Environment Canada Environnement Canada

MONTHLY SUPPLEMENT INCLUDED

Climatic Perspectives

July 17 to 23, 1989 ***A weekly review of Canadian climate*** *Vol. 11 No 30*

Torrential rains in extreme southwestern Ontario cause devastating flooding

A stalled low pressure system with regenerating local thunderstorms was responsible for the flood waters that inundated parts of Essex County. In the time span of 17 hours, from 2200 hours, July 19, until 1500 hours, July 20, 264.2 mm of rain fell at Harrow, 25 km south of Windsor. This was the highest two-day total ever recorded in Ontario. Unofficial, but reliable reports from Colchester, 5 km south of Harrow, on Lake Erie, indicate totals of greater than 300 mm. Damage was extensive, with more than 1,000 homes affected by surface flooding and more than 3,000 people had to leave their homes. Three houses washed away into Lake Erie, crops turned into mush, and roads became rivers. Estimates of crop losses are set at 60%, while road repairs are expected to cost 35 million dollars. Fortunately, no lives were lost. In stark contrast, much of Ontario remains in the grip of a worsening dry spell. No rain has fallen so far this month in Peterborough. Other rainfall amounts so far this month: Wiarton, 0.2 mm; Gore Bay, 4.4 mm; Muskoka, 7.4 mm; Kapuskasing, 11.6 mm; and Toronto City, 13.8 mm.

Bryan Smith, Ontario Climate Centre

Record heat in northern Manitoba spawns extensive forest fires

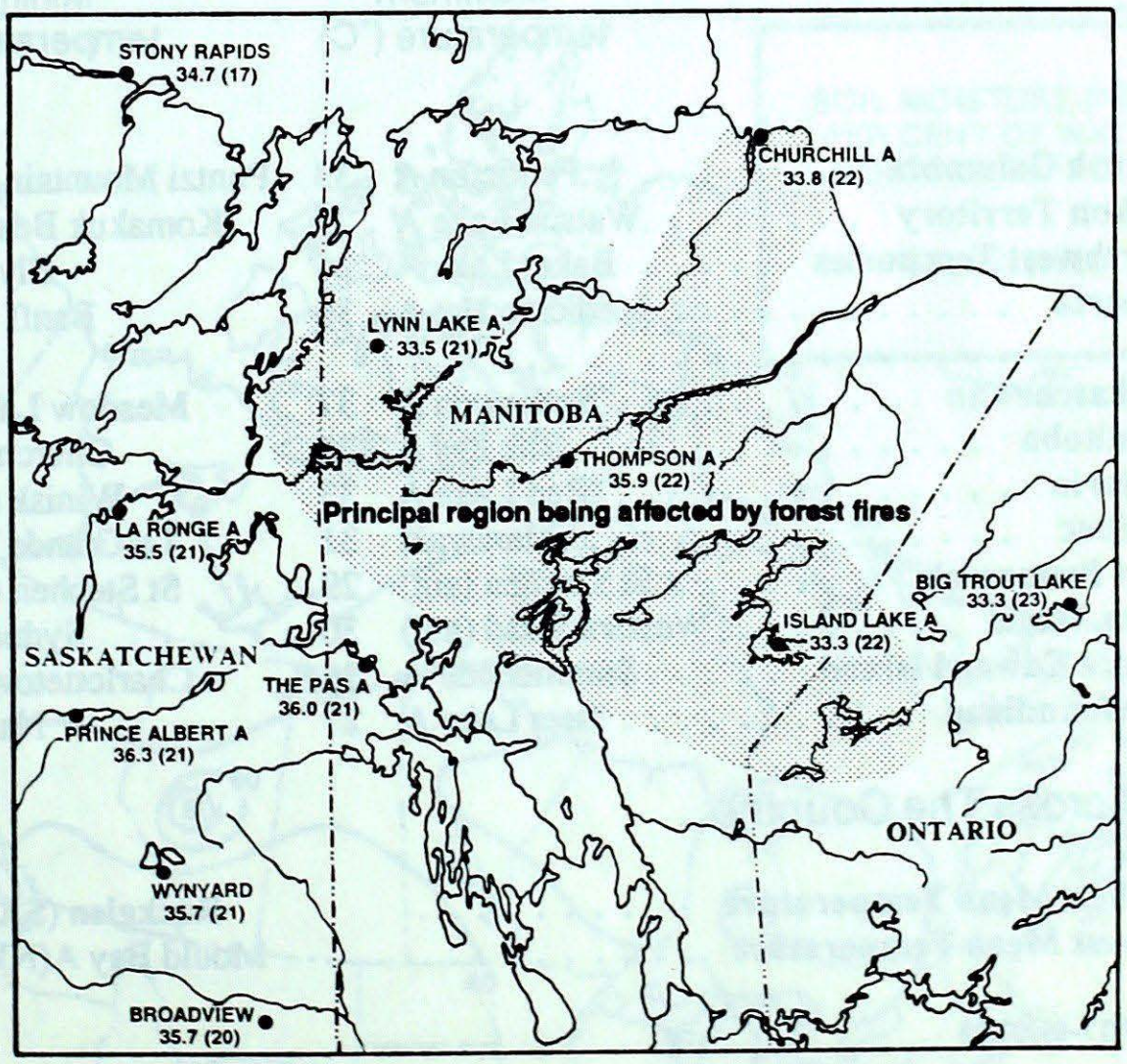
A heat wave combined with dry winds produced a disastrous forest fire situation across northern parts of Saskatchewan, Manitoba, and Ontario. Altogether, 600 fires were burning by July 24th, of which 250 were in Manitoba where more than 20,000 people were forced to flee their homes. The Manitoba fire belt is about 350 kilometres wide and begins north of Lake Winnipeg. Smoke from the fires has hampered evacuation by aircraft due to poor visibility, and has been reported as far away as Cape Dorset, on Baffin Island.

More warm temperatures ahead...

Average temperatures for the first week of August are expected to be above normal for most of Canada, except near normal over the southern parts of British Columbia, and Baffin Island. The greatest departures from normal are expected to be in Manitoba and northwestern Ontario. Precipitation is likely over British Columbia, southern Québec and the Maritimes. Dry weather will continue over Saskatchewan, Manitoba, and northwestern Ontario under the influence of an upper atmospheric ridge.

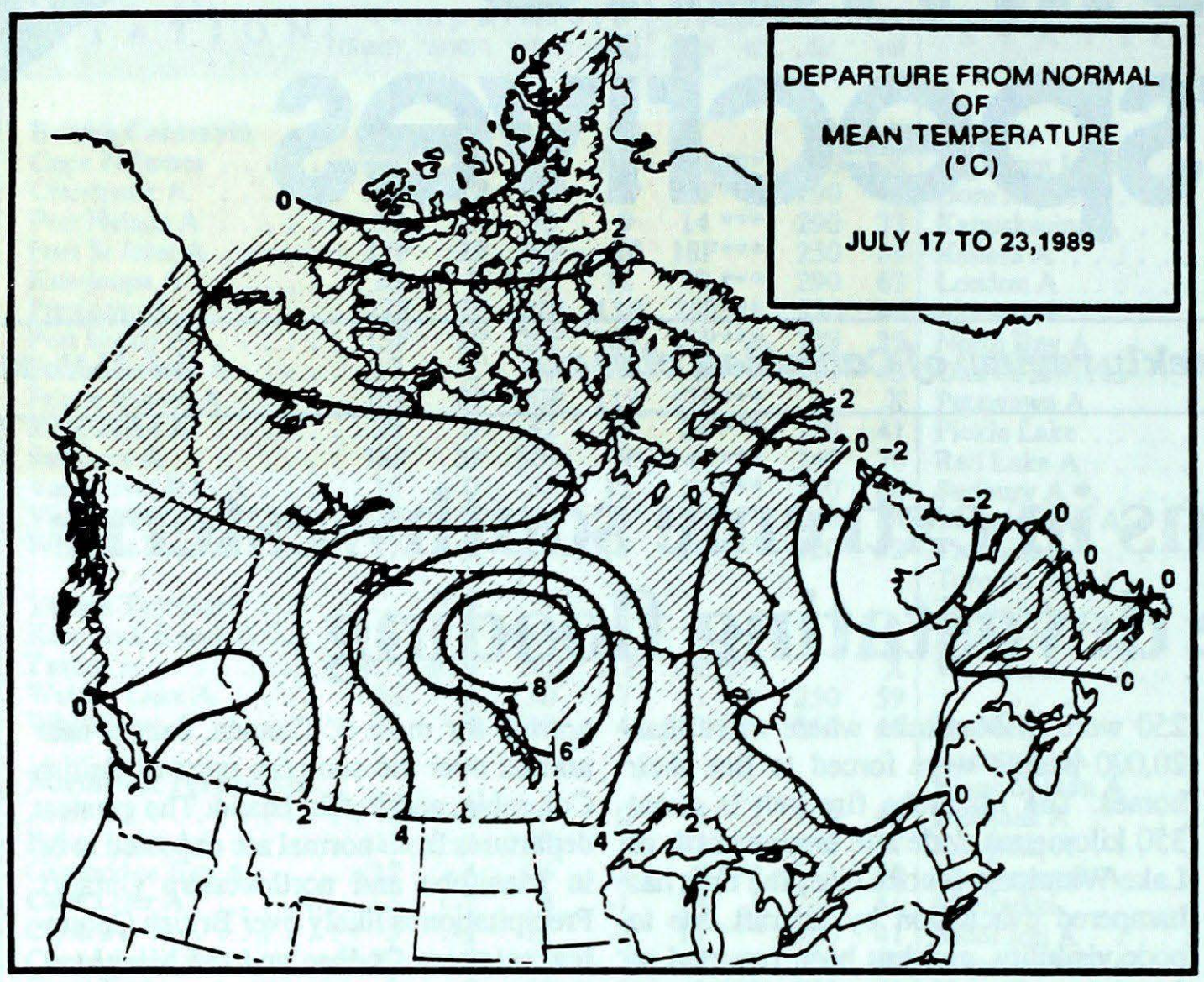
— *prepared July 25, 1989*

Aaron Gergye, Canadian Climate Centre



RECORD DAILY MAXIMUM TEMPERATURES (°C), AND DATE (IN BRACKETS)

Canada



Elsewhere ...

Rain needed in New Brunswick

At several locations, such as Fredericton and St-Léonard, there has been no significant rainfall since July 10th. The dry conditions have caused some concern to potato growers located in the upper Saint John River Valley area of New Brunswick. A wet spring, followed by a dry summer, has put the crop 1 to 2 weeks behind schedule. The provincial Department of Natural Resources reported that water levels on the Saint John River were at their lowest since 1982. Residents along the river complained about washed-up algae, boating hazards, and smelly swimming water. At the source of the Saint John River, north of Edmunston, water flows in July have been less than 50% of normal, due to the dry weather.

Frank Amirault, AES, Halifax

Weekly temperature and precipitation extremes

	Maximum temperature (°C)		Minimum temperature (°C)		Heaviest precipitation (mm)	
British Columbia	Penticton A	33	Puntzi Mountain (aut)	1	Dease Lake	50
Yukon Territory	Watson Lake A	25	Komakuk Beach A	3	Watson Lake A	35
Northwest Territories	Baker Lake A	34	Clyde A	-3	Yellowknife	44
Alberta	Medicine Hat A	36	Banff (aut)	3	Slave Lake A	34
					Whitecourt A	34
Saskatchewan	Saskatoon A	37	Meadow Lake A	7	Buffalo Narrows A	21
Manitoba	The Pas A	36	Churchill A	7	Churchill A	22
Ontario	Red Lake A	33	Winisk (aut)	0	Harrow	270
Québec	Maniwaki	31	La Grande Iv A	1	Schefferville A	63
New Brunswick	St Stephen (aut)	29	St Stephen (aut)	7	Saint John A	6
Nova Scotia	Western Head (aut)	30	Sydney A	7	Sable Island	37
Prince Edward Island	Summerside A	26	Charlottetown A	9	Charlottetown A	4
Newfoundland	Deer Lake A	27	Nain A	1	Stephenville A	29

Across The Country...

Highest Mean Temperature	Rockglen (SASK)	25
Lowest Mean Temperature	Mould Bay A(NWT)	2

89/07/17-89/07/23

CLIMATIC PERSPECTIVES
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Managing Editor . . . . P.R. Scholefield
Editors-in-charge
- weekly . . . . . Brian Taylor
- monthly . . . . . Brian Taylor
French version . . . . . Alain Caillet
Data Manager . . . . M. Skarpathiotakis
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Desktop publishing . . . . . Alain Caillet
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The data in this publication are based on unverified reports from approximately 225 Canadian synoptic weather stations. Information concerning climatic impacts is gathered from AES contacts with the public and from the media. Articles do not necessarily reflect the views of the Atmospheric Environment Service.

