0.6/1918/25
	Monthly Average Minimum (°C)	11.6[a]	12.1	11.5	
	Number of recording years			27	101
	Days with Frost	0	0	0	
	Heating Degree-Days (18°C base)	24.8[a]	22.9	32.0	
	Growing Degree-Days (5°C base)	441.3[a]	418.3	414.8	
	Cooling Degree-Days (18°C base)	63.1[a]	38.2	43.9	
PRECIPITATION	Monthly total (mm)	22.0[a]	74.0	55.7	
	Greatest 24-h (mm)/Date	8.4/06	27.8/17	45.5/1968/29	79.2/1946/3
	Number of recording years			27	101
	Days with Precipitation	8[a]	16	11	
	Total Year - to - Date	186.2[a]	228.4	238.3	
WIND	Average Speed (km/h)	12.7[b]	12.6	15.5	
	Peak Gust Speed (km/h)/Date	63.0/04[b]	100.1/04	113.0/1955/05	
SUNSHINE	Total Bright Sunshine (h)	306.5[c]	278.4	333.3	
	% Possible Bright Sunshine	61.2[c]	55.6	66.5	
	Number of days with Bright Sun	31	31	30	
	Total Global Radiation (MJ/m^2)	626.4[b]	674.2	633.5	
	Total Diffuse Radiation (MJ/m^2)	182.4[b]	209.2	216.5	
SOIL	Average Temperature (°C) @ 0900 h	5 cm /10 cm	16.6[b]/18.6[b]	16.5/18.0	17.6/18.0
		20 cm / 50 cm	19.8[b]/14.9[b]	18.8/15.9	18.8/16.8
		100cm /150cm	12.0[b]/10.2[b]	na/9.9	13.2/11.1
		300 cm	6.8[b]	6.0	7.5

FOR YOUR INFORMATION

July was a very warm month with 15 days of above 27°C temperatures; 6 of which were over 30°C. The average temperature was 0.9°C above normal with the maximum average 1.7°C above normal. This is reflected in the higher than normal growing and cooling degree-days. By the end of July, the frost-free period was at 78 days with the frost free growing degree-days at 927.4. The bright sunshine value was 23.8 hours less than normal but this did not translate into much needed precipitation. The rainfall was 60.6% less than normal by the end of the month with the yearly total increasing to 52.1 mm below normal. July was not a particularly windy month but it did have its moments such as on July 4th when the winds reach *Near Gale* force at 63 kph.

Two years ago on July 30th at Oxbow, SK a "plough wind" ripped through the area for 10 minutes littering the street with shingles, insulation, wood, glass, tree branches and tops off grain elevators[1].

[1] Phillips 1996a

[a] Values for July 25-29 supplied by AES , Saskatoon
[b] Values exclude July 25-29
[c] Values for July 25-29 supplied by Kernen Farm, U of S

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SASKATCHEWAN RESEARCH COUNCIL
MONTHLY WEATHER SUMMARY

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Latitude 52°09' N **SASKATOON** **Longitude 106°36' W**

	AUGUST 1997	1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE FOR CRS	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Monthly Average (°C)	19.0	19.1[a]	17.2	
	Extreme Monthly Maximum (°C)/Date	39.3/07	35.8/30[b]	39.3/1997/07	39.3/07/1997
	Monthly Average Maximum (°C)	26.5	27.0[a]	24.3	
	Number of recording years			27	100
	Extreme Monthly Minimum (°C)/Date	5.1/12	5.9/25[b]	-2.8/1976/28	-2.8/1976/28
	Monthly Average Minimum (°C)	11.4	11.1[a]	10.1	
	Number of recording years			27	100
	Days with Frost	0	0	0	
	Heating Degree-Days (18°C base)	40.5	21.9[a]	62.4	
	Growing Degree-Days (5°C base)	434.1	437.5[a]	379.6	
	Cooling Degree-Days (18°C base)	71.6	56.4[a]	39.0	
PRECIPITATION	Monthly total (mm)	45.0	28.0	35.3	
	Greatest 24-h (mm)/Date	13.0/14	na	27.9/1989/25	73.7/1945/3
	Number of recording years			27	100
	Days with Precipitation	9	6[b]	9	
	Total Year - to - Date	231.2	256.4	273.6	
WIND	Average Speed (km/h)	12.8	13.0[c]	15.5	
	Peak Gust Speed (km/h)/Date	86.3/01	62.1/12[c]	151.0/1967/14	
SUNSHINE	Total Bright Sunshine (h)	286.6	323.6[d]	295.2	
	% Possible Bright Sunshine	63.3	71.4[d]	65.0	
	Number of days with Bright Sun	31	31[d]	30	
	Total Global Radiation (MJ/m^2)	586.5	534.3[e]	529.0	
	Total Diffuse Radiation (MJ/m^2)	154.9	119.7[e]	185.6	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	16.2/18.2	15.8[c]/17.6[c]	16.4/16.8	
	20 cm / 50 cm	19.8/16.1	18.5[c]16.0[c]	17.9/16.8	
	100cm /150cm	13.4/11.8	13.4[c]/11.8[c]	14.1/12.4	
	300 cm	8.5	8.2[c]	9.1	

FOR YOUR INFORMATION

August began with a week of temperatures ranging from 29.2°C to a record-breaking 39.3°C. This temperature broke the previous record of 37.8°C set in 1893 and 1949. The week of high temperatures pushed up the monthly average by 1.8°C and the average maximum by 2.2°C. The high temperatures decreased the heating degree-days and increased the growing-degree-days. By the end of the month, the frost free period was 109 days with a growing-degree value of 1361.5. Three days during this hot spell produced an extreme cooling degree-day value of 7.7 (base 24). Rainfall was 9.7 mm above normal. The station received 8.6 hours less sunshine than usual but only 2 days received less than 1 hour.

In 1987 the prairie weather was significantly cooler and wetter than normal, with record daily low temperatures being set in several localities. The slump in beer sales was so great it forced a temporary shutdown of Carling O'Keefe's Calgary brewery.[1]

[1] Phillips, 1997

a August 1-6 data supplied by AES Saskatoon
bConfirmed with AES Saskatoon
c Based on data from August 7-31
d August 1-6 data supplied by Kernen Farm, Univ. of SK
e August 1-6 data missing or partial

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SASKATCHEWAN RESEARCH COUNCIL
MONTHLY WEATHER SUMMARY

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Latitude 52°09' N SASKATOON Longitude 106°36' W

	SEPTEMBER 1997		1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE FOR CRS	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Monthly Average (°C)		14.6	11.0	11.3	
	Extreme Monthly Maximum (°C)/Date		31.3/11	24.3/08	35.6 /1978 /04	35.6 /1978 /4
	Monthly Average Maximum (°C)		21.6	16.2	17.7	
	Number of recording years				27	99
	Extreme Monthly Minimum (°C)/Date		0.9/19	-4.4/29	-7.8 /1974 /30	-11.1/1908/28
	Monthly Average Minimum (°C)		7.5	5.8	4.9	
	Number of recording years				27	99
	Days with Frost		0	2	5	
	Heating Degree-Days (18°C base)		116.7	209.4	206.2	
	Growing Degree-Days (5°C base)		288.2	189.6	197.1	
	Cooling Degree-Days (18°C base)		14.3	0.0	6.2	
PRECIPITATION	Monthly total (mm)		39.4	43.4	32.9	
	Greatest 24-h (mm)/Date		14.8/15&16	19.4/05	29.6/1980/03	44.2 /1931/12
	Number of recording years				27	99
	Days with Precipitation		5	10	9	
	Total Year - to - Date		270.6	299.8	306.5	
WIND	Average Speed (km/h)		16.5	15.8	16.7	
	Peak Gust Speed (km/h)/Date		74.8/28	58.1/13	148/1967/22	
SUNSHINE	Total Bright Sunshine (h)		220.3	134.4	184.4	
	% Possible Bright Sunshine		58.1	35.5	48.0	
	Number of days with Bright Sun		27	27	27	
	Total Global Radiation (MJ/m^2)		395.2	317.0	351.8	
	Total Diffuse Radiation (MJ/m^2)		112.5	140.8	127.6	
SOIL	Average	5 cm /10 cm	11.4/13.4	15.1/12.0	10.5/11.2	
	Temperature (°C)	20 cm / 50 cm	15.0/13.3	13.4/13.5	12.5/13.3	
	@ 0900 h	100cm /150cm	12.4/11.7	12.3/11.5	12.5/11.9	
		300 cm	8.8	9.1	9.9	

FOR YOUR INFORMATION

This September, an exceptionally warm month, recorded all monthly averages well above their 30 year normal values: mean maximum 3.9°C; mean minimum 2.6°C and the monthly mean 3.3°C higher. By September 30th, no frost had yet been recorded at the site since May 14th lengthening the growing season to 139 days. Precipitation (higher than normal) fell on three days mid-month leaving the rest of the month warm and bright. We had 35.9 hours more bright sunshine than normal. On the average, September was not a windy month but *Near Gale* (51-62 km/h) winds did occur four times and *Gale* (63-75 km/h) winds twice.

