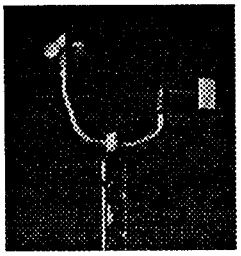
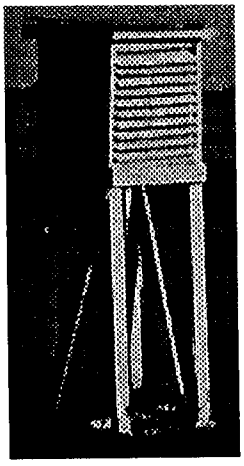


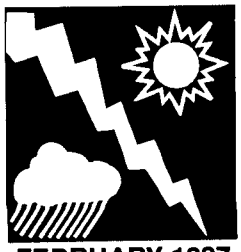


SASKATOON SRC CLIMATOLOGICAL REFERENCE STATION

ANNUAL SUMMARY 1996

C. Beaulieu
V. Wittrock

R-1550-1-E-97



FEBRUARY, 1997

RESOURCES & ENVIRONMENT GROUP
ENVIRONMENT BRANCH
CLIMATOLOGY SECTION

SASKATOON SRC CLIMATOLOGICAL REFERENCE STATION

ANNUAL SUMMARY 1996

C. Beaulieu
V. Wittrock

R-1550-1-E-97

FEBRUARY 1997

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ACKNOWLEDGEMENTS

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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:

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Cover design concept by Adam Schmidt, Prairie View School, Dalmeny, SK

Campbell-Stokes sunshine recorder
Wind anemometer and direction gauge
Stevenson screen
at the SRC, Climate Reference Station, Saskatoon , circa 1993.

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 1996 and compared with the long-term (*circa* 1900-1996) and standard-period (1961-1990) records.

A cold winter thawed reluctantly into a cool spring. The months between January and May were below the 30-year average with the exception of April. May was the coldest since 1983 with its average temperature 2.9°C below the 30-year average. Late January experienced an 18 day cold spell which extended into February. Except for January 22nd, when the temperature rose to -29°C, the minimum temperature stayed at or below -30°C from January 17th until February 3rd. This cold spell missed the record by one day.[1] The average maximum, minimum and mean temperatures were well below the 30-year averages. The year overall was the coldest since 1951. Only 1966 and 1982 have the same 0.4°C yearly mean temperature. Saskatchewan Environmental Services Centre station at the Saskatoon airport reported an even lower yearly mean temperature of -0.5°C[2].

The yearly total for growing degree-days (5°C base) were near average despite the cool spring. The frost free period began on May 13th; 7 days earlier than usual, and lasted for 139 days ending on September 28th; 14 days later than usual. Growing degree-days for the frost free period were 1513.3.

Annual precipitation was slightly under the 30-year average. Two notable rain storms during July dumped an excess of 37 mm of rain. This, along with the frequent showers (16 out of 31 days) throughout the month, secured July the title of the wettest month for 1996. On September 29th, snow flurries first were observed but snow did not stay on the ground until around November 12th. Even though October was well below average precipitation, it was very damp and caused poor harvesting conditions.

Annual bright sunshine was 249.7 hours less than the 30-year average. The first three months of the year were near average but only August managed to rise above the 30-year average. May 1996 had the dubious honour of having the lowest bright sunshine value for May since SRC began recording sunshine data in 1965.

Saskatoon experienced a very windy year. "Near gale" winds (55-64 km/h) occurred in June, July, August, September and October. "Gale" winds (65-74 km/h) blew during March and June while "strong gale" winds (75-94 km/h) were recorded during June. Early evening on July 4th after three days of plus 30°C weather, Saskatoon was bombarded by a violent summer thunderstorm. Considerable rain, varying from area to area in the city, was accompanied by 100 km/h "storm" winds . The winds destroyed buildings, moved vehicles and buildings, ripped shingles from houses, toppled well established mature trees onto houses, fences, roads, cars and power lines, and generally made a mess of the city and surrounding area.

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[1](Sheane,1996)

[2](Miller, 1997)

WEATHER EVENTS

Frost Free Season

Last Spring Frost	First Fall Frost	Length of Season
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

Hottest day =August 25th at 35.8°C

Coldest day = January 19th at -42.6°C

Cold Spells (-30.0°C)	Hot Spells (+30.0°C)
January 4 - 6 = 3 days	June 7 - 9 = 3 days
January 17 - 21 = 5 days	July 2 - 4 = 3 days
January 23 - February 3 = 12 days	August 9 -10 = 2 days
December 21 - 25 = 5 days	August 15 = 1 day
December 27 - 29 = 3 days	August 23 = 1 day
	August 26 - 30 = 5 days

Precipitation

Rainiest Month	Rainiest Day	Heaviest Rainfall
July	June 17th	June 17th
74.0 mm	29.4 mm	29.0 mm between 7:00pm and midnight

Tipping Bucket was used to officially record precipitation between May 13th and September 30th .

Wind

Near Gale (55-64 km/h)	Gale(65-74 km/h)	Strong Gale(75-94 km/h)	Storm (95-110 km/h)
June 29 = 59.0	March 15 = 68.2	June 17 = 84.5	July 4 = 100.8
July 17 = 60.7	March 16 = 72.8		
August 12 = 62.1	June 19 = 67.		
September 13 = 58.1	July 5 = 71.1		
September 17 = 55.9			
October 29 = 57.2			

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 start. 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 along with 10 to 15 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. Continuous observations were taken by the Ebys at a site on 8th Street until October 31, 1942, when the station was closed. Mr. Eby, Sr. took the observations until his death in 1921, at which time his daughter, Miss E.S. Eby, recorded the observations until April 1931 then by her brother, Mr. J.M. Eby continued the observations until the station was closed. 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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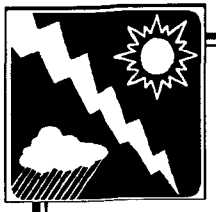
[1]From various sources including the *Physical Environment of Saskatoon, Canada* (E.A. Christiansen (ed.) 1970) and 1974 *Annual Meteorological Summary, Saskatoon, Saskatchewan,* (Environment Canada, Atmospheric Environment Service).



SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

ANNUAL SUMMARY 1996

		1996 VALUE	1995 VALUE	AVERAGES (1961 - 1990) EXTREME VALUES (1892-1994)
TEMPERATURE	Annual Average (°C)	0.4[1]	2.3	1.9
	Extreme Annual Maximum (°C)/Date	35.8/Aug 25[1]	36.0/Aug 5	41.0/June 1988
	Annual Average Maximum (°C)	6.1[1]	7.9	7.8
	Extreme Annual Minimum (°C)/Date	-42.6/Jan 19	-32.5/Dec 8 &10	-50.0/Feb 1893
	Annual Average Minimum (°C)	-5.3[1]	-3.4	-3.8
	Days with Frost	205	199	198
	Heating Degree-Days (18°C base)	6583[1]	5841.9	5684.3
	Growing Degree-Days (5°C base)	1627.3[1]	1657.7	1659.7
	Cooling Degree-Days (18°C base)	129.0[1]		
PRECIPITATION	Yearly total (mm)	354.8[1]	329.4	360.2
	Greatest 24-h (mm)/Date	29.4/June 17	25.0/Aug 9	99.4/June 1983
	Days with Precipitation	109[1]	107[5]	114
WIND	Average Speed (km/h)	12.6[2]	13.9	16.3
	Peak Gust Speed (km/h)/Date	100.8/July 4	89.3/Jul 29	151/Aug/1967/14[6]
SUNSHINE	Total Bright Sunshine (h)	2149.7[3]	2083.1	2399.4
	% Possible Bright Sunshine	55.5[3]	46.7	53.8
	Number of days with Bright Sun	324[3]	303	
	Total Global Radiation (MJ/m²)	4379.1[4]	4520.9	4391.9
	Total Diffuse Radiation (MJ/m²)	1680.5[4]	1758.4	1729.6

FOR YOUR INFORMATION

[1] August 1-6 data supplied by Saskatchewan Environmental Services Centre, Saskatoon.

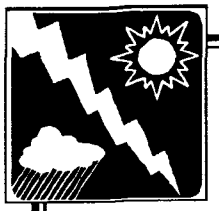
[2] August average based on data from August 7-31.

[3] Data supplied by Kernen Farm, University of Saskatchewan, for May 11-14 & August 1-6.

[4] Missing or partial data for August 1-6.

[5] Missing 5 days of data.

[6] Information from Saskatchewan Environmental Services Centre, Saskatoon.



SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

JANUARY 1996

		1996 VALUE	1995 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	-23.1	-13.8	-17.6	
	Extreme Monthly Maximum (°C)/Date	6.4/12	6.0/30	7.0/1986/11	10.0/1931/30
	Monthly Average Maximum (°C)	-17.9	-10.0	-12.4	
	Number of recording years			28	98
	Extreme Monthly Minimum (°C)/Date	-42.6/19	-30.0/3	-43.9/1966/22&1969/29	-48.9/1893/31
	Monthly Average Minimum (°C)	-28.2	-17.6	-22.7	
	Number of recording years			28	98
	Days with Frost	31	31	31	
	Heating Degree-Days (18°C base)	1273.3	986.2	1043.0	
	Growing Degree-Days (5°C base)	0	0.0	0.0	
	Cooling Degree-Days (18°C base)	0			
PRECIPITATION	Monthly total (mm)	13	12.0	20.8	
	Greatest 24-h (mm)/Date	3/15 &16	4.0/15	15.4/1989/30	30.5/1893 /23
	Number of recording years			28	98
	Days with Precipitation	7	9	11	
	Total Year - to - Date	13	12.0	20.8	
WIND	Average Speed (km/h)	11.0	11.0	15.7	
	Peak Gust Speed (km/h)/Date	43.6/3	44.2/2	111.0/1986/11	
SUNSHINE	Total Bright Sunshine (h)	142.6	70.4	104.9	
	% Possible Bright Sunshine	55.7	27.5	41.0	
	Number of days with Bright Sun	26	15		
	Total Global Radiation (MJ/m²)	153.6	115.0	129.9	
	Total Diffuse Radiation (MJ/m²)	61.6	67.5	71.4	
SOIL	Average 5 cm /10 cm	-11.0/-10.9	-7.6/-6.9	na/-8.3	
	Temperature (°C) 20 cm / 50 cm	-9.2/-4.4	-5.3/-1.8	na/-3.9	
	@ 0900 h 150cm / 300 cm	1.5/4.0	2.2/4.5	1.8/4.4	

FOR YOUR INFORMATION

The January temperatures provided much discussion. We went from the monthly maximum of +6.4°C to the monthly minimum -42.6 in one week. Although no records were broken, several were in danger. The 30 year maximum was just missed by 0.6°; the minimum by 1.3°, and the longest cold spell (with the minimum temperature of -30° or colder) was missed by a day. Most of the time, the wind remained very low keeping the wind chill bearable. The higher than usual bright sunshine values accompanied the cold and providing some psychological relief to those venturing outside. Precipitation, similar to last year, was well below monthly average.

January's weather spells, according to folklore, were typical. The "January Thaw" or "Bonspiel Thaw" occurred right on schedule halfway through the month. Even so, the bitterly cold temperatures following were a bit much even for winter hardy prairie people.

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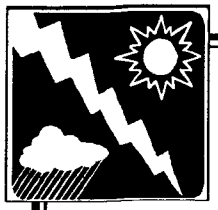

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

	FEBRUARY 1996	1996 VALUE	1995 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	-12.5	-11.8	-13.8	
	Extreme Monthly Maximum (°C)/Date	6.5/21	6.5/21	7.5/ 1988/26	12.8/1931/19
	Monthly Average Maximum (°C)	-7.0	-7.0	-9.0	
	Number of recording years			28	99
	Extreme Monthly Minimum (°C)/Date	-39.9/01	-28.0/28	-41.1/1972/6	-50.0 /1893/1
	Monthly Average Minimum (°C)	-18.0	-16.7	-18.3	
	Number of recording years			28	99
	Days with Frost	29	28	28	
	Heating Degree-Days (18°C base)	915.0	835.5	878.0	
	Growing Degree-Days (5°C base)	0	0.0	0.0	
	Cooling Degree-Days (18°C base)	0			
PRECIPITATION	Monthly total (mm)	16.0	13.0	14.5	
	Greatest 24-h (mm)/Date	8.0/13	5.0/25	14.2/1979/13	20.3/1918 /7
	Number of recording years			28	99
	Days with Precipitation	7	6[1]	10	
	Total Year - to - Date	29.0	25.0	35.3	
WIND	Average Speed (km/h)	14.6	14.8	15.8	
	Peak Gust Speed (km/h)/Date	54.2/15	46.7/9	106.0/1988/22	
SUNSHINE	Total Bright Sunshine (h)	147.7	140.1	133.2	
	% Possible Bright Sunshine	53.9	51.1	48.6	
	Number of days with Bright Sun	26	26		
	Total Global Radiation (MJ/m²)	214.2	226.9	210.1	
	Total Diffuse Radiation (MJ/m²)	102.2	94.2	105.3	
SOIL	Average 5 cm /10 cm	-8.6/-8.3	-7.6/-6.6	na/-7.3	
	Temperature (°C) 20 cm / 50 cm	-7.3/-4.6	-5.0/-2.1	na/-4.1	
	@ 0900 h 150cm / 300 cm	0.5/2.7	1.5/3.4	0.8/3.2	

FOR YOUR INFORMATION

The severe cold spell, that began on January 18th, ended on February 4th when the minimum temperature only dropped to -27.2°C instead of -30°C. Although February began and ended with below average temperatures, overall the month was 1.3°C warmer than the 30-year average. The below average soil temperatures recorded at all depths might be attributed to the prolonged cold spell and thin snow cover even though snow fall was above normal by 1.5 mm. It was a month full of sunshine (14.5 hours higher than usual).