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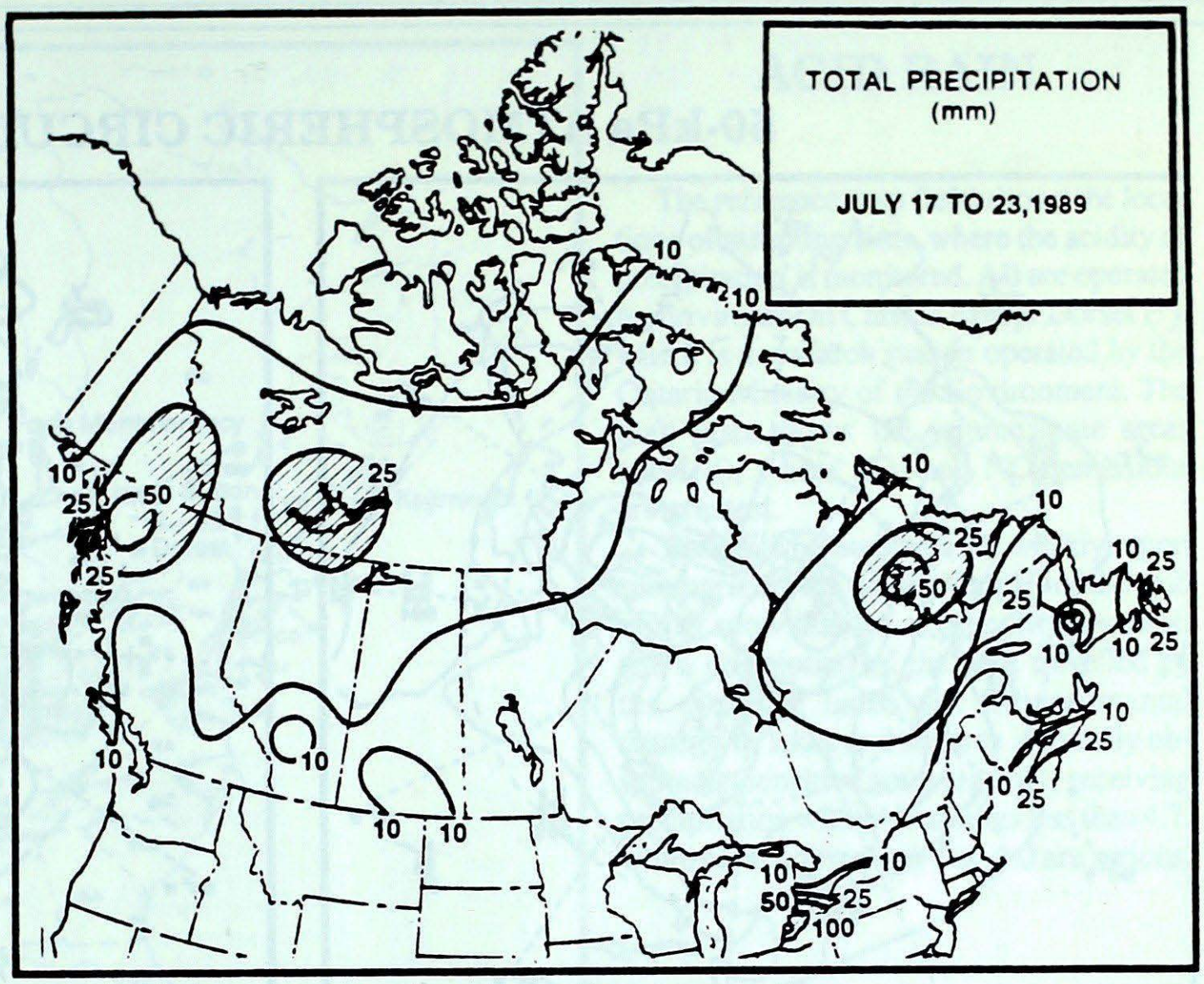
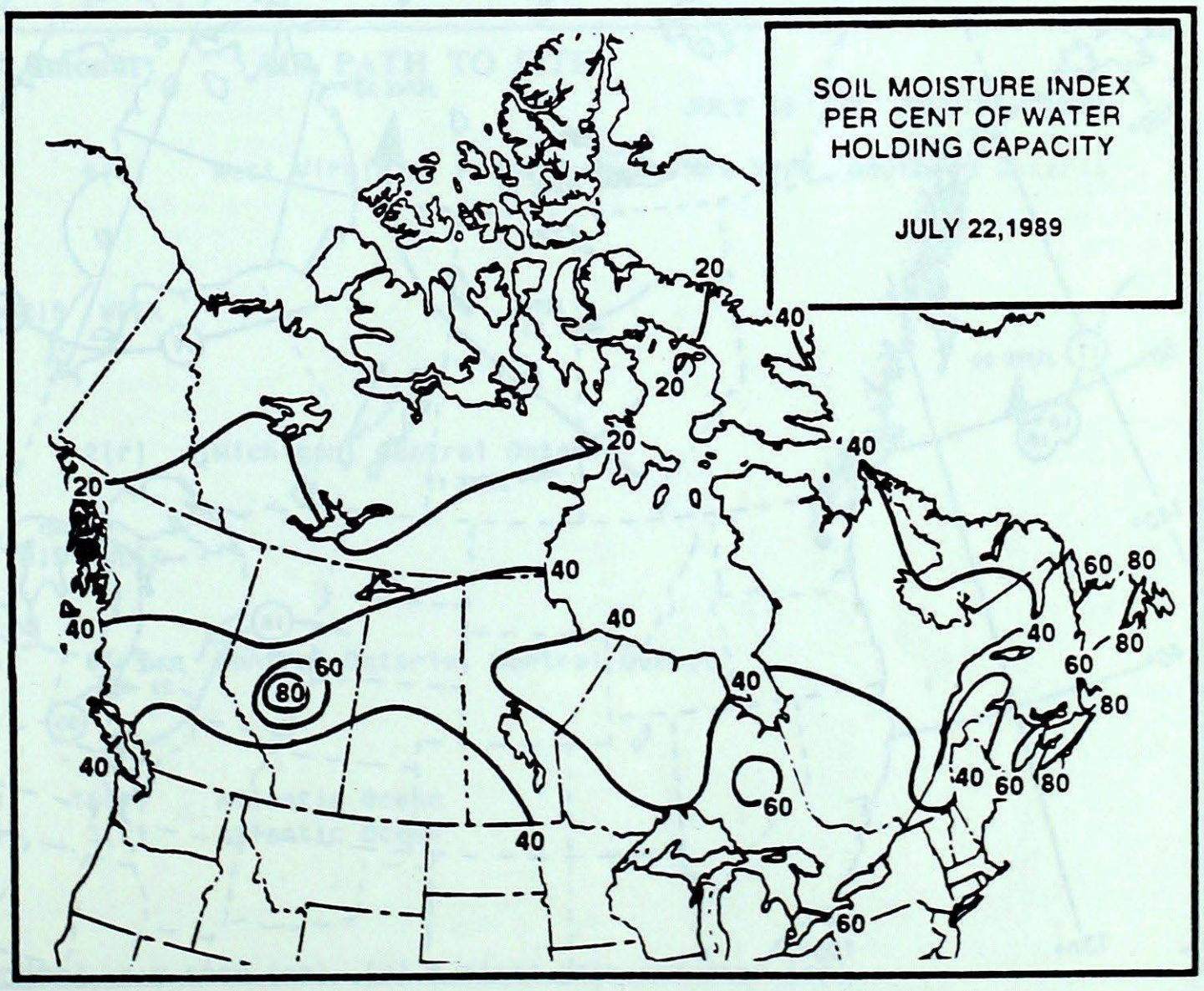
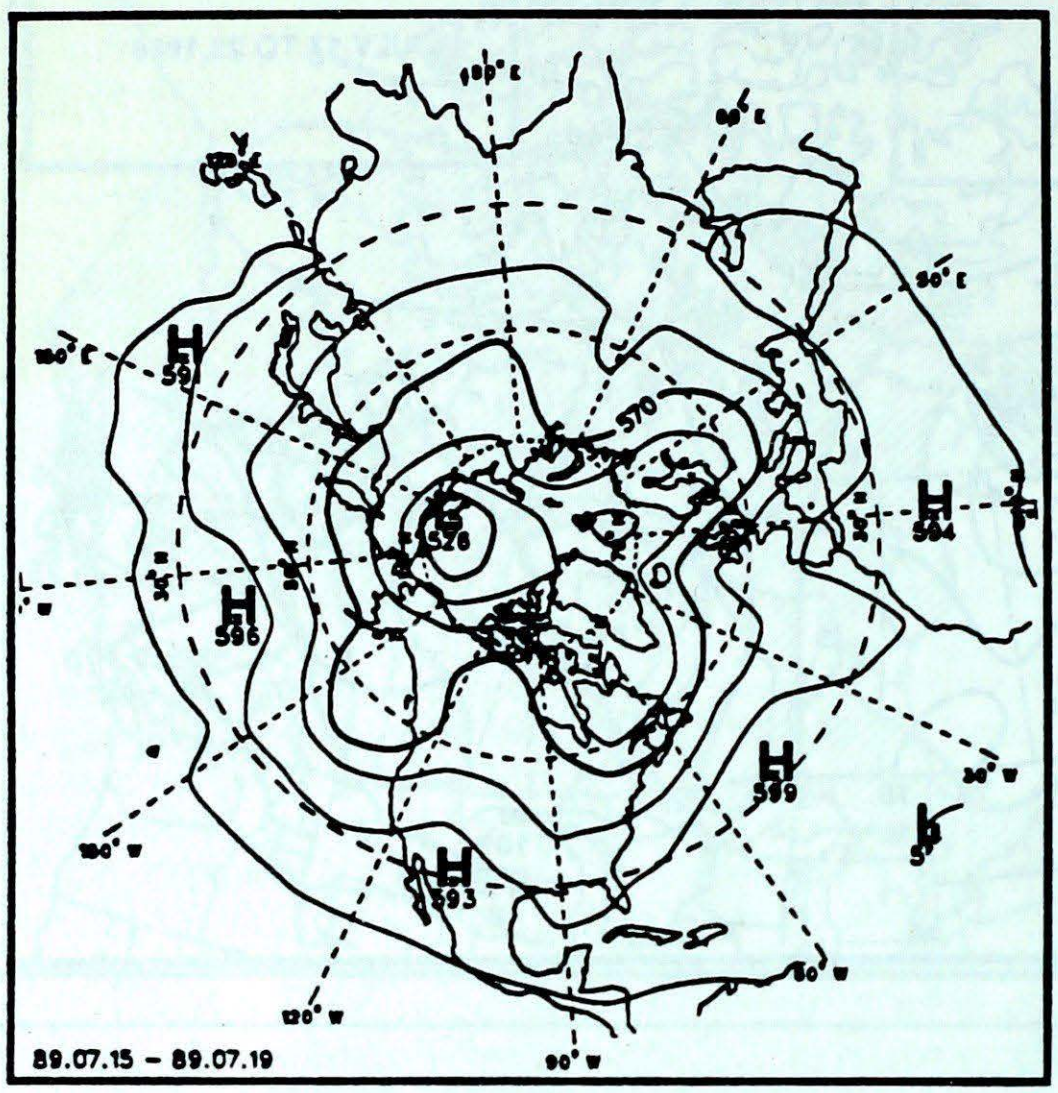
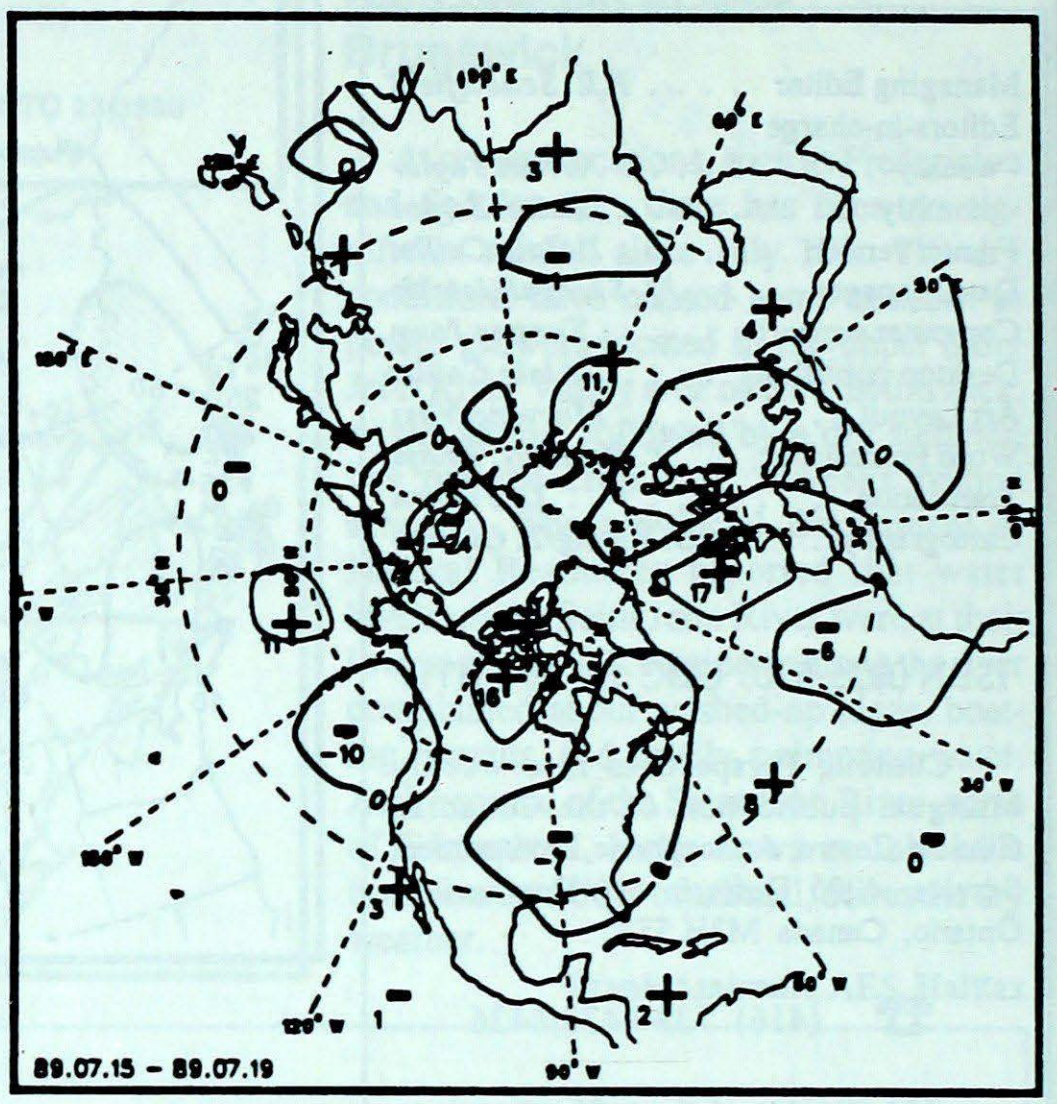




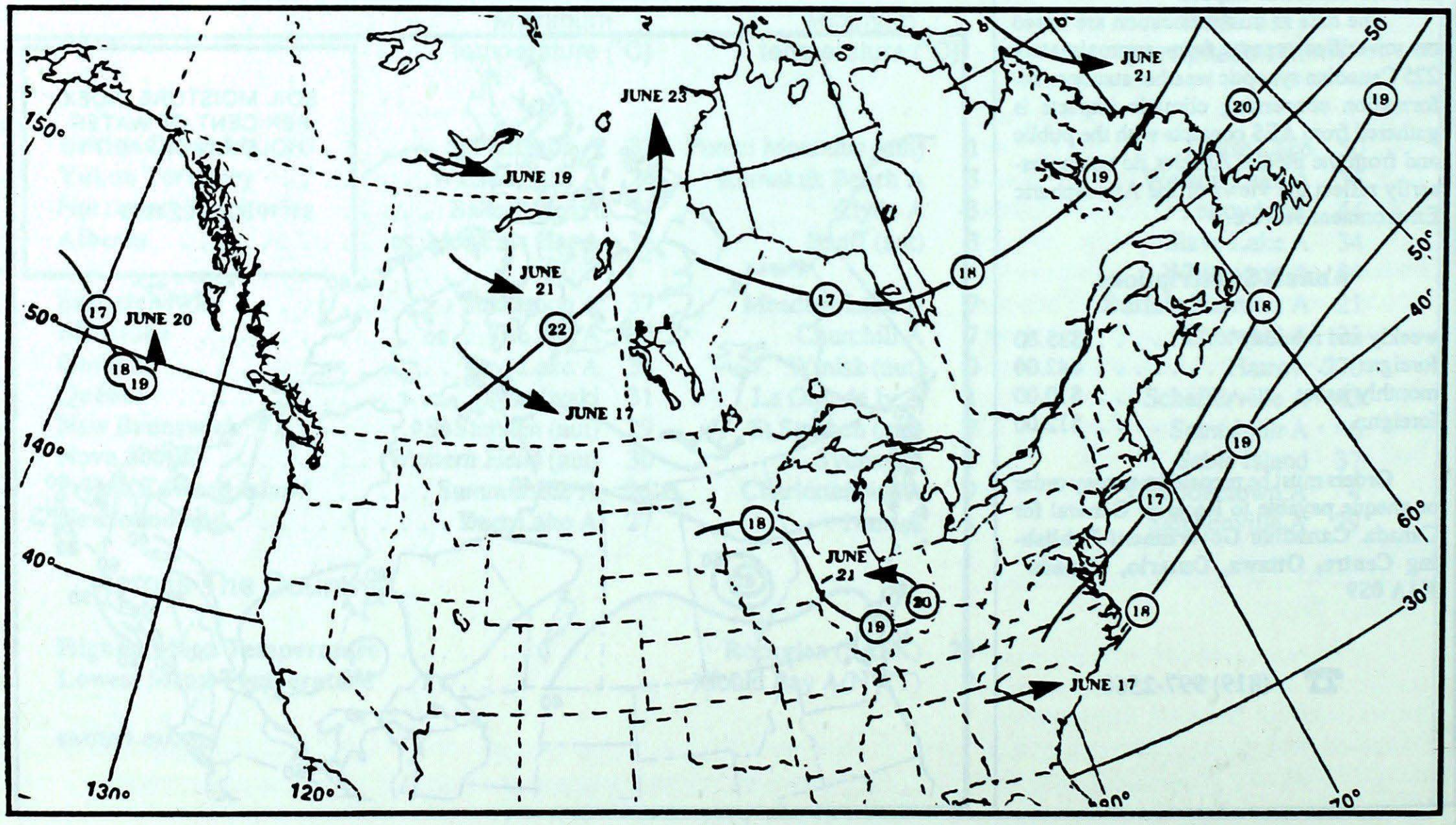
50-kPa ATMOSPHERIC CIRCULATION



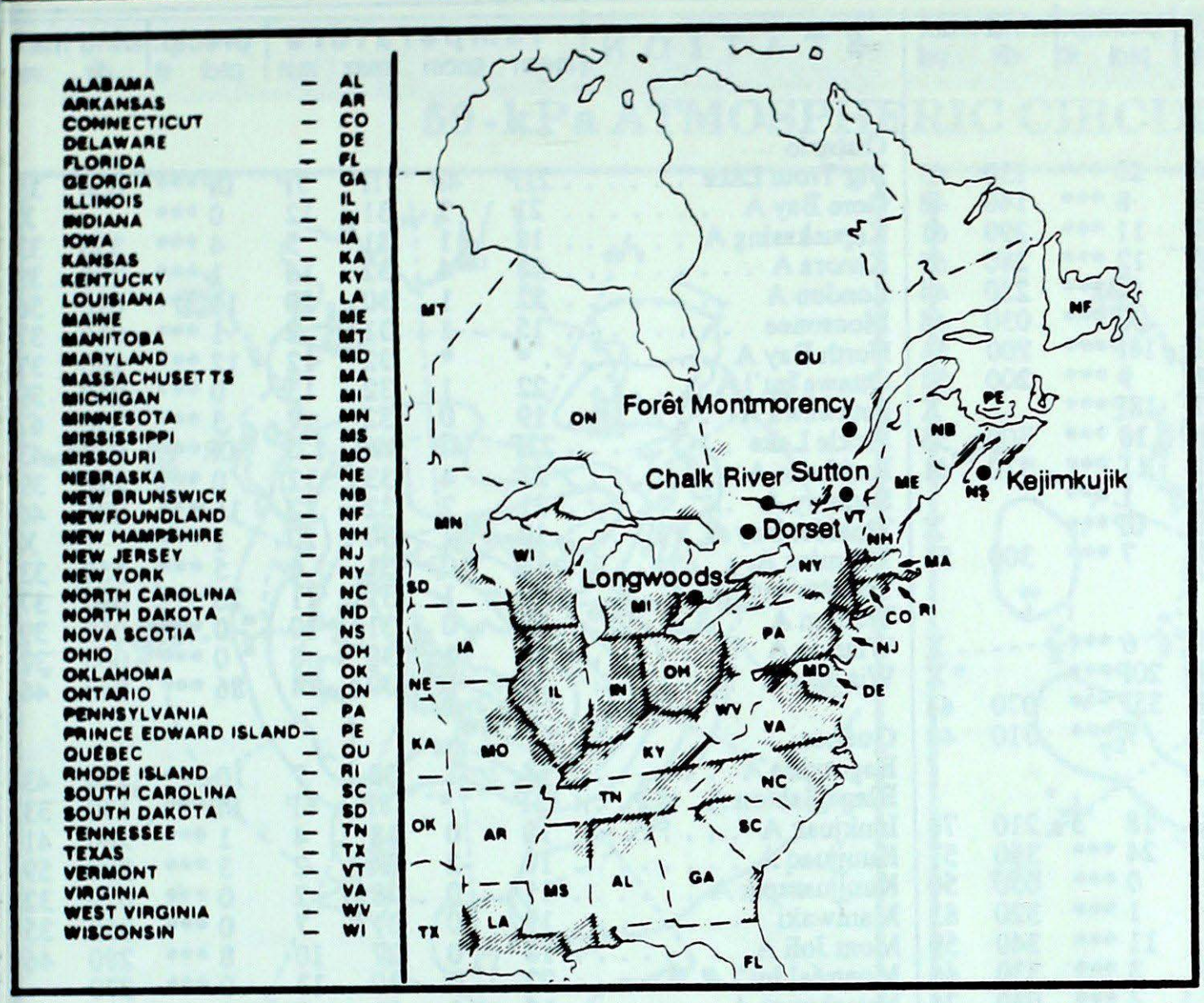
Mean geopotential height
50-kPa level (10 decametre intervals)



Mean geopotential height anomaly
50-kPa level (10 decametre intervals)



Tracks of low pressure centres at 12:00 U.T. each day during the period.



ACID RAIN

The reference map (left) shows the locations of sampling sites, where the acidity of precipitation is monitored. All are operated by Environment Canada except Dorset (*), which is a research station operated by the Ontario Ministry of the Environment. The map also shows the approximate areas (shaded), where SO_2 and NO_x emissions are greatest.

The table below gives the weekly report summarizing the acidity (or pH) of the acid rain or snow that fell at the collection sites, and a description of the path travelled by the moisture laden air. Environmental damage to lakes and streams is usually observed in sensitive areas regularly receiving precipitation with pH readings less than 4.7, while pH readings less than 4.0 are serious.