On September 8th, 1759, General Wolfe cancelled his plans to land an army of 3600 men on the north shore above Quebec City due to heavy rains and gale-force winds. Five days later on September 13th he defeated Montcalm on the 'Plains of Abraham' after scaling the cliffs during a calm night of fine weather.[1]

[1] Phillips, 1996a

SASKATCHEWAN RESEARCH COUNCIL
MONTHLY WEATHER SUMMARY

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Latitude 52°09' N **SASKATOON** **Longitude 106°36' W**

	OCTOBER 1997	1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE FOR CRS	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Monthly Average (°C)	4.7	3.6	4.8	
	Extreme Monthly Maximum (°C)/Date	28.1/02	23.4/11	28.5 /1984 /08	32.2 /1943 /5
	Monthly Average Maximum (°C)	10.1	9.6	10.9	
	Number of recording years			27	99
	Extreme Monthly Minimum (°C)/Date	-7.5/20	-16.5/31	-21.5/1984/30&31	-25.6/1919/26
	Monthly Average Minimum (°C)	-0.8	-2.5	-1.3	
	Number of recording years			27	99
	Days with Frost	19	19	20	
	Heating Degree-Days (18°C base)	414.4	448.8	406.5	
	Growing Degree-Days (5°C base)	57.9	58.9	61.5	
	Cooling Degree-Days (18°C base)	0.0	0.0	0.0	
PRECIPITATION	Monthly total (mm)	20.8	7.0	17.5	
	Greatest 24-h (mm)/Date	16.4/07	2.0/14&29	36.7/1984/16	36.7/1984 /16
	Number of recording years			27	99
	Days with Precipitation	8	5	6	
	Total Year - to - Date	291.4	306.8	324.0	
WIND	Average Speed (km/h)	16.4	13.5	17.1	
	Peak Gust Speed (km/h)/Date	67.2/13	57.2/29	138/1967/16	
SUNSHINE	Total Bright Sunshine (h)	144.2	151.6	160.7	
	% Possible Bright Sunshine	43.8	46.1	49	
	Number of days with Bright Sun	26	26	27	
	Total Global Radiation (MJ/m^2)	223.0	234.6	239.1	
	Total Diffuse Radiation (MJ/m^2)	92.4	74.2	92.6	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	3.7/5.5	3.0/4.6	4.1/4.5	
	20 cm / 50 cm	7.3/8.0	6.1/7.9	6.0/8.0	
	100cm /150cm	9.5/9.8	8.8/9.3	9.2/9.7	
	300 cm	9.2	8.8	9.5	

FOR YOUR INFORMATION

The first frost of the fall occurred at the station on Oct. 5 ending a 143 day frost-free season with 1682.9 growing degree-days. The late frost resulted in 25 days more than the normal 118 frost-free days. All recorded weather elements were near normal values. The majority of the rainfall occurred on Oct. 7 with 16.4 mm. Traces of snow were observed on the 13 and 24. It was not a windy month with *Near Gale* winds only occurring thrice and *Gale* winds once. With the good harvest weather, the crops are above average quality with 94% of the Sask. spring wheat crop expected to grade No. 1 & 2 Canada Western. Other crops are also expected to be in their top grades.[1]

This pleasant interlude of warm weather between the first killing frost and the onset of winter has been called "Indian Summer" in Canada as far back as 1796 as noted in the diary of Lady Simcoe, wife of the first Lieutenant-governor of Upper Canada. A 1778 reference by Joseph Doddridge of Virginia suggests a possible origin of the term. Native Americans would harass the settlers all summer then stop when the cold weather arrived. They would resume their fighting if a spell of unseasonable warm weather occurred to which the settlers then called "Indian summer".[2]

[1] Karwandy 1997
[2] Phillips 1993

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SASKATCHEWAN RESEARCH COUNCIL
MONTHLY WEATHER SUMMARY

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Latitude 52°09' N **SASKATOON** **Longitude 106°36' W**

NOVEMBER 1997

		1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE FOR CRS	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Monthly Average (°C)	-3.1	-11.8	-6.0	
	Extreme Monthly Maximum (°C)/Date	12.3/06	9.5/02	19.4/1975 /04	21.7 /1903 /3
	Monthly Average Maximum (°C)	1.4	-7.2	-1.5	
	Number of recording years			28	99
	Extreme Monthly Minimum (°C)/Date	-15.3/21	-30.4/24	-33.5/1985/24	-39.4 /1893/30
	Monthly Average Minimum (°C)	-7.5	-16.3	-10.6	
	Number of recording years			29	99
	Days with Frost	29	30	28	
	Heating Degree-Days (18°C base)	631.8	892.3	721.5	
	Growing Degree-Days (5°C base)	0.4	0.0	2.7	
	Cooling Degree-Days (18°C base)	0.0	0.0	0.0	
PRECIPITATION	Monthly total (mm)	1.6	24.0	15.5	
	Greatest 24-h (mm)/Date	1.0/22	13.0/19	19.3/1978/04	27.9/1938 /1
	Number of recording years			28	99
	Days with Precipitation	2	9	8	
	Total Year - to - Date	293.0	330.8	339.5	
WIND	Average Speed (km/h)	12.3	12.2	15.3	
	Peak Gust Speed (km/h)/Date	54.1/29	45.4/07	100.0/1976/17	
SUNSHINE	Total Bright Sunshine (h)	97.2	80.2	100.9	
	% Possible Bright Sunshine	37.0	30.5	38.0	
	Number of days with Bright Sun	24	24	22	
	Total Global Radiation (MJ/m²)	126.2	122.4	123.7	
	Total Diffuse Radiation (MJ/m²)	59.8	64.6	73.6	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	-2.1/-0.6	-3.5/-2.6	-2.2/-1.7	
	20 cm / 50 cm	1.3/2.8	-1.0/2.5	-0.5/2.8	
	100cm /150cm	5.7/6.8	4.9/6.3	5.4/6.8	
	300 cm	8.0	7.5	8.1	

FOR YOUR INFORMATION

November was greatly appreciated with its average temperatures 2.9° above normal. There were 15 days when the temperature rose above 0°C allowing golfing fanatics to play right until the end of the month. The high temperatures are reflected in the lower than normal heating degree-days. Soil temperatures were normal except at the 10 cm level (1.1°C above normal) and the 20 cm level (1.8°C above normal). Saskatoon received only a fraction of its normal November precipitation at 1.6 mm compared to the normal of 15.5 mm. Only a trace of snow remained by the end of the month in shaded areas. We received 97.2 hours of bright sunshine; 3.7 hours less than normal. These values are a direct contrast to last November when we were battling -30.0°C temperatures and 12.5 cm of snow on the ground.

Have you ever wondered how clouds and rain are formed? A survey of some fifth- and sixth-graders offer these suggestions: "Clouds are made by vapours from steam kettles." "Water vapour gets together in a cloud. When it is big enough to be called a drop, it does." "I am not sure how clouds get formed. But the clouds know how to do it, and that is the important thing." [1]

[1]Phillips 1996b

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SASKATCHEWAN RESEARCH COUNCIL
MONTHLY WEATHER SUMMARY

technology is our business

Latitude 52°09' N **SASKATOON** **Longitude 106°36' W**

DECEMBER 1997

		1997 VALUE	1996 VALUE	NORMAL (1961-1990) OR EXTREME VALUE FOR CRS	EXTREME FOR SASKATOON STATIONS
TEMPERATURE	Monthly Average (°C)	-4.5	-18.4	-14.5	
	Extreme Monthly Maximum (°C)/Date	11.2/14	-1.0/05	11.2/1997/14	13.3/1939 /05
	Monthly Average Maximum (°C)	0.1	-13.9	-9.8	
	Number of recording years			28	99
	Extreme Monthly Minimum (°C)/Date	-18.5/04	-36.1/29	-42.2/ 1973/31	-43.9 / 1892/ 22
	Monthly Average Minimum (°C)	-9.1	-22.9	-19.3	
	Number of recording years			28	99
	Days with Frost	31	31	31	
	Heating Degree-Days (18°C base)	697.9	1129.2	1004.8	
	Growing Degree-Days (5°C base)	0.4	0.0	0.0	
	Cooling Degree-Days (18°C base)	0.0	0.0	0.0	
PRECIPITATION	Monthly total (mm)	1.2	24.0	21.3	
	Greatest 24-h (mm)/Date	0.9/29	3.0/2,20,27&30	14.5/1973/23	20.6/1936 /24
	Number of recording years			28	99
	Days with Precipitation	2	14	12	
	Total Year - to - Date	294.2	354.8	360.8	
WIND	Average Speed (km/h)	13.4	14.8	15.7	
	Peak Gust Speed (km/h)/Date	62.3/29	56.8/16	121/1955/12	
SUNSHINE	Total Bright Sunshine (h)	82.9	76.1	83.7	
	% Possible Bright Sunshine	34.7	31.8	35.0	
	Number of days with Bright Sun	24	23.0	23	
	Total Global Radiation (MJ/m^2)	86.2	96.9	95.2	
	Total Diffuse Radiation (MJ/m^2)	40.3	54.0	54.3	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	-5.0/-3.8	-6.0/-5.4	-7.1/-6.5	
	20 cm / 50 cm	-2.2/-0.6	-3.8/-0.4	-5.5/-1.6	
	100cm /150cm	2.5/4.1	2.4/3.9	1.9/3.9	
	300 cm	6.3	5.7	6.3	

