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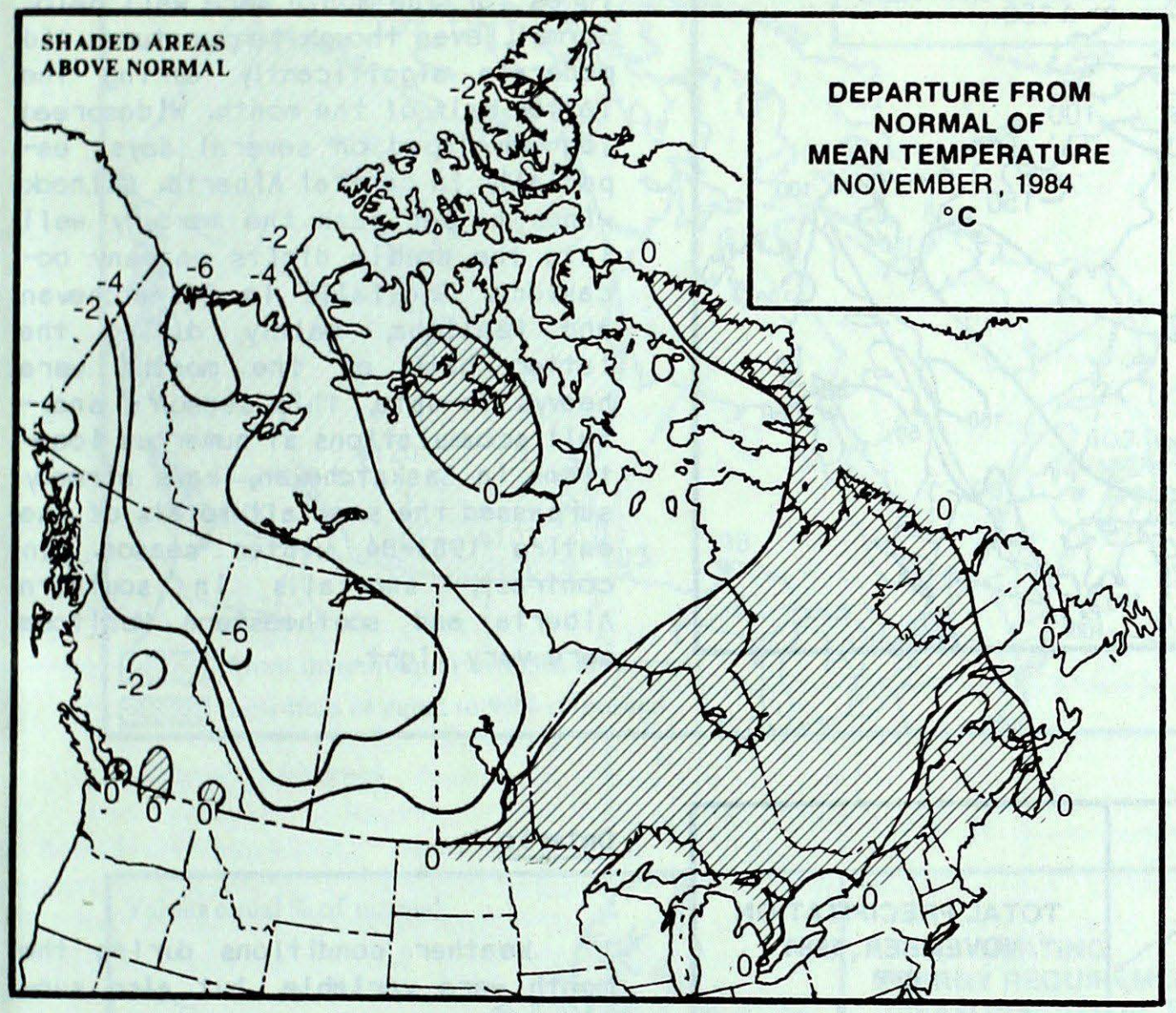
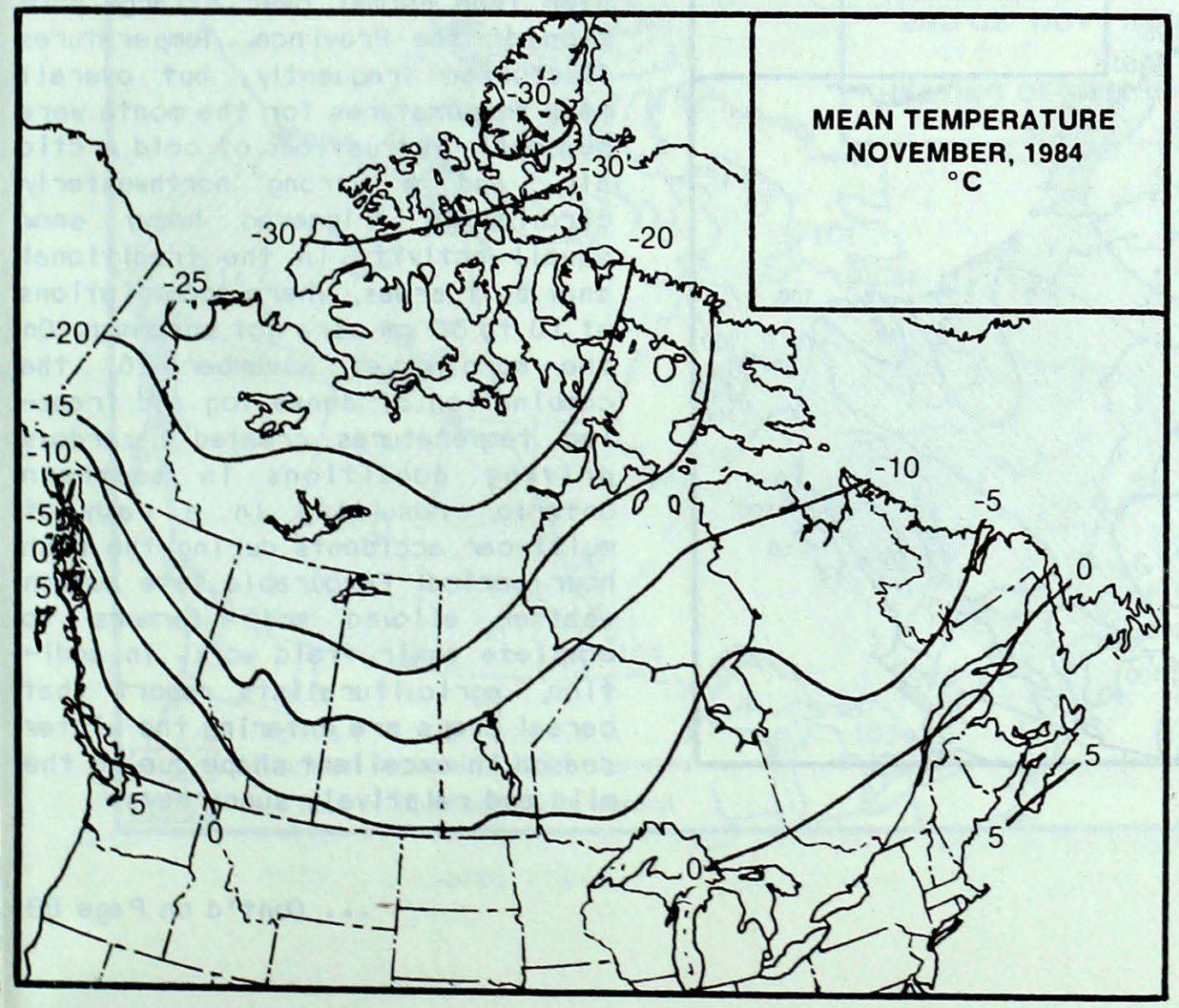
adian Climate Centre