SITE	day	pH	amount	AIR PATH TO SITE
				JULY 16 TO JULY 22, 1989
Longwoods	19	4.1	4(r)	West Virginia, Pennsylvania, New York, Southern Ontario
Dorset	NO RAIN THIS WEEK			
Chalk River	18	4.6	2(r)	Michigan, Central Ontario
Sutton	NO RAIN THIS WEEK			
Montmorency	19	4.5	6(r)	Central Ontario, Central Québec
Kejimkujik	17	5.3	16(r)	Atlantic Ocean
	20	3.6	3(r)	Atlantic Ocean

r = rain (cm), s = snow (cm), (m) = mixed rain and snow (mm)

STATION	temperature mean	anom	max	min	precip. ptot	st	wind max dir	vel
British Columbia								
Cape St James	14	1	19	10	20 ***		130	43
Cranbrook A	20	1	33	9	8 ***		140	48
Fort Nelson A	17	0	26	9	11 ***		290	61
Fort St John A	17	1	25	9	12 ***		280	69
Kamloops A	20P	-1P	32P	9P	0P***		220	44
Penticton A	21	0	33	10	0 ***		030	48
Port Hardy A	15P	1P	21P	8P	18P***		200	56
Prince George A	15	0	26	4	9 ***		200	54
Prince Rupert A	15P	2P	19P	9P	18P***			X
Revelstoke A	20	1	29	9	18 ***		300	56
Smithers A	15	0	25	3	11 ***		310	41
Vancouver Int'l A	18	0	24	12	1 ***			
Victoria Int'l A	17P	0P	24P	9P	0P***			X
Williams Lake A	15	-1	27	5	7 ***		300	56
Yukon Territory								
Komakuk Beach A	9	2	24	3	6 ***			X
Teslin (aut)	13P	*	21P	7P	20P***			X
Watson Lake A	15P	0P	25P	8P	35P***		070	44
Whitehorse A	15	2	24	7	9 ***		310	44
Northwest Territories								
Alert	5	1	18	-2	18	3	210	78
Baker Lake A	13	1	34	6	24 ***		350	57
Cambridge Bay A	12	4	27	5	0 ***		050	50
Cape Dyer A	6	0	15	0	1 ***		320	83
Clyde A	7	2	16	-3	11 ***		340	59
Coppermine A	13	4	21	3	3 ***		330	46
Coral Harbour A	*	*	*	3	4 ***		030	76
Eureka	5	-1	11	1	10 ***		120	54
Fort Smith A	20	3	34	10	29 ***		300	41
Hall Beach A	11P	6P	19P	2P	33P***		340	67
Inuvik A	16P	3P	27P	7P	10P***		150	52
Iqaluit A	11	3	20	3	5 ***		320	63
Mould Bay A	2	-1	7	-2	1 ***		300	54
Norman Wells A	18	1	26	9	22 ***		240	52
Resolute A	5P	1P	14P	0P	1P***		290	44
Yellowknife A	17P	0P	25P	12P	44P***		350	54
Alberta								
Calgary Int'l A	19	2	31	7	13 ***		150	69
Cold Lake A	21	4	32	10	13 ***		230	72
Edmonton Namao A	19	1	29	10	5 ***		280	54
Fort McMurray A	21	4	32	12	17 ***		260	48
High Level A	18	1	27	8	18 ***		320	35
Jasper	15	0	27	3	4 ***			X
Lethbridge A	21	1	32	8	2 ***		170	98
Medicine Hat A	23	2	36	10	3 ***		270	78
Peace River A	17P	1P	29P	7P	0P***		250	52
Saskatchewan								
Cree Lake	21	6	31	13	19 ***		260	74
Estevan A	23	3	35	12	17 ***		160	46
La Ronge A	23	6	36	12	3 ***		180	41
Regina A	24P	4P	36P	12P	9P***		160	52
Saskatoon A	24	5	37	10	5 ***		280	63
Swift Current A	22P	3P	33P	10P	0P***		200	44
Yorkton A	23	4	35	12	0 ***		170	48
Manitoba								
Brandon A	24	5	35	12	1 ***		360	69
Churchill A	19	6	34	7	22 ***		290	63
Lynn Lake A	24P	8P	34P	15P	0P***		160	37
The Pas A	24	6	36	13	0 ***		150	44
Thompson A	24	8	36	10	6 ***		190	54
Winnipeg Int'l A	24	4	34	13	0 ***		090	50

STATION	temperature mean	anom	max	min	precip. ptot	st	wind max dir	vel
Ontario								
Big Trout Lake	21P	4P	31P	7P	0P***		050	35
Gore Bay A	21	2	31	12	0 ***			X
Kapuskasing A	18	1	31	5	4 ***		330	33
Kenora A	24	4	32	16	1 ***		200	39
London A	22	1	30	10	11 ***		070	56
Moosonee	15	-1	31	2	1 ***		010	37
North Bay A	*	*	32	12	12 ***		240	37
Ottawa Int'l A	22	1	32	13	0 ***		210	39
Petawawa A	19	0	32	7	5 ***		330	67
Pickle Lake	22P	4P	30P	12P	0P***		030	43
Red Lake A	23	4	33	12	0 ***		220	39
Sudbury A	21	2	32	12	16 ***		270	46
Thunder Bay A	19	1	30	10	1 ***			X
Timmins A	18	0	31	6	5 ***		350	33
Toronto Int'l A	22	1	31	11	20 ***		090	37
Trenton A	21	0	31	10	0 ***		050	39
Wiarton A	20	1	30	8	0 ***		060	37
Windsor A	23	0	30	14	86 ***		040	46
Québec								
Bagotville A	18	-1	30	7	10 ***		270	43
Blanc Sablon A	13P	*	18P	6P	8P***		130	33
Inukjuak A	10	0	18	4	1 ***		260	41
Kuujjuaq A	10	-2	24	2	3 ***		280	59
Kuujjuarapik A	11	0	28	2	0 ***		020	32
Maniwaki	19	0	31	7	0 ***		350	35
Mont Joli A	18	0	27	10	8 ***		280	46
Montréal Int'l A	22	0	30	13	0 ***		270	
Natashquan A	15	0	23	7	1 ***		170	46
Québec A	20	0	29	10	0 ***		230	39
Schefferville A	10	-3	22	2	63 ***		360	59
Sept-Îles A	16	1	28	9	14 ***		230	48
Sherbrooke A	19	1	29	9	2 ***			X
Val-d'Or A	17	0	30	7	6 ***		330	33
New Brunswick								
Charlo A	18	-1	27	8	4 ***		280	37
Chatham A	19	-1	28	9	1 ***		210	39
Fredericton A	18	-2	28	8	1 ***		180	44
Moncton A	18P	-1P	26P	9P	0P***		210	43
Saint John A	17	-1	29	9	6 ***		360	41
Nova Scotia								
Greenwood A	18	-2	27	11	14 ***		020	37
Shearwater A	17	-1	27	13	16 ***			X
Sydney A	15	-3	24	7	6 ***		300	39
Yarmouth A	15	-1	26	10	29 ***		080	39
Prince Edward Island								
Charlottetown A	17	-2	25	9	4 ***			X
Summerside A	18	-1	26	12	0 ***		200	46
Newfoundland								
Cartwright	11P	-2P	20P	1P	11P***		290	52
Churchill Falls A	11	-3	21	2	17 ***		350	5
Gander Int'l A	16	0	26	7	5 ***		280	50
Goose A	14	-2	23	6	18 ***		240	54
Port Aux Basques	14	1	20	10	0 ***		280	57
St John's A	15	-1	23	7	15 ***		280	54
St Lawrence	15	2	22	9	18 ***			X
Wabush Lake A	12	-2	23	4	18 ***		300	52

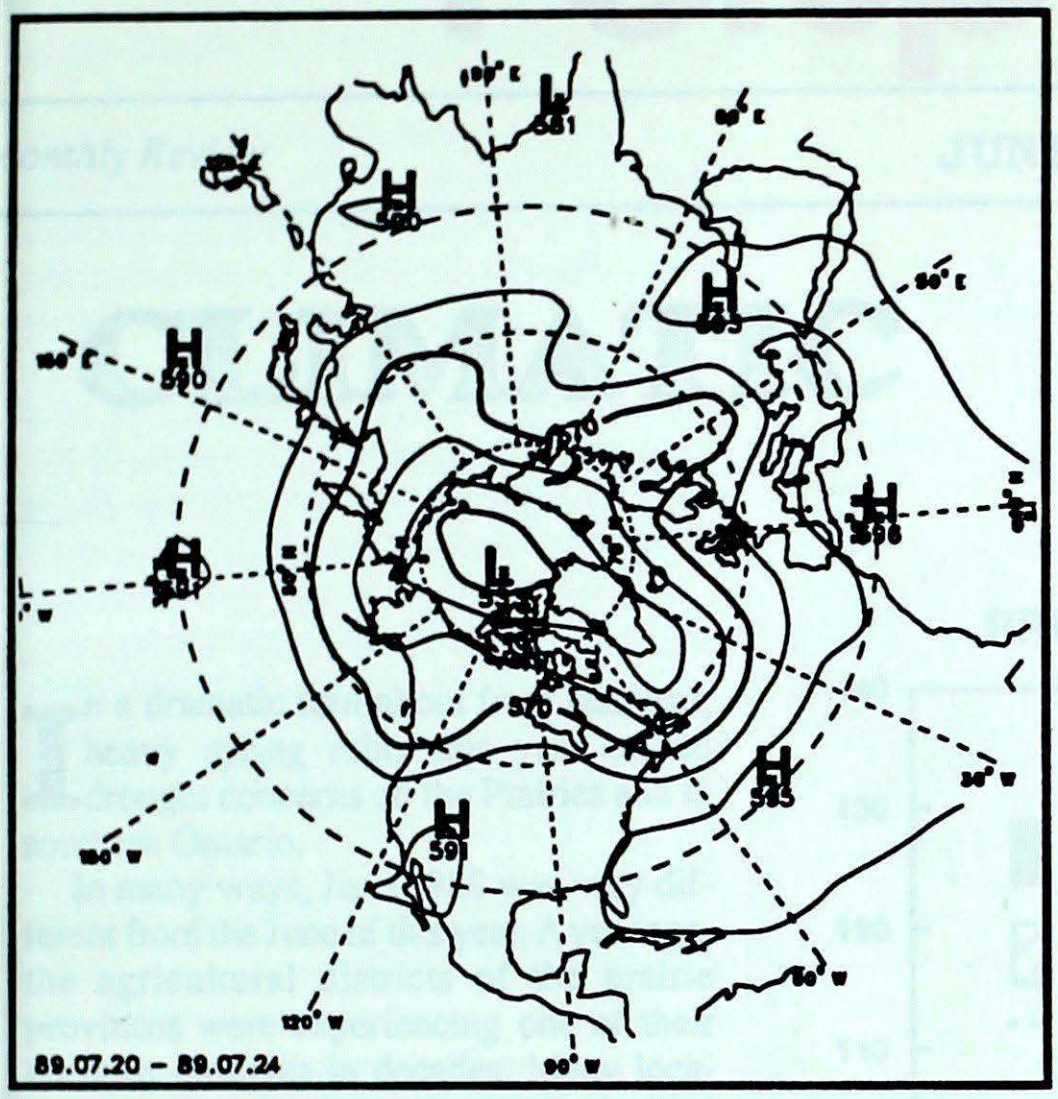
89/07/17-89/07/23

mean = mean weekly temperature, °C
max = maximum weekly temperature, °C
min = minimum weekly temperature, °C
anom = mean temperature anomaly, °C

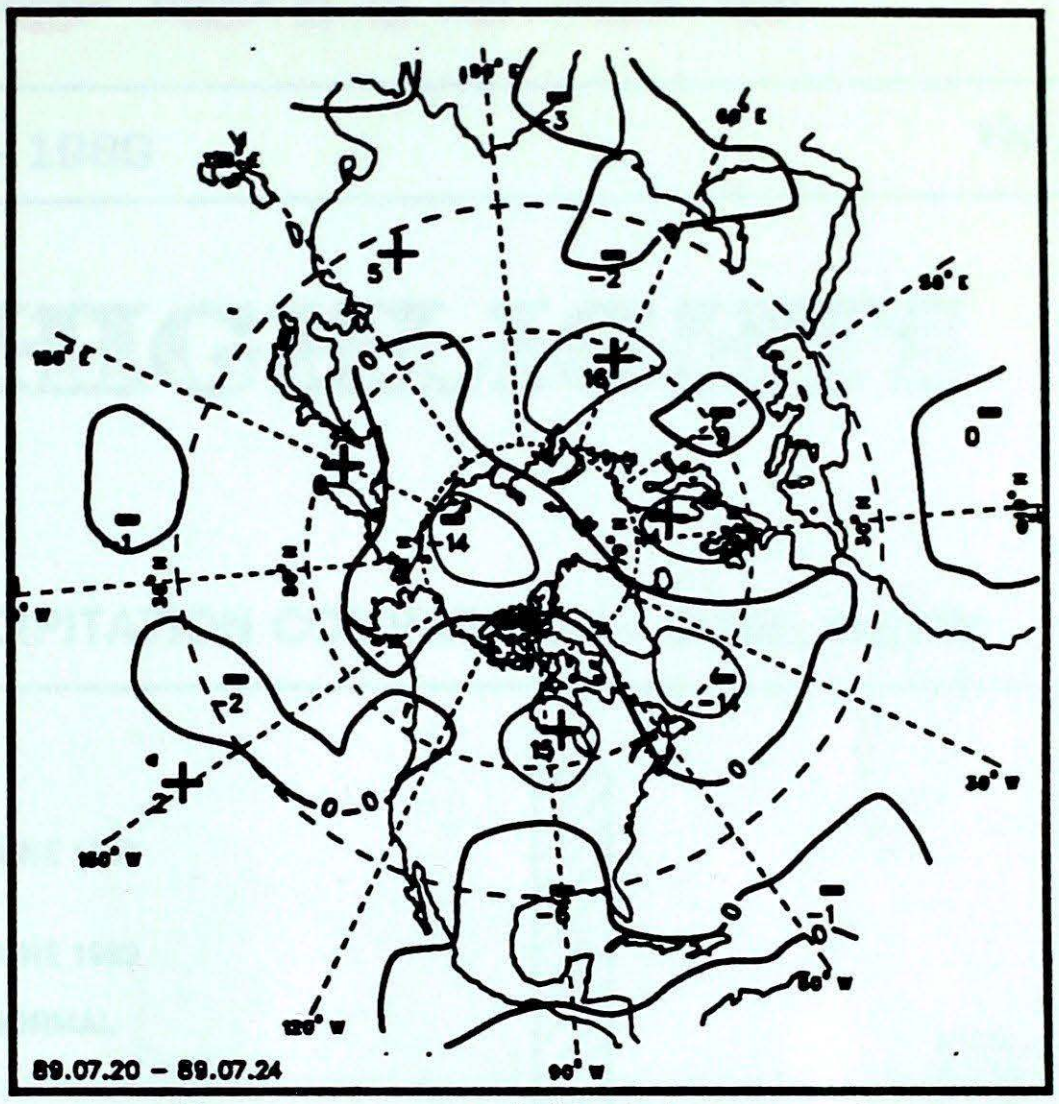
ptot = weekly precipitation total in mm
st = snow thickness on the ground in cm
dir = direction of max wind, deg. from north.
vel = wind speed in km/h

— Annotations —
X = no observation
P = less than 7 days of data
* = missing data when going to printing.

50-kPa ATMOSPHERIC CIRCULATION



Mean geopotential height
50-kPa level (10 decametre intervals)



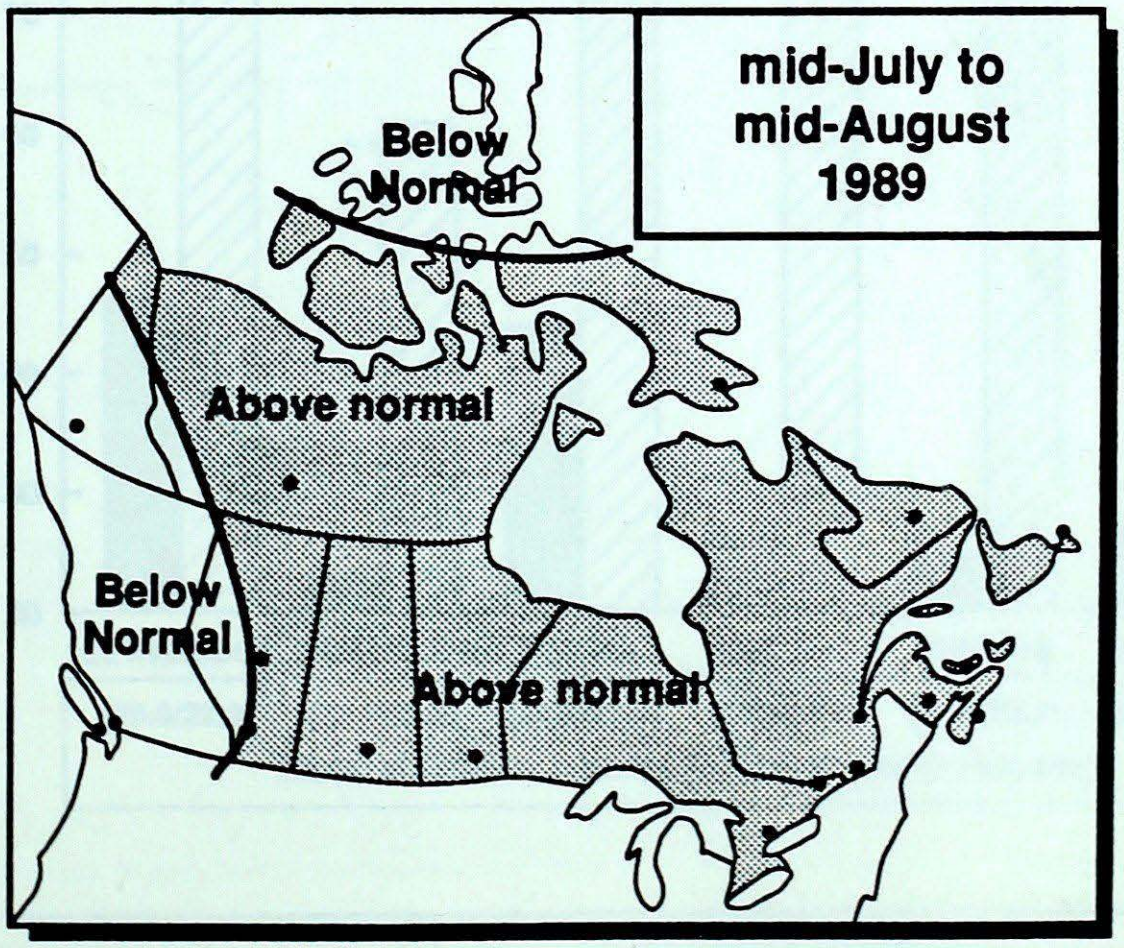
Mean geopotential height anomaly
50-kPa level (10 decametre intervals)

Environment Canada / Environnement Canada
Atmospheric Environment Service / Service de l'environnement atmosphérique

MONTHLY TEMPERATURE FORECAST

Normal temperatures for mid-July to mid-August, °C

Whitehorse	13	Toronto	20
Yellowknife	15	Ottawa	20
Iqaluit	7	Montréal	20
Vancouver	17	Québec	18
Victoria	16	Fredericton	19
Calgary	16	Halifax	18
Edmonton	16	Charlottetown	18
Regina	18	Goose Bay	15
Winnipeg	19	St. John's	15



Canada

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Climatic Perspectives

Monthly Review JUNE – 1989 Vol. 11

CLIMATIC HIGHLIGHTS

In a dramatic turn-about from last year, heavy spring rains this year erased drought concerns on the Prairies and in southern Ontario.