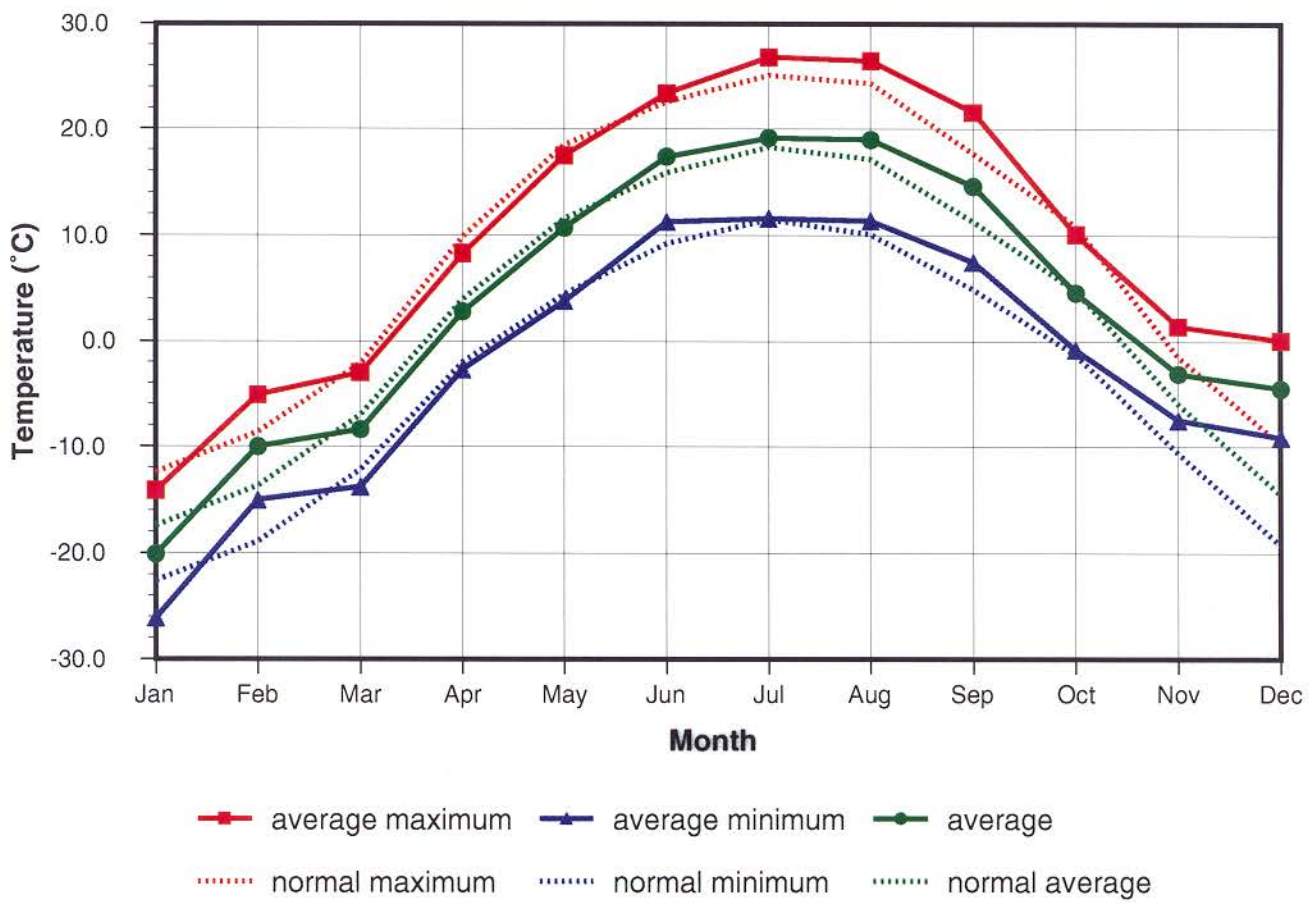
FOR YOUR INFORMATION

This December, Santa delivered toys dressed in shorts and had wheels attached to his sleigh. With only 1.2 mm of measurable precipitation at the end of the month, the snow on the ground was negligible. It rained trace amounts on the 17 and 23. The average maximum and minimum temperatures were 9.9°C and 10.2°C above normal respectfully, creating an overall monthly average of 10.0°C above normal. The extreme maximum temperature of 11.2°C came within 2.1°C of the record set in 1939. Overall, there were 18 days above 0°C. The upper level soil temperatures reflected the warm daytime temperatures. The 10 cm level was 2.7°C above normal and the 50cm level was 1.0°C above normal. Bright sunshine values were near normal for December.

The strange weather patterns for December were likely caused by a Pacific Ocean phenomena named El Niño. It occurs every 3-5 years with a strong event every 7-10 years or so. The current El Niño has been usually strong. It has allowed avid outdoor enthusiasts to golf in the morning and then down-hill ski in the afternoon at the mountain ski resorts during the Christmas holidays.

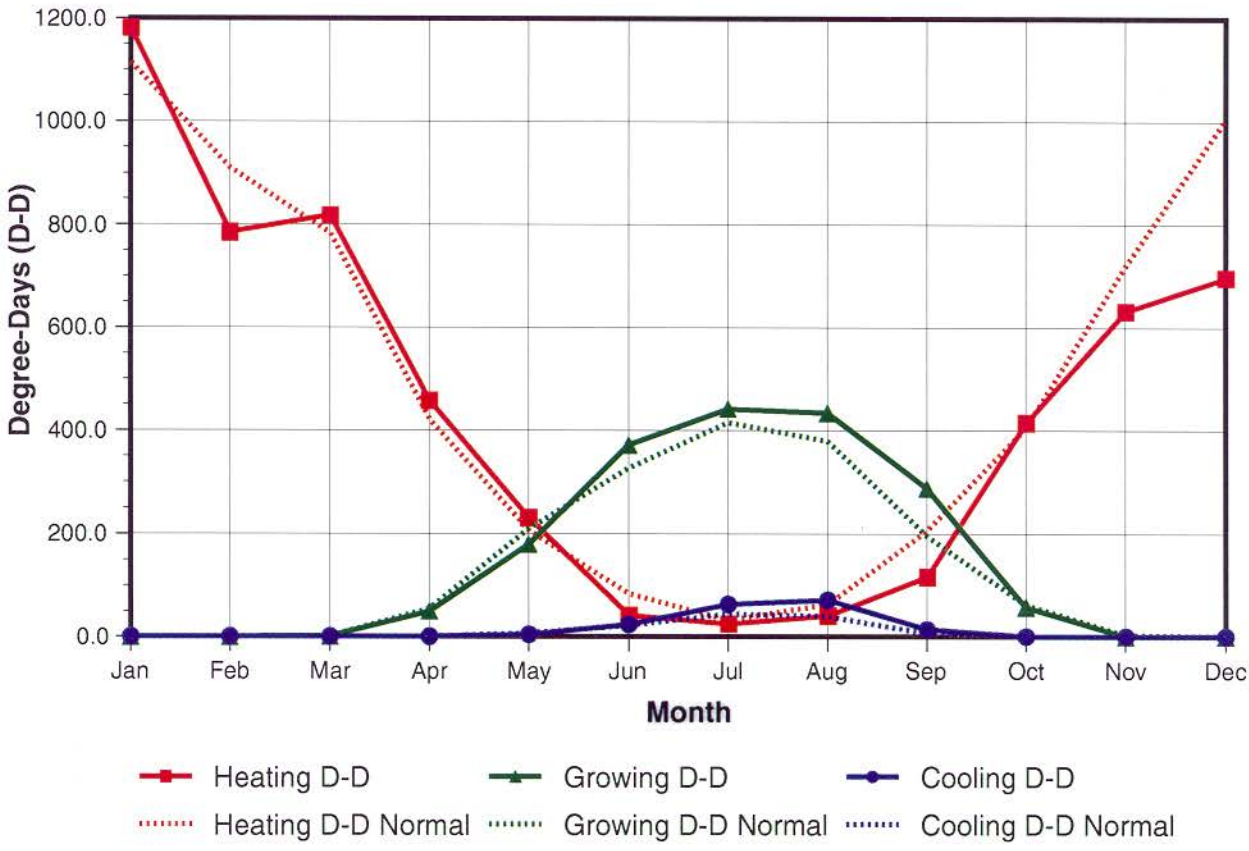
Monthly Average Temperatures, 1997

Month	Average Maximum Temperature (°C)		Average Minimum Temperature (°C)		Average Temperature (°C)	
	1997	Normal	1997	Normal	1997	Normal
January	-14.1	-12.4	-26.1	-22.6	-20.1	-17.4
February	-5.1	-8.6	-15.0	-18.9	-10.0	-13.7
March	-3.0	-2.1	-13.8	-12.1	-8.4	-7.0
April	8.3	9.9	-2.7	-2.0	2.8	4.0
May	17.5	18.5	3.8	4.5	10.7	11.6
June	23.4	22.6	11.3	9.2	17.4	15.9
July	26.8	25.1	11.6	11.5	19.2	18.3
August	26.5	24.3	11.4	10.1	19.0	17.2
September	21.6	17.7	7.5	4.9	14.6	11.3
October	10.1	10.9	-0.8	-1.3	4.7	4.8
November	1.4	-1.5	-7.5	-10.6	-3.1	-6.0
December	0.1	-9.8	-9.1	-19.3	-4.5	-14.5
Average	9.5	7.9	-2.5	-3.9	3.5	2.0