If a ground hog lived in Saskatoon, it would have seen its shadow at noon on February 2nd, as there was bright sunshine. According to legend, six more weeks of winter should be expected. The trouble is, the ground hog is only right 37% of time which is just a little bit better than guessing at 33%.
(Phillips 1993)

[1] 5 days missing data

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

MARCH 1996

		1996 VALUE	1995 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	-10.1	-5.4	-7.1	
	Extreme Monthly Maximum (°C)/Date	11.3/15	13.0/11	15.0/1973/24&1981/16	22.8/1910/23
	Monthly Average Maximum (°C)	-4.7	-0.8	-2.2	
	Number of recording years			28	100
	Extreme Monthly Minimum (°C)/Date	-32.5/5	-32.5/6	-38.9/1972/2	-43.3/1897/14
	Monthly Average Minimum (°C)	-15.5	-10.1	-12.1	
	Number of recording years			28	100
	Days with Frost	30	28	30	
	Heating Degree-Days (18°C base)	872.8	726.1	727.8	
	Growing Degree-Days (5°C base)	0.8	3.8	1.5	
	Cooling Degree-Days (18°C base)	0			
PRECIPITATION	Monthly total (mm)	5.0	24.0	19.9	
	Greatest 24-h (mm)/Date	3.0/15	11.0/25	32.0/1967/30	32.0/1967/30
	Number of recording years			28	95
	Days with Precipitation	3	8	9	
	Total Year - to - Date	34.0	49.0	55.2	
WIND	Average Speed (km/h)	14.0	15.7	16.6	
	Peak Gust Speed (km/h)/Date	72.8/16	55.4/21	93.0/1959/18	
SUNSHINE	Total Bright Sunshine (h)	245.3	129.8	176.9	
	% Possible Bright Sunshine	67.0	35.5	48.3	
	Number of days with Bright Sun	31	23		
	Total Global Radiation (MJ/m²)	448.6	324.8	362.4	
	Total Diffuse Radiation (MJ/m²)	155.7	171.0	173.9	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	-5.9/-4.3	-2.1/-2.9	na/-3.1	
	20 cm / 50 cm	-3.0/-1.8	-2.1/-0.8	na/-1.8	
	150cm / 300 cm	0.1/1.8	-1.7/2.5	0.4/2.4	

FOR YOUR INFORMATION

It's a good thing "spring" was marked on the calendar this year because you certainly could not tell by the weather. It was 1989 when a similar temperature of -10.1°C for the monthly average was experienced and 1975 when a colder temperature of -13.0°C was recorded. An arctic air mass responsible for the cold temperatures also kept the skies clear producing a very high monthly bright sunshine value.[1] Precipitation values were well below normal at 5mm. For one week, mid month, temperatures did manage to struggle above freezing providing some relief. The cold weather was reflected in the high heating degree-day value of 872.8°. Soil temperatures are rising slowly but the cold weather is keeping them below the usual seasonal values. March, like last year, came in like a lion and certainly went out like one. This, however, has not deterred the gophers or the Canada geese. They appeared back in Saskatoon right on schedule.

1 Flysak 1996 p.comm.

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SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

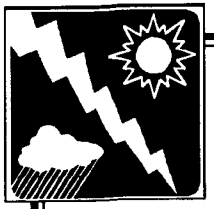
	APRIL 1996	1996 VALUE	1995 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	3.5	1.1	3.5	
	Extreme Monthly Maximum (°C)/Date	23.9/16	14.5/11&21	30.6/1977/26	33.0/1952/28
	Monthly Average Maximum (°C)	9.2	6.8	9.9	
	Number of recording years			28	99
	Extreme Monthly Minimum (°C)/Date	-11.6/3	-19.5/3	-27.8/1979/1	-28.3/1893/5&1954/2
	Monthly Average Minimum (°C)	-2.2	-4.7	-2.0	
	Number of recording years			28	99
	Days with Frost	25	27	20	
	Heating Degree-Days (18°C base)	433.1	507.9	388.0	
	Growing Degree-Days (5°C base)	39.3	1.3	60.2	
	Cooling Degree-Days (18°C base)	0.0			
PRECIPITATION	Monthly total (mm)	26.0	26.0	20.2	
	Greatest 24-h (mm)/Date	5.0/18&25	5/15	24.6/1985/19	30.2/1955/19
	Number of recording years			28	99
	Days with Precipitation	10	12	7	
	Total Year - to - Date	60.0	75.0	75.4	
WIND	Average Speed (km/h)	15.0	15.2	17.6	
	Peak Gust Speed (km/h)/Date	54.0/24	73.7/2	108.0/1959/06	
SUNSHINE	Total Bright Sunshine (h)	165.7	201.4	231.3	
	% Possible Bright Sunshine	39.9	48.5	56.0	
	Number of days with Bright Sun	26	27		
	Total Global Radiation (MJ/m²)	454.7	482.5	492.2	
	Total Diffuse Radiation (MJ/m²)	207.3	200.0	178.5	
SOIL	Average 5 cm /10 cm	0.9/1.7	1.6/2.3	na/3.1	
	Temperature (°C) 20 cm / 50 cm	1.9/0.6	2.9/1.7	na/2.5	
	@ 0900 h 150cm / 300 cm	0.3/1.6	1.6/2.3	1.2/2.2	

FOR YOUR INFORMATION

Winter refused to give up and leave quietly. Everyone was impatiently waiting for the warmer weather but April temperatures were typical. The maximum and minimum temperatures were slightly under the 30-year average value with the monthly average right on the 30-year average. What was not typical was 65.6 hours less bright sunshine and about1/3 less growing degree-days than usual. Soil temperatures were very slow in recovering from the late winter freeze with average temperatures at all levels being below normal. Frost left the soil around April 24 with the 100cm level being the last to thaw. Precipitation came as both snow and rain with the majority of the 26.0 mm coming after the 17th. This is 5.8 mm above the average for the month. This extra precipitation did not help the flooding situation in parts of Saskatchewan.

During the latter half of April 1967 southern Alberta was declared a disaster area after receiving a record depth of 70 cm of snow. Thousands of cattle starved to death on the open range, unable to forage for food in the deep snow. The only good news was the deadline for income tax returns for residents of southern Alberta was extended to May 15.

(Phillips, 1995)



SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

MAY 1996

		1996 VALUE	1995 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	8.7	11.1	11.5	
	Extreme Monthly Maximum (°C)/Date	24.4/31	34.0/29	35.0/1988/30	37.2/1936/27
	Monthly Average Maximum (°C)	14.3	18.8	18.5	
	Number of recording years			28	99
	Extreme Monthly Minimum (°C)/Date	-5.9/09	-3.5/4	-10.0/1967/2	-19.8/1907/6
	Monthly Average Minimum (°C)	3.1	3.3	4.5	
	Number of recording years			28	99
	Days with Frost	8	7	6	
	Heating Degree-Days (18°C base)	287.2	239.8	193.1	
	Growing Degree-Days (5°C base)	134.2	179.4	209.9	
	Cooling Degree-Days (18°C base)	0			
PRECIPITATION	Monthly total (mm)	27.8	15.4	43.9	
	Greatest 24-h (mm)/Date	7.0/15	6.2/15	39.9/1985/4	51.3/1909/30
	Number of recording years			28	99
	Days with Precipitation	11	10	9	
	Total Year - to - Date	87.8	90.4	119.3	
WIND	Average Speed (km/h)	13.6	13.5	17.6	
	Peak Gust Speed (km/h)/Date	54.0/7	76.9/13	132.0/1965/17	
SUNSHINE	Total Bright Sunshine (h)	153.0[1]	274.7	284.6	
	% Possible Bright Sunshine	31.5	56.6	59.0	
	Number of days with Bright Sun	27	31		
	Total Global Radiation (MJ/m²)	505.2	667.2	586.3	
	Total Diffuse Radiation (MJ/m²)	276.0	194.6[2]	222.2	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	6.6/7.7	8.7/9.5	na/10.5	
	20 cm / 50 cm	8.2/5.5	10.3/7.9	na/8.9	
	150cm / 300 cm	2.6/1.8	4.4/3.1	4.4/3.1	

FOR YOUR INFORMATION

This May will go on record as one of the coldest and cloudiest. The average temperature of 8.7°C (2.8°C below normal) was influenced by the average maximum temperature being 4.2°C below average. The below average temperatures are reflected in the high heating degree-days (49% above normal) and low growing degree-days (36% below normal). Spring flowers bloomed very late while trees only began to leaf out in the last week. To make matters worse, the sun refused to shine. There were 10 days with less than 2 hrs. of bright sunshine. The total sunshine value of 153.0 hours was the lowest since SRC began recording sunshine data in 1965.

Monthly precipitation was variable. CRS recorded a below average amount of 27.8 mm while AES (airport) across the river recorded above average amount of 58.7 mm.[a] Buffalo Gap in south central Sask. holds the record for the most intense rainstorm ever in Canada. In one hour on May 30th 1961, 250 mm of rain fell causing roads to washout, fields to erode and even the bark to be stripped from large trees because of the accompanying strong winds.[b]

a Flysak 1996 p.comm. b Phillips 1988

[1] Sunshine data from May 11-14 provided by U of S because of equipment maintenance at CRS

[2] 66.5 h of missing data

SRC Publication No. R-1550-1-E-97

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

JUNE 1996

		1996 VALUE	1995 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	16.6	18.0	15.9	
	Extreme Monthly Maximum (°C)/Date	33.5/08	32.5/13	41.0/1988/5	41.0/1988/5
	Monthly Average Maximum (°C)	22.8	25.1	22.6	
	Number of recording years			28	100
	Extreme Monthly Minimum (°C)/Date	2.8/24	2.5/8	-3.3/1967/6	-3.9/1903/9&1917/2
	Monthly Average Minimum (°C)	10.4	10.9	9.2	
	Number of recording years			28	99
	Days with Frost	0	0	0	
	Heating Degree-Days (18°C base)	76.6	48.1	77.9	
	Growing Degree-Days (5°C base)	348.7	389.8	338.8	
	Cooling Degree-Days (18°C base)	35.3			
PRECIPITATION	Monthly total (mm)	66.6	31.6	63.6	
	Greatest 24-h (mm)/Date	29.4/17	9.0/15	99.4/1983/24	99.4/1983/24
	Number of recording years			28	100
	Days with Precipitation	11	9	12	
	Total Year - to - Date	154.4	122.0	182.9	
WIND	Average Speed (km/h)	16.2	13.5	17.0	
	Peak Gust Speed (km/h)/Date	84.5/17	60.6/16	117.0/1986/10	
SUNSHINE	Total Bright Sunshine (h)	251.1	254.3	299.3	
	% Possible Bright Sunshine	50.5	51.2	60.0	
	Number of days with Bright Sun	26	29		
	Total Global Radiation (MJ/m²)	623.4	651.1	638.7	
	Total Diffuse Radiation (MJ/m²)	215.2	250.7	228.1	
SOIL	Average 5 cm /10 cm	14.2/15.2	13.2/17.1	na/15.7	
	Temperature (°C) 20 cm / 50 cm	15.6/12.6	17.6/13.8	na/14.0	
	@ 0900 h 150cm / 300 cm	7.0/3.6	7.9/5.0	8.3/5.3	

FOR YOUR INFORMATION

The June average temperatures were slightly higher than the 30 year averages. The warm temperatures pushed the growing degree-days over the average for the month while the heating degree-days were slightly lower than average. However, the bright sunshine value was 48.2 hours less than expected. Soil temperatures are still recovering from the cold spring especially at the lower levels. On June 17 & 19, we experienced gale force winds of over 65 km/h. Although the maximum winds were 84.5 km/h, it did not come close to the 117 km/h winds recorded in 1986.