Climatic Perspectives

MONTHLY SUPPLEMENT

Vol.6 November, 1984





ACROSS THE COUNTRY

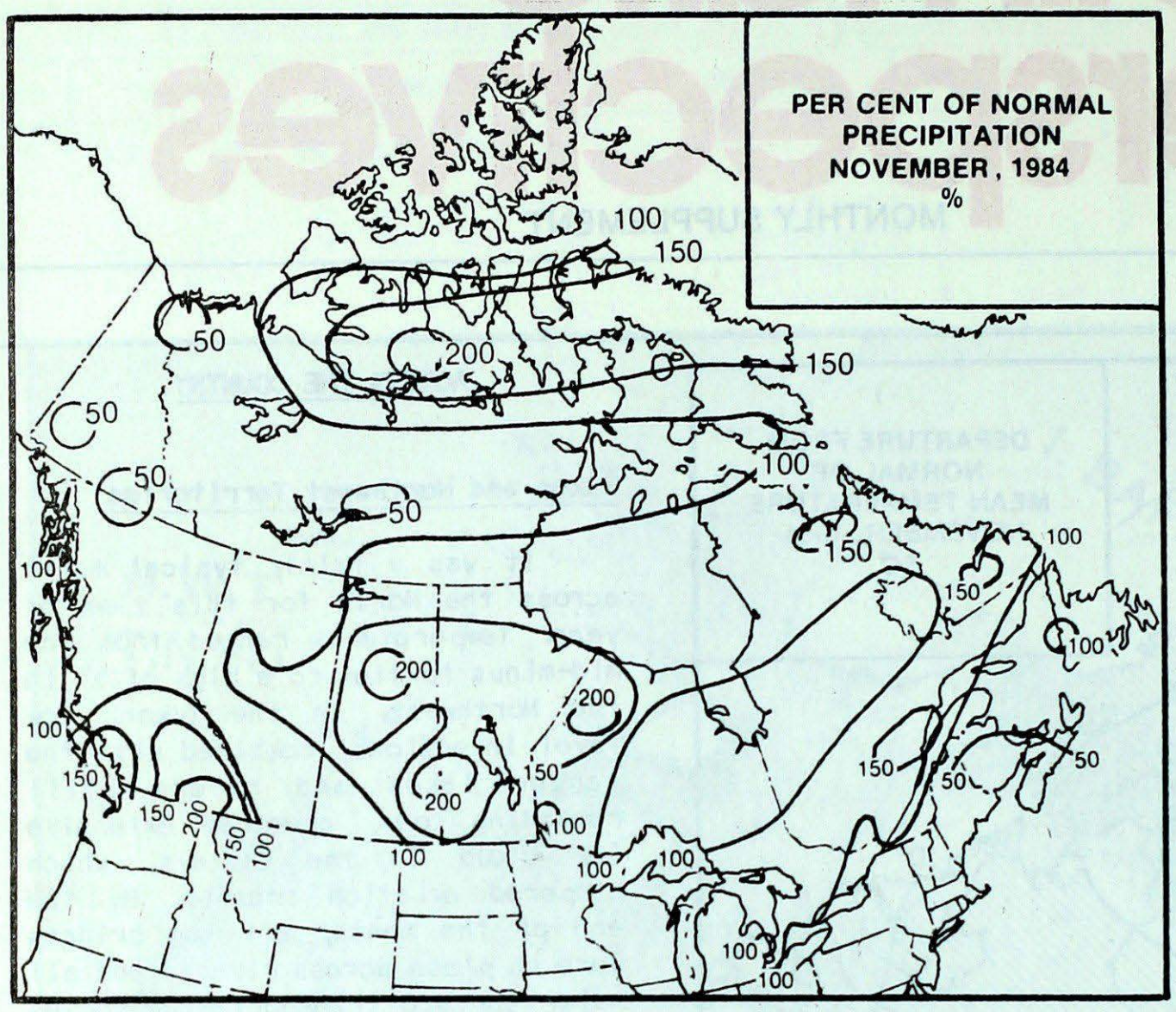
Yukon and Northwest Territories

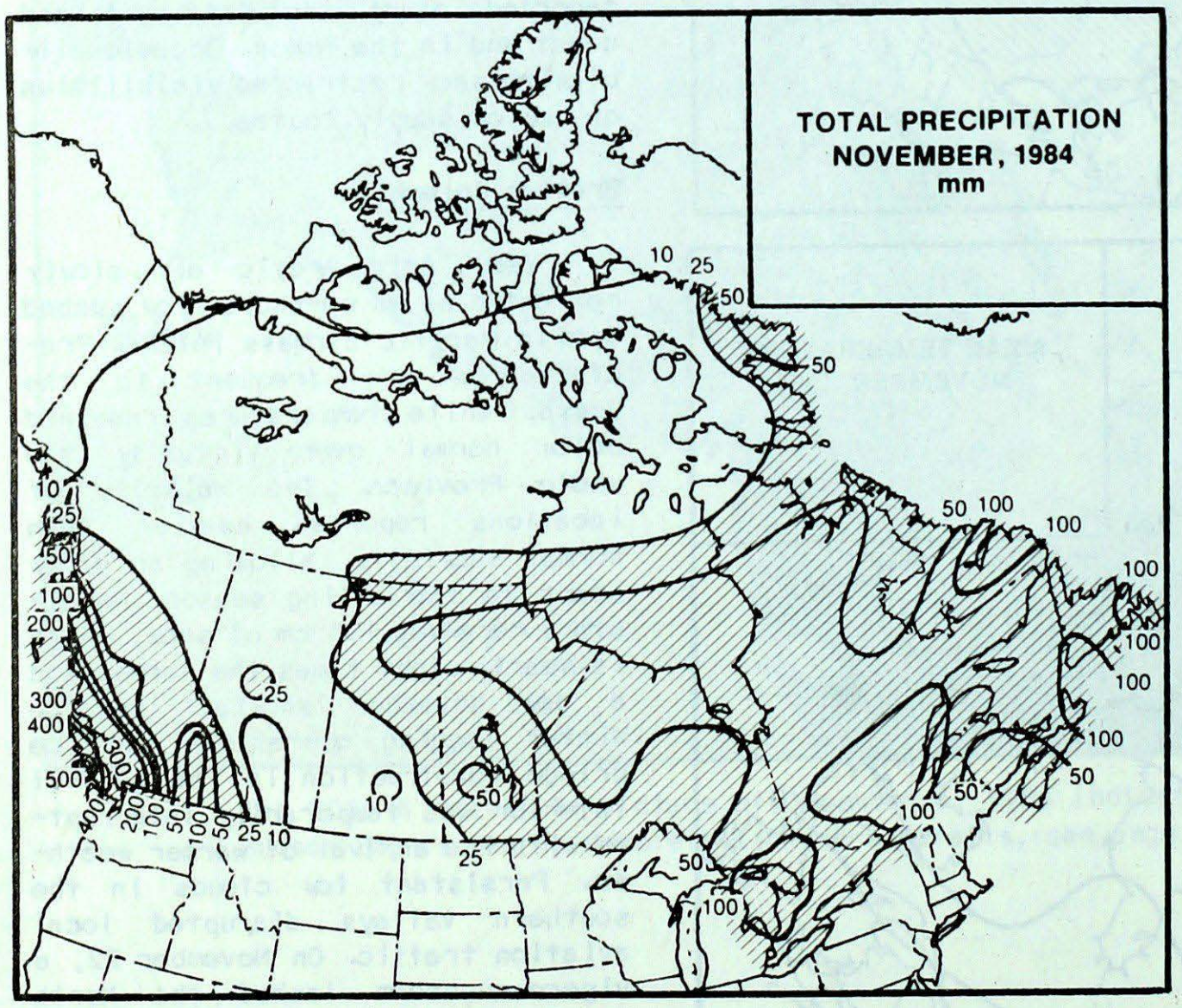
It was a fairly typical month across the North for this time of year. Temperatures ranged from the mid-minus forties to a high of 5° in the Northwest. In the Yukon, low level inversions, combined with the larger lakes and rivers still remaining open, produced extensive low cloud in the valleys, which hampered aviation traffic. By the end of the month, all ice bridges were in place across rivers, and all major surface transportation routes were open. Snowfalls were not unusual, generally less than 10 cm each week, but heavier amounts were reported along the Baffin Island coast and in the Yukon. Occasionally blowing snow restricted visibilities on major supply routes.

British Columbia

Very cold Arctic air slowly retreated as an on-shore flow pushed a mild Pacific airmass inland. Precipitation was frequent in the South, while temperatures remained below normal over virtually the whole Province. The majority of locations reported heavier than normal snowfalls, allowing an early start to the skiing season. Revelstoke received 195 cm of snow, which is nearly eight times the normal and a new November snowfall record. Winter logging operations and ice bridge construction in the central interior was temporarily interrupted with the arrival of warmer weather. Persistant low clouds in the southern valleys disrupted local aviation traffic. On November 22, a vigorous storm lashed the North Coast with winds in excess of 120 km/h, while in the interior, winds of 100 km/h whipped across the countryside, damaging roofs, toppling trees and power lines.