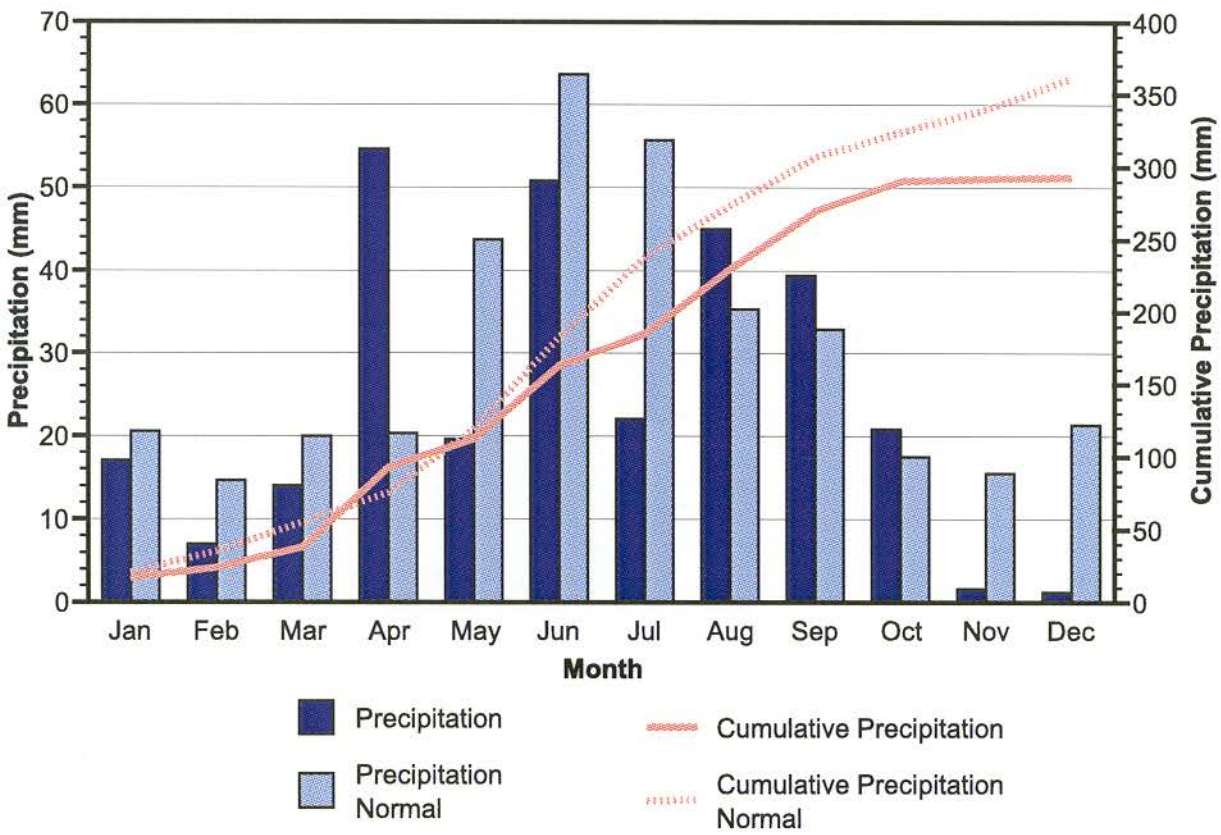
Monthly Degree-Days (D-D), 1997

Month	Heating Degree-Days Base 18°C		Growing Degree-Days Base 5°C		Cooling Degree-Days Base 18°C		Extreme Cooling D-D Base 24°C	
	1997	Normal	1997	Normal	1997	Normal	1997	Normal
January	1181.2	1114.8	0.0	0.0	0.0	0.0	0	0.0
February	785.3	909.9	0.0	0.0	0.0	0.0	0	0.0
March	818.6	784.1	1.1	1.2	0.0	0.0	0	0.0
April	457.1	420.9	49.1	54.8	0.0	0.2	0	0.0
May	231.1	206.9	180.2	209.4	4.1	7.0	0	0.2
June	42.1	84.0	371.8	327.3	23.9	21.2	0	1.3
July	24.8	32.0	441.4	414.8	63.2	43.9	1.6	1.7
August	40.5	62.4	434.1	379.6	71.6	39.0	7.7	1.5
September	116.7	206.2	288.2	197.1	14.3	6.2	0	0.1
October	414.5	406.5	57.8	61.5	0.6	0.0	0	0.0
November	631.8	721.5	0.4	2.7	0.0	0.0	0	0.0
December	697.9	1004.8	0.4	0.0	0.0	0.0	0	0.0
Total	5441.6	5954.0	1824.5	1648.4	177.7	117.5	9.3	4.8



Monthly Precipitation, 1997

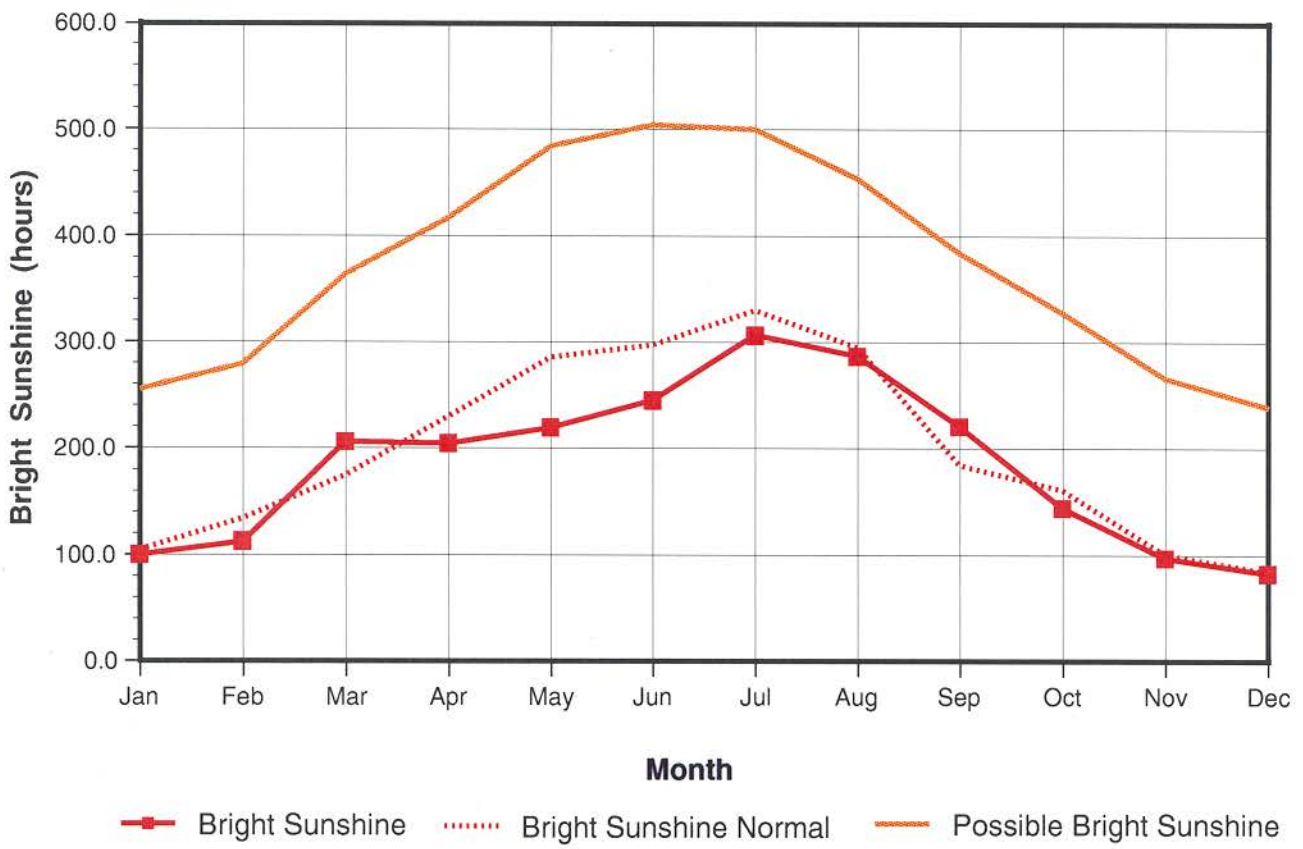
Month	Precipitation (mm)		Cumulative Precipitation (mm)	
	1997	Normal	1997	Normal
January	17.0	20.5	17.0	20.5
February	7.0	14.6	24.0	35.1
March	14.0	19.9	38.0	55.0
April	54.6	20.3	92.6	75.3
May	19.6	43.7	112.2	119.0
June	50.8	63.6	163.0	182.6
July	22.0	55.7	185.0	238.3
August	45.0	35.3	230.0	273.6
September	39.4	32.9	269.4	306.5
October	20.8	17.5	290.2	324.0
November	1.6	15.5	291.8	339.5
December	1.2	21.3	293.0	360.8
Total	293.0	360.8	293.0	360.8



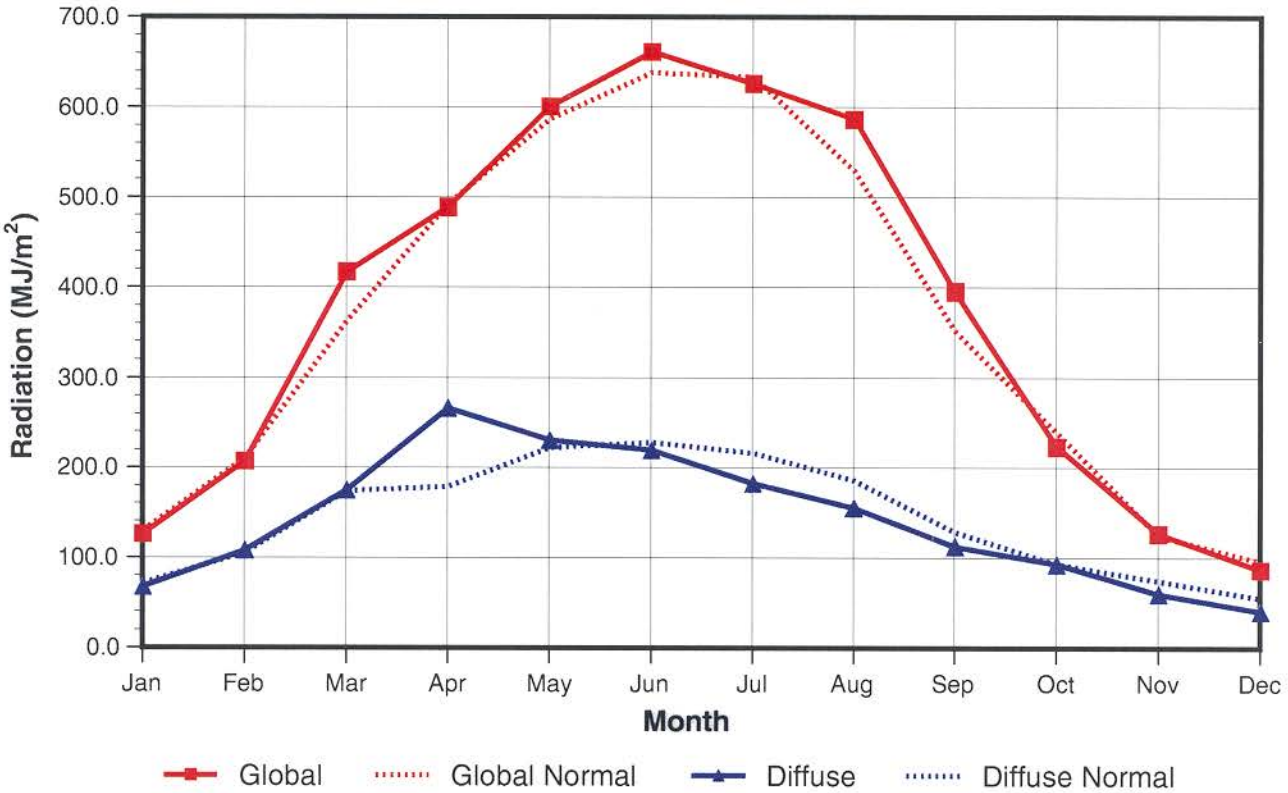
Monthly Solar Radiation, 1997

Month	Bright Sunshine (hours)			Global Radiation (MJ/m^2)		Diffuse Radiation (MJ/m^2)	
	1997	Normal	Possible	1997	Normal	1997	Normal
January	100.1	104.6	256.0	125.9	129.9	67.3	71.4
February	112.6	134.1	274.0	207.2	210.1	107.4	105.3
March	205.8	174.6	366.0	417.1	362.4	174.6	173.9
April	204.4	229.4	415.0	488.8	492.2	266.0	178.5
May	219.1	285.7	485.0	600.6	586.3	230.5	222.2
June	245.2	297.2	497.0	661.5	638.7	219.6	228.1
July	306.5	330.3	501.0	626.4	633.5	182.4	216.5
August	286.6	295.2	453.0	586.5	529.0	154.9	185.6
September	220.3	184.4	379.0	395.2	351.8	112.5	127.6
October	144.2	160.7	329.0	223.0	239.1	92.4	92.6
November	97.2	100.9	263.0	126.2	123.7	59.8	73.6
December	82.9	83.7	239.0	86.2	95.2	40.3	54.3
Total	2224.9	2380.8	4457.0	4544.6	4391.9	1707.7	1729.6