The worst Canadian tornado by death toll was the "Regina Cyclone" on June 30, 1912. An F-4 (332-418 km/h winds) tornado cut a five-block wide swath through the city centre leaving 28 people dead, 200 injured, 2500 homeless and about 500 buildings destroyed.
(Lanken 1996)

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

JULY 1996

		1996 VALUE	1995 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	18.5	18.1	18.4	
	Extreme Monthly Maximum (°C)/Date	34.1/03	35.0/26	38.5/1984/27	40.0/1919/17&1941/19
	Monthly Average Maximum (°C)	24.8	25.2	25.1	
	Number of recording years			28	100
	Extreme Monthly Minimum (°C)/Date	7.9/08	5.0/4	1.7/1967/2	-0.6/1918/25
	Monthly Average Minimum (°C)	12.1	11.0	11.6	
	Number of recording years			28	100
	Days with Frost	0	0	0	
	Heating Degree-Days (18°C base)	22.9	34.6	28.7	
	Growing Degree-Days (5°C base)	418.3	407.4	409.8	
	Cooling Degree-Days (18°C base)	38.2			
PRECIPITATION	Monthly total (mm)	74.0	57.2	55.8	
	Greatest 24-h (mm)/Date	27.8/17	16.2/5	45.5/1968/29	79.2/1946/3
	Number of recording years			27	100
	Days with Precipitation	16	12	12	
	Total Year - to - Date	228.4	179.2	238.7	
WIND	Average Speed (km/h)	12.6	12.4	15.5	
	Peak Gust Speed (km/h)/Date	100.1/04	89.3/29	113.0/1955/05	
SUNSHINE	Total Bright Sunshine (h)	278.4	248.5	333.1	
	% Possible Bright Sunshine	55.6	49.6	66.5	
	Number of days with Bright Sun	31	31		
	Total Global Radiation (MJ/m²)	674.2	626.8	633.5	
	Total Diffuse Radiation (MJ/m²)	209.2	254.8	216.5	
SOIL	Average 5 cm /10 cm	16.5/18.0	16.4/17.5	na/18.1	
	Temperature (°C) 20 cm / 50 cm	18.8/15.9	18.2/15.7	na/16.8	
	@ 0900 h 150cm / 300 cm	9.9/6.0	10.4/7.1	11.0/7.5	

FOR YOUR INFORMATION

Like last year, July was close to the 30-year averages for temperatures. The maximum, minimum and average temperatures were within 0.5°C of the 30-year averages. Bright sunshine was 54.7 hours less than normal even though all days recorded some radiation.

The monthly rainfall value of 74.0 mm was 18.2 mm above average. The majority came on the 17th with 27.8 mm being recorded. On the 4th, 10mm of rain were recorded at the station although many parts of the city received more. This storm, accompanied by 100 km winds, did considerable damage to the trees and houses in Saskatoon.

Tornados are now linked with the word "disaster". However, the first tornado recorded in Canada was considered a blessing by most. On July 1st, 1792, a tornado roared arrow straight across the Niagara Peninsula clearing a tract of land one half mile wide stretching from present-day Fonthill to Port Robinson. The early settlers cleared the path of debris and named it "Hurricane Road".

Lanken 1996

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SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

AUGUST 1996

		1996 VALUE	1995 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	19.1[1]	16.8	17.2	
	Extreme Monthly Maximum (°C)/Date	35.8/30[2]	36.0/5	37.0/1984/10	37.8/1893/6&1949/6
	Monthly Average Maximum (°C)	27.0[1]	22.9	24.3	
	Number of recording years			28	99
	Extreme Monthly Minimum (°C)/Date	5.9/25[2]	6.0/11	-2.8/1976/28	-2.8/1976/28
	Monthly Average Minimum (°C)	11.1[1]	10.6	10.1	
	Number of recording years			28	99
	Days with Frost	0	0	0	
	Heating Degree-Days (18°C base)	21.9[1]	59.2	63.3	
	Growing Degree-Days (5°C base)	437.5[1]	365.2	378.3	
	Cooling Degree-Days (18°C base)	56.4[1]			
PRECIPITATION	Monthly total (mm)	28.0	75.6	35.2	
	Greatest 24-h (mm)/Date	na	25.0/9	27.9/1989/25	73.7/1945/3
	Number of recording years			28	99
	Days with Precipitation	6[2]	11	9	
	Total Year - to - Date	256.4	254.8	273.9	
WIND	Average Speed (km/h)	13.0[3]	15.2	15.5	
	Peak Gust Speed (km/h)/Date	62.1/12[3]	73.6/9	105.0	
SUNSHINE	Total Bright Sunshine (h)	323.6[4]	231.5	294.8	
	% Possible Bright Sunshine	71.4[4]	51.1	65.0	
	Number of days with Bright Sun	31[4]	28		
	Total Global Radiation (MJ/m²)	534.3[5]	530.0	529.0	
	Total Diffuse Radiation (MJ/m²)	119.7[5]	184.9	185.6	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	15.8[3]/17.6[3]	14.6/16.0	na/16.7	
	20 cm / 50 cm	18.5[3]/16.0[3]	na/15.3	na/16.8	
	150cm / 300 cm	11.8[3]/8.2[3]	11.2/8.4	12.4/9.3	

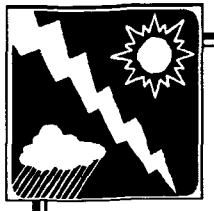
FOR YOUR INFORMATION

August was a hot, dry, bright month. Above average temperatures contributed to heating degree-days and growing degree-days well below and above their normals. The average minimum temperature soared 9°C above normal. The station recorded 9 days of plus 30°C temperatures; 5 days above the historical average of 4.[a] Six of the nine occurred within the last 9 days of the month. By August 6th, 26mm of rain had been recorded leaving the rest of the month very dry and well under the monthly average. The bright sunshine was 29.6 hours higher than average to the delight of vacationers.

In 1857 the Palliser expedition experienced a violent wind storm accompanied by vivid lightning and myriads of grasshoppers. The wind driven insects, causing much discomfort from the blows they inflicted to the faces of the men, fell as thick as snow.[b]

a Flysak 1996 p.comm. b Phillips 1995

1 August 1-6 data supplied by AES Saskatoon
2 Confirmed with AES Saskatoon
3 Based on data from August 7-31
4 August 1-6 data supplied by Kernen Farm, Univ. of SK
5 August 1-6 data missing or partial



SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

SEPTEMBER 1996		1996 VALUE	1995 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	11.0	12.8	11.3	
	Extreme Monthly Maximum (°C)/Date	24.3/08	30.5/3	35.6 /1978 /4	35.6 /1978 /4
	Monthly Average Maximum (°C)	16.2	20.5	17.7	
	Number of recording years			28	97
	Extreme Monthly Minimum (°C)/Date	-4.4/29	-5.5\20	-7.8 /1978 /30	-11.1/1908/28
	Monthly Average Minimum (°C)	5.8	5.0	4.8	
	Number of recording years			28	97
	Days with Frost	2	4	4	
	Heating Degree-Days (18°C base)	209.4	160.2	199.6	
	Growing Degree-Days (5°C base)	189.6	242.1	196.2	
	Cooling Degree-Days (18°C base)	0.0			
PRECIPITATION	Monthly total (mm)	43.4	0.8	32.8	
	Greatest 24-h (mm)/Date	19.4/05	0.4/17&18	29.6/1980/3	44.2 /1931/12
	Number of recording years			28	97
	Days with Precipitation	10	2	9	
	Total Year - to - Date	299.8	255.6	306.7	
WIND	Average Speed (km/h)	15.8	12.6	16.7	
	Peak Gust Speed (km/h)/Date	58.1/13	64.1/12	148/1967/22	
SUNSHINE	Total Bright Sunshine (h)	134.4	255.7	188.9	
	% Possible Bright Sunshine	35.5	67.5	50.0	
	Number of days with Bright Sun	27	30		
	Total Global Radiation (MJ/m²)	317.0	447.2	351.8	
	Total Diffuse Radiation (MJ/m²)	140.8	106.9	127.6	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	15.1/12.0	10.8/12.5	na/11.2	
	20 cm / 50 cm	13.4/13.5	12.7/13.5	na/13.3	
	150cm / 300 cm	11.5/9.1	11.3/9.0	11.9 /9.9	

FOR YOUR INFORMATION

Unlike last year, this September was not a good harvest month. Precipitation, in the form of rain and on the 29th, snow, was 32% above the 30-year average. Below average temperatures and 54.5 hours less sunshine than normal produced very poor drying conditions which interfered with the harvest. The growing season ended with the first fall frost on the 29th with a total of 139 frost free days; 21 days more than usual. Growing-degree days for this period totalled 1513.3 degree days. The last spring frost had occurred on May 12th.

Although this September was cool in Saskatoon, the world's hottest day on record did occur in September, 1922, at Al'Aziziyah, Libya when the thermometer registered 58°C.[1] Midale & Yellowgrass hold the Saskatchewan and Canadian temperature records at 45.0°C set on July 5th, 1937.[2]

1 Camden House Publishing, 1994
2 Phillips 1990

SRC Publication No. R-1550-1-E-97

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

OCTOBER 1996

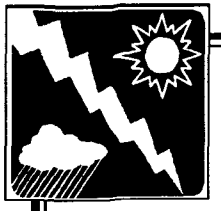
		1996 VALUE	1995 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	3.6	5.5	4.8	
	Extreme Monthly Maximum (°C)/Date	23.4/11	20.0/10&16	28.5 /1984 /8	32.2 /1943 /5
	Monthly Average Maximum (°C)	9.6	10.8	10.9	
	Number of recording years			28	97
	Extreme Monthly Minimum (°C)/Date	-16.5/31	-11.0/31	-19.5/1984/30&31	-25.6/1919/26
	Monthly Average Minimum (°C)	-2.5	0.3	-1.3	
	Number of recording years			28	97
	Days with Frost	19	13	19	
	Heating Degree-Days (18°C base)	448.8	385.2	405.2	
	Growing Degree-Days (5°C base)	58.9	68.7	62.2	
	Cooling Degree-Days (18°C base)	0.0			
PRECIPITATION	Monthly total (mm)	7.0	32.8	18.0	
	Greatest 24-h (mm)/Date	2.0/14&29	22.2/12	36.7/1984/16	36.7/1984 /16
	Number of recording years			28	97
	Days with Precipitation	5	10	6	
	Total Year - to - Date	306.8	288.4	324.7	
WIND	Average Speed (km/h)	13.5	13.2	17.1	
	Peak Gust Speed (km/h)/Date	57.2/29	65.9/16	138/1967/16	
SUNSHINE	Total Bright Sunshine (h)	151.6	116.3	166.4	
	% Possible Bright Sunshine	46.1	35.3	51	
	Number of days with Bright Sun	26	26		
	Total Global Radiation (MJ/m²)	234.6	223.2	239.1	
	Total Diffuse Radiation (MJ/m²)	74.2	107.7	92.6	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	3.0/4.6	5.1/6.4	na/4.5	
	20 cm / 50 cm	6.1/7.9	7.8/9.3	na /8.1	
	150cm / 300 cm	9.3/8.8	9.7/8.9	9.7/9.5	

FOR YOUR INFORMATION

October was not a pleasant harvesting month. The temperatures were below the 30-year averages by at least 1.2°C. On October 1st, a trace of snow fell and then, whenever it threatened to dry up, it either snowed or rained. The total monthly precipitation, however, was less than half of the average. The bright sunshine values, 5% below the average, contributed to the poor harvest conditions. There were 26 days with some sunshine. During the last days of the month an "Alberta Clipper" blew through bringing very cold temperatures, snow and near gale force winds of 57 km/h. Soil temperatures were average in the upper levels with the lower levels slightly colder than expected for this time of year.

This October weather dampened the optimistic harvest outlook. At the start of harvest, 89% of the combined spring wheat was grading No. 1 Canada Western; by the end of Sept. 79% was No. 1. By Oct. 28th only 47% of the spring wheat harvested was grading No.1.

(Karwandy 1996)



SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

NOVEMBER 1996

		1996 VALUE	1995 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	-11.8	-9.2	-6.1	
	Extreme Monthly Maximum (°C)/Date	9.5/02	9.5/18	19.4/1975 /4	21.7 /1903 /3
	Monthly Average Maximum (°C)	-7.2	-5.4	-1.5	
	Number of recording years			29	98
	Extreme Monthly Minimum (°C)/Date	-30.4/24	-26.5/11	-33.5/1985/24	-39.4 /1893/30
	Monthly Average Minimum (°C)	-16.3	-13.0	-10.5	
	Number of recording years			29	98
	Days with Frost	30	30	29	
	Heating Degree-Days (18°C base)	892.3	817.6	692.0	
	Growing Degree-Days (5°C base)	0	0.0	2.8	
	Cooling Degree-Days (18°C base)	0			
PRECIPITATION	Monthly total (mm)	24.0	19.0	14.9	
	Greatest 24-h (mm)/Date	13.0/19	6.0/9	19.3/1978/4	27.9/1938 /1
	Number of recording years			29	98
	Days with Precipitation	9	8	8	
	Total Year - to - Date	330.8	307.4	339.6	
WIND	Average Speed (km/h)	12.2	15.4	15.3	
	Peak Gust Speed (km/h)/Date	45.4/07	63.8/19	100.0/1976/17	
SUNSHINE	Total Bright Sunshine (h)	80.2	74.1	101.8	
	% Possible Bright Sunshine	30.5	28.2	39.0	
	Number of days with Bright Sun	24	17		
	Total Global Radiation (MJ/m²)	122.4	125.0	123.7	
	Total Diffuse Radiation (MJ/m²)	64.6	73.1	73.6	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	-3.5/-2.6	-1.9/-1.2	na/-1.7	
	20 cm / 50 cm	-1.0/2.5	0.1/3.4	na/2.6	
	150cm / 300 cm	6.3/7.5	6.9/7.8	6.8/8.1	

FOR YOUR INFORMATION

November was a very cold month. The average temperatures, 5.6° below normal, were pulled down on the 24th when the temperature fell to -30.4°. Only the first week of November saw maximum temperatures above freezing.

Although 24 days received some sunshine, 12 days received less than 1 hour lowering the bright sunshine value to 21.6 hours below normal.

Snow fell in earnest around the 19th with 24 mm recorded and 12.5 cm of snow was measured on the ground by month's end. Throughout the month, blizzards and low wind chill values were not a big problem because wind speeds remained low.