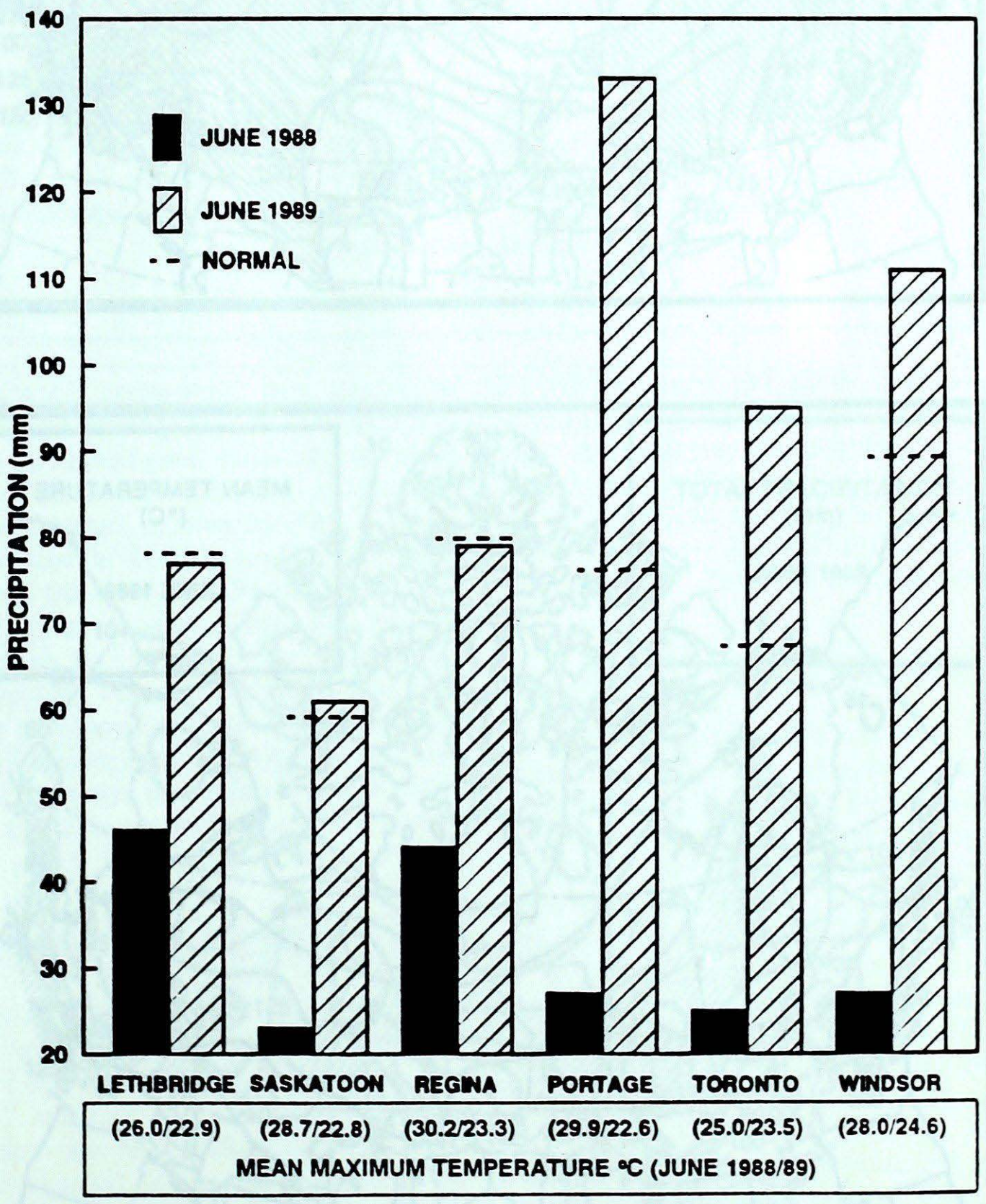
In many ways, June 1988 was very different from the June of this year. A year ago, the agricultural districts of the prairie provinces were experiencing one of their harshest droughts in decades. Many locations in Saskatchewan and Alberta had below-normal precipitation for at least nine months. Moisture in the soil was critically low, leaving the earth powder dry. Oppressively hot temperatures further aggravated the dryness by increasing the rate of evaporation. Southern Ontario was also experiencing a severe drought where many communities had their driest June on record.

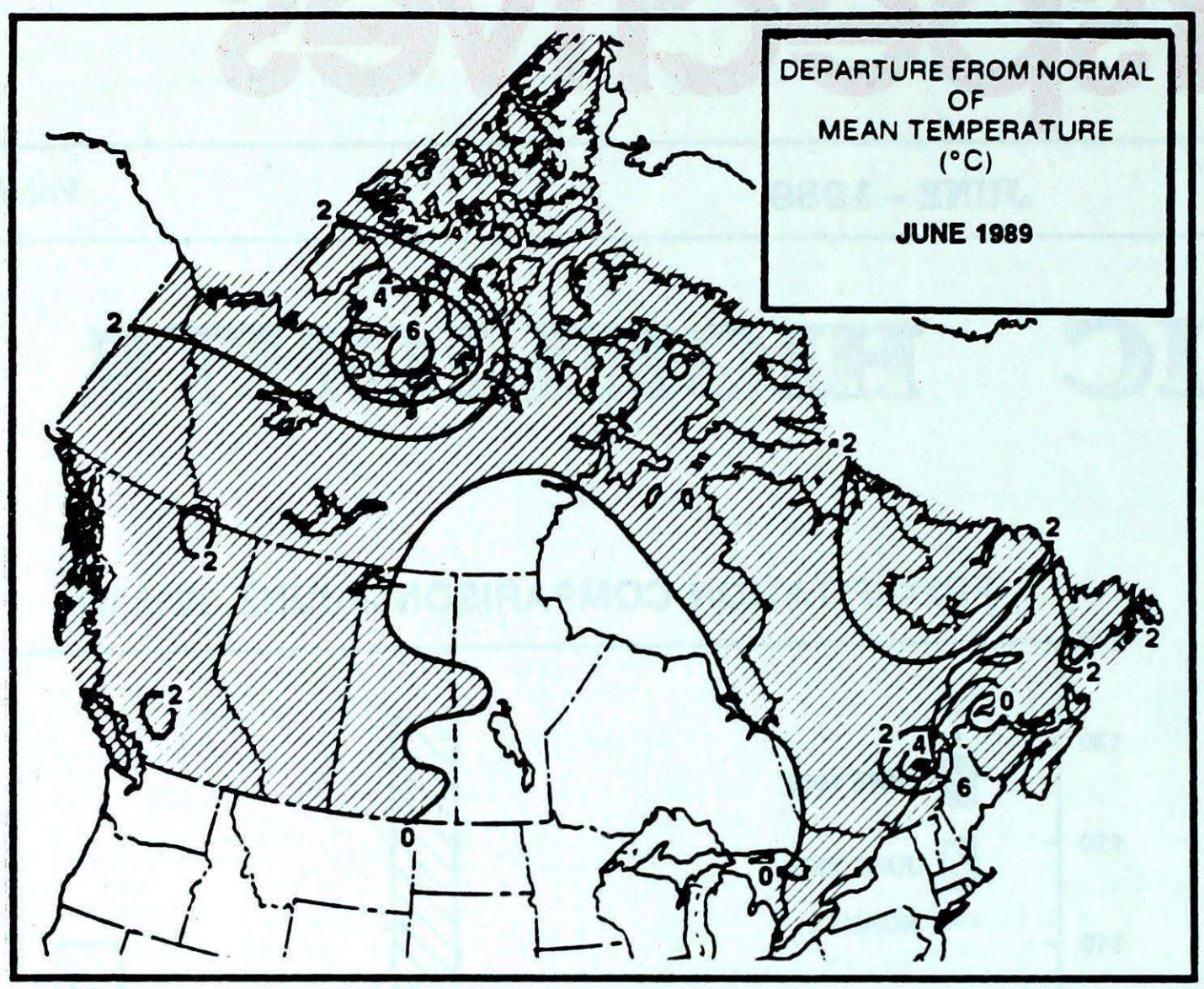
In sharp contrast, this year, heavy rains arrived on the Prairies in late spring. Farmers hailed the arrival of timely rains which helped to alleviate drought concerns in Alberta and Saskatchewan. Normal to above-normal amounts of precipitation fell where it was needed the most: for example, Saskatoon's 61.3 mm was 104% of normal.

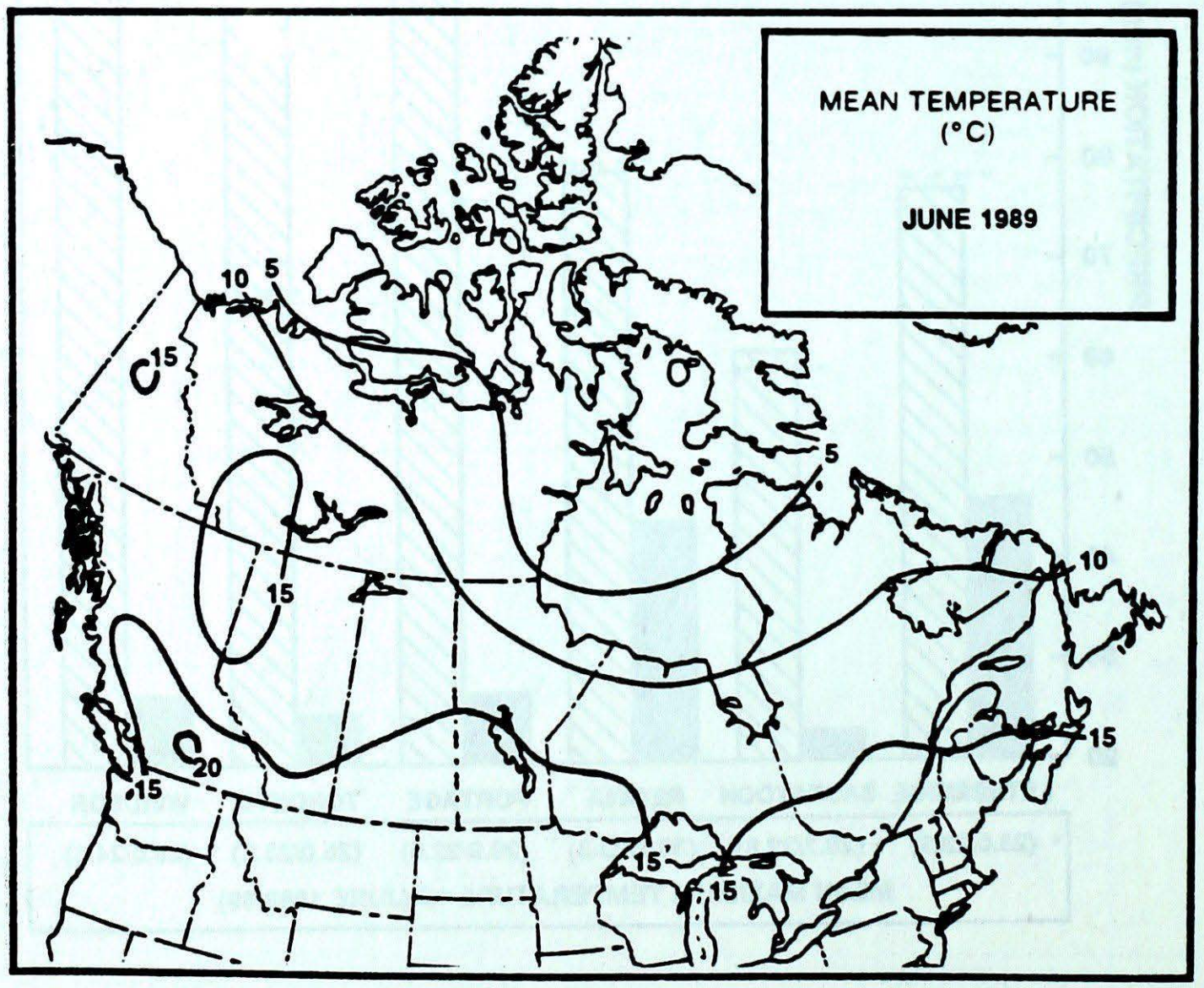
Heavy rains also fell in southwestern Ontario. Some areas had more rain in the first five days of June 1989, than in all of June 1988. Comparisons of these values are, with 1988 in brackets: London, 29 mm, (10 mm), Toronto, 50 mm, (17 mm), and Waterloo-Wellington, 45 mm, (9 mm). Farmers were unable to get on to their fields this June, as farms became water logged.

Amir Shabbar, Canadian Climate Centre

PRECIPITATION COMPARISON – JUNE 1988/89







Across the country

YUKON AND N.W.T.

Temperatures averaged well-above normal across most of the Northwest Territories in June. In the southern Mackenzie District, the mercury rose into the thirties on several days just before mid-month. Hay River reached 34°C on the 13th. Generally dry conditions prevailed for the month, except for the central Mackenzie River Valley, where Norman Wells received 61 mm of rain.

In the Yukon, however, occasional cool periods resulted in near-normal monthly temperatures. An Arctic cold front swept across the northern Yukon at mid-month, dropping afternoon temperatures close to the freezing point at Old Crow. High winds accompanied the cold outbreak, giving high wind chill, and visibilities were reduced to 1 km in snow.

BRITISH COLUMBIA

Temperatures averaged well-above normal during the first week of June, and despite two weeks of relatively cool weather during the last half of the month, the monthly means still averaged about 1 to 2°C above normal everywhere in the province.

It was very wet over the Queen Charlottes and Vancouver Island and also over some southern Interior valleys, with many stations in these areas receiving 150% of their normal June precipitation. In contrast, the north coast, the eastern lower Fraser Valley, and much of central and northern B.C. reported less than half of their normal precipitation amounts. In spite of the fact that many areas had heavy rain, sunshine was generally normal, to slightly above normal. Prince Rupert recorded a record 224.1 hours for the month. A severe hail storm hit the Okanagan area on June 19, causing much damage to apple orchards.

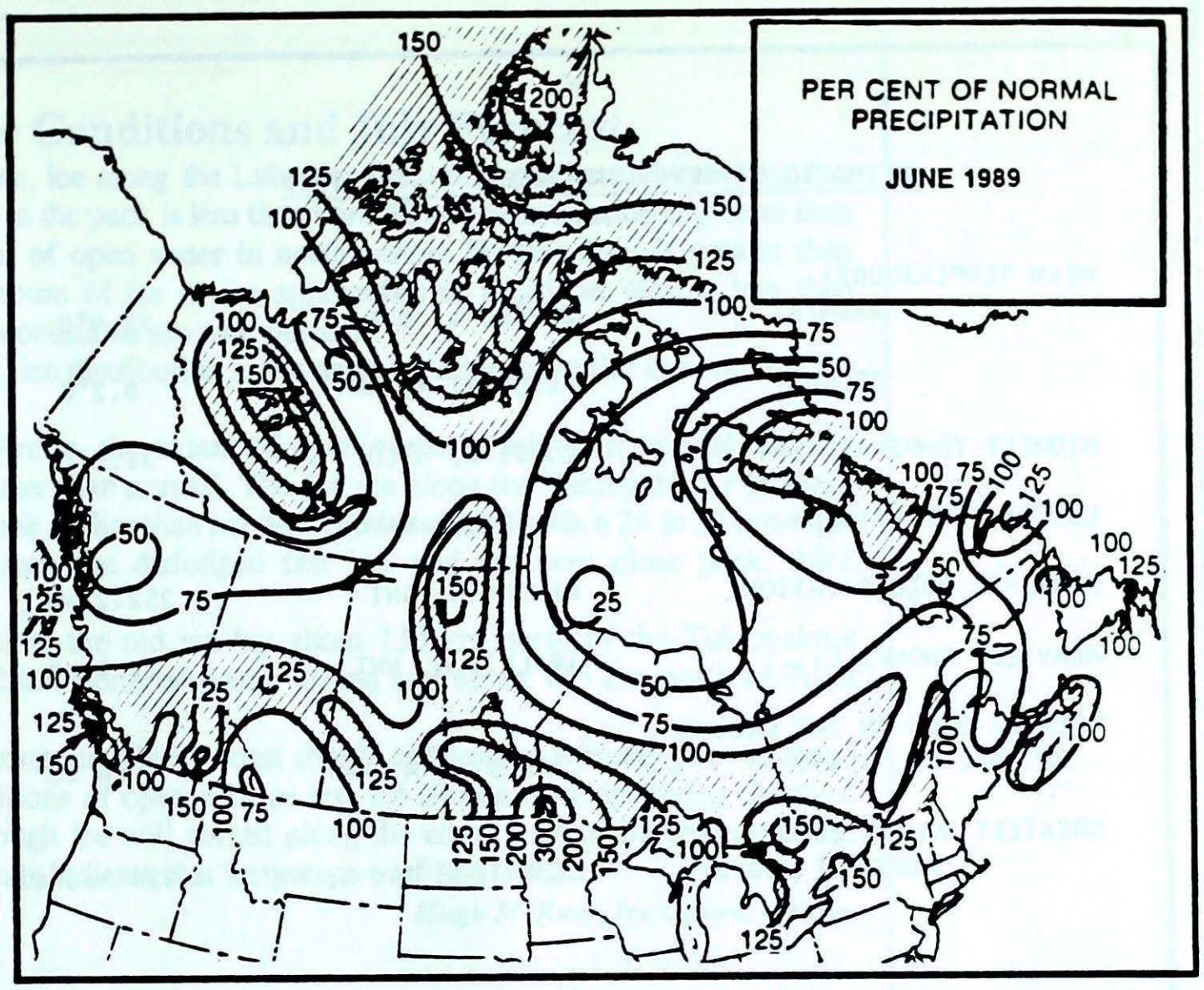
PRAIRIE PROVINCES

Mean temperatures ranged from near normal over Manitoba to 1 to 2°C above

normal over most of Saskatchewan and Alberta. Most of the hot weather occurred over a two-week period in mid-June and again towards the very end of the month.

In Alberta, above-normal rainfall occurred in central regions, while there were some dry pockets in the very northern and southern parts of the province. It was wet over most regions of the other prairie provinces, except for some dry areas in southeastern Saskatchewan and southwestern Manitoba. Gimli recorded over 200 mm for the month, and Winnipeg, 150 mm. Some localized flooding occurred on the 11th and 12th when over 200 mm fell at Langruth, Manitoba.

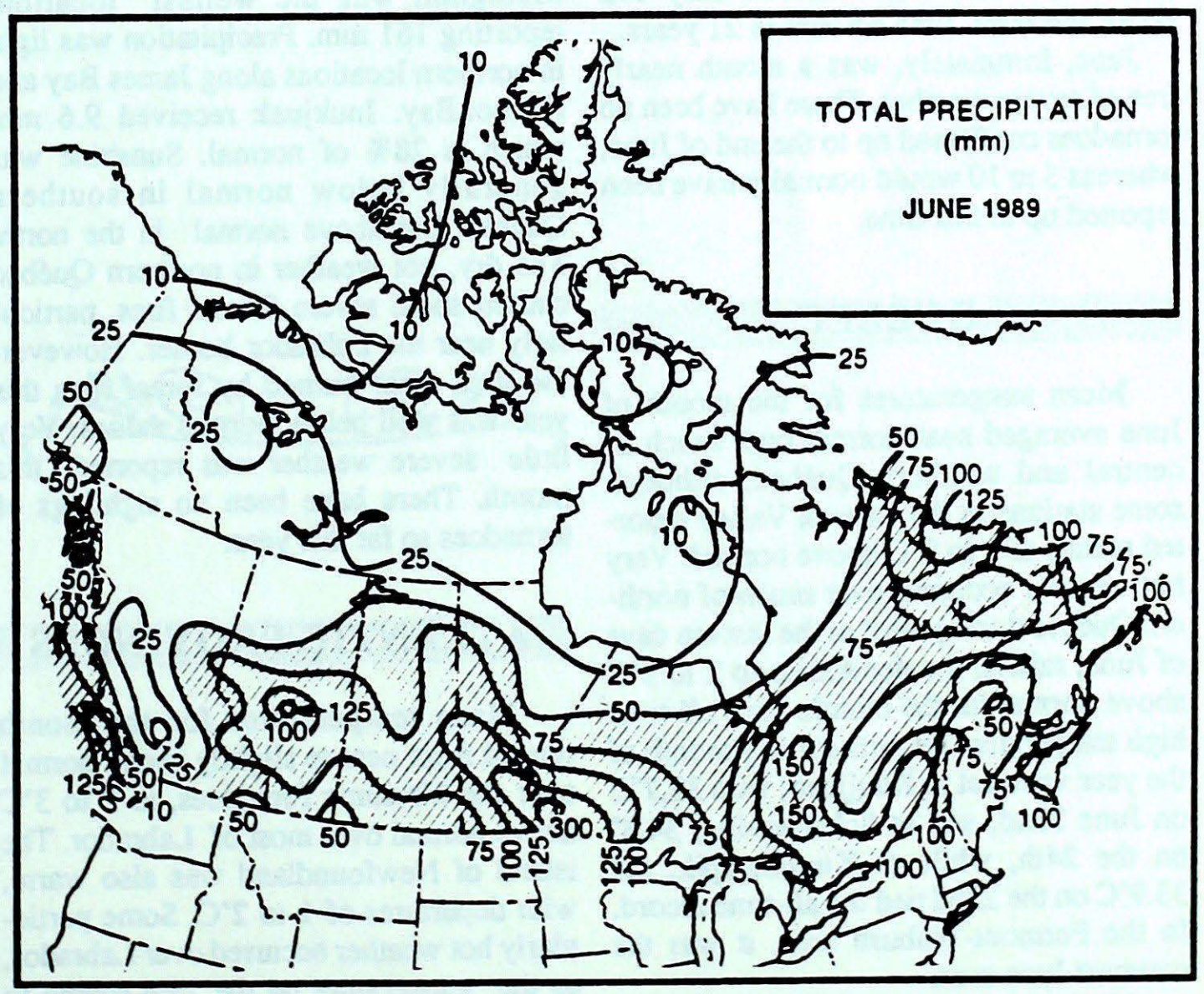
Several outbreaks of severe weather occurred across the Prairies during the month, with hail and damaging winds occurring on a number of occasions. From the beginning of the season up to the end of June, there were 11 individual tornado sightings in Saskatchewan alone, some of which caused considerable damage. On the 30th, a tornado ripped through the Poundmaker Indian Reserve near Cutknife, Sask. Seventy of the 100 houses on the reserve were damaged and nine people were taken to hospital. At Cutknife, a senior citizens home was damaged and six people had to be taken to hospital.