Monthly Bright Sunshine, 1997



Monthly Global and Diffuse Solar Radiation, 1997



Daily Global and Diffuse Solar Radiation (MJ/m²), 1997

DATE	JAN		FEB		MAR		APR		MAY		JUN		JULY		AUG		SEPT		OCT		NOV		DEC	
1997	G[1]	D[2]	G	D	G	D	G	D	G	D	G	D	G	D	G	D	G	D	G	D	G	D	G	D
1	2.5	1.6	3.9	3.8	6.0	5.6	3.4	3.2	20.5	8.0	24.7	7.4	25.3	8.9	23.6	5.2	20.5	2.4	13.0	3.0	2.7	2.7	5.0	1.0
2	3.6	1.7	3.5	3.6	8.0	6.0	17.1	11.7	21.8	7.7	21.7	8.8	24.5	8.4	24.0	4.3	19.8	2.2	9.1	4.9	7.0	1.6	5.8	1.1
3	2.2	2.2	5.1	3.1	15.1	3.1	13.6	12.1	25.6	4.1	27.3	6.0	24.5	7.6	22.8	3.3	16.3	5.4	10.8	4.5	5.0	3.7	1.2	1.2
4	5.0	1.8	6.1	1.7	10.5	7.4	7.4	13.6	21.0	6.3	22.0	5.9	18.1	7.9	25.3	2.6	16.1	3.9	11.7	2.8	5.7	2.7	5.6	1.5
5	2.5	2.0	9.4	2.6	13.0	4.3	14.2	17.0	22.8	7.3	27.7	6.6	29.6	2.9	23.9	3.1	4.7	4.3	11.7	3.8	5.9	3.0	2.2	1.7
6	2.6	2.3	2.5	2.5	12.6	4.7	15.2	18.2	21.3	8.6	16.5	9.3	24.5	5.7	24.1	2.7	13.9	6.5	12.3	2.3	6.1	2.1	2.3	1.5
7	3.0	2.4	5.5	3.0	15.1	3.3	14.7	23.2	5.6	4.8	26.9	6.5	22.6	8.2	20.9	5.6	18.0	3.2	1.0	1.1	3.7	3.0	1.4	1.1
8	3.0	2.3	10.3	2.3	7.4	7.0	20.4	13.1	26.6	3.5	5.8	4.9	24.2	10.0	10.0	8.6	17.7	3.5	4.8	4.6	8.8	1.3	2.0	1.6
9	5.5	1.6	4.7	4.1	13.0	4.5	22.1	5.9	24.3	6.8	22.2	12.6	16.8	8.9	15.4	9.4	17.4	2.1	6.7	5.3	7.7	1.4	1.4	1.3
10	4.4	2.4	4.1	3.5	16.0	2.4	22.2	5.8	10.1	6.8	28.0	6.2	17.9	9.6	24.4	5.6	17.4	2.4	10.4	4.0	2.5	2.5	4.8	1.1
11	5.7	2.0	6.6	4.9	14.4	5.4	22.2	6.1	23.8	5.6	27.0	8.3	17.2	9.7	20.1	6.6	16.6	4.1	2.1	2.1	4.7	3.5	3.2	2.0
12	6.5	1.3	5.9	4.7	10.3	9.0	21.9	6.4	18.0	9.9	28.4	6.3	28.7	3.9	24.9	2.3	3.6	3.2	3.7	3.2	4.4	2.2	2.9	1.5
13	4.2	1.5	7.3	4.9	15.2	3.6	21.2	7.2	26.6	4.6	21.8	11.2	24.9	5.0	17.2	6.1	18.1	2.2	4.8	3.7	4.8	2.3	2.8	2.2
14	4.7	2.0	5.4	5.1	16.1	4.1	15.3	18.4	25.4	9.5	18.6	8.9	25.2	4.7	11.3	6.7	13.6	7.3	9.5	2.5	8.0	1.3	1.9	1.8
15	4.2	1.3	5.5	5.7	16.4	4.1	22.3	5.7	26.1	5.8	28.6	4.4	24.7	5.5	9.9	7.3	1.7	1.7	9.4	3.0	6.0	1.1	1.8	1.3
16	5.9	1.7	7.8	5.9	12.2	7.2	6.7	2.3	26.0	4.7	10.8	7.0	24.2	5.8	16.8	9.1	3.8	3.3	7.1	4.3	0.8	0.8	2.5	1.6
17	3.4	2.4	4.6	4.1	13.8	4.7	22.3	2.6	13.4	6.0	25.1	6.8	18.5	10.2	17.5	8.1	16.8	2.1	9.3	1.9	1.8	1.7	2.9	1.1
18	4.7	0.0	8.7	3.8	14.8	8.8	22.2	3.1	11.3	10.1	25.8	5.9	12.4	9.3	22.7	3.6	5.5	4.8	6.4	2.6	1.0	1.0	1.2	1.1
19	4.0	1.7	9.4	4.9	14.0	8.4	5.3	4.9	20.0	11.3	25.1	7.0	27.4	3.7	20.3	4.4	11.6	6.5	10.1	2.2	1.1	1.1	4.3	1.3
20	2.0	1.9	7.0	4.4	13.8	8.2	18.8	7.5	11.8	10.3	8.5	7.0	25.6	8.2	21.5	3.2	15.1	2.6	9.4	1.7	2.9	2.7	4.2	1.2
21	2.4	2.4	6.6	6.1	17.4	2.0	10.9	8.5	3.9	3.3	14.6	9.9	22.5	6.9	16.7	8.4	14.6	3.1	4.4	3.8	2.1	1.9	3.5	0.7
22	4.3	3.5	11.2	1.7	18.6	3.2	11.2	8.9	11.9	9.9	7.8	6.7	24.7	5.3	20.4	4.7	14.9	2.6	7.6	2.7	2.6	2.3	4.2	0.8
23	3.3	3.2	11.3	2.9	9.7	8.2	14.2	7.1	21.8	10.9	24.5	4.9	24.3	4.6	21.7	2.4	15.6	2.0	1.2	1.3	3.7	2.5	0.8	0.8
24	4.5	3.6	11.9	3.4	13.4	5.5	14.3	8.4	5.1	4.4	27.4	5.8	24.9	6.0	7.3	5.0	14.8	2.0	5.2	4.3	4.8	1.1	2.6	1.0
25	6.8	2.1	6.2	4.3	16.1	6.9	19.3	6.2	10.7	9.5	23.7	10.3	4.4	3.0	20.9	4.2	13.6	4.3	8.7	1.8	4.9	1.1	3.6	0.6
26	4.4	2.3	13.4	2.4	13.5	8.5	21.6	5.3	23.8	9.2	29.2	2.9	M	M	20.6	2.4	12.6	5.5	6.4	3.9	2.8	1.8	2.3	1.5
27	4.3	2.8	10.8	5.2	17.5	3.5	16.4	9.0	22.0	12.8	29.9	3.4	M	M	19.2	5.3	12.1	4.6	7.0	3.2	3.9	2.3	1.4	1.4
28	2.6	2.5	12.6	2.8	6.5	5.4	10.9	8.9	25.6	8.6	24.8	7.3	M	M	20.8	2.9	5.9	5.6	8.4	1.7	4.2	2.1	1.8	1.3
29	4.5	4.4			18.0	3.8	24.1	6.3	25.2	6.0	18.4	10.7	23.8	3.8	15.7	4.2	11.7	4.1	6.4	2.0	4.1	0.9	2.5	1.0
30	2.4	2.4			16.6	7.2	17.4	9.4	24.3	5.9	18.7	10.7	18.6	6.0	20.2	2.3	11.2	5.0	2.7	2.5	2.5	2.1	1.5	1.5
31	6.8	2.0			12.1	8.6			24.3	8.3			26.4	2.7	6.4	5.3			1.7	1.7			2.6	1.5
TOTAL	125.9	67.3	207.2	107.4	417.1	174.6	488.8	266.0	600.6	230.5	661.5	219.6	626.4	182.4	586.5	154.9	395.2	112.5	223.0	92.4	126.2	59.8	86.2	40.3

COMMENTS:

[1]G = Global solar radiation

[2]D = Diffuse solar radiation

On Jan 18th = Diffuse value may be in error due to frost build up on instrument

From April 4-7= Diffuse values may be in error due to instrument problems

On July 25-29 power outage at site - partial data for 25 and 29 (M)

Sunrise and Sunset at Saskatoon, 1997

(local time in hours and minutes)

1997	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	17:06	8:46	17:55	7:52	18:47	6:41	19:41	5:36	20:32	4:52	21:18	4:50	21:30	5:28	20:57	6:18	19:53	7:08	18:43	8:02	17:37	8:53	16:58
2	9:15	17:07	8:45	17:56	7:50	18:48	6:38	19:43	5:34	20:34	4:51	21:19	4:51	21:30	5:30	20:55	6:20	19:51	7:09	18:41	8:04	17:36	8:55	16:57
3	9:15	17:08	8:43	17:58	7:47	18:50	6:36	19:45	5:32	20:36	4:50	21:20	4:52	21:29	5:31	20:53	6:22	19:49	7:11	18:39	8:06	17:34	8:56	16:57
4	9:15	17:09	8:41	18:00	7:45	18:52	6:34	19:46	5:30	20:37	4:49	21:21	4:53	21:29	5:33	20:51	6:23	19:47	7:13	18:37	8:08	17:32	8:57	16:56
5	9:14	17:10	8:40	18:02	7:43	18:54	6:31	19:48	5:28	20:39	4:49	21:22	4:54	21:28	5:34	20:50	6:25	19:44	7:15	18:34	8:09	17:30	8:59	16:56
6	9:14	17:12	8:38	18:04	7:41	18:56	6:29	19:50	5:27	20:41	4:48	21:23	4:54	21:28	5:36	20:48	6:26	19:42	7:16	18:32	8:11	17:29	9:00	16:55
7	9:13	17:13	8:36	18:06	7:38	18:57	6:27	19:51	5:25	20:42	4:48	21:24	4:55	21:27	5:38	20:46	6:28	19:40	7:18	18:30	8:13	17:27	9:01	16:55
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31	8:48	17:53			6:43	19:39			4:52	21:17			5:27	20:58	6:17	19:56			8:00	17:39			9:15	17:04