Snow fall is measured as its water equivalent(i.e. as if the snow was melted and poured into a rain gauge). One cm of snow, melted, will, on average, equal one mm of water.

Although the Climate Reference Station at SRC has been in operation for over 30 years, we are a young site compared to others on the prairies. There are 16 prairie sites including Indian Head, Moose Jaw, Prince Albert, Qu'Appelle, Regina, and Swift Current with over 100 years of records.

SRC Publication No. R-1550-1-E-97

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

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

DECEMBER 1996

		1996 VALUE	1995 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	-18.4	-15.7	-14.8	
	Extreme Monthly Maximum (°C)/Date	-1.0/05	0.0/4	9.5/1987/7	13.3/1939 /5
	Monthly Average Maximum (°C)	-13.9	-11.7	-9.8	
	Number of recording years			29	98
	Extreme Monthly Minimum (°C)/Date	-36.1/29	-32.5/8&10	-42.2/ 1973/31	-43.9 / 1892/ 22
	Monthly Average Minimum (°C)	-22.9	-19.7	-19.3	
	Number of recording years			29	98
	Days with Frost	31	31	31	
	Heating Degree-Days (18°C base)	1129.2	1041.5	987.7	
	Growing Degree-Days (5°C base)	0	0.0	0.0	
	Cooling Degree-Days (18°C base)	0			
PRECIPITATION	Monthly total (mm)	24.0	22.0	20.6	
	Greatest 24-h (mm)/Date	3.0/2,20,27&30	6.0/13&31	14.5/1973/23	20.6/1936 /24
	Number of recording years			29	98
	Days with Precipitation	14	10	13	
	Total Year - to - Date	354.8	329.4	360.2	
WIND	Average Speed (km/h)	14.8	14.1	15.7	
	Peak Gust Speed (km/h)/Date	56.8/16	77.5/4	121/1955/12	
SUNSHINE	Total Bright Sunshine (h)	76.1	86.3	84.2	
	% Possible Bright Sunshine	31.8	36.1	35.0	
	Number of days with Bright Sun	23.0	20		
	Total Global Radiation (MJ/m²)	96.9	101.2	95.2	
	Total Diffuse Radiation (MJ/m²)	54.0	53.0	54.3	
SOIL	Average Temperature (°C) @ 0900 h — 5 cm /10 cm	-6.0/-5.4	-9.5/-8.9	na/-6.6	
	20 cm / 50 cm	-3.8/-0.4	-7.3/-2.4	na/-1.7	
	150cm / 300 cm	3.9/5.7	3.5/6.0	3.9/6.3	

FOR YOUR INFORMATION

December's average maximum & minimum temperatures were 4.1° & 3.6° below normal. The monthly average was pulled downward by the extreme low temperatures (-27.9° to -36.1°) experienced over the Christmas holidays between the 21& 30. Although snow fall for the month was above normal, the total for the year ended at 5.4 mm below normal.

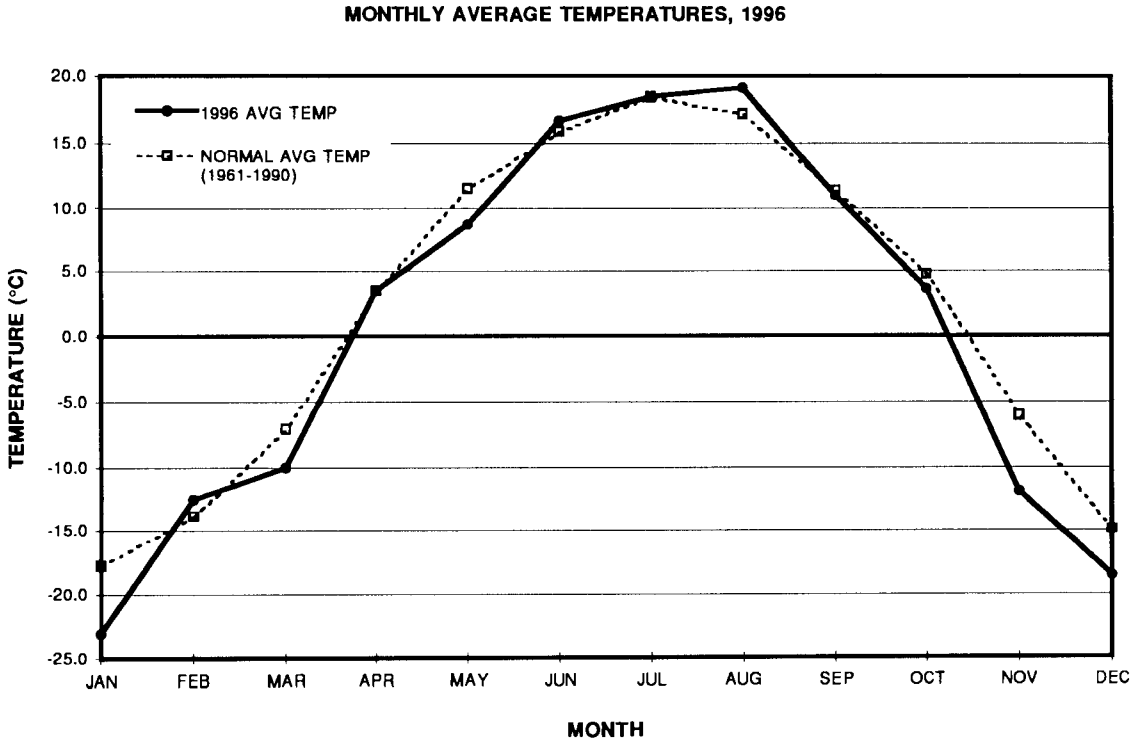
Near gale winds were experienced on the 16th but the average wind speed for the month was still normal at 14.8 km/h. Sunshine values were about 8 hours less than usual with 15 days receiving less than one hour of sunshine.

It is a common misconception that the extreme values for sunrise and sunset times occur on the shortest and longest days of the year. This is not the case. At mid northern latitudes, the earliest sunset occurs early in December and the latest sunrise is early in January, whereas the shortest day is December 21 or 22. (Bishop 1995)

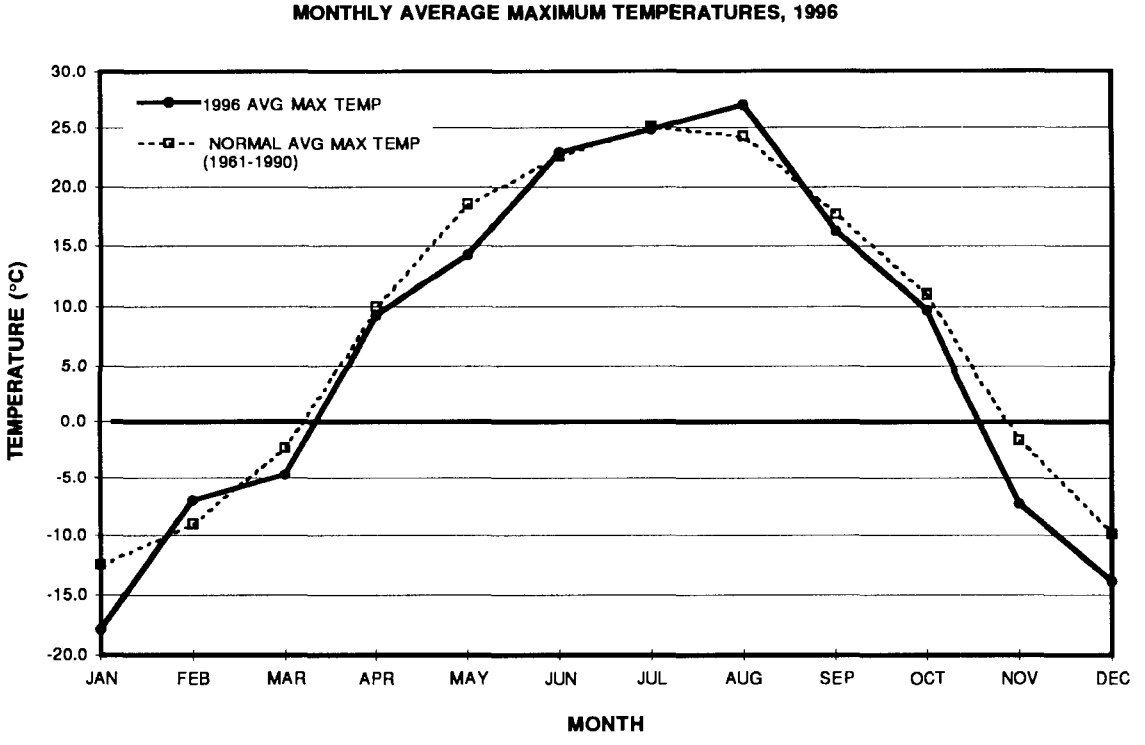
MONTHLY TEMPERATURES, 1996

MONTH	AVERAGE TEMPERATURE °C		AVERAGE MAXIMUM TEMPERATURE °C		AVERAGE MINIMUM TEMPERATURE °C		HEATING DEGREE DAYS °C		GROWING DEGREE DAYS°C		COOLING DEGREE DAYS °C	
	1996	NORMAL	1996	NORMAL	1996	NORMAL	1996	NORMAL	1996	NORMAL	1996	NORMAL
JANUARY	-23.1	-17.6	-17.9	-12.4	-28.2	-22.7	1273.3	1043.0	0.0	0.0	0.0	
FEBRUARY	-12.5	-13.8	-7.0	-9.0	-18.0	-18.3	915.0	878.0	0.0	0.0	0.0	
MARCH	-10.1	-7.1	-4.7	-2.2	-15.5	-12.1	872.8	727.8	0.8	1.5	0.0	
APRIL	3.5	3.5	9.2	9.9	-2.2	-2.0	433.1	388.0	39.3	60.2	0.0	
MAY	8.7	11.5	14.3	18.5	3.1	4.5	287.2	193.1	134.2	209.9	0.0	
JUNE	16.6	15.9	22.8	22.6	10.4	9.2	76.6	77.9	348.7	338.8	35.3	
JULY	18.5	18.4	24.8	25.1	12.1	11.6	22.9	28.7	418.3	409.8	38.2	
AUGUST	19.1	17.2	27.0	24.3	11.1	10.1	21.9	63.3	437.5	378.3	56.4	
SEPTEMBER	11.0	11.3	16.2	17.7	5.8	4.8	209.9	199.6	189.6	196.2	0.0	
OCTOBER	3.6	4.8	9.6	10.9	-2.5	-1.3	448.8	405.2	58.9	62.2	0.0	
NOVEMBER	-11.8	-6.1	-7.2	-1.5	-16.3	-10.5	892.3	692.0	0.0	2.8	0.0	
DECEMBER	-18.4	-14.8	-13.9	-9.8	-22.9	-19.3	1129.2	987.7	0.0	0.0	0.0	
TOTAL	5.1	23.2	73.2	94.1	-63.1	-46.0	6583.0	5684.3	1627.3	1659.7	129.9	
AVERAGE	0.4	1.9	6.1	7.8	-5.3	-3.8						