Canada





Prairie Provinces

An extremely cold Arctic airmass remained well entrenched across the regions until mid-month. During this period, snowfalls were light, and many new daily minimum temperature records were set. Mean temperatures for the month were well below normal, even though temperatures did moderate significantly during the latter half of the month. Widespread fog developed on several days, especially in central Alberta. Chinook winds helped push the mercury well into the double digits on many occasions. Snowfalls in Saskatchewan and Manitoba, mainly during the latter half of the month, were heavy. To-date, this season's snowfall accumulations at numerous locations in Saskatchewan, have already surpassed the snowfall totals of the entire 1983-84 winter season. In contrast, snowfalls in southern Alberta and southeastern Manitoba were very light.

Ontario

Weather conditions during the month were variable, but also sunnier than normal over a large portion of the Province. Temperatures fluctuated frequently, but overall mean temperatures for the month were seasonal. Intrustions of cold Arctic air, and a strong northwesterly circulation triggered heavy snow squall activity in the traditional snow belt areas, where accumulations of 10 to 30 cm were not uncommon. On the morning of November 26, the combination of dense fog and freezing temperatures created hazardous driving conditions in southern Ontario, resulting in a rash of multi-car accidents during the rush hour period. Favourable late autumn weather allowed most farmers to complete their field work. In addition, agriculturalists report that cereal crops are entering the winter season in excellent shape due to the mild and relatively sunny days.