ONTARIO

Mean temperatures averaged close to normal over practically all of the province. The only significant exceptions were areas bordering Lake Superior, where means were up to 1.4°C below normal, and over eastern Ontario, where it was about 1°C above normal.

Most of the province was wet, with rainfall totalling 150 to 200% of normal at many locations. Kenora, with 252 mm, had the wettest June in 52 years. Over parts of southwestern and south-central Ontario, the heavy rains disrupted planting, and soggy fields caused considerable loss to some crops, particularly potatoes and tomatoes. In contrast, much of the eastern part of northern Ontario was dry, with precipitation only half of the normal values. With so much wet, dull weather, sunshine was below normal over most of the



CLIMATIC EXTREMES IN CANADA - JUNE 1989

MEAN TEMPERATURE:		
WARMEST	QUÉBEC A, QUE	22.4°C
COLDEST	RESOLUTE A, NWT	0.2°C
HIGHEST TEMPERATURE:	GOOSE A, NFLD	36.2°C
LOWEST TEMPERATURE:	CAMBRIDGE BAY A, NWT	-9.5°C
HEAVIEST PRECIPITATION:	KENORA A, ONT	252.2 mm
HEAVIEST SNOWFALL:	IQALUIT A, NWT	28.2 cm
DEEPEST SNOW ON THE GROUND ON JUNE 30, 1989:	CAPE DYER A, NWT	64 cm
GREATEST NUMBER OF BRIGHT SUNSHINE HOURS:	CAMBRIDGE BAY A, NWT	423 hours

province. North Bay received only 192 hours, the least June amount in 21 years.

June, fortunately, was a month nearly free of severe weather. There have been no tornadoes confirmed up to the end of June, whereas 5 to 10 would normally have been reported up to this time.

QUÉBEC

Mean temperatures for the month of June averaged near normal over much of central and southern Québec, although some stations in the Ottawa Valley reported means of 1 to 2°C above normal. Very hot weather occurred over much of northern Québec during most of the last ten days of June, raising the departures to 2 to 3°C above normal for the month. New all-time high temperature records for any month of the year were set at Kuujjuaq, with 32.7°C on June 22nd, and at Schefferville, 34.3° on the 24th, while at Kuujjuarapik, the 33.9°C on the 22nd tied the all-time record. In the Fermont-Wabush area, it was the warmest June ever.

Most locations over the south reported precipitation totals close to normal. Matagami was the wettest location, reporting 161 mm. Precipitation was light in northern locations along James Bay and HudsonBay. Inukjuak received 9.6 mm which is 28% of normal. Sunshine was generally below normal in southern Québec, but above normal in the north. The dry, hot weather in northern Québec caused some severe forest fires, particularly near the Labrador border. However, the total area burned by forest fires this year was well below normal values. Very little severe weather was reported this month. There have been no sightings of tornadoes so far this year.

ATLANTIC PROVINCES

Mean temperatures for the month ranged from near to slightly above normal over the Maritime Provinces, to 2 to 3°C above normal over most of Labrador. The island of Newfoundland was also warm, with departures of 1 to 2°C. Some particularly hot weather occurred over Labrador, as the temperature on the 25th soared to 36.2°C at Goose Bay and 35.3°C at Cartwright, both the highest ever for the month of June. The hot, dry weather caused several severe forest fires in Labrador, but cool, damp weather towards the end of the month brought considerable relief to fire-fighting crews. On the 26th, the mercury at Goose Bay failed to rise above 8°C.

Cloudy, dull weather, with precipitation generally above normal, occurred over Nova Scotia and over the Avalon Peninsula of Newfoundland. The remainder of the Maritimes and practically all of Newfoundland and Labrador were dry, with some stations reporting only half of their normal June precipitation. On a surprise note, cold air flooded across Labrador on the 29th, and Nain received 22 cm of wet snow. A line of severe thunderstorms crossed the Maritimes on the 28th, causing a number of power outages in Nova Scotia.

Ice Conditions and July Forecast

At the end of June, ice along the Labrador coast is about normal in extent, but concentration of ice in the pack is less than normal, and deterioration is greater than normal. The amount of open water in northwestern Hudson Bay is greater than normal, and the amount of ice in the approaches to Frobisher Bay is less than normal. Otherwise, conditions are near normal.

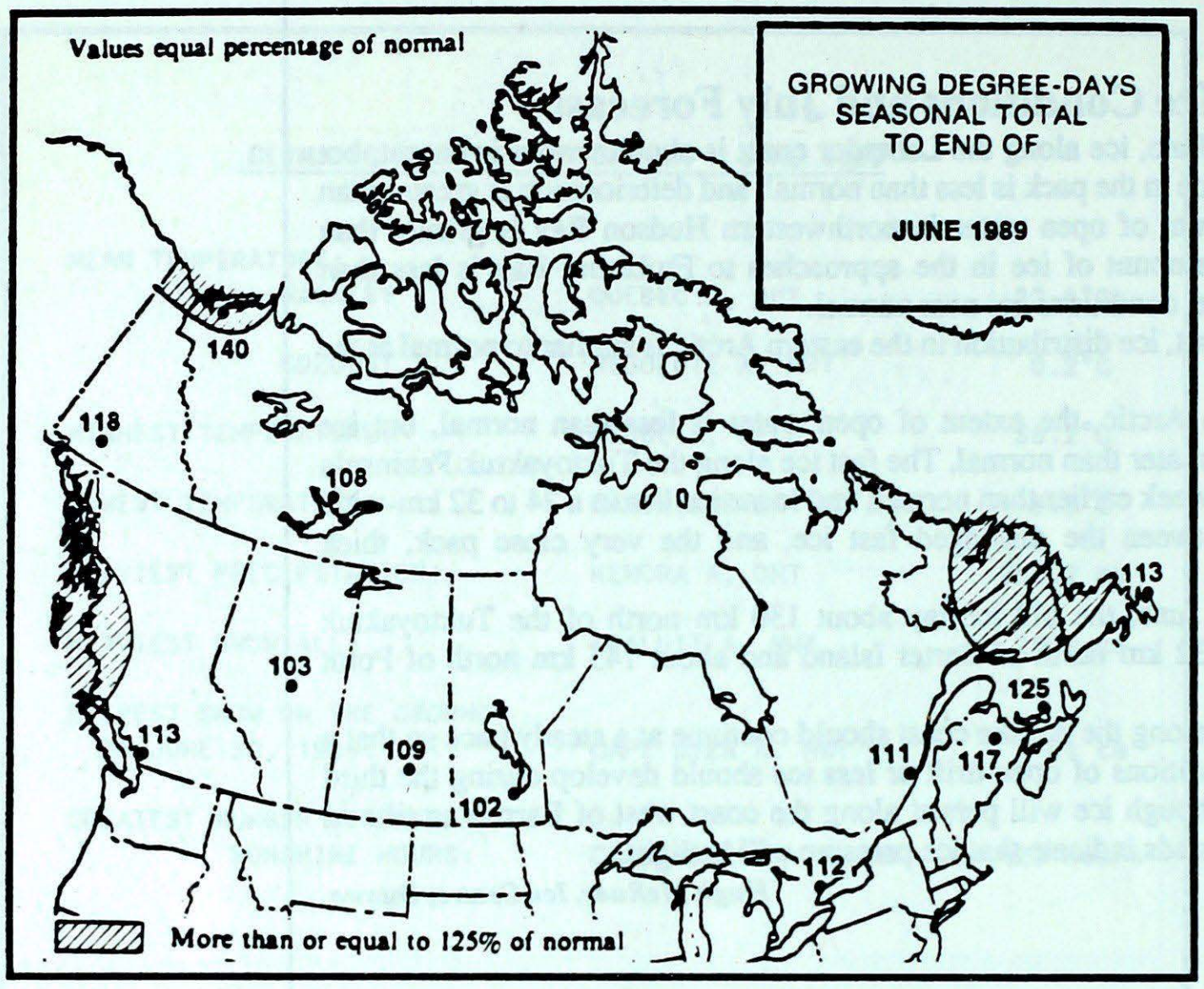
For the most part, ice distribution in the eastern Arctic is similar to normal at the end of June.

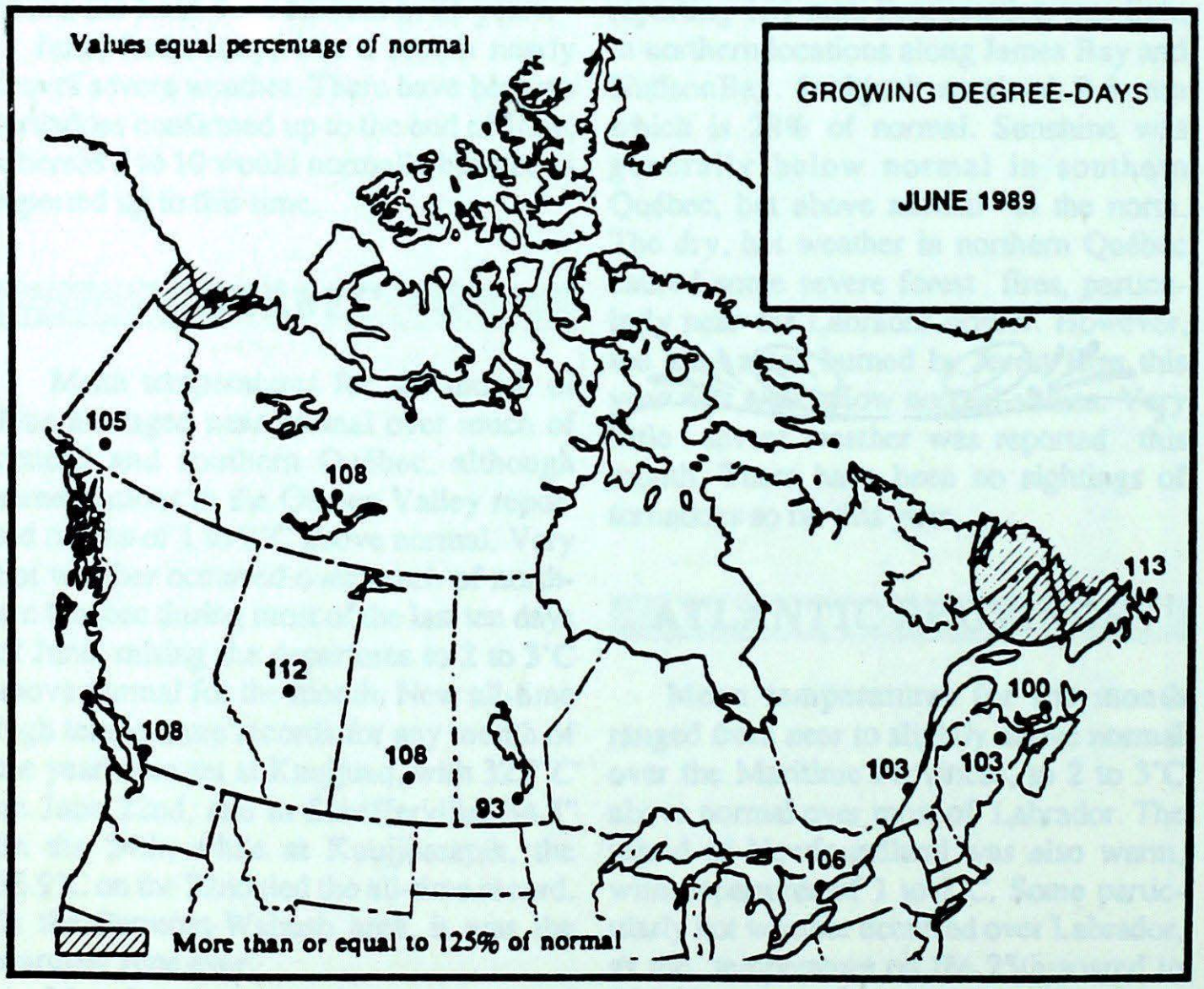
In the western Arctic, the extent of open water is less than normal, but ice deterioriation is greater than normal. The fast ice along the Tuktoyaktuk Peninsula fractured about a week earlier than normal, and loose ice lies in a 24 to 32 km-wide band offshore between the dislodged fast ice, and the very close pack, thick first-year ice.

At the end of June, the old ice lay about 130 km north of the Tuktoyaktuk Peninsula, about 32 km north of Barter Island and about 145 km north of Point Barrow.

Melting of ice along the Alaska coast should continue at a steady pace so that a route through conditions of open drift or less ice should develop during the third week of July. Although ice will persist along the coast west of Barrow until mid July, favourable winds indicate that ice pressure will be light.