Source: Hertzberg Institute of Astrophysics

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

Sunrise and Sunset at Saskatoon, 1998

(local time in hours and minutes)

1998	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	7:52	18:46	6:41	19:41	5:36	20:32	4:52	21:18	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	5:34	20:34	4:51	21:19	4:51	21:30	5:29	20:55	6:20	19:52	7:09	18:42	8:04	17:36	8:54	16:58
3	9:15	17:08	8:44	17:58	7:48	18:50	6:37	19:44	5:33	20:35	4:50	21:20	4:52	21:29	5:31	20:53	6:21	19:49	7:11	18:39	8:05	17:34	8:56	16:57
4	9:15	17:09	8:42	18:00	7:46	18:52	6:34	19:46	5:31	20:37	4:50	21:21	4:52	21:29	5:32	20:52	6:23	19:47	7:12	18:37	8:07	17:32	8:57	16:56
5	9:14	17:10	8:40	18:02	7:43	18:53	6:32	19:48	5:29	20:39	4:49	21:22	4:53	21:28	5:34	20:50	6:24	19:45	7:14	18:35	8:09	17:31	8:58	16:56
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31	8:48	17:52			6:43	19:39			4:53	21:16			5:26	20:59	6:16	19:56			8:00	17:40			9:15	17:04

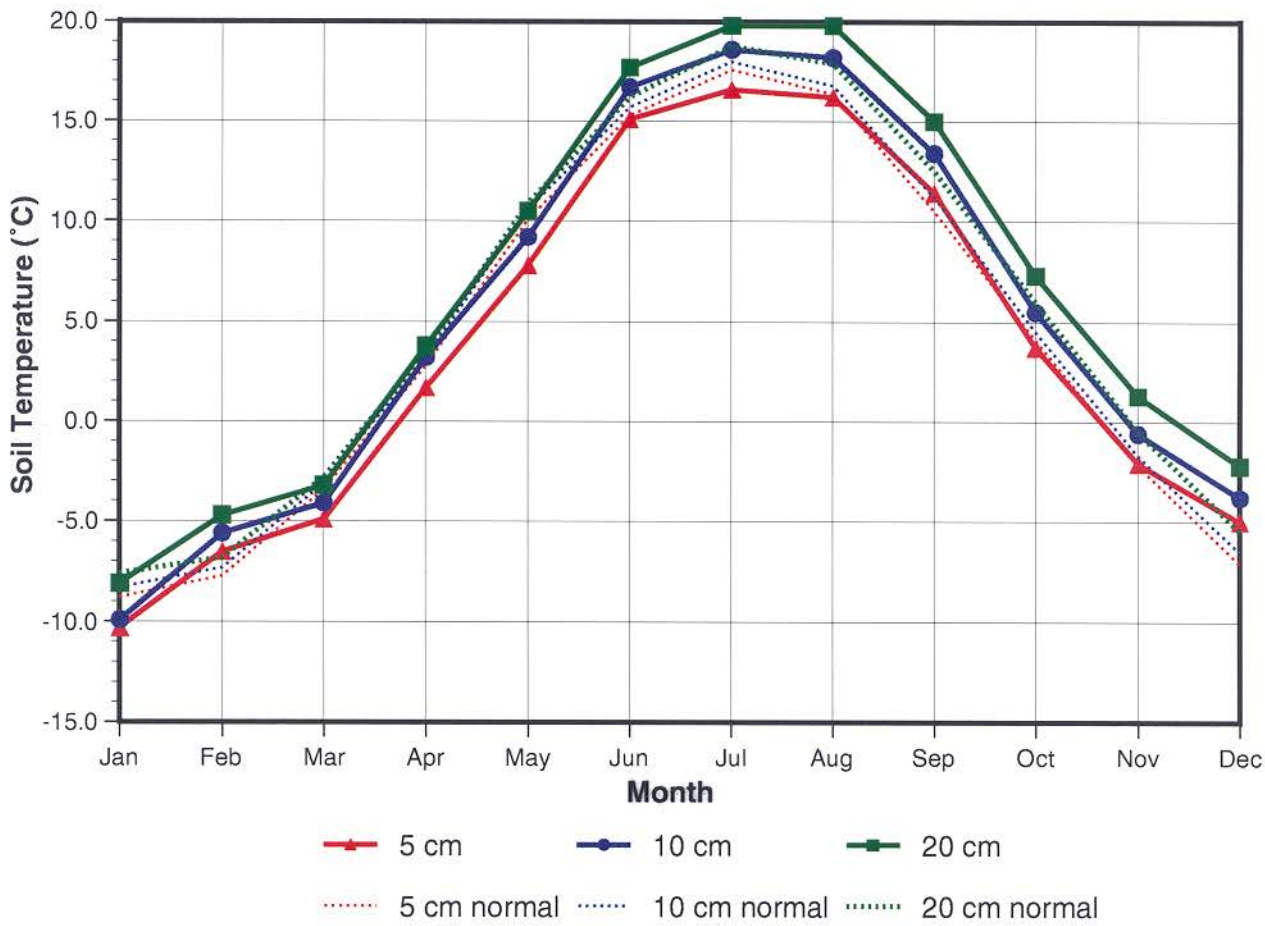
Source: Hertzberg Institute of Astrophysics

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

Soil Temperatures at 0900 hours, 1997

(5 to 20 cm depths)

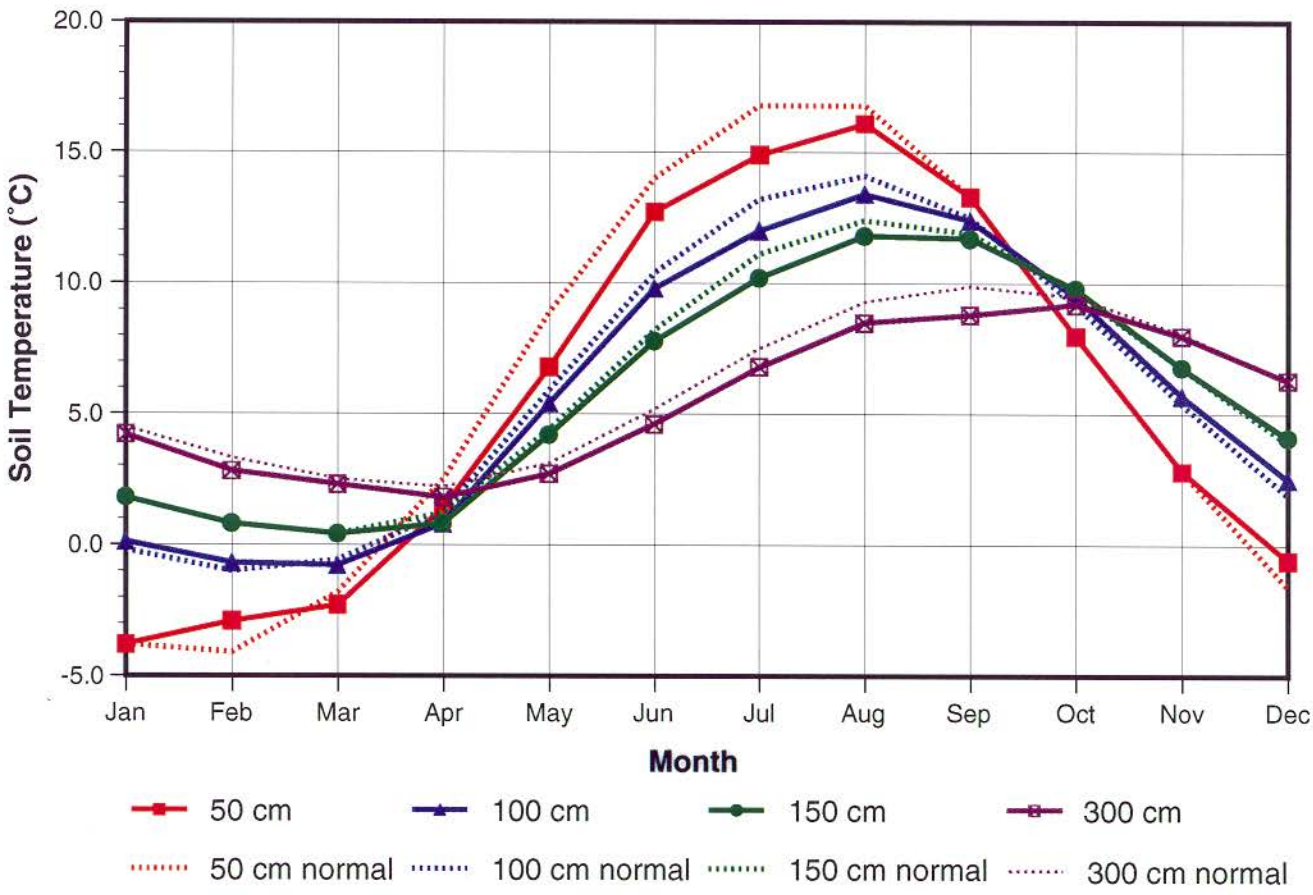
Month	5 cm (°C) 0900h		10 cm (°C) 0900h		20 cm (°C) 0900h	
	1997	Normal	1997	Normal	1997	Normal
January	-10.3	-8.8	-9.9	-8.3	-8.1	-7.6
February	-6.5	-7.7	-5.6	-7.3	-4.7	-6.8
March	-4.9	-3.4	-4.1	-3.1	-3.2	-2.8
April	1.7	2.8	3.2	3.2	3.8	3.5
May	7.8	10.1	9.2	10.6	10.5	10.9
June	15.1	15.3	16.7	15.7	17.7	16.2
July	16.6	17.6	18.6	18.0	19.8	18.8
August	16.2	16.4	18.2	16.8	19.8	17.9
September	11.4	10.5	13.4	11.2	15.0	12.5
October	3.7	4.1	5.5	4.5	7.3	6.0
November	-2.1	-2.2	-0.6	-1.7	1.3	-0.5
December	-5.0	-7.1	-3.8	-6.5	-2.2	-5.5



Soil Temperatures at 0900 hours, 1997

(50 to 300 cm depths)