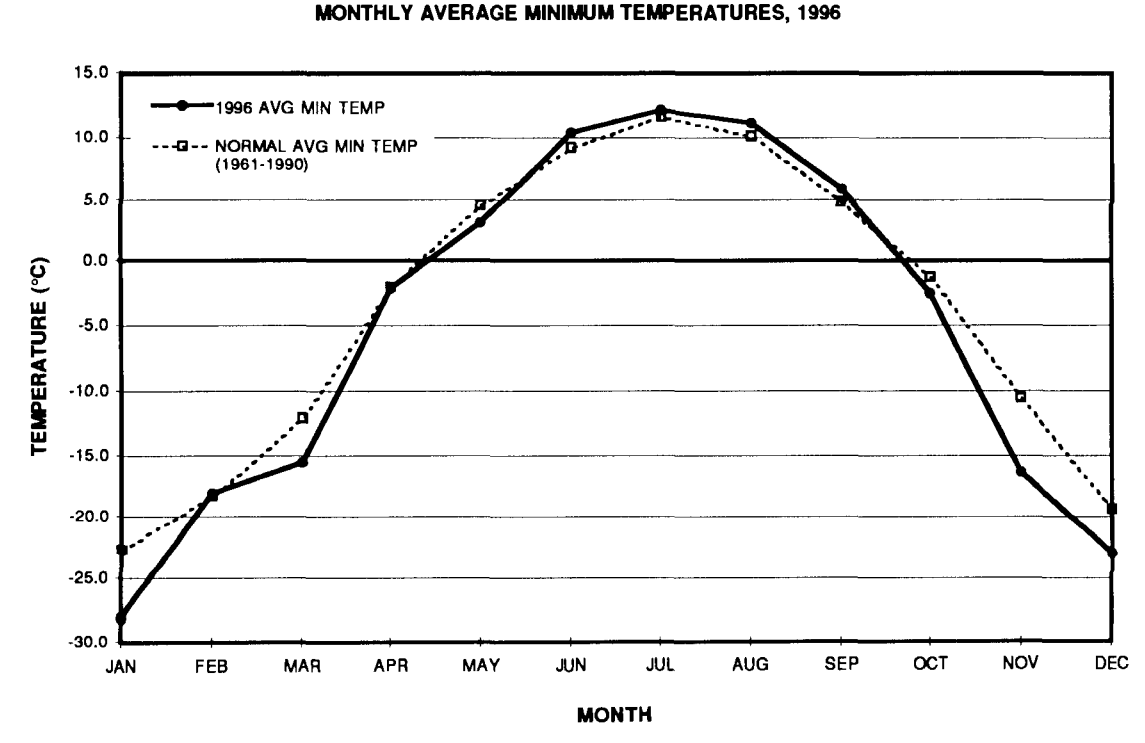
MONTHLY AVERAGE TEMPERATURES, 1996



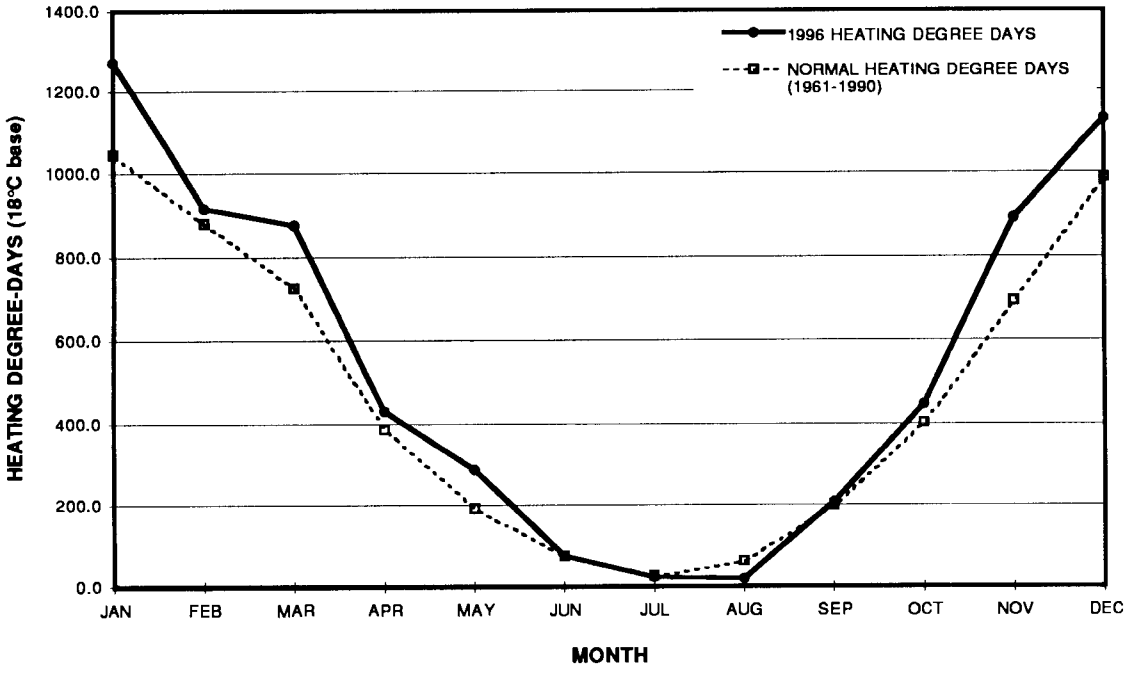
MONTHLY MAXIMUM TEMPERATURES, 1996



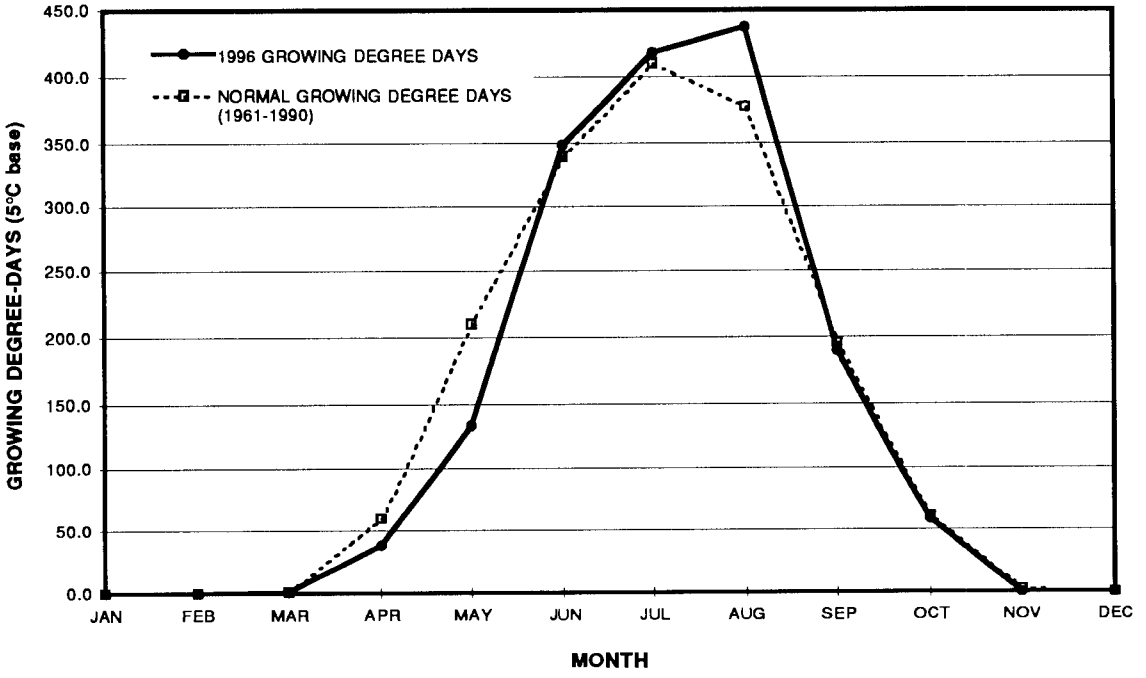
MONTHLY MINIMUM TEMPERATURES, 1996



MONTHLY HEATING DEGREE-DAYS, 1996

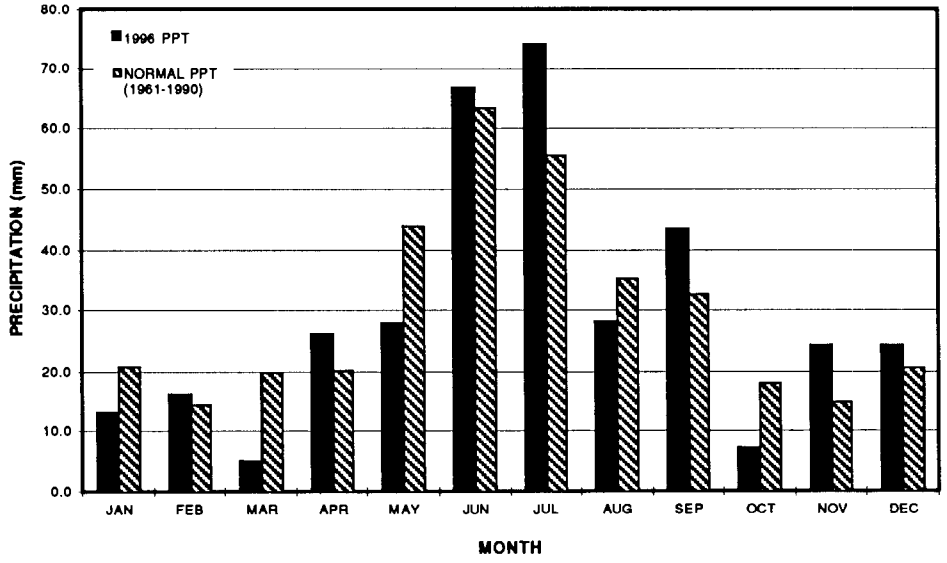


MONTHLY GROWING DEGREE-DAYS, 1996

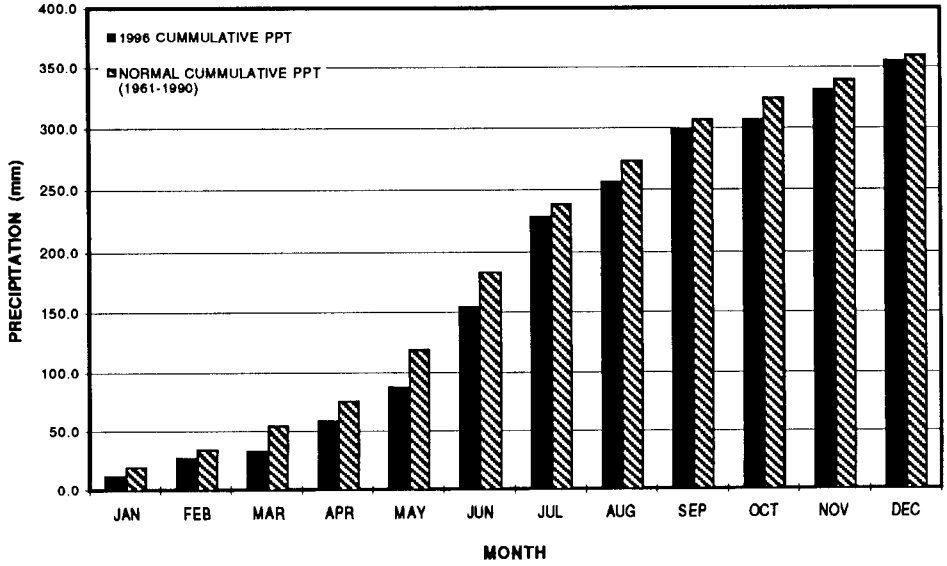


MONTHLY PRECIPITATION, 1996

MONTH	PRECIPITATION mm		CUMMULATIVE PRECIPITATION mm	
	1996	NORMAL	1996	NORMAL
JANUARY	13.0	20.8	13.0	20.8
FEBRUARY	16.0	14.5	29.0	35.3
MARCH	5.0	19.9	34.0	55.2
APRIL	26.0	20.2	60.0	75.4
MAY	27.8	43.9	87.8	119.3
JUNE	66.6	63.6	154.4	182.9
JULY	74.0	55.8	228.4	238.7
AUGUST	28.0	35.2	256.4	273.9
SEPTEMBER	43.4	32.8	299.8	306.7
OCTOBER	7.0	18.0	306.8	324.7
NOVEMBER	24.0	14.9	330.8	339.6
DECEMBER	24.0	20.6	354.8	360.2
TOTAL	354.8	360.2		



CUMULATIVE PRECIPITATION, 1996



GLOBAL AND DIFFUSE SOLAR RADIATION, 1996

(MJ/m²)