Hugh McRuer, Ice Centre, Ottawa



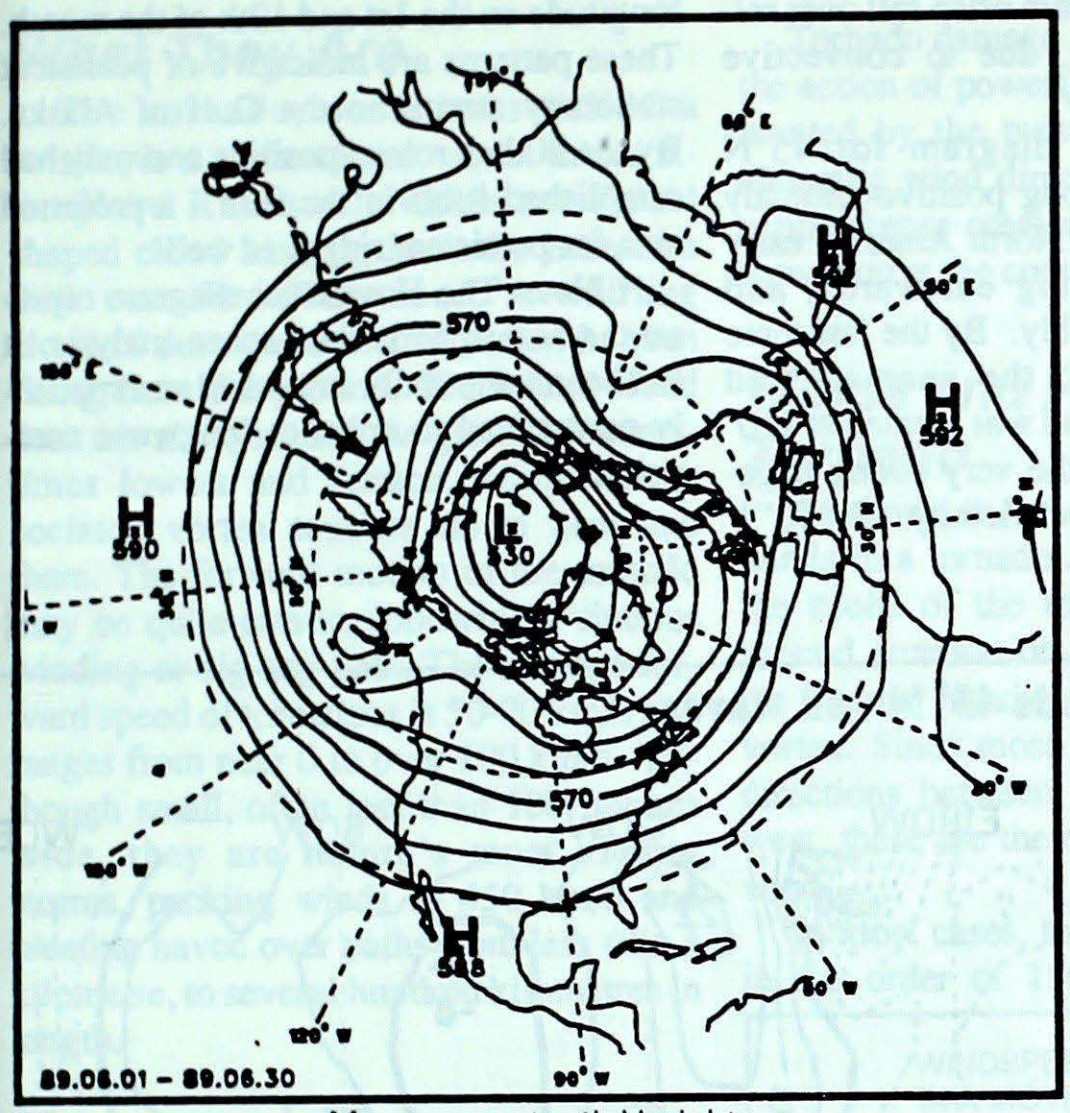


SEASONAL TOTAL OF GROWING DEGREE-DAYS TO END OF JUNE

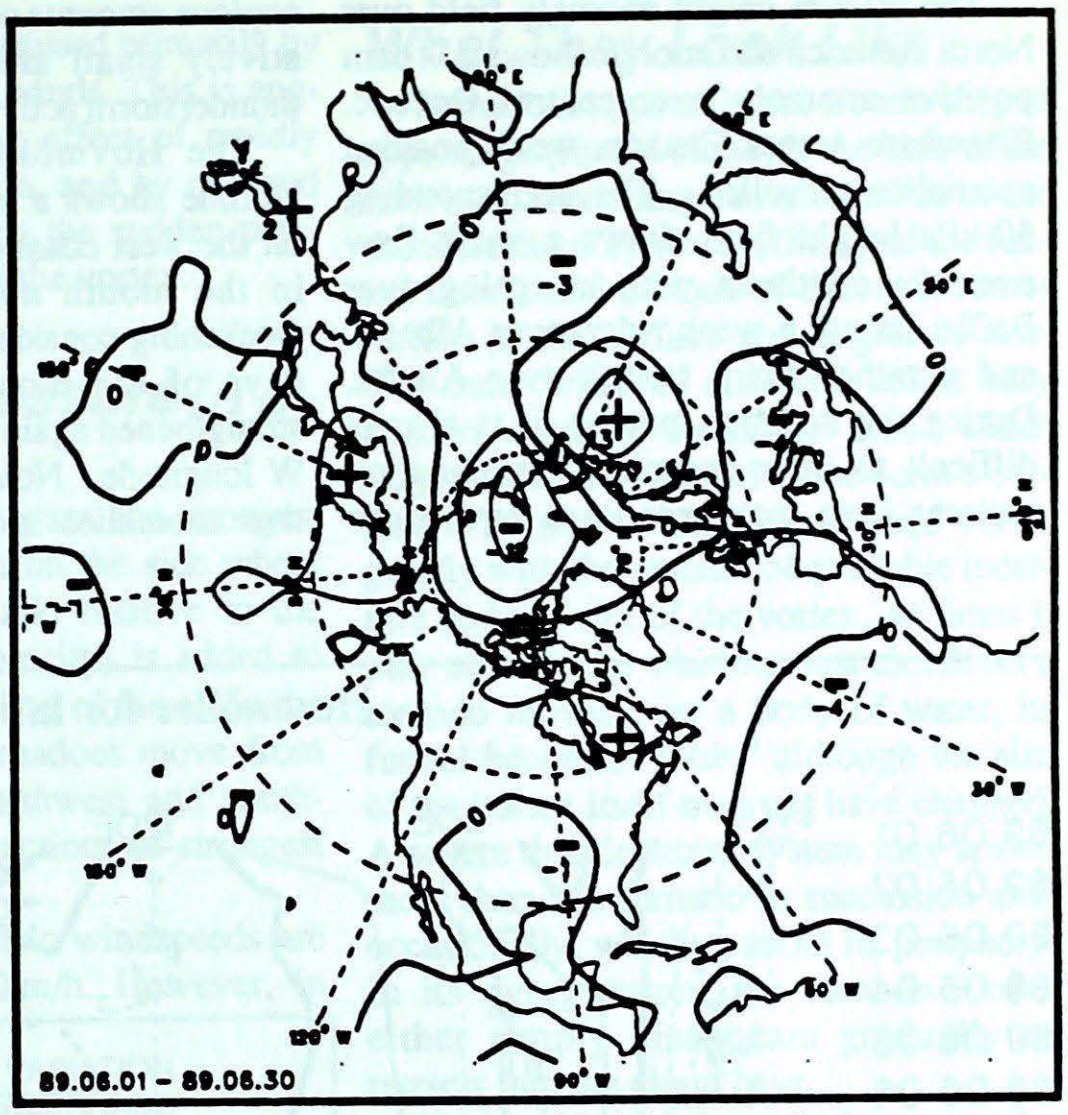
	1989	1988	NORMAL
BRITISH COLUMBIA			
Abbotsford	693	646	572
Kamloops	827	*	746
Penticton	776	*	694
Prince George	323	*	278
Vancouver	670	659	593
Victoria	604	569	545
ALBERTA			
Calgary	257	556	237
Edmonton Mun.	336	575	327
Grande Prairie	326	*	289
Lethbridge	302	670	283
Peace River	284	422	253
SASKATCHEWAN			
Estevan	536	842	505
Prince Albert	440	564	417
Regina	523	798	480
Saskatoon	472	781	472
Swift Current	423	*	444
MANITOBA			
Brandon	479	*	472
Churchill	*	26	*
Dauphin	525	600	459
Winnipeg	543	*	507
ONTARIO			
London	605	684	549
North Bay	506	*	451
Ottawa	628	684	557
Thunder Bay	356	377	368
Toronto	609	643	546
Trenton	649	624	599
Windsor	742	832	738
QUEBEC			
Baie Comeau	312	*	296
Maniwaki	575	517	498
Montréal	719	669	655
Québec	571	513	515
Sept-Îles	292	212	235
Sherbrooke	580	471	478
NEW BRUNSWICK			
Charlo	367	371	345
Fredericton	592	480	508
Moncton	524	387	434
NOVA SCOTIA			
Sydney	292	325	270
Yarmouth	476	*	381
PRINCE EDWARD ISLAND			
Charlottetown	487	356	391
NEWFOUNDLAND			
Gander	113	168	98
St. John's	98	*	87
Stephenville	381	262	266

50-kPa ATMOSPHERIC CIRCULATION

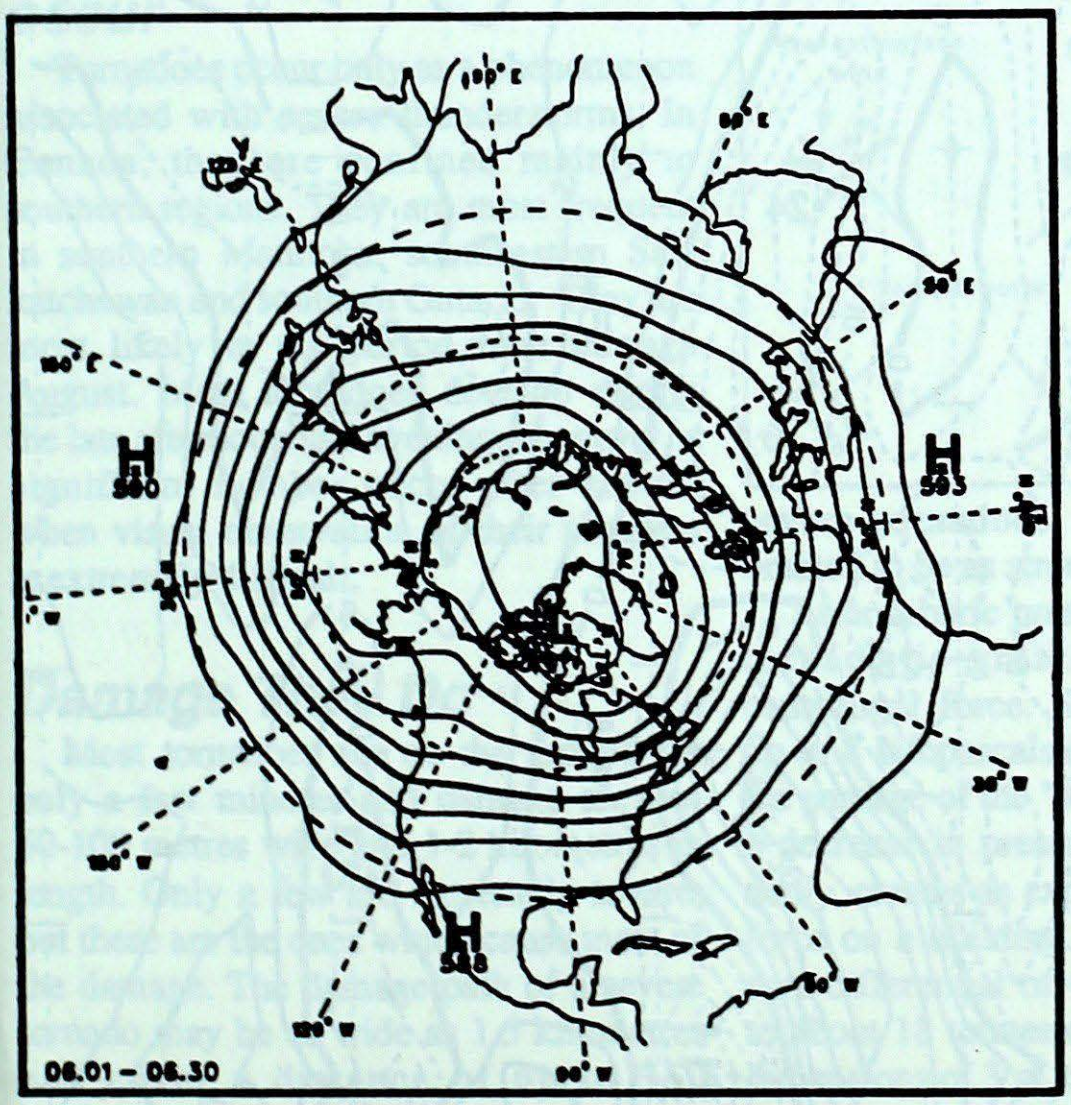
June 1989



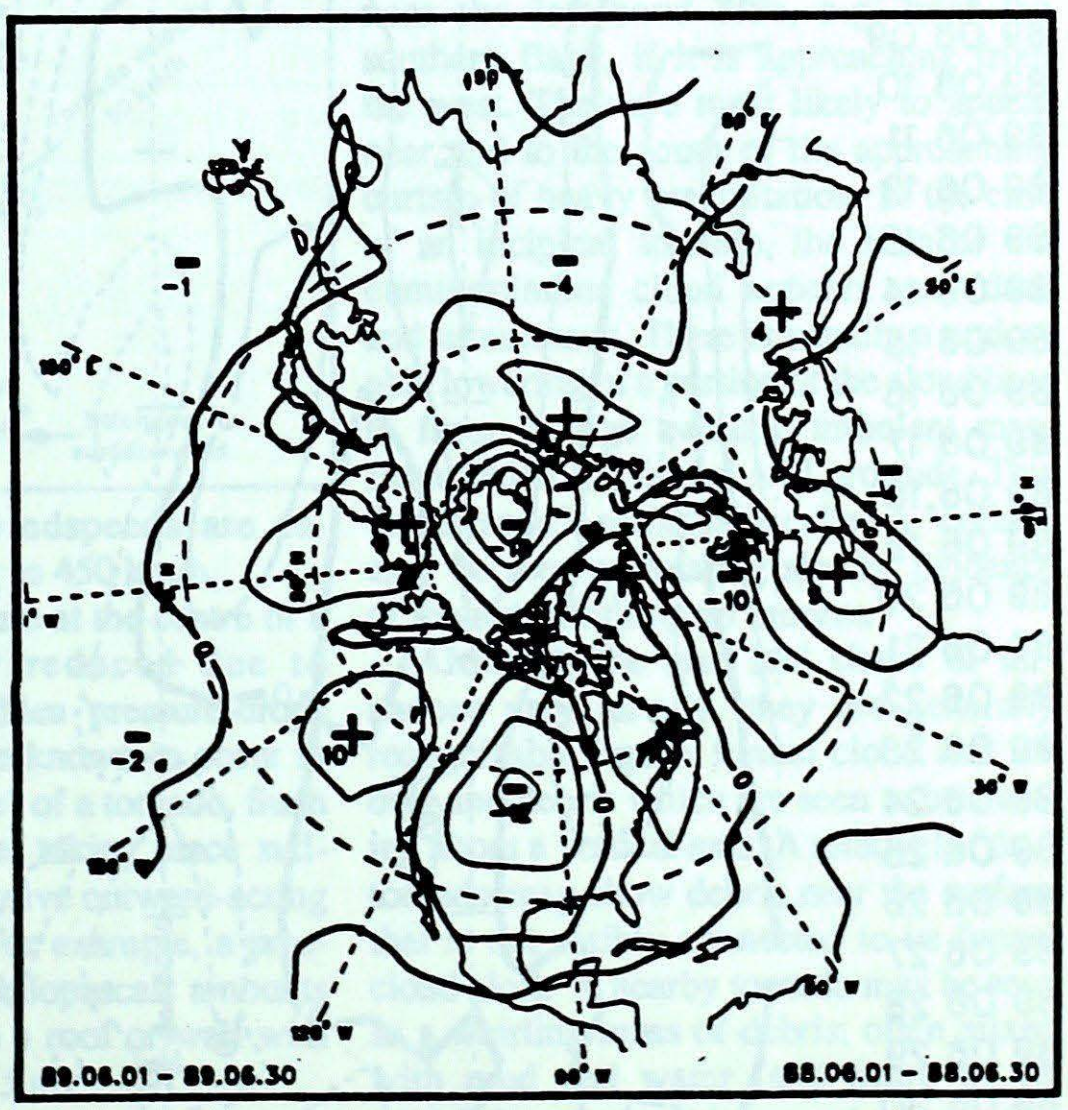
Mean geopotential heights
- 5 decametre interval -



Mean geopotential height anomaly
- 5 decametre interval-



Normal geopotential heights for the month
- 5 decametre interval -



Mean heights difference w/r to previous month
- 5 decametre interval -

50-kPa ATMOSPHERIC CIRCULATION

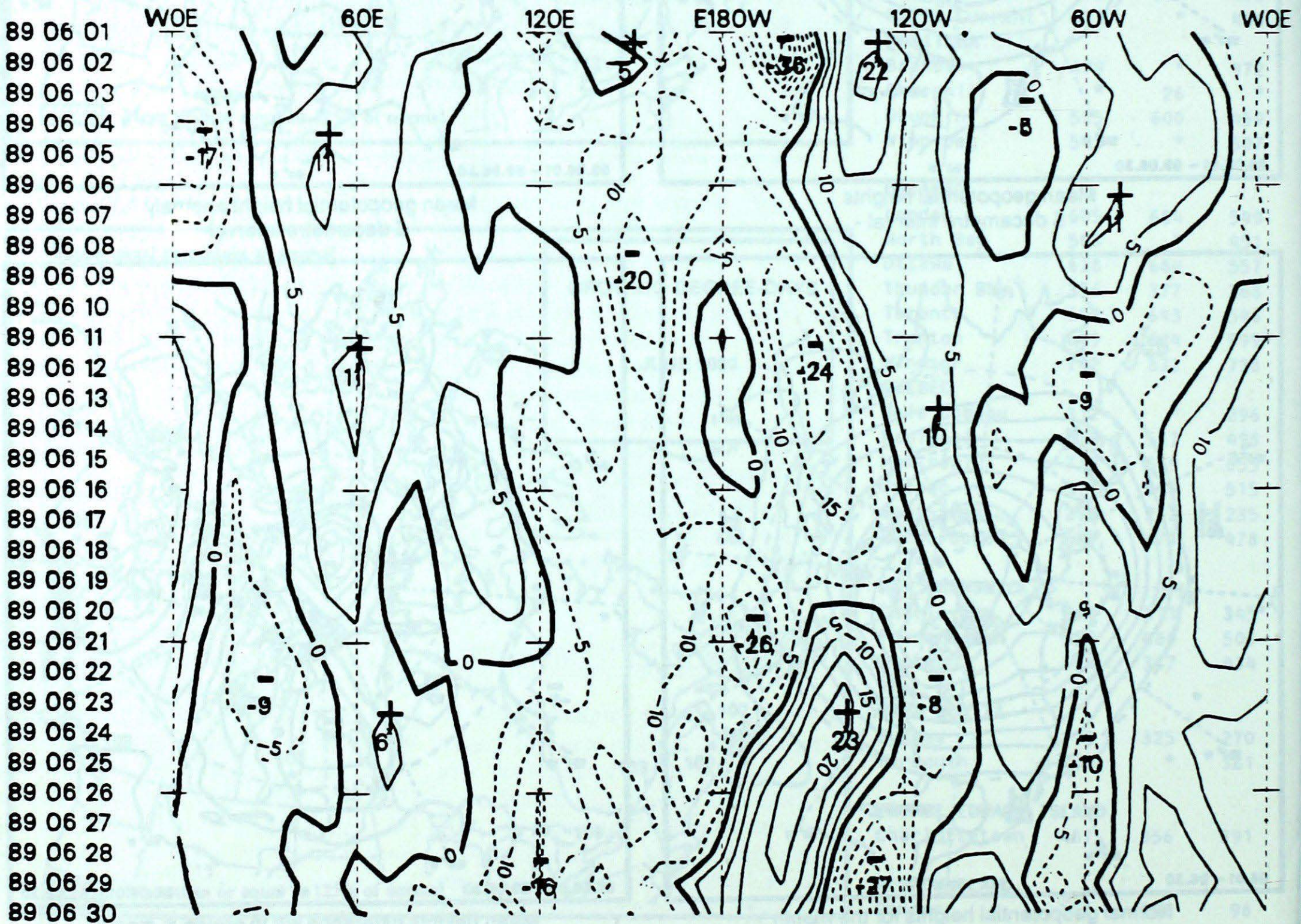
May 1989

The 50-kPa height anomaly field over North America this month shows a 7 dam positive anomaly over central Québec. Elsewhere across Canada, weak positive anomalies prevailed. The corresponding 50-kPa height field shows a weak flow over the continent with troughing over Baffin Island, a weak ridge over Alberta, and a rather sharp trough over Alaska. During the summer months, it is always difficult to infer organized precipitation patterns from the upper level flow, since copious amounts of rain often fall over relatively small areas, due to convective thunderstorm activity.

The Hovmöller diagram for 45°N latitude shows a strong positive anomaly on the west coast of North America early in the month moving eastwards, and weakening considerably. By the last three days of the month, the anomaly had strengthened again and was located at 110° W longitude. Note the very strong negative anomalies in the vicinity of 150°W longitude on the 1st and 12th of the month. These patterns are indicative of persistent stationary storms in the Gulf of Alaska. By the 20th, a robust positive anomaly had established itself in the Gulf - a preferred area for persistent ridges as well.

* Note: The Hovmöller diagram represents a hemispheric time-space analysis. It has been temporally smoothed and spacially normalized to enhance longwave components.

Hovmöller for latitude 45° N - all waves



TORNADOES

What They Are

The tornado, sometimes called a twister, is a violent local vortex in the atmosphere. It is usually visible as a funnel shaped cloud hanging from the base of a dark cumulonimbus cloud. A whirling cloud of dust and debris can often be seen rising from the ground. The funnel cloud does not always reach the ground. It sometimes lowers and retracts while the associated vortex touches down here and there. The forward motion of the tornado may be quite erratic, following a sinuous winding or zig-zag path. The average forward speed of tornadoes is 50-70 km/h and ranges from near 0 to over 100 km/h. Although small, often less than 100 metres wide, they are nature's most violent storms, packing winds to 450 km/h and creating havoc over paths from less than a kilometre, to several hundred kilometres in length.

Where and when they occur

Tornadoes occur only as a phenomenon associated with severe thunderstorms. In Canada, they are confined mainly to southern regions. They are most frequent in southern Manitoba, southeastern Saskatchewan and southern Ontario. They are most likely in the period June through August. Most tornadoes develop during the late afternoon and evening. However, a significant number occur after sunset, when visual observation of their progress is extremely difficult.

Damage They Do

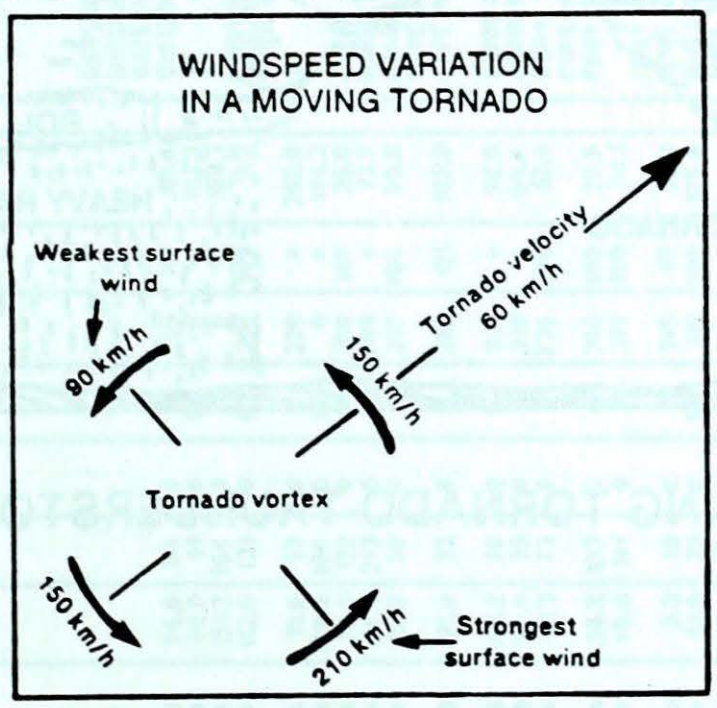
Most tornadoes are on the ground for only a few minutes and damage an area 50-100 metres wide and 1-2 kilometres in length. Only a few are extremely severe, but these are the ones which cause most of the damage. The damage path of a severe tornado may be as wide as 1.5 kilometres and cover a distance of up to 350 kilometres.