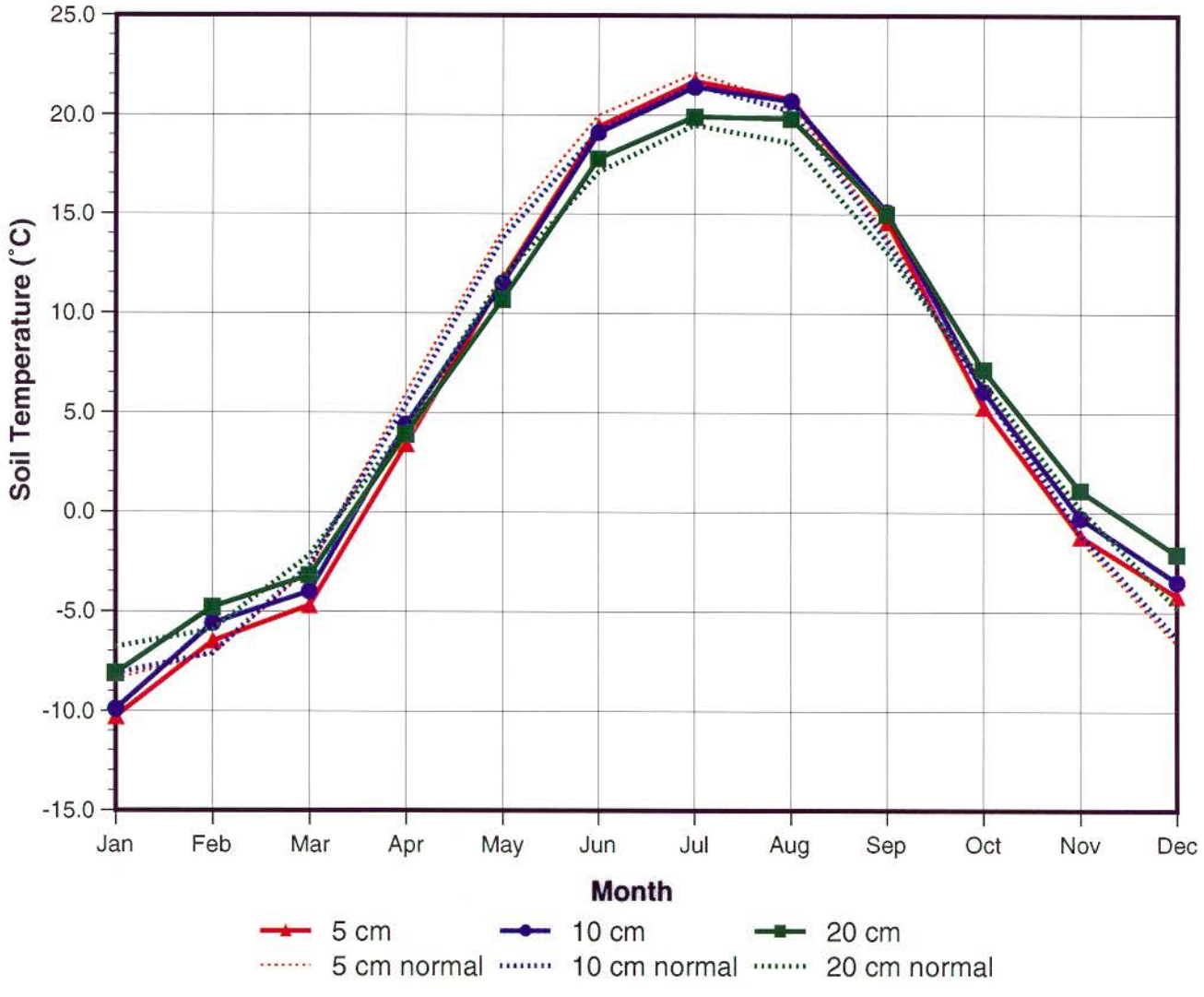
Month	50 cm (°C) 0900h		100 cm (°C) 0900h		150 cm (°C) 0900h		300 cm (°C) 0900h	
	1997	Normal	1997	Normal	1997	Normal	1997	Normal
January	-3.8	-3.8	0.1	-0.2	1.8	1.8	4.2	4.5
February	-2.9	-4.1	-0.7	-1.0	0.8	0.8	2.8	3.3
March	-2.3	-1.8	-0.8	-0.6	0.4	0.4	2.3	2.5
April	1.4	2.5	0.8	1.2	0.8	1.2	1.8	2.2
May	6.8	8.9	5.4	5.9	4.2	4.4	2.7	3.1
June	12.7	14.0	9.8	10.4	7.8	8.2	4.6	5.2
July	14.9	16.8	12.0	13.2	10.2	11.1	6.8	7.5
August	16.1	16.8	13.4	14.1	11.8	12.4	8.5	9.1
September	13.3	13.3	12.4	12.5	11.7	11.9	8.8	9.9
October	8.0	8.0	9.5	9.2	9.8	9.7	9.2	9.5
November	2.8	2.8	5.7	5.4	6.8	6.8	8.0	8.1
December	-0.6	-1.6	2.5	1.9	4.1	3.9	6.3	6.3



Soil Temperatures at 1600 hours, 1997

(5 to 20 cm depths)

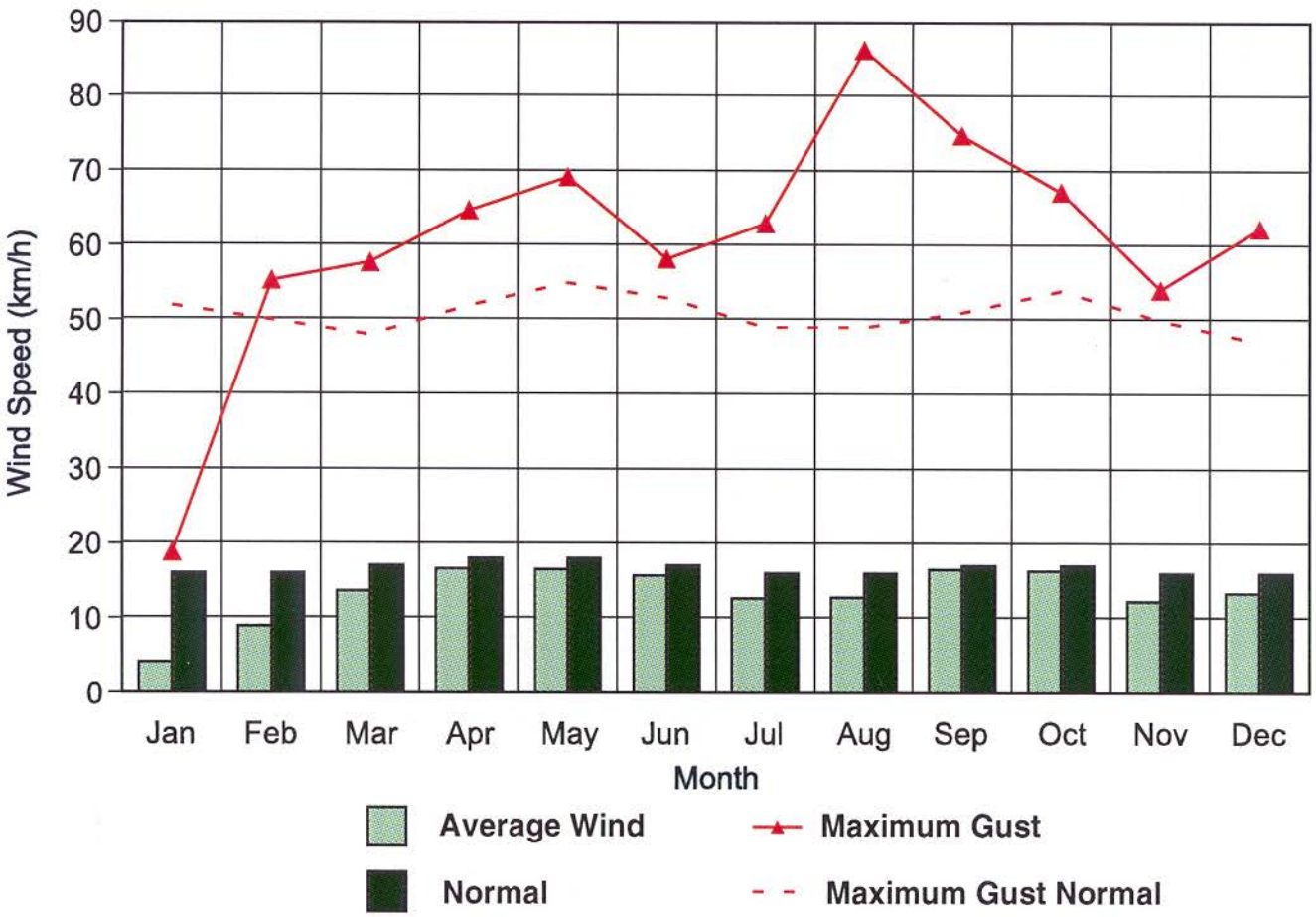
Month	5 cm (°C) 1600h		10 cm (°C) 1600h		20 cm (°C) 1600h	
	1997	Normal	1997	Normal	1997	Normal
January	-10.3	-8.4	-9.9	-8.1	-8.1	-6.8
February	-6.5	-7.1	-5.6	-7.1	-4.8	-5.9
March	-4.7	-2.9	-4.0	-2.7	-3.2	-2.2
April	3.4	6.0	4.4	5.4	3.9	4.2
May	11.7	14.2	11.5	13.8	10.7	11.8
June	19.4	20.0	19.1	19.2	17.8	17.1
July	21.7	22.1	21.4	21.5	19.9	19.5
August	20.8	20.6	20.7	20.2	19.8	18.6
September	14.6	13.9	15.1	13.6	15.0	13.1
October	5.3	6.1	6.1	6.2	7.2	6.6
November	-1.2	-1.4	-0.3	-1.1	1.1	0.2
December	-4.2	-6.6	-3.5	-6.3	-2.1	-4.8