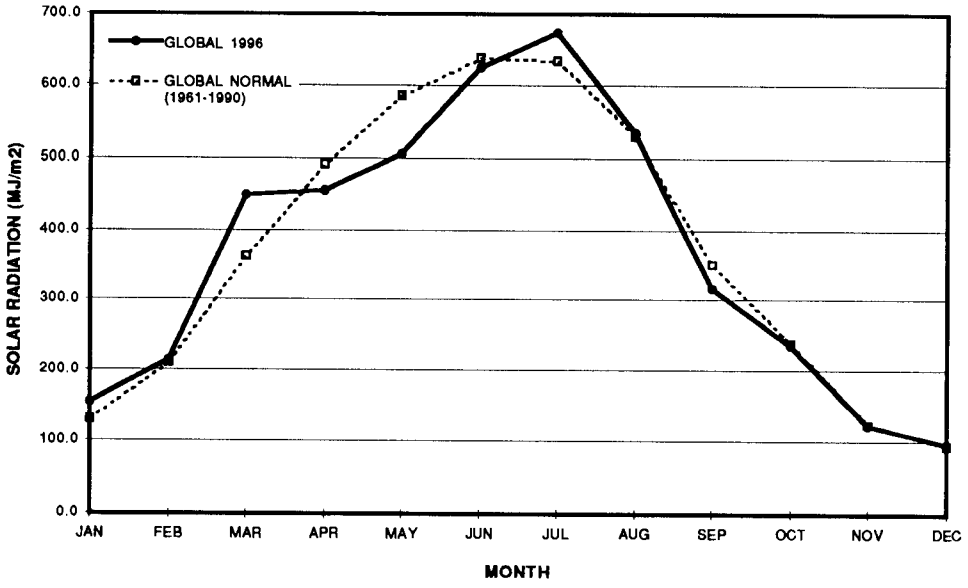
1996	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
Date	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse	Global	Diffuse
1	1.9	1.5	5.6	4.1	11.1	4.9	11.3	9.7	11.9	9.3	4.8	4.4	23.2	6.1	■18.5	■ 0.0	16.7	5.5	6.0	4.5	7.1	1.1	2.3	2.2
2	1.5	1.5	8.7	2.6	12.1	5.7	7.6	7.0	23.9	5.8	29.0	5.4	25.8	6.9	■	■	11.7	7.1	13.9	3.8	3.9	3.0	2.3	2.2
3	3.1	2.4	9.0	2.6	13.7	3.0	20.7	4.1	19.6	6.3	16.0	11.5	27.1	6.5	■	■	9.6	7.6	12.1	1.7	3.9	2.9	3.0	2.9
4	5.7	1.4	6.4	2.7	14.9	3.6	20.1	5.8	20.1	7.1	26.5	6.5	26.3	4.9	■	■	4.7	4.4	9.7	5.4	3.9	1.9	2.5	1.5
5	4.2	1.6	6.5	3.6	15.9	3.1	16.4	9.0	25.8	4.8	20.0	8.0	11.7	5.4	■	■	2.7	2.5	2.7	2.5	7.4	0.0	2.8	2.0
6	4.3	1.2	5.6	3.3	13.3	5.3	9.1	6.2	24.8	5.6	28.8	4.9	24.7	3.8	■10.4	■ 6.6	16.8	3.7	11.2	4.8	4.6	3.0	4.5	0.0
7	3.3	1.7	6.6	1.9	14.9	3.1	20.1	5.4	6.7	6.2	29.0	5.3	15.0	8.5	18.7	7.9	14.5	4.3	11.4	2.3	5.3	2.9	3.6	0.7
8	4.3	1.5	7.1	3.7	15.6	2.7	17.9	6.5	15.8	11.7	29.1	4.9	24.9	9.0	24.6	2.2	15.1	4.8	10.5	2.4	3.5	3.0	4.6	2.0
9	4.6	1.3	3.9	3.5	14.2	4.8	18.6	5.6	16.5	9.4	29.2	5.3	28.7	3.2	24.2	3.8	16.5	4.2	11.3	0.0	3.3	3.1	2.0	1.8
10	4.2	1.2	8.4	1.8	8.9	7.2	6.2	4.6	18.6	10.7	28.1	6.0	15.8	8.2	22.3	5.2	17.0	3.3	10.4	1.5	3.8	3.4	1.5	1.5
11	3.0	2.8	8.3	2.0	13.5	3.9	20.4	5.0	14.4	10.0	20.5	11.9	17.1	8.1	22.7	4.4	18.1	1.0	10.3	1.3	5.9	1.6	1.4	1.4
12	3.6	2.5	5.7	4.4	14.7	3.8	10.6	8.8	24.1	7.5	28.4	4.9	21.3	7.8	23.4	4.0	17.8	2.4	11.3	0.9	6.0	1.7	5.5	0.9
13	1.9	1.9	3.4	3.1	15.5	2.6	13.6	8.7	17.7	9.5	29.1	5.4	23.7	7.7	21.3	5.6	12.3	6.9	6.9	3.1	6.5	0.8	3.9	1.6
14	3.8	1.7	1.3	0.5	14.5	3.4	14.8	7.1	18.4	10.3	24.8	8.2	23.5	5.9	23.6	1.1	13.7	5.8	2.6	2.5	0.7	0.6	6.0	0.9
15	2.5	2.5	2.7	2.0	14.6	3.0	23.4	2.6	15.3	10.3	29.7	4.0	25.9	6.3	22.0	4.7	6.3	4.8	10.1	0.1	2.3	2.3	2.1	1.9
16	2.8	2.7	5.3	3.3	15.5	4.1	18.3	6.2	11.7	9.2	23.3	6.7	25.2	4.6	19.2	5.8	5.8	5.5	10.3	0.1	4.8	3.4	1.8	1.8
17	6.3	1.5	5.7	5.1	16.5	2.5	16.4	7.8	4.1	3.9	10.3	7.2	14.9	7.1	18.1	7.5	6.9	5.2	9.9	1.3	2.4	2.4	3.0	2.1
18	5.1	2.1	5.0	5.0	12.3	7.7	8.3	7.9	11.1	9.5	24.2	7.9	11.3	9.9	8.1	6.5	10.1	6.5	3.0	2.8	3.4	3.0	2.6	1.7
19	5.5	1.7	6.7	3.2	18.8	4.3	9.0	7.9	8.7	8.0	18.2	10.2	23.3	6.8	21.7	3.7	9.3	5.5	2.4	2.1	2.1	2.1	1.8	1.8
20	5.9	2.0	7.4	6.6	10.3	8.0	9.2	8.3	9.7	8.5	17.3	11.9	28.0	4.6	19.4	6.8	7.7	5.7	4.5	4.1	3.6	2.7	2.0	2.0
21	6.6	1.9	8.7	4.4	12.8	6.4	17.9	8.9	13.5	9.9	11.9	10.8	23.8	8.2	19.0	4.8	9.3	6.2	10.5	0.6	6.9	1.5	3.4	2.3
22	6.4	2.6	7.4	4.9	11.2	8.7	19.6	6.4	6.6	6.4	7.7	6.9	25.1	4.1	19.5	5.8	11.8	4.2	3.4	3.4	3.9	2.8	2.1	2.1
23	7.5	1.6	8.5	5.1	15.3	7.7	20.9	6.4	9.0	8.5	6.7	6.3	23.2	6.9	21.9	0.5	15.0	2.8	7.7	2.4	3.7	3.2	4.1	0.9
24	6.8	1.9	11.2	2.9	19.1	3.3	10.7	6.9	19.7	13.4	14.6	5.1	19.8	8.1	21.5	1.7	3.4	3.3	2.5	2.5	5.3	2.1	4.3	1.4
25	6.7	1.7	11.4	3.1	17.4	4.4	9.5	7.9	22.3	9.3	6.6	5.7	16.7	10.1	18.0	6.4	6.2	3.9	3.3	2.9	3.5	2.3	4.1	2.2
26	5.1	3.3	11.5	4.5	10.5	8.9	9.8	8.6	24.0	9.2	15.6	8.5	24.0	5.8	20.3	3.6	8.1	5.3	3.7	3.5	3.8	1.7	5.0	1.8
27	7.3	1.9	11.5	4.2	18.7	3.8	24.2	4.1	18.3	13.3	17.3	8.1	11.3	7.4	20.2	3.7	8.3	4.8	5.4	3.4	3.8	1.7	2.5	2.0
28	4.0	3.8	13.7	3.2	19.3	4.0	20.6	5.4	20.9	12.6	26.7	5.6	24.4	4.6	18.8	5.4	10.7	6.0	5.8	3.4	2.1	2.1	4.3	2.0
29	8.6	2.0	11.0	4.9	13.4	8.5	11.7	9.5	14.4	9.9	25.7	7.3	23.9	5.8	18.4	4.4	2.4	1.7	8.5	0.7	1.9	1.9	2.4	1.9
30	8.0	1.9			9.9	7.9	17.8	9.0	14.8	10.1	24.3	10.4	23.1	8.7	19.1	4.1	8.5	5.9	8.1	0.1	3.1	0.4	3.1	2.4
31	9.1	2.3			20.2	5.4			22.8	9.8			21.5	8.2	19.4	3.5			5.2	4.1			2.4	2.1
TOTAL	153.6	61.6	214.2	102.2	448.6	155.7	454.7	207.3	505.2	276.0	623.4	215.2	674.2	209.2	534.3	119.7	317.0	140.8	234.6	74.2	122.4	64.6	96.9	54.0

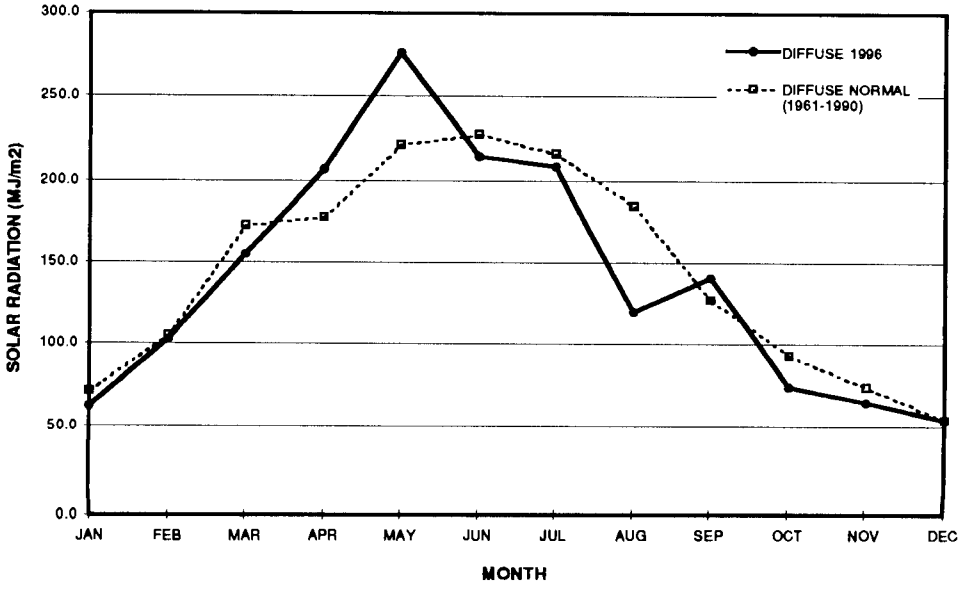
■ missing or partial data

MONTHLY GLOBAL AND DIFFUSE SOLAR RADIATION, 1996

MONTH	GLOBAL MJ/m²		DIFFUSE MJ/m²	
	1996	NORMAL	1996	NORMAL
JANUARY	153.6	129.9	61.6	71.4
FEBRUARY	214.2	210.1	102.2	105.3
MARCH	448.6	362.4	155.7	173.9
APRIL	454.7	492.2	207.3	178.5
MAY	505.2	586.3	276.0	222.2
JUNE	623.4	638.7	215.2	228.1
JULY	674.2	633.5	209.2	216.5
AUGUST	■ 534.3	529.0	■ 119.7	185.6
SEPTEMBER	317.0	351.8	140.8	127.6
OCTOBER	234.6	239.1	74.2	92.6
NOVEMBER	122.4	123.7	64.6	73.6
DECEMBER	96.9	95.2	54.0	54.3
TOTAL	4379.1	4391.9	1680.5	1729.6

■ partial data set

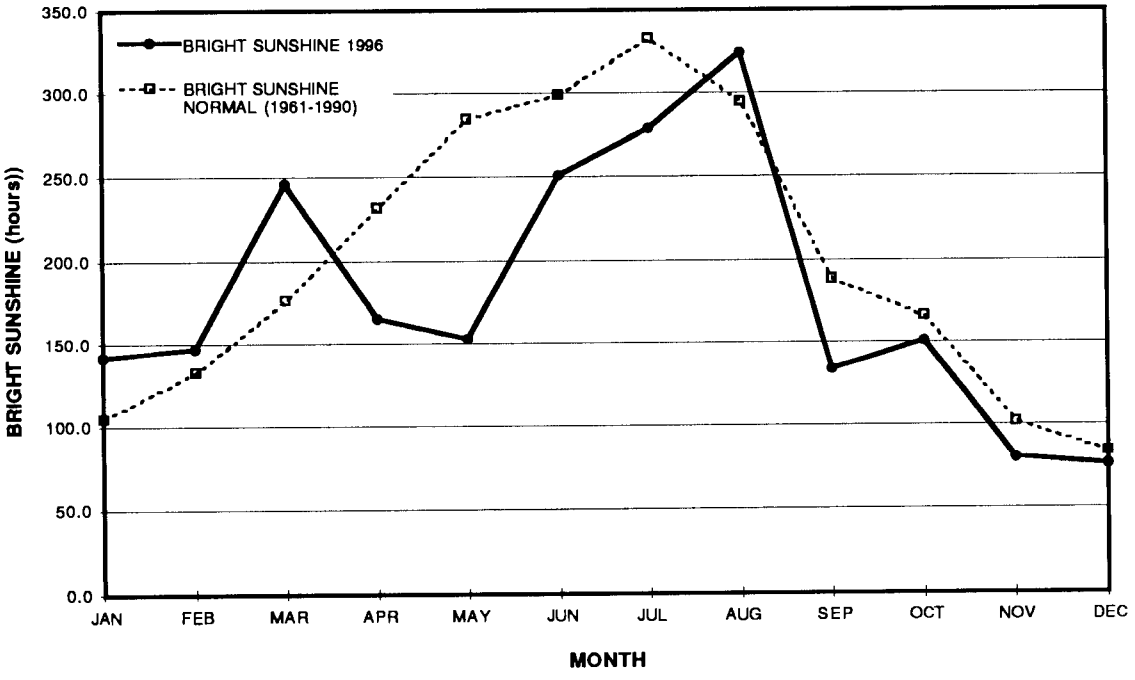




MONTHLY BRIGHT SUNSHINE, 1996

MONTH	BRIGHT SUNSHINE 1996	NORMAL
JANUARY	142.6	104.9
FEBRUARY	147.7	133.2
MARCH	245.3	176.9
APRIL	165.7	231.3
MAY	■ 153.0	284.6
JUNE	251.1	299.3
JULY	278.4	333.1
AUGUST	■ 323.6	294.8
SEPTEMBER	134.4	188.9
OCTOBER	151.6	166.4
NOVEMBER	80.2	101.8
DECEMBER	76.1	84.2
TOTAL	2149.7	2399.4