Tornado damage is caused primarily by the action of powerful winds. This is augmented by the twisting effect of rapidly changing wind direction, and by outward acting forces created by the sudden pressure-drop at the core of the vortex.

Winds and Pressure in a Tornado

As shown in the diagram, the strongest winds in a tornado are on the side where the speed of the tornado relative to the ground (translation velocity) is added to the internal rotating speed of the air in the vortex. Since most tornadoes move from directions between northwest and southwest, these are the directions of strongest wind.

In most cases, tornado windspeeds are in the order of 150 km/h. However, in



severe tornadoes, windspeeds are estimated to be as strong as 450 km/h.

Atmospheric pressure at the centre of a tornado is greatly reduced due to centrifugal force. Sudden pressure-drops up to 8 kilopascals are known to occur at the passage of the "eye" of a tornado. Such a decrease in pressure, taking place suddenly, creates an explosive outward-acting force on a building. For example, a pressure differential of 4 kilopascals amounts to about 18 tonnes on a roof or wall with dimensions of 3 m x 15 m.

What They Look Like

Tornadoes appear first as a cone-shaped appendage (funnel cloud) at the base of the dark and threatening cumulonimbus of the thunderstorm. Typically, the tip of the funnel lowers and a cloud of debris becomes visible at the surface and begins to rise. The outer whirl of dust and debris may obscure much of the funnel cloud which may, or may not, extend to the earth's surface. The size of the funnel cloud varies greatly with the amount of available moisture and the size of the vortex. At times it may obscure the whirling dust cloud. As a tornado moves over a body of water, its funnel becomes "fatter" although the size of the vortex itself may not have changed. A severe thunderstorm system may spawn more than one tornado in succession and, occasionally, whirling about its periphery. In its dying stages, the tornado funnel either simply disappears gradually or retracts into the cloud base.

In an approaching thunderstorm, the most likely place for a tornado to appear is near the left-hand side, e.g. near the southern flank, if it is approaching from the west. They are most likely to appear near and to the south of the approaching curtain of heavy precipitation. In the case of an incipient tornado, the base of the cumulonimbus cloud appears very dark and tumultuous. There is usually a noticeable lowering of a portion of the cloud base to form a large swirling turbulent mass from which the funnel will protrude. This "wall cloud", sometimes called a "collar", may be seen as rotating slowly, evidence of inward spiralling air current.

Although the size and shape of tornadoes vary greatly, they are generally recognizable by the funnel cloud and the dust and debris which are seen to be rotating about a vertical axis. A relatively "dry" tornado may show debris near the surface that is not visibly connected to its funnel cloud aloft. A nearby tornado may be seen as a whirling mass of debris, often mixed with mud and water (and heard by its tremendous roar, which may be likened to that of an express train, only louder, or that of a nearby jet engine).

Tornado Safety

The following basic principles may be used in order to minimize the danger of injury when a tornado threatens.

- In open country, avoid an approaching tornado by moving away from its path at a right angle. If there is not time to escape, lie flat in a ditch or a ravine for protection against flying debris. Hold onto the base of a small tree or shrub to avoid being lifted or rolled away.

- In built-up areas, seek shelter in a sturdy building. Go to an interior hallway on the lower floor. Avoid possible flying glass by keeping away from windows. Avoid buildings with wide free-span roofs such as shopping markets, gymnasiums and auditoriums.

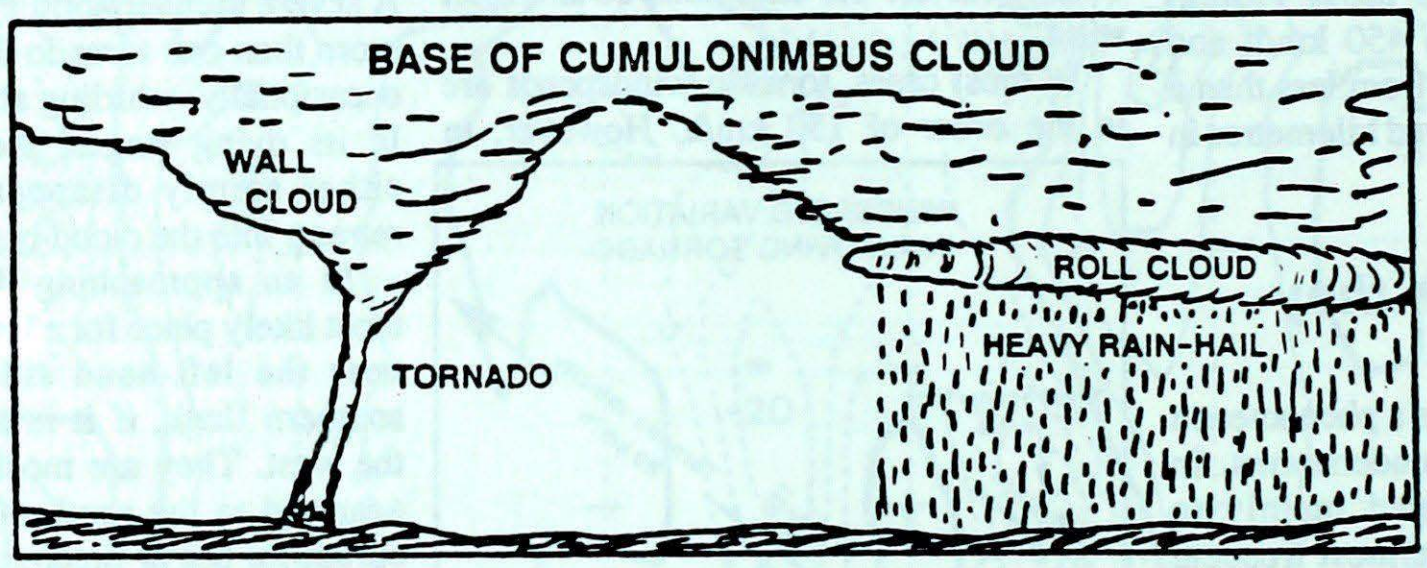
- In homes, seek shelter in the basement under a sturdy table or under a stairway. If there is no basement, go to a small room or interior hallway. The side of the building facing away from it is generally less hazardous than the one facing towards an oncoming tornado. Open one or two windows on the leeward side to reduce the explosive effect of suddenly reduced outside air pressure.

- Mobile homes are particularly vulnerable to overturning and severe damage. They may be made more secure by means of cables anchored in concrete. Nevertheless, in the face of a tornado threat it would be advisable to seek a more secure place.

Remember, recent studies have shown that the principal effects of a large tornado, in order of importance are:

- disintegration of buildings due to wind pressure, - injuries and damage by wind-driven objects and by debris falling from collapsing higher portions of buildings, - explosive pressure differential created by the passage of the centre of the tornado vortex.

Finally, attention is directed to the fact that the Weather Service is able to identify conditions in which severe thunderstorms are likely. Special forecasts in the form of advisories or "Watch" bulletins are issued and broadcast. It should be noted that even when a relatively small area, such as one about 80 kilometres wide and 150 kilometres long, has been identified as one in which a special "Watch" should be kept, the chance of actually experiencing a tornado at any particular location is only about one in a thousand. Consequently, a TORNADO WARNING is very rare and only issued when a tornado or a funnel cloud has actually been reported. When severe thunderstorms threaten, it is a good practice to keep a "Weather-Eye" open and to have a plan of action in mind.



APPROACHING TORNADO-THUNDERSTORM

JUNE 1989

STATION	Temperature C				Snowfall (cm)	% of Normal Snowfall	Total Precipitation (mm)	% of Normal Precipitation	Snow on ground at end of month (cm)	No. of days with Precip 1.0 mm or more	Bright Sunshine (hours)	% of Normal Bright Sunshine	Degree Days below 18 C
	Mean	Difference from Normal	Maximum	Minimum									
BRITISH COLUMBIA													
ABBOTSFORD A	16.5	1.8	32.6	6.9	0.0	*	54.4	84	0	8	253	117	62.4
ALERT BAY	12.6	0.3	21.2	6.4	0.0	*	59.9	91	0	12	0	*	162.2
AMPHITRITE POINT	13.1	0.7	23.2	7.7	0.0	*	151.2	164	0	9	0	*	144.1
BLUE RIVER A	14.7	0.9	30.6	2.9	0.0	*	112.6	131	0	17	216	109	0.0
CAPE ST JAMES	11.3	0.7	17.1	6.8	0.0	*	71.6	97	0	8	229	*	202.0
CAPE SCOTT	11.8	0.6	15.5	8.0	0.0	*	109.6	104	0	12	0	*	194.2
CASTLEGAR A	17.8	0.9	32.0	6.3	0.0	*	70.3	122	0	11	258	107	35.0
COMOX A	16.2	1.2	32.2	6.4	0.0	*	74.9	213	0	11	289	*	72.7
CRANBROOK A	16.7	1.8	29.5	3.6	0.0	*	26.2	59	0	8	297	104	50.8
DEASE LAKE	11.9	1.5	25.1	-1.1	0.0	0	31.8	73	0	8	262	121	182.8
FORT NELSON A	16.6	2.2	32.8	6.1	0.0	0	48.2	70	0	11	331	*	58.6
FORT ST JOHN A	15.4	1.9	29.4	5.0	0.0	0	50.9	75	0	9	310	*	89.4
HOPE A	17.2	1.4	33.1	7.4	0.0	*	47.3	73	0	8	234	104	52.9
KAMLOOPS A	19.0	1.0	33.8	7.1	0.0	*	36.8	123	0	9	256	100	30.5
KELOWNA A	17.7	1.6	33.9	5.2	0.0	*	48.6	191	0	7	272	100	34.1
LYTTON	20.0	2.0	35.8	9.1	0.0	*	3.3	18	0	1	245	92	22.0
MACKENZIE A	13.7	1.3	29.2	0.0	0.0	*	51.0	72	0	10	271	108	129.6
PENTICTON A	19.0	1.8	33.9	7.3	0.0	*	46.3	164	0	5	272	103	17.6
PORT ALBERNI A	15.8	1.5	33.5	4.5	0.0	*	63.8	165	0	10	241	*	78.1
PORT HARDY A	12.6	0.8	23.6	5.2	0.0	*	80.1	113	0	11	230	134	161.2
PRINCE GEORGE A	14.3	1.4	30.0	-0.9	0.0	*	40.9	61	0	8	260	100	115.0
PRINCE RUPERT A	11.6	0.9	17.9	4.1	0.0	*	37.8	30	0	5	224	148	189.6
PRINCETON A	15.6	1.1	30.6	1.3	0.0	*	28.7	108	0	8	288	*	0.0
QUESNEL A	*	*	*	*	*	*	*	*	*	*	*	*	*
REVELSTOKE A	17.3	1.5	32.7	7.0	0.0	*	87.9	131	0	15	231	107	46.6
SANDSPIT A	13.5	1.9	23.5	11.8	0.0	*	81.0	157	0	10	247	141	136.6
SMITHERS A	14.1	1.6	30.0	0.4	0.0	*	12.7	32	0	5	276	111	122.2
TERRACE A	15.4	1.7	29.5	4.3	0.0	*	20.2	48	0	4	275	144	88.1
VANCOUVER INT'L A	16.1	1.0	26.1	8.1	0.0	*	49.6	110	0	7	265	111	66.1
VICTORIA INT'L A	15.1	0.8	30.7	6.1	0.0	*	22.6	78	0	4	271	105	96.7
VICTORIA MARINE	13.4	0.9	26.9	5.2	0.0	*	29.0	121	0	6	0	*	141.1
WILLIAMS LAKE A	14.2	1.2	29.3	9.9	0.0	0	47.8	106	0	9	279	98	116.6

STATION	Temperature C				Snowfall (cm)	% of Normal Snowfall	Total Precipitation (mm)	% of Normal Precipitation	Snow on ground at end of month (cm)	No. of days with Precip 1.0 mm or more	Bright Sunshine (hours)	% of Normal Bright Sunshine	Degree Days below 18 C
	Mean	Difference from Normal	Maximum	Minimum									
YUKON TERRITORY													
DAWSON A	14.2	*	27.1	0.5	0.0	*	39.0	*	0	*	*	*	*
MAYO A	15.2	1.8	27.3	2.0	0.0	*	32.7	93	0	*	*	*	*
WATSON LAKE A	14.1	1.4	27.6	0.5	0.0	*	26.4	51	0	7	339	128	119.5
WHITEHORSE A	12.6	0.6	25.2	0.4	0.0	0	24.1	79	0	5	272	100	163.4
NORTHWEST TERRITORIES													
ALERT	1.8	2.0	9.8	-3.2	21.4	218	24.0	198	1	8	233	77	495.8
BAKER LAKE A	3.6	-0.5	18.1	6.2	6.8	243	20.6	99	0	4	328	125	433.7
CAMBRIDGE BAY A	8.5	7.0	20.1	-9.5	4.2	105	17.8	135	0	4	423	158	395.9
CAPE DYER A	0.3	0.1	7.8	-7.2	11.6	40	13.4	34	64	5	*	*	532.6
CAPE PARRY A	4.1	2.5	19.6	-2.7	0.4	13	11.5	80	0	2	*	*	416.3
CLYDE A	0.8	0.2	11.4	-8.8	9.5	99	15.7	126	0	5	276	106	518.6
COPPERMINE A	7.4	3.6	24.4	-6.2	0.6	23	8.2	48	0	3	415	134	319.5
CORAL HARBOUR A	3.0	0.9	17.8	-4.4	2.6	32	10.5	39	0	3	270	96	450.3
EUREKA	2.2	0.4	8.5	-2.7	6.8	283	12.6	233	0	5	319	79	474.7
FORT RELIANCE	10.6	1.1	28.6	-4.2	1.0	77	16.8	64	0	6	*	*	226.5
FORT SIMPSON A	15.7	1.1	33.1	3.9	0.0	*	39.7	101	0	6	320	114	104.4
FORT SMITH A	14.8	1.2	30.7	1.1	0.0	0	21.8	53	0	9	281	*	112.2
IQALUIT	3.8	0.4	15.5	-3.6	28.2	279	45.6	116	0	6	139	80	424.6
HALL BEACH A	1.7	1.7	12.3	-5.9	2.0	32	8.4	50	0	3	*	*	489.7
HAY RIVER A	13.5	1.6	34.0	0.8	0.0	0	28.2	105	0	7	*	*	135.6
INUVIK A	12.3	2.2	27.0	-0.2	0.8	36	20.2	86	0	6	356	95	178.2
MOULD BAY A	0.7	1.0	8.1	-6.1	0.8	23	8.6	137	0	2	240	98	484.9
NORMAN WELLS A	14.9	0.9	30.1	2.2	0.0	0	60.5	164	0	8	260	84	109.1
POND INLET A	2.3	*	15.5	-6.4	0.4	*	20.6	*	0	2	32	*	46.1
RESOLUTE A	0.2	0.8	6.4	-5.0	4.4	63	15.2	126	0	6	257	100	533.7
YELLOWKNIFE A	13.8	0.9	28.1	3.1	0.0	0	28.5	170	0	9	367	93	130.5
ALBERTA													
BANFF	12.9	1.3	28.0	1.5	0.0	0	52.4	85	0	6	*	*	*
CALGARY INT'L A	14.3	0.8	28.1	3.0	0.0	0	80.7	90	0	16	291	109	114.2
COLD LAKE A	14.6	0.1	25.3	2.4	0.0	*	69.0	96	0	14	213	75	102.3
CORONATION A	14.8	0.4	30.7	1.5	0.0	*	78.4	136	0	11	265	86	101.6
EDMONTON INT'L A	14.7	0.6	30.3	3.6	0.0	*	80.6	105	0	12	287	100	102.7
EDMONTON MUNICIPAL	15.5	0.4	29.7	5.3	0.0	*	83.4	108	0	13	285	105	81.0
EDMONTON NAMAO A	14.6	-0.1	29.5	4.2	0.0	0	90.9	117	0	14	*	*	103.0
EDSON A	13.4	0.9	29.6	-1.0	0.0	0	144.0	120	0	12	267	105	139.0

JUNE 1989

STATION	Temperature C Mean	Difference from Normal	Maximum	Minimum	Snowfall (cm)	% of Normal Snowfall	Total Precipitation (mm)	% of Normal Precipitation	Snow on ground at end of month (cm)	No. of days with Precip 1.0 mm or more	Bright Sunshine (hours)	% of Normal Bright Sunshine	Degree Days below 18 C
FORT CHIPEWYAN A	14.4	0.2	30.0	-1.0	0.0	*	28.8	62	0	*	*	*	*
FORT MCMURRAY A	14.4	0.4	27.6	4.6	0.0	*	91.8	143	0	13	224	82	115.3
GRANDE PRAIRIE A	15.0	1.3	30.0	3.5	0.0	*	83.7	120	0	12	312	*	99.1
HIGH LEVEL A	14.7	0.3	29.2	2.6	0.0	*	46.8	65	0	8	314	103	105.1
JASPER	13.6	1.2	28.2	2.2	0.0	*	55.2	101	0	11	239	*	131.2
LETHBRIDGE A	16.2	0.8	30.3	6.2	0.0	0	77.1	99	0	8	300	*	71.8
MEDICINE HAT A	17.3	0.7	33.5	3.2	0.0	*	32.4	51	0	9	327	117	49.0
PEACE RIVER A	15.0	1.3	29.8	2.8	0.0	*	36.1	61	0	6	*	*	96.8
RED DEER A	14.4	0.8	29.3	2.8	0.0	0	76.9	91	0	15	*	*	111.2
ROCKY MTN HOUSE A	13.1	0.3	29.0	0.2	0.0	0	91.4	88	0	11	*	*	147.8
SLAVE LAKE A	13.9	0.3	26.5	1.5	0.0	*	75.0	77	0	10	285	104	126.9
SUFFIELD A	16.7	*	32.4	2.7	0.0	*	29.4	*	0	8	303	*	61.1
WHITECOURT A	14.0	1.3	28.4	0.2	0.0	0	117.6	128	0	14	*	*	122.7
SASKATCHEWAN													
BROADVIEW	13.4	0.2	32.7	0.5	0.0	*	67.2	114	0	11	269	91	93.4
COLLINS BAY	10.6	*	26.7	-1.9	0.0	*	81.2	*	0	11	238	*	225.5
CREE LAKE	12.1	-1.4	25.6	-2.2	0.0	0	54.4	85	0	7	237	89	179.3
ESTEVAN A	16.3	-0.2	33.2	0.2	0.0	*	49.7	64	0	9	289	96	73.0
HUDSON BAY A	*	*	*	*	*	*	*	*	*	*	*	*	*
KINDERSLEY	16.1	0.4	35.4	3.1	0.0	*	53.0	93	0	11	302	*	77.7
LA RONGE A	*	*	*	*	*	*	*	*	*	*	*	*	*
MEADOW LAKE A	14.5	*	28.9	3.1	0.0	*	69.0	*	0	14	229	*	109.3
MOOSE JAW A	16.8	0.2	33.9	3.8	0.0	*	96.1	145	0	11	289	102	63.9
NIPAWIN A	15.7	*	30.4	2.1	0.0	*	91.2	*	0	13	300	*	82.0
NORTH BATTLEFORD A	*	*	*	*	*	*	*	*	*	*	*	*	*
PRINCE ALBERT A	16.0	1.4	32.3	3.0	0.0	*	48.9	71	0	9	285	109	78.7
REGINA A	16.5	0.6	35.4	4.4	0.0	*	79.3	100	0	11	274	97	72.3
SASKATOON A	16.4	0.7	34.3	4.7	0.0	*	61.3	104	0	9	*	*	71.4
SWIFT CURRENT A	15.4	0.3	32.9	3.5	0.0	*	96.7	128	0	10	291	104	97.2
WYNYARD	15.3	-0.1	31.4	3.8	0.0	*	108.4	147	0	11	269	92	100.6
YORKTON A	15.0	-0.5	31.3	2.2	0.0	*	112.3	159	0	7	269	93	103.8
MANITOBA													
BRANDON A	15.1	-1.0	31.1	0.7	0.0	*	62.4	81	0	12	234	*	96.9
CHURCHILL A	5.5	-0.7	27.1	-3.6	0.6	17	20.4	47	0	5	215	92	376.1
DAUPHIN A	15.6	-0.2	31.8	0.5	0.0	*	132.9	154	0	11	263	96	90.5
GILLAM A	10.5	-0.4	31.1	-2.8	0.0	0	13.6	24	0	5	*	*	241.3
GIMLI	15.3	*	29.7	-1.3	0.0	*	203.4	*	0	100	286	97	99.2
ISLAND LAKE	13.7	-0.3	29.0	-0.5	0.0	0	56.1	87	0	6	*	*	144.8
LYNN LAKE A	11.2	-1.3	28.0	-0.6	0.0	0	103.6	152	0	12	235	89	203.4
NORWAY HOUSE A	13.8	*	29.7	0.5	0.0	*	30.0	*	0	8	*	*	135.9