Average Monthly Wind Speed, 1997

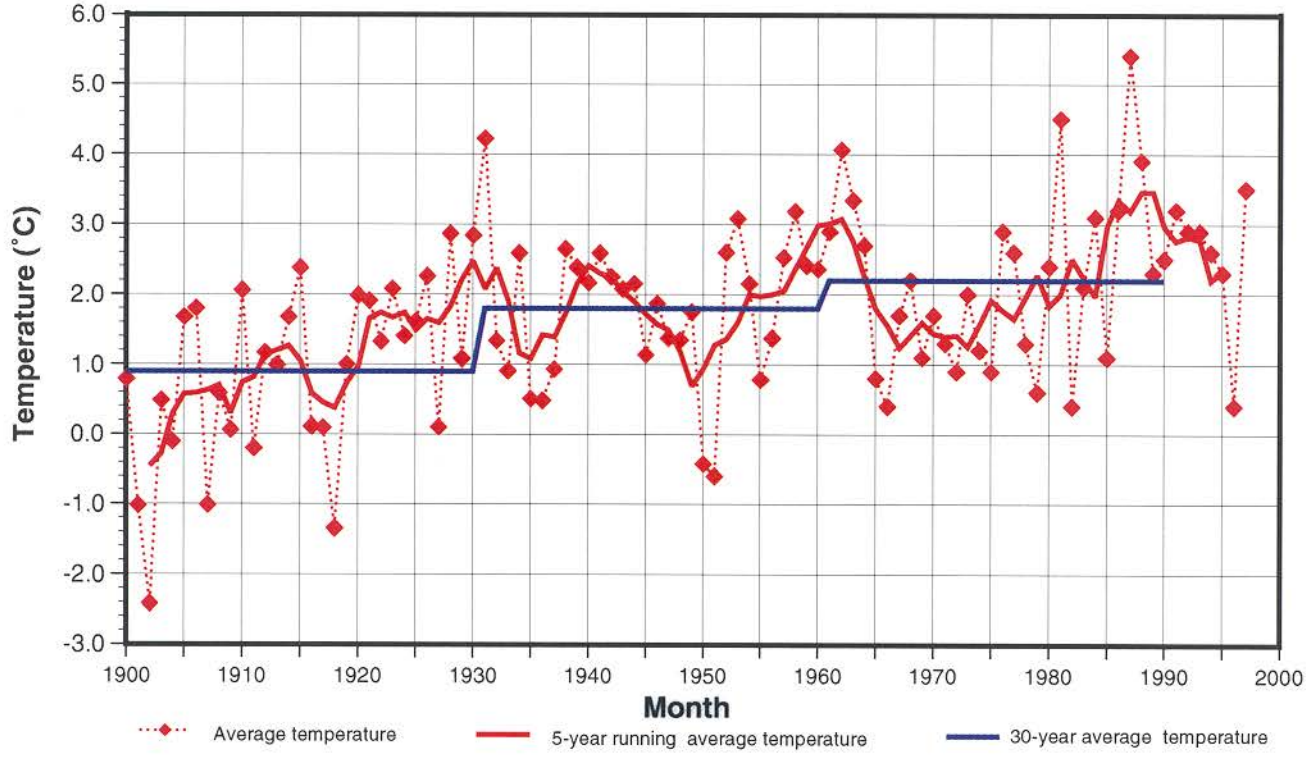
Month	km/h Average 1997	km/h Normal[1]	km/h Maximum Gust	km/h Normal[1]
January	4.1	16.0	18.8	52.0
February	8.9	16.0	55.3	50.0
March	13.6	17.0	57.7	48.0
April	16.6	18.0	64.7	52.0
May	16.5	18.0	69.2	55.0
June	15.7	17.0	58.2	53.0
July	12.7	16.0	63.0	49.0
August	12.8	16.0	86.3	49.0
September	16.5	17.0	74.8	51.0
October	16.4	17.0	67.2	54.0
November	12.3	16.0	54.1	50.0
December	13.4	16.0	62.3	47.0

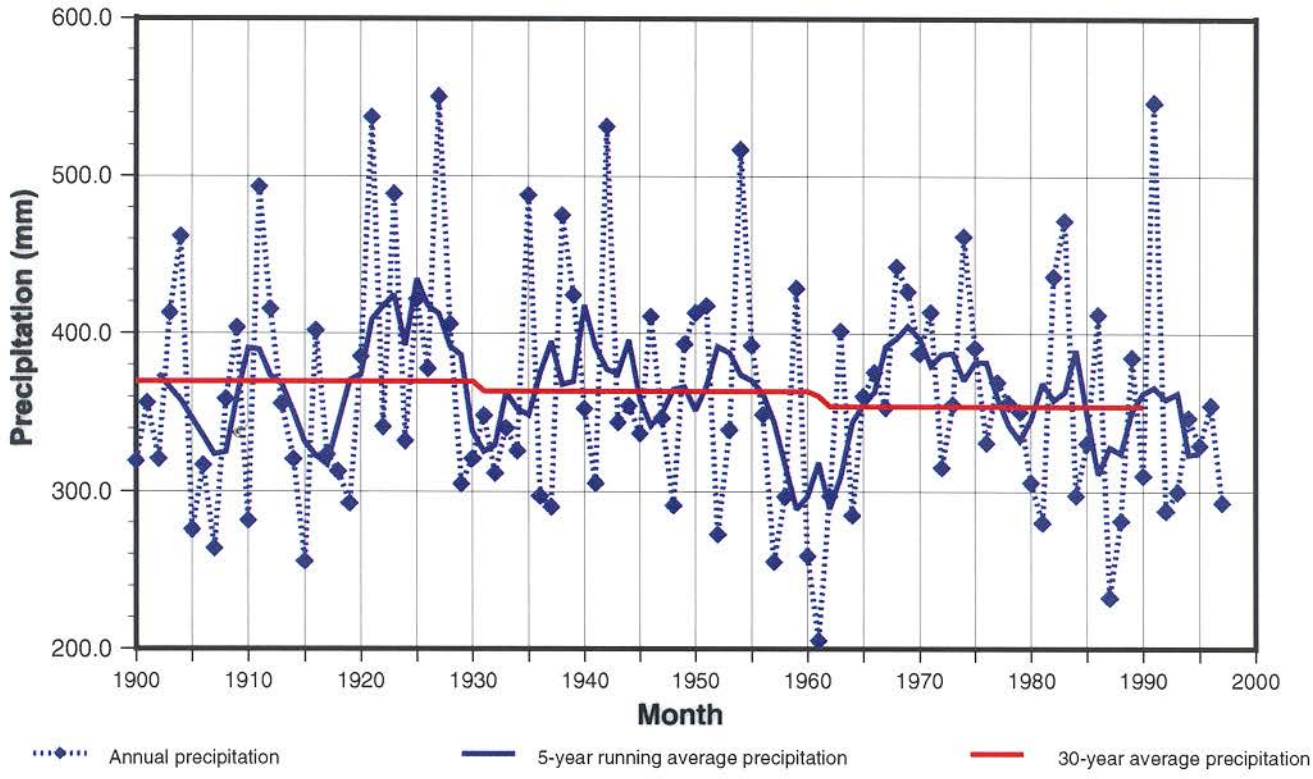
[1]Note: Normals used are for the Saskatoon Airport



Time Series of Average Annual Temperature and Precipitation for Saskatoon, 1900-1997

Data source 1963-1997 SRC Climate Reference Station





INSTRUMENTS USED AT SASKATOON SRC CRS AND GLOSSARY OF TERMS

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

BRIGHT SUNSHINE - Number of Days is the total number of days when at least 0.1 of an hour of bright sunshine was recorded.

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

BRIGHT SUNSHINE - 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 -Cooling (CDD) is an index of 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 greater than 18°C, CDD = 0.

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

DEGREE-DAY -Extreme Cooling (XCDD) is an index of 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. A temperature of greater than 24°C has been used as an index of potential heat stress. On a specific day, the amount by which 24°C is less than the daily average temperature defines the number of extreme cooling degree-days for that day. Mathematically:

XCDD = (T - 24°C), for that day,

where T = daily mean temperature in °C

if T is equal to or greater than 24°C, XCDD = 0.

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

DEGREE-DAY - Growing (GDD) is an index of 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.

DEGREE-DAY- Heating (HDD) is an index of 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 from the following data sets:

Saskatoon, SRC:1963 to 1997

Saskatoon, U of S:1916 to 1963

Saskatoon, City:1892 to 1915

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

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

NORMAL VALUE (1961-1990) 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 January 1st, 1961 to December 31st, 1990 for data analysis. Data derived from CRS conform to this standard, except where noted. For this year, the normals for CRS are taken form the normals published by Environment Canada for the standard period. Normals used in SRC CRS annual summaries 1990 - 1996 were hand-calculated values determined before the official normals were published.

NUMBER OF RECORDING YEARS Due to missing observations, faulty instrument calibration, lost records, *etc.*, only partial data are available especially during the period 1892 - 1915. The number of years of useful record is therefore cited.

PRECIPITATION (Ppt) - **Total** is the sum of the daily recorded precipitation. The snowfall component of precipitation is recorded as an equivalent amount of liquid water. For particulars on precipitation measurement procedures and instruments, the reader is referred to the Atmospheric Environment Service publication "*Manual of Climatological Observation's*", 2nd Ed., January, 1978. The notation "T" in this column refers to a trace of precipitation (less than 0.2 mm water equivalent). As of August 7, 1993, total precipitation was measured using the Belfort weighing gauge for the winter season and the tipping bucket during frost-free period.

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 AES, record keeping was changed to the 24-hour period of 0000 hours - 2400 hours to conform to their reporting of climatological statistics.

SOIL TEMPERATURE under a short grass surface with normal accumulation, is measured according to procedures outlined in the AES 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. The100 cm level is not reported in this report. 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).

SOLAR RADIATION-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 are defined as a sequence of days when the daily maximum temperature is higher than 30°C (hot spell) or the daily minimum temperature is lower than -30°C (cold spell).

SUNRISE/SUNSET times have been included in this report. They have been acquired from the Herzberg Institute of Astrophysics Web Site http://www.dao.nrc.ca/services/sunmoon/sunmoon.html

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

TEMPERATURE - 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.

TEMPERATURE - Average Maximum is the average of the daily maximum temperatures in degrees Celsius (°C) for one year for the particular month in question. For details concerning measurement procedures, the reader is referred to the AES publication, " *Manual of Climatological Observations*", 2nd Ed., January, 1978.

TEMPERATURE - 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.

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

WIND SPEED - Average (Avg) 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.

WIND SPEED - 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 Saskatoon Airport.

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