■ data set supplemented from U of S



SUNRISE/SET AT SASKATOON SK 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
8	9:13	17:14	8:34	18:08	7:36	18:59	6:25	19:53	5:23	20:44	4:47	21:25	4:56	21:26	5:39	20:44	6:30	19:37	7:20	18:27	8:15	17:25	9:02	16:55
9	9:12	17:16	8:33	18:10	7:34	19:01	6:22	19:55	5:21	20:46	4:47	21:25	4:57	21:26	5:41	20:42	6:31	19:35	7:21	18:25	8:17	17:24	9:03	16:55
10	9:12	17:17	8:31	18:11	7:32	19:03	6:20	19:57	5:20	20:47	4:46	21:26	4:58	21:25	5:42	20:40	6:33	19:33	7:23	18:23	8:19	17:22	9:04	16:54
11	9:11	17:19	8:29	18:13	7:29	19:05	6:18	19:58	5:18	20:49	4:46	21:27	4:59	21:24	5:44	20:38	6:35	19:30	7:25	18:21	8:20	17:20	9:06	16:54
12	9:10	17:20	8:27	18:15	7:27	19:06	6:16	20:00	5:16	20:50	4:46	21:27	5:01	21:23	5:46	20:36	6:36	19:28	7:27	18:18	8:22	17:19	9:06	16:54
13	9:10	17:22	8:25	18:17	7:25	19:08	6:13	20:02	5:15	20:52	4:46	21:28	5:02	21:22	5:47	20:34	6:38	19:26	7:28	18:16	8:24	17:17	9:07	16:54
14	9:09	17:23	8:23	18:19	7:22	19:10	6:11	20:03	5:13	20:54	4:45	21:29	5:03	21:21	5:49	20:32	6:40	19:23	7:30	18:14	8:26	17:16	9:08	16:54
15	9:08	17:25	8:21	18:21	7:20	19:12	6:09	20:05	5:12	20:55	4:45	21:29	5:04	21:20	5:50	20:30	6:41	19:21	7:32	18:12	8:27	17:15	9:09	16:54
16	9:07	17:26	8:19	18:23	7:18	19:13	6:07	20:07	5:10	20:57	4:45	21:30	5:05	21:19	5:52	20:28	6:43	19:19	7:34	18:10	8:29	17:13	9:10	16:55
17	9:06	17:28	8:17	18:25	7:15	19:15	6:05	20:09	5:09	20:58	4:45	21:30	5:07	21:18	5:54	20:26	6:45	19:16	7:35	18:08	8:31	17:12	9:11	16:55
18	9:05	17:30	8:15	18:26	7:13	19:17	6:02	20:10	5:07	21:00	4:45	21:30	5:08	21:17	5:55	20:24	6:46	19:14	7:37	18:05	8:33	17:11	9:11	16:55
19	9:04	17:31	8:13	18:28	7:11	19:19	6:00	20:12	5:06	21:01	4:45	21:31	5:09	21:16	5:57	20:22	6:48	19:12	7:39	18:03	8:34	17:09	9:12	16:56
20	9:03	17:33	8:11	18:30	7:09	19:20	5:58	20:14	5:05	21:02	4:45	21:31	5:11	21:14	5:59	20:20	6:49	19:09	7:41	18:01	8:36	17:08	9:13	16:56
21	9:02	17:35	8:09	18:32	7:06	19:22	5:56	20:15	5:03	21:04	4:46	21:31	5:12	21:13	6:00	20:18	6:51	19:07	7:42	17:59	8:38	17:07	9:13	16:56
22	9:01	17:36	8:07	18:34	7:04	19:24	5:54	20:17	5:02	21:05	4:46	21:31	5:13	21:12	6:02	20:16	6:53	19:04	7:44	17:57	8:39	17:06	9:14	16:57
23	8:59	17:38	8:05	18:36	7:02	19:26	5:52	20:19	5:01	21:07	4:46	21:31	5:15	21:10	6:04	20:13	6:54	19:02	7:46	17:55	8:41	17:05	9:14	16:58
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25	8:57	17:42	8:01	18:39	6:57	19:29	5:48	20:22	4:58	21:09	4:47	21:31	5:18	21:08	6:07	20:09	6:58	18:57	7:50	17:51	8:44	17:03	9:15	16:59
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29	8:51	17:49			6:48	19:36	5:40	20:29	4:54	21:14	4:49	21:31	5:23	21:01	6:13	20:00	7:04	18:48	7:57	17:43	8:50	16:59	9:15	17:02
30	8:50	17:51			6:45	19:38	5:38	20:31	4:53	21:16	4:50	21:31	5:25	21:00	6:15	19:58	7:06	18:46	7:59	17:41	8:52	16:59	9:15	17:03
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: Dominion Astrophysical Observatory

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

SUNRISE/SET AT SASKATOON SK 1996

(local time in hours and minutes)

1996	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	8:48	17:53	7:51	18:47	6:40	19:41	5:35	20:33	4:51	21:18	4:51	21:30	5:28	20:56	6:19	19:53	7:08	18:43	8:03	17:37	8:54	16:58
2	9:15	17:06	8:46	17:55	7:49	18:49	6:38	19:43	5:34	20:34	4:51	21:19	4:51	21:30	5:30	20:54	6:20	19:51	7:10	18:41	8:04	17:35	8:55	16:57
3	9:15	17:07	8:44	17:57	7:47	18:51	6:35	19:45	5:32	20:36	4:50	21:20	4:52	21:29	5:32	20:53	6:22	19:48	7:12	18:38	8:06	17:33	8:56	16:57
4	9:15	17:08	8:43	17:59	7:45	18:53	6:33	19:47	5:30	20:38	4:49	21:21	4:53	21:29	5:33	20:51	6:24	19:46	7:13	18:36	8:08	17:32	8:58	16:56
5	9:15	17:09	8:41	18:01	7:42	18:54	6:31	19:48	5:28	20:39	4:49	21:22	4:54	21:28	5:35	20:49	6:25	19:44	7:15	18:34	8:10	17:30	8:59	16:56
6	9:14	17:11	8:39	18:03	7:40	18:56	6:29	19:50	5:26	20:41	4:48	21:23	4:55	21:28	5:36	20:47	6:27	19:41	7:17	18:31	8:12	17:28	9:00	16:55
7	9:14	17:12	8:38	18:04	7:38	18:58	6:26	19:52	5:24	20:43	4:48	21:24	4:56	21:27	5:38	20:45	6:29	19:39	7:18	18:29	8:14	17:26	9:01	16:55
8	9:13	17:13	8:36	18:06	7:36	19:00	6:24	19:54	5:23	20:44	4:47	21:25	4:57	21:26	5:40	20:44	6:30	19:37	7:20	18:27	8:15	17:25	9:03	16:55
9	9:13	17:15	8:34	18:08	7:33	19:01	6:22	19:55	5:21	20:46	4:47	21:26	4:58	21:25	5:41	20:42	6:32	19:34	7:22	18:25	8:17	17:23	9:04	16:55
10	9:12	17:16	8:32	18:10	7:31	19:03	6:20	19:57	5:19	20:48	4:46	21:26	4:59	21:25	5:43	20:40	6:33	19:32	7:24	18:22	8:19	17:22	9:05	16:54
11	9:12	17:17	8:30	18:12	7:29	19:05	6:17	19:59	5:18	20:49	4:46	21:27	5:00	21:24	5:44	20:38	6:35	19:30	7:25	18:20	8:21	17:20	9:06	16:54
12	9:11	17:19	8:28	18:14	7:26	19:07	6:15	20:00	5:16	20:51	4:46	21:28	5:01	21:23	5:46	20:36	6:37	19:27	7:27	18:18	8:23	17:19	9:07	16:54
13	9:10	17:20	8:27	18:16	7:24	19:09	6:13	20:02	5:14	20:52	4:45	21:28	5:02	21:22	5:48	20:34	6:38	19:25	7:29	18:16	8:24	17:17	9:08	16:54
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15	9:09	17:23	8:23	18:19	7:20	19:12	6:08	20:06	5:11	20:55	4:45	21:29	5:04	21:20	5:51	20:30	6:42	19:20	7:32	18:11	8:28	17:14	9:09	16:55
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17	9:07	17:27	8:19	18:23	7:15	19:16	6:04	20:09	5:08	20:58	4:45	21:30	5:07	21:18	5:54	20:26	6:45	19:16	7:36	18:07	8:31	17:12	9:11	16:55
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22	9:01	17:35	8:08	18:32	7:03	19:24	5:53	20:18	5:02	21:06	4:46	21:31	5:14	21:11	6:02	20:15	6:53	19:04	7:45	17:57	8:40	17:06	9:14	16:57
23	9:00	17:37	8:06	18:34	7:01	19:26	5:51	20:19	5:00	21:07	4:46	21:31	5:15	21:10	6:04	20:13	6:55	19:02	7:46	17:54	8:41	17:05	9:14	16:58
24	8:59	17:39	8:04	18:36	6:59	19:28	5:49	20:21	4:59	21:08	4:47	21:31	5:16	21:09	6:06	20:11	6:56	18:59	7:48	17:52	8:43	17:04	9:15	16:58
25	8:58	17:40	8:02	18:38	6:56	19:29	5:47	20:23	4:58	21:10	4:47	21:31	5:18	21:07	6:07	20:09	6:58	18:57	7:50	17:50	8:45	17:03	9:15	16:59
26	8:56	17:42	8:00	18:40	6:54	19:31	5:45	20:24	4:57	21:11	4:48	21:31	5:19	21:06	6:09	20:06	7:00	18:55	7:52	17:48	8:46	17:02	9:15	17:00
27	8:55	17:44	7:58	18:42	6:52	19:33	5:43	20:26	4:56	21:12	4:48	21:31	5:21	21:04	6:11	20:04	7:01	18:52	7:54	17:46	8:48	17:01	9:15	17:01
28	8:54	17:46	7:56	18:43	6:49	19:35	5:41	20:28	4:55	21:14	4:49	21:31	5:22	21:03	6:12	20:02	7:03	18:50	7:55	17:45	8:49	17:00	9:15	17:02
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30	8:51	17:50			6:45	19:38	5:37	20:31	4:53	21:16	4:50	21:30	5:25	20:59	6:15	19:57	7:07	18:45	7:59	17:41	8:52	16:58	9:15	17:03
31	8:49	17:51			6:42	19:40			4:52	21:17			5:27	20:58	6:17	19:55			8:01	17:39			9:15	17:04

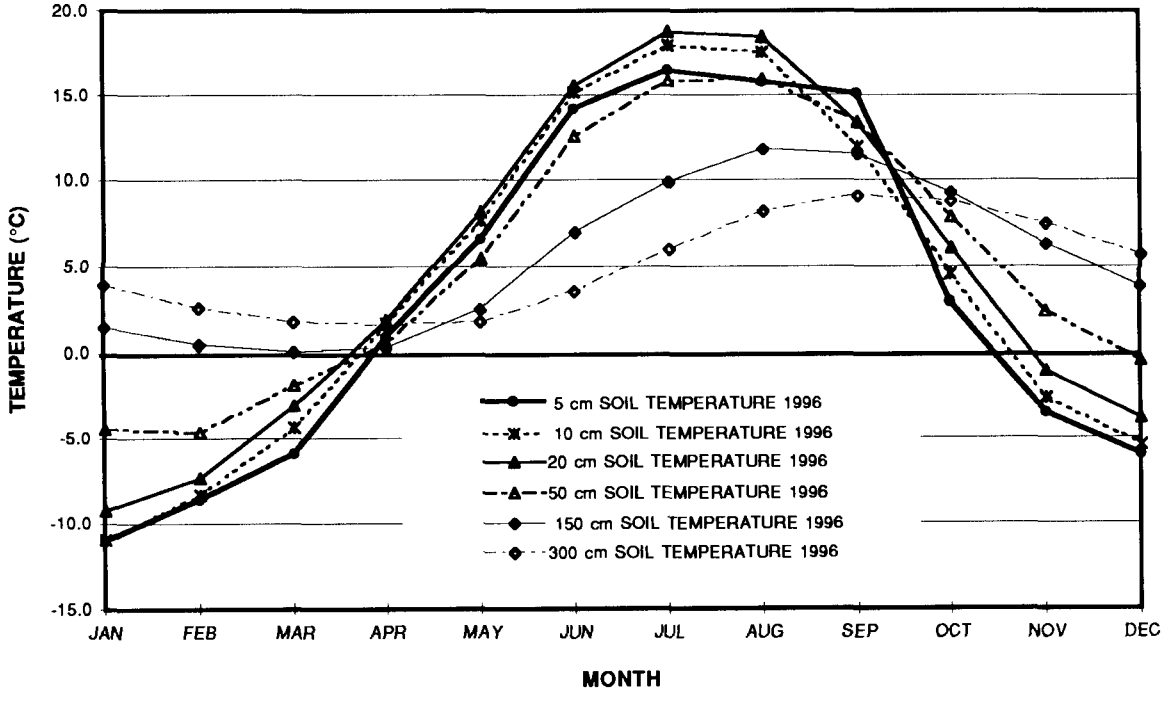
Source: Dominion Astrophysical Observatory