STATION	Temperature C Mean	Difference from Normal	Maximum	Minimum	Snowfall (cm)	% of Normal Snowfall	Total Precipitation (mm)	% of Normal Precipitation	Snow on ground at end of month (cm)	No. of days with Precip 1.0 mm or more	Bright Sunshine (hours)	% of Normal Bright Sunshine	Degree Days below 18 C
PORTAGE LA PRAIRIE	16.3	-0.7	31.0	-1.6	0.0	*	133.0	176	0	11	*	*	71.3
THE PAS A	16.1	1.7	31.2	5.0	0.0	0	63.9	101	0	11	*	*	71.2
THOMPSON A	11.3	-0.9	18.7	3.9	0.6	13	39.1	53	0	7	273	104	205.7
WINNIPEG INT'L A	16.4	-0.4	30.6	-0.8	0.0	*	150.2	188	0	12	279	101	70.6
ONTARIO													
BIG TROUT LAKE	11.7	-0.3	28.4	-1.8	*	*	33.2	50	0	4	236	*	199.4
EARLTON A	15.0	-0.2	29.8	0.0	0.0	0	112.2	126	0	17	*	*	115.9
GERALDTON A	13.0	*	28.6	-2.4	0.0	*	61.6	*	0	8	*	*	160.4
GORE BAY A	15.5	-0.1	27.6	4.1	0.0	*	80.6	138	0	10	*	*	89.1
HAMILTON RBG	18.9	*	32.1	9.7	0.0	*	87.2	*	0	12	232	*	*
HAMILTON A	17.9	0.0	29.7	7.1	0.0	*	89.1	128	0	15	*	*	44.4
KAPUSKASING A	13.8	-0.3	31.0	0.0	0.0	0	93.1	110	0	14	*	*	149.0
KENORA A	16.4	0.3	31.0	1.2	0.0	*	252.2	302	0	14	*	*	70.9
KINGSTON A	17.8	1.4	27.6	7.4	0.0	*	103.6	135	0	9	209	87	42.1
LANSDOWNE HOUSE	*	*	*	*	*	*	*	*	*	*	*	*	*
LONDON A	18.4	0.5	29.6	7.9	0.0	*	93.2	127	0	10	186	76	34.1
MOOSONEE	11.9	0.0	31.7	-2.9	0.0	0	39.4	50	0	9	206	94	210.3
MUSKOKA A	16.6	0.7	28.6	4.3	0.0	*	115.4	141	0	12	*	*	69.1
NORTH BAY A	16.0	0.3	28.0	5.9	0.0	*	142.4	167	0	11	192	76	87.1
OTTAWA INT'L A	18.9	0.9	32.1	8.6	0.0	*	70.8	96	0	10	226	92	29.2
PETAWAWA A	16.6	0.2	30.5	3.1	0.0	*	54.8	58	0	7	*	*	75.6
PETERBOROUGH A	17.9	1.2	31.0	5.5	0.0	*	97.6	150	0	13	*	*	40.5
PICKLE LAKE	13.7	-0.2	28.7	-1.0	*	*	82.5	94	0	11	*	*	150.1
RED LAKE A	14.8	-0.3	30.1	0.4	0.0	0	121.4	140	0	13	284	*	110.1
ST CATHARINES A	19.2	0.7	29.6	9.7	0.0	*	103.2	138	0	12	*	*	21.6
SARNIA A	18.1	0.3	31.4	6.0	0.0	*	81.3	99	0	11	322	118	39.4
SAULT STE MARIE A	14.4	0.0	29.1	-1.4	0.0	*	74.2	89	0	11	219	86	115.5
SIOUX LOOKOUT A	15.3	0.1	30.7	2.7	*	*	121.2	132	0	10	*	*	103.5
SUDBURY A	15.9	-0.1	29.5	3.9	0.0	*	160.9	194	0	12	181	74	90.3
THUNDER BAY A	12.6	-1.4	27.7	0.9	0.0	*	98.7	129	0	12	233	89	161.7
TIMMINS A	13.8	-0.8	29.4	-1.2	0.0	0	94.3	105	0	12	*	*	147.3
TORONTO	19.4	*	30.0	11.1	0.0	*	105.8	*	0	10	*	*	16.0
TORONTO INT'L A	18.4	0.7	31.4	7.4	0.0	*	94.7	141	0	11	*	*	31.8
TORONTO ISLAND A	17.9	*	28.5	9.5	0.0	*	91.0	*	0	12	*	*	32.9
TRENTON A	18.5	0.7	28.6	6.0	0.0	*	84.2	132	0	12	*	*	29.5
WATERLOO WELLINGTON	17.8	0.7	30.4	6.5	0.0	*	108.8	147	0	12	*	*	44.1
WAWA A	11.8	*	26.3	-1.5	0.0	*	65.0	*	0	13	*	*	196.9
WIARTON A	15.3	-0.3	29.0	2.7	0.0	*	78.4	117	0	11	207	71	114.9
WINDSOR A	19.8	0.1	32.6	10.3	0.0	*	110.6	124	0	10	*	*	13.5

STATION	Temperature C Mean	Difference from Normal	Maximum	Minimum	Snowfall (cm)	% of Normal Snowfall	Total Precipitation (mm)	% of Normal Precipitation	Snow on ground at end of month (cm)	No. of days with Precip 1.0 mm or more	Bright Sunshine (hours)	% of Normal Bright Sunshine	Degree Days below 18 C
QUÉBEC													
BAGOTVILLE A	M	M	M	M	M		M		M	M	M	M	M
BAIE COMEAU A	12.8	0.0	26.0	0.4	0.0		68.3	97	0	11	247	105	155.9
BLANC SABLON A	9.2	2.0	21.3	0.0	0.0		82.0	88	0	9	210	M	263.5
CHIBOUGAMAU CHAPAIS	13.7	M	33.4	-0.4	0.2		89.0	M	0	11	215	92	154.3
GASPE A	13.8	M	29.0	-2.1	0.0		65.8	M	0	70	243	M	132.5
INUKJUAK A	4.9	0.5	17.2	-5.0	2.4	66	9.6	28	0	4	262	136	394.5
KUUJJUAQ A	9.0	2.1	32.7	-1.6	0.0		41.0	81	0	8	232	129	278.4
KUUJJUARAPIK A	7.2	0.7	33.9	-5.0	9.1	190	31.1	55	0	3	259	139	335.4
LA GRANDE IV A	M	M	M	M	M		M	M	M	M	M	M	M
LA GRANDE RIVIERE A	11.4	M	34.3	-3.9	9.4	M	38.5	M	0	5	266	M	222.6
MANIWAKI	17.0	1.1	31.6	3.8	0.0	M	64.0	71	0	7	200	81	68.7
MATAGAMI A	13.0	M	31.6	-1.9	0.0	M	16.1	M	0	11	210	88	176.2
MONT JOLI A	14.4	0.1	26.2	3.1	0.0	M	69.4	111	0	7	249	103	116.6
MONTREAL INT'L A	18.9	0.6	32.7	7.9	0.0	M	84.6	103	0	8	225	90	229.4
MONTREAL MIRABEL V	17.5	M	31.9	6.9	0.0	M	105.4	M	0	9	245	M	53.9
NATASHQUAN A	12.5	2.0	26.4	3.6	0.0	M	61.6	69	0	7	256	112	165.6
QUEBEC A	22.4	6.0	31.9	6.7	0.0	M	121.2	110	0	9	224	100	68.7
ROBERVAL A	15.5	0.0	33.9	2.8	0.0	M	62.6	77	0	8	236	M	112.5
SCHEFFERVILLE A	11.7	3.1	34.3	-3.7	0.0	0	75.2	102	0	11	227	120	212.9
SEPT-ILES A	13.0	1.3	26.0	2.5	0.0	M	81.9	91	0	100	267	114	151.3
SHERBROOKE A	16.5	0.9	31.0	1.6	0.0	M	74.2	76	0	11	213	M	63.7
STE AGATHE DES MONT	16.0	0.8	30.9	5.0	0.0	0	133.6	123	0	10	221	93	83.8
ST HUBERT A	18.5	0.3	32.2	5.6	0.0	M	85.0	99	0	10	196	M	35.4
VAL D'OR A	14.6	0.0	30.7	-0.4	0.0	0	96.0	102	0	10	200	83	130.7
NEW BRUNSWICK													
CHARLO A	14.4	-0.3	29.9	1.4	0.0	M	56.9	67	0	6	226	96	124.7
CHATHAM A	15.8	0.1	31.9	3.8	0.0	M	48.8	60	0	9	211	92	88.4
FREDERICTON A	16.3	0.1	31.1	3.3	M	M	60.8	72	0	8	157	M	73.4
MONCTON A	15.3	0.3	28.0	4.1	0.0	M	69.6	78	0	12	207	92	93.7
SAINT JOHN A	15.2	1.4	28.1	6.2	0.0	M	99.6	106	0	11	209	103	94.5

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NOVA SCOTIA													
GREENWOOD A	M	M	M	M	M		M	M	M	M	M	M	M
HALIFAX INT'L A	15.4	0.6	26.9	6.7	0.0	M	104.4	117	0	12	M	M	83.5
SABLE ISLAND	11.4	0.4	18.7	6.9	0.0	M	85.2	91	0	11	104	63	197.2
SHEARWATER A	M	M	M	M	M	M	M	M	M	M	M	M	M
SYDNEY A	13.4	0.2	25.4	4.2	0.0	M	99.2	121	0	14	152	67	139.6
YARMOUTH A	14.1	0.7	22.6	7.0	0.0	M	90.2	111	0	10	184	87	116.6
PRINCE EDWARD ISLAND													
CHARLOTTETOWN A	14.4	-0.1	27.2	4.8	0.0	M	76.2	95	0	14	M	M	112.3
SUMMERSIDE A	14.9	0.0	27.9	5.2	0.0	M	62.7	85	0	12	187	77	99.1
NEWFOUNDLAND													
BONAVISTA	11.3	1.7	25.1	1.0	0.0	0	59.4	93	0	22	M	M	200.5
BURGEO	11.4	1.9	21.1	2.5	0.0	M	90.2	66	0	12	M	M	196.5
CARTWRIGHT	9.8	1.4	35.3	-1.2	0.0	0	102.1	131	0	100	184	102	258.7
CHURCHILL FALLS A	12.7	3.0	33.4	-1.0	0.0	0	45.4	44	0	9	275	147	181.1
COMFORT COVE	12.8	0.9	28.0	0.3	0.0	0	48.8	64	0	10	M	M	161.7
DANIELS HARBOUR	11.3	1.5	25.5	1.4	0.0	0	90.0	104	0	10	211	111	200.1
DEER LAKE A	14.1	1.9	30.1	-0.8	0.0	0	63.7	90	0	10	M	M	120.9
GANDER INT'L A	13.0	1.2	26.8	-0.8	0.0	0	53.1	66	0	9	189	103	154.0
GOOSE A	13.7	2.4	36.2	-0.3	0.0	0	73.1	79	0	11	230	123	163.7
MARY'S HARBOUR	9.8	3.6	35.6	-1.2	0.0	0	75.4	95	0	11	M	M	256.6
PORT AUX BASQUES	11.6	2.6	20.4	4.0	0.0	M	99.8	97	0	12	185	M	192.1
ST ANTHONY	9.5	1.4	27.4	-2.0	0.0	0	75.9	76	0	8	M	M	254.6
ST JOHN'S A	11.8	0.9	25.5	0.8	0.0	0	109.4	128	0	9	152	81	189.1
ST LAWRENCE	11.3	3.0	20.1	1.5	0.0	0	98.5	90	0	13	M	M	200.0
STEPHENVILLE A	13.6	1.7	28.9	3.6	0.0	M	69.6	81	0	11	210	110	132.5
WABUSH LAKE A	12.6	2.7	33.2	-0.9	0.0	0	57.2	64	0	10	251	132	155.9

AGROCLIMATOLOGICAL STATIONS — JUNE 1989

STATION	Temperature C				Snowfall (cm)	Total Precipitation (mm)	% of Normal Precipitation	Snow on ground at end of month (cm)	No. of days with Precip 1.0 mm or more	Bright Sunshine (hours)	Degree days above 5 C	
	Mean	Difference from Normal	Maximum	Minimum							This month	Since jan. 1st
BRITISH COLUMBIA												
AGASSIZ	17.2	1.6	32.0	7.0	0.0	53.4	67	0	9	234	365.3	898.7
KAMPLOOPS	M	M	M	M	M	M	M	***	***	**	M	M
SIDNEY	15.1	0.8	28.5	5.5	0.0	23.7	83	0	6	272	313.8	764.1
SUMMERLAND	18.9	1.5	33.0	6.5	0.0	22.6	74	0	6	280	416.4	879.2
ALBERTA												
BEAVERLODGE	14.6	1.5	29.5	4.0	0.0	68.4	100	0	10	316	287.3	493.3
ELLERSLIE	M	M	M	M	M	M	**	***	***	**	M	M
LACOMBE	16.5	2.8	30.0	3.0	0.0	46.8	58	0	14	305	285.7	454.1
LETHBRIDGE	M	M	M	M	M	M	**	***	***	**	M	M
VEGREVILLE	M	M	M	M	M	M	**	***	***	**	M	M
SASKATCHWAN												
INDIAN HEAD	15.8	0.2	33.0	1.0	0.0	72.8	99	0	10	**	325.0	637.9
MELFORT	15.8	0.5	32.0	3.0	0.0	64.1	90	0	12	256	325.0	563.5
REGINA	16.4	0.7	35.0	1.0	0.0	88.5	122	0	8	**	340.7	610.0
SASKATOON	M	M	M	M	M	M	**	***	***	**	M	M
SCOTT	15.5	1.0	31.0	4.0	0.0	69.8	105	0	11	279	314.1	500.5
SWIFT CURRENT	15.6	0.1	32.0	4.0	0.0	117.5	159	0	9	251	318.0	545.1
MANITOBA												
BRANDON	16.2	-0.1	32.7	0.0	0.0	63.0	78	0	8	**	335.3	647.9
GLENLEA	16.9	0.0	31.0	3.5	0.0	97.4	110	0	10	**	362.5	711.5
MORDEN	16.5	-0.9	29.5	-2.0	0.0	184.0	243	0	12	266	343.0	658.5
ONTARIO												
DELHI	18.4	0.1	31.0	6.5	0.0	101.2	142	0	12	**	M	735.2
ELORA	17.1	0.0	29.2	5.5	0.0	134.0	154	0	11	**	345.6	603.2
GUELPH	17.5	0.1	29.8	4.4	0.0	118.0	167	0	10	211	374.7	648.3
HARROW	19.5	-0.2	32.0	8.0	0.0	116.4	154	0	8	212	434.1	803.7
KAPUSKASING	13.6	-0.5	30.0	-1.0	0.0	92.6	113	0	14	221	247.4	410.3
OTTAWA	18.9	0.8	31.1	7.2	0.0	105.1	132	0	10	226	417.3	751.0
SMITHFIELD	19.1	1.8	30.8	5.8	0.0	120.0	193	0	11	**	414.4	733.2
VINELAND	18.2	-0.2	29.6	8.0	0.0	94.0	132	0	11	210	396.9	696.7
WOODSLIE	M	M	M	M	M	M	**	***	***	**	M	M

STATION	Temperature C				Snowfall (cm)	Total Precipitation (mm)	% of Normal Precipitation	Snow on ground at end of month (cm)	No. of days with Precip 1.0 mm or more	Bright Sunshine (hours)	Degree days above 5 C	
	Mean	Difference from Normal	Maximum	Minimum							This month	Since jan. 1st
QUÉBEC												
LA POCATIERE	15.3	-0.4	30.5	5.0	0.0	87.2	97	0	9	252	311.3	517.0
L'ASSOMPTION	18.4	0.8	32.5	6.5	0.0	77.8	92	0	9	183	M	415.3
LENNOXVILLE	M	M	M	M	M	M	**	***	***	**	M	M
NORMANDIN	14.5	-0.1	34.5	-1.0	0.0	48.6	63	0	10	229	287.6	501.4
STE.CLOTILDE	18.5	0.8	32.5	4.0	0.0	58.4	68	0	5	233	405.8	743.1
NEW BRUNSWICK												
FREDERICTON	16.9	0.9	30.0	6.0	0.0	57.2	64	0	9	157	350.7	641.3
NOVA SCOTIA												
KENTVILLE	16.6	0.7	28.5	5.0	0.0	100.5	141	0	10	198	348.4	685.6
NAPPAN	15.8	1.1	28.0	2.5	0.0	108.0	138	0	12	191	358.2	622.0
PRINCE EDWARD ISLAND												
CHARLOTTETWN	15.1	0.2	28.0	4.0	0.0	58.6	80	0	11	190	302.6	573.0
NEWFOUNDLAND												
ST.JOHN'S WEST	12.9	1.8	24.5	1.0	0.0	111.6	140	0	10	135	M	394.4