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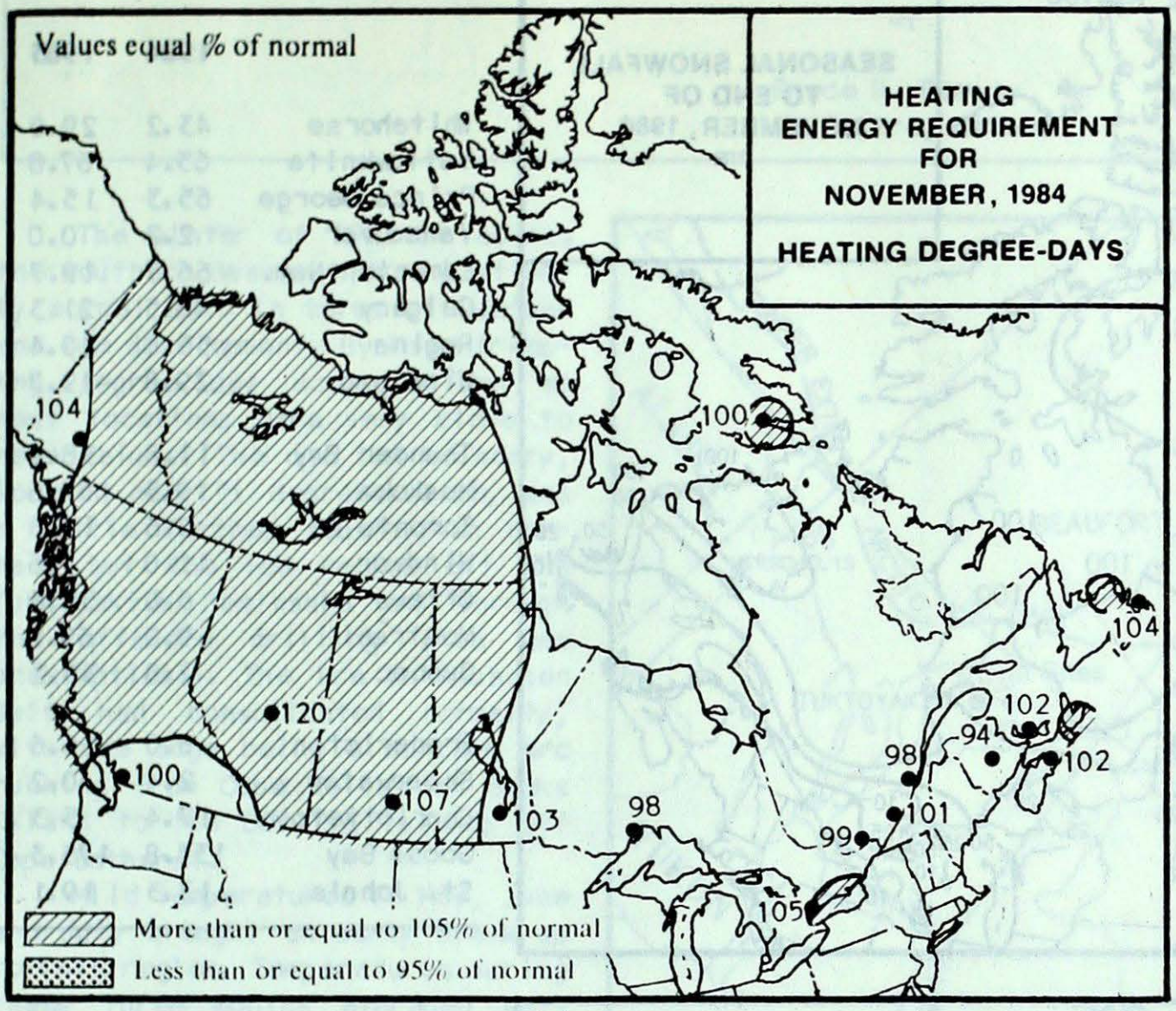
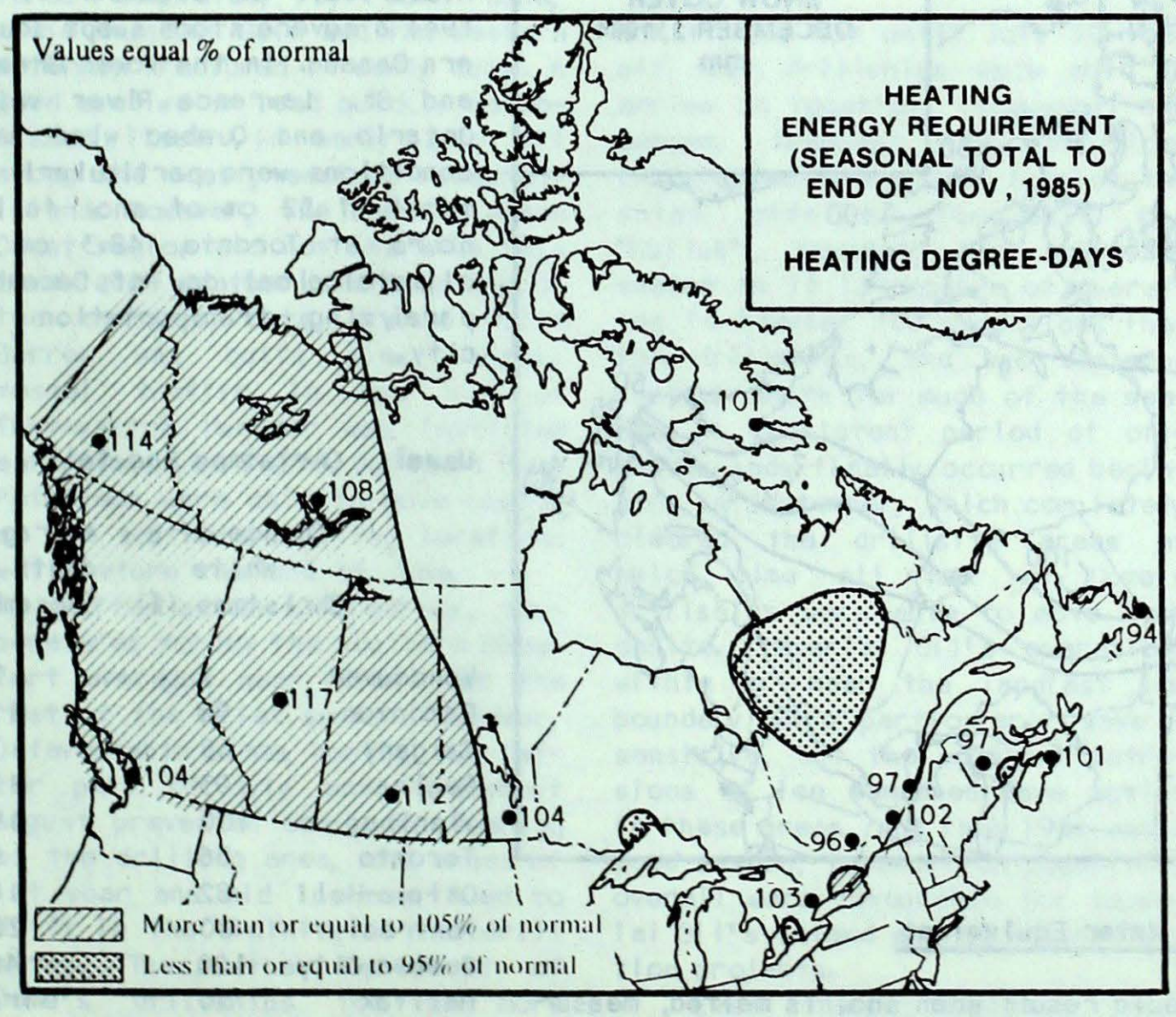
ENERGY REQUIREMENT

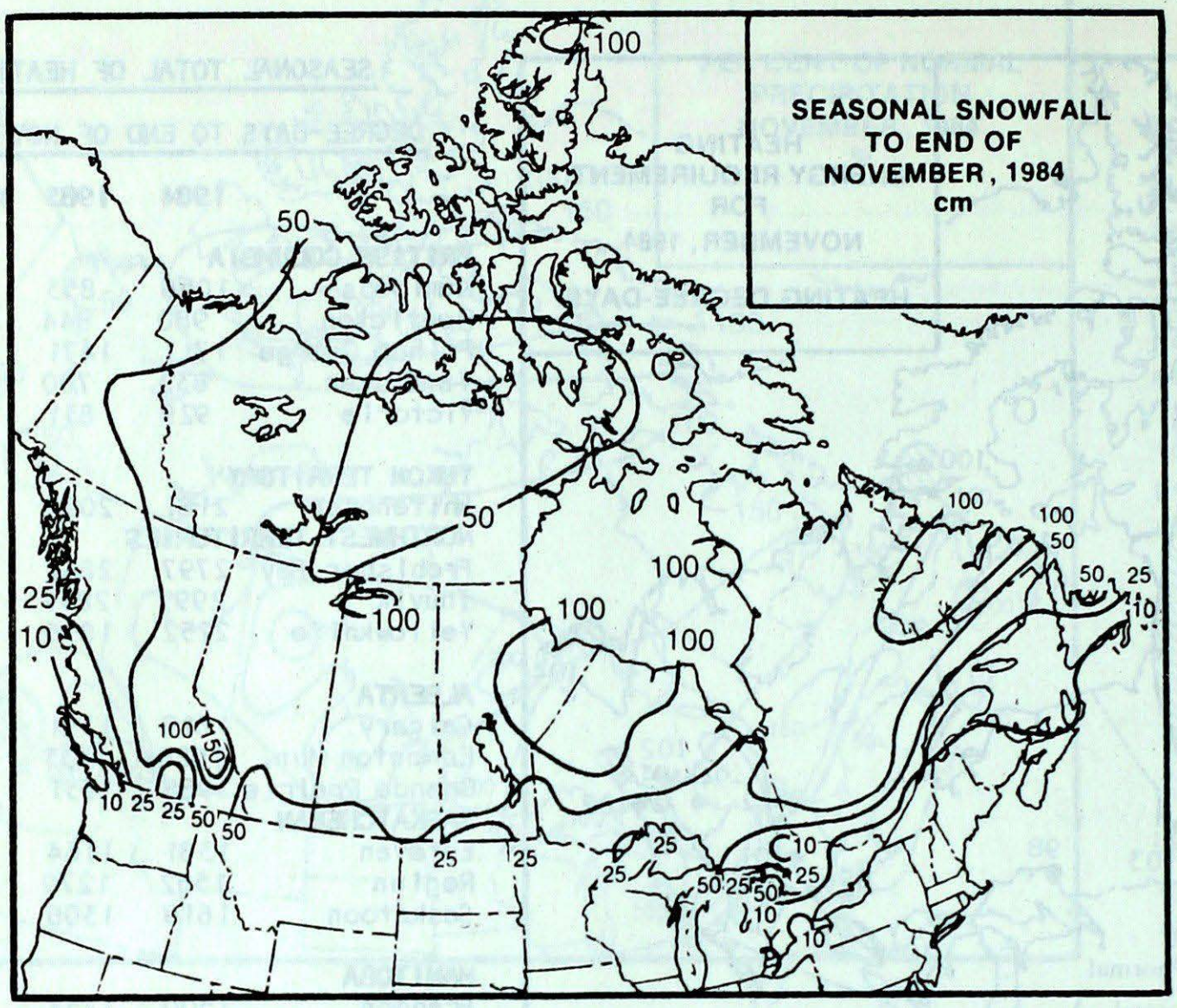