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

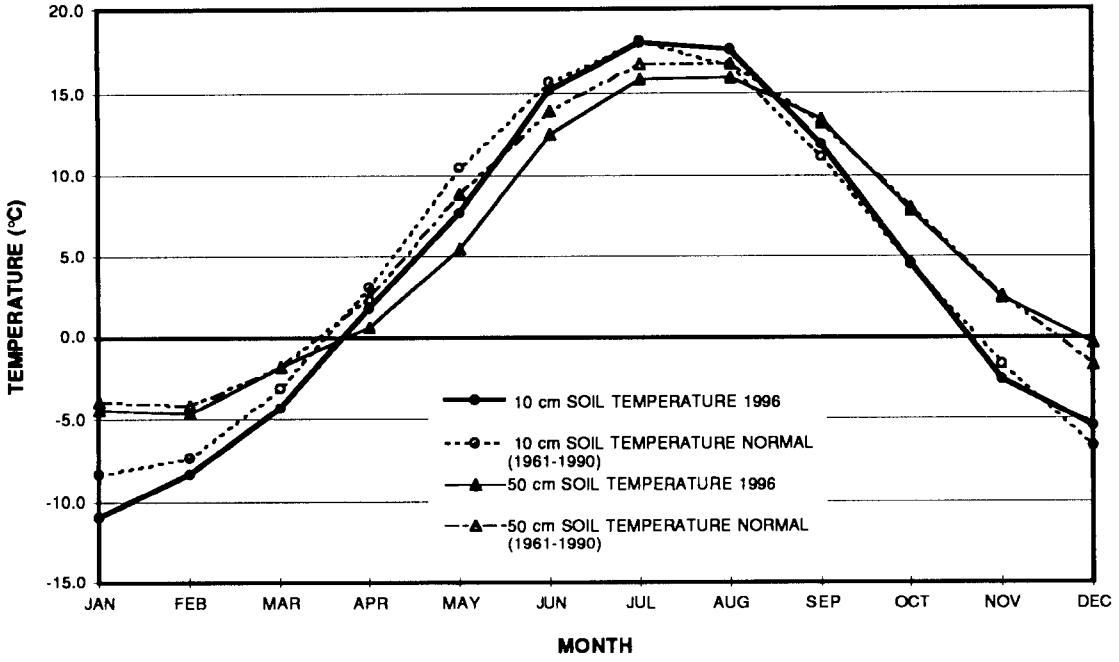
SOIL TEMPERATURES AT ALL LEVELS, 1996

MONTH	5 cm SOIL TEMPERATURE °C		10 cm SOIL TEMPERATURE °C		20 cm SOIL TEMPERATURE °C		50 cm SOIL TEMPERATURE °C		150 cm SOIL TEMPERATURE °C		300 cm SOIL TEMPERATURE °C	
	1996	NORMAL	1996	NORMAL	1996	NORMAL	1996	NORMAL	1996	NORMAL	1996	NORMAL
JANUARY	-11.0	not	-10.9	-8.3	-9.2	not	-4.4	-3.9	1.5	1.8	4.0	4.4
FEBRUARY	-8.6	available	-8.3	-7.3	-7.3	available	-4.6	-4.1	0.5	0.8	2.7	3.2
MARCH	-5.9		-4.3	-3.1	-3.0		-1.8	-1.8	0.1	0.4	1.8	2.4
APRIL	0.9		1.7	3.1	1.9		0.6	2.5	0.3	1.2	1.6	2.2
MAY	6.6		7.7	10.5	8.2		5.5	8.9	2.6	4.4	1.8	3.1
JUNE	14.2		15.2	15.7	15.6		12.6	14.0	7.0	8.3	3.6	5.3
JULY	16.5		18.0	18.1	18.8		15.9	16.8	9.9	11.0	6.0	7.5
AUGUST	■ 15.8		■ 17.6	16.7	■ 18.5		■ 16.0	16.8	■ 11.8	12.4	■ 8.2	9.3
SEPTEMBER	15.1		12.0	11.2	13.4		13.5	13.3	11.5	11.9	9.1	9.9
OCTOBER	3.0		4.6	4.5	6.1		7.9	8.1	9.3	9.7	8.8	9.5
NOVEMBER	-3.5		-2.6	-1.7	-1.0		2.5	2.6	6.3	6.8	7.5	8.1
DECEMBER	-6.0		-5.4	-6.6	-3.8		-0.4	-1.7	3.9	3.9	5.7	6.3

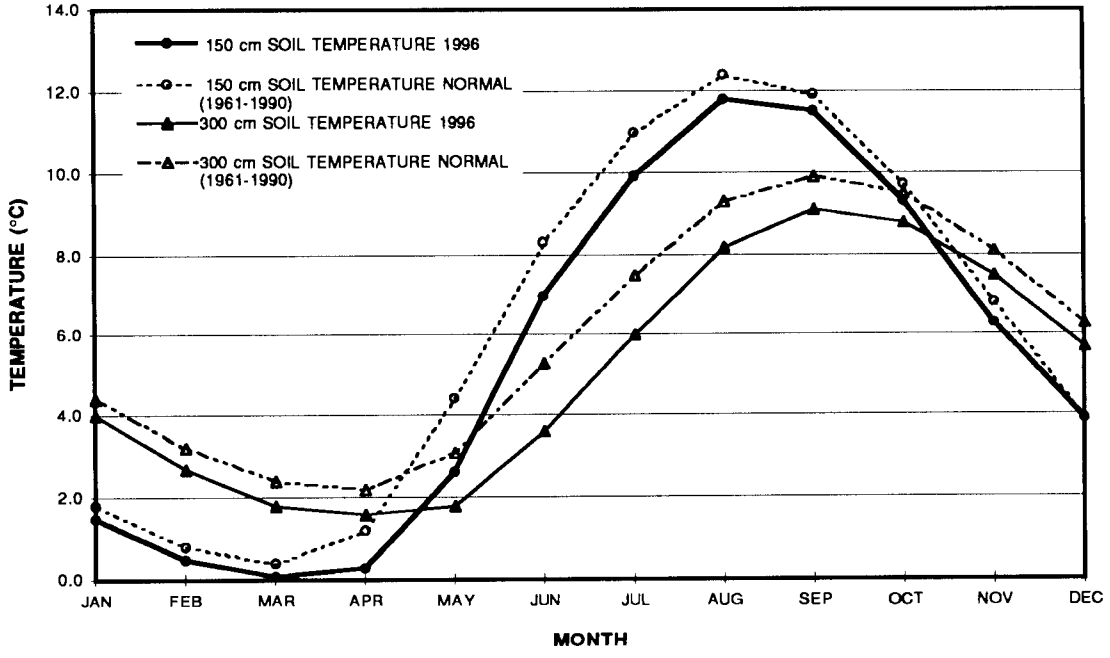
■ Based on data from Aug. 7-31

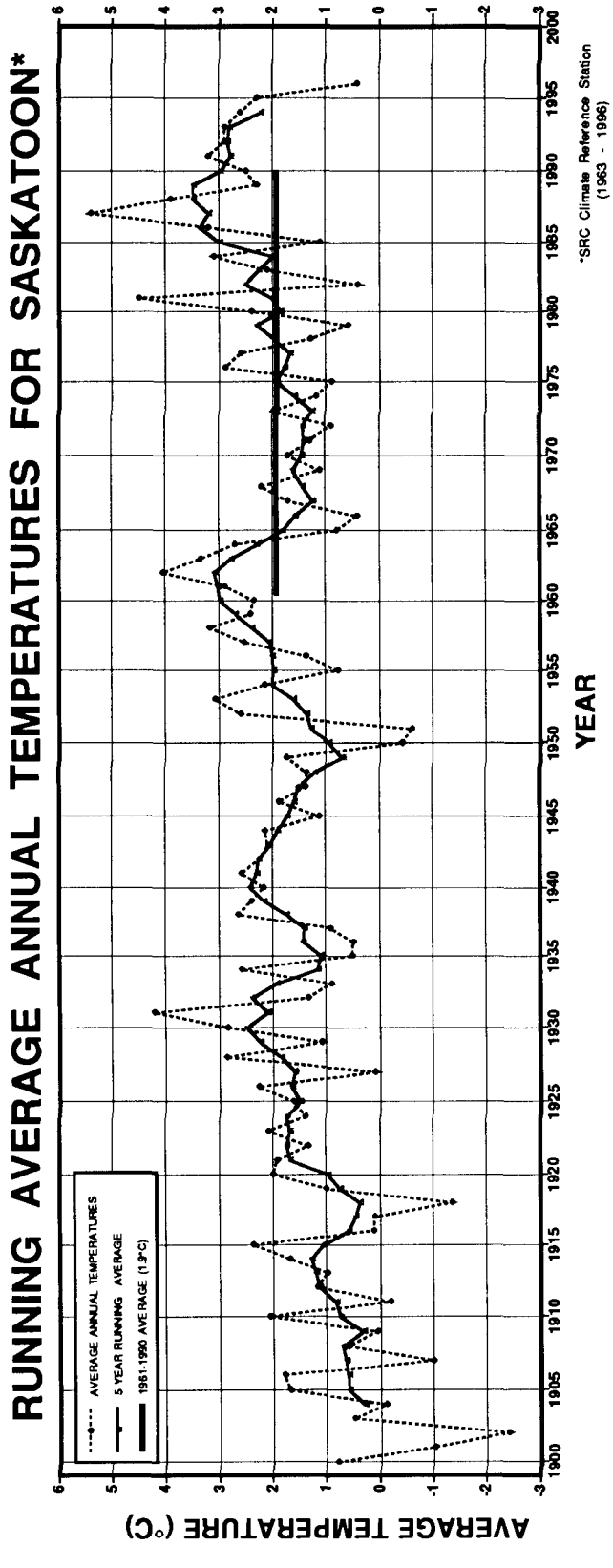


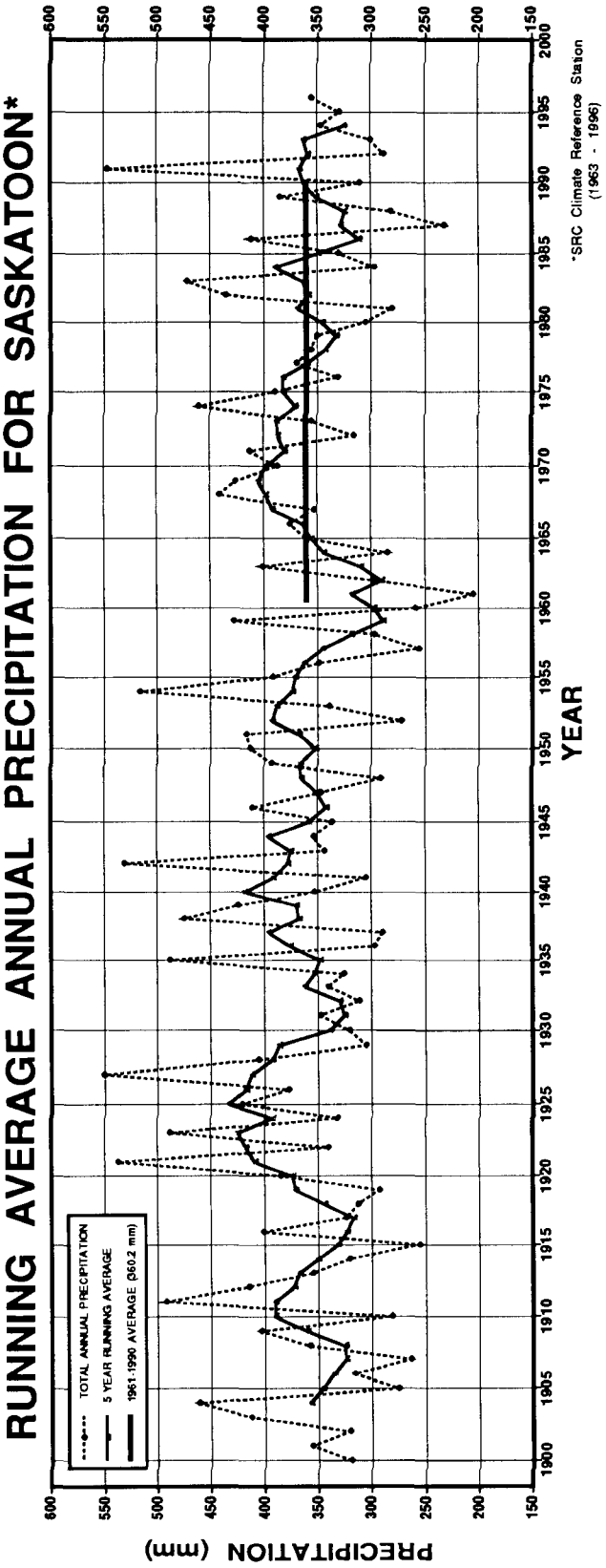
MONTHLY SOIL TEMPERATURES AT THE 10 cm & 50 cm LEVELS, 1996



MONTHLY SOIL TEMPERATURES AT THE 150 cm & 300 cm LEVELS, 1996




RUNNING AVERAGE ANNUAL TEMPERATURES FOR SASKATOON*
AVERAGE ANNUAL TEMPERATURES
5 YEAR RUNNING AVERAGE
1961-1990 AVERAGE (1.9°C)
AVERAGE TEMPERATURE (°C)
YEAR
*SRC Climate Reference Station (1963 - 1996)


RUNNING AVERAGE ANNUAL PRECIPITATION FOR SASKATOON*
TOTAL ANNUAL PRECIPITATION
5 YEAR RUNNING AVERAGE
1961-1990 AVERAGE (350.2 mm)
PRECIPITATION (mm)
YEAR
*SRC Climate Reference Station (1963 - 1996)

INSTRUMENTS USED AT SASKATOON SRC CRS AND GLOSSARY OF TERMS

AVERAGE (Avg) **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.

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.

COOLING DEGREE-DAY (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.

DIFFUSE SOLAR RADIATION - 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 GLOBAL SOLAR RADIATION - Total).

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 1996

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 <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.

GLOBAL SOLAR RADIATION - 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 (1975-1990).

GROWING DEGREE-DAY (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.

HEATING DEGREE-DAY (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.

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 1, 1976. Depths below surface at which soil temperature measurements are made are: 5 cm, 10 cm, 20 cm, 50 cm, 100 cm, 150 cm and 300 cm. 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.

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 Dominion Astrophysical Observatory Web Site http://www.hia.nrc.ca/DAO/TABLES/table1.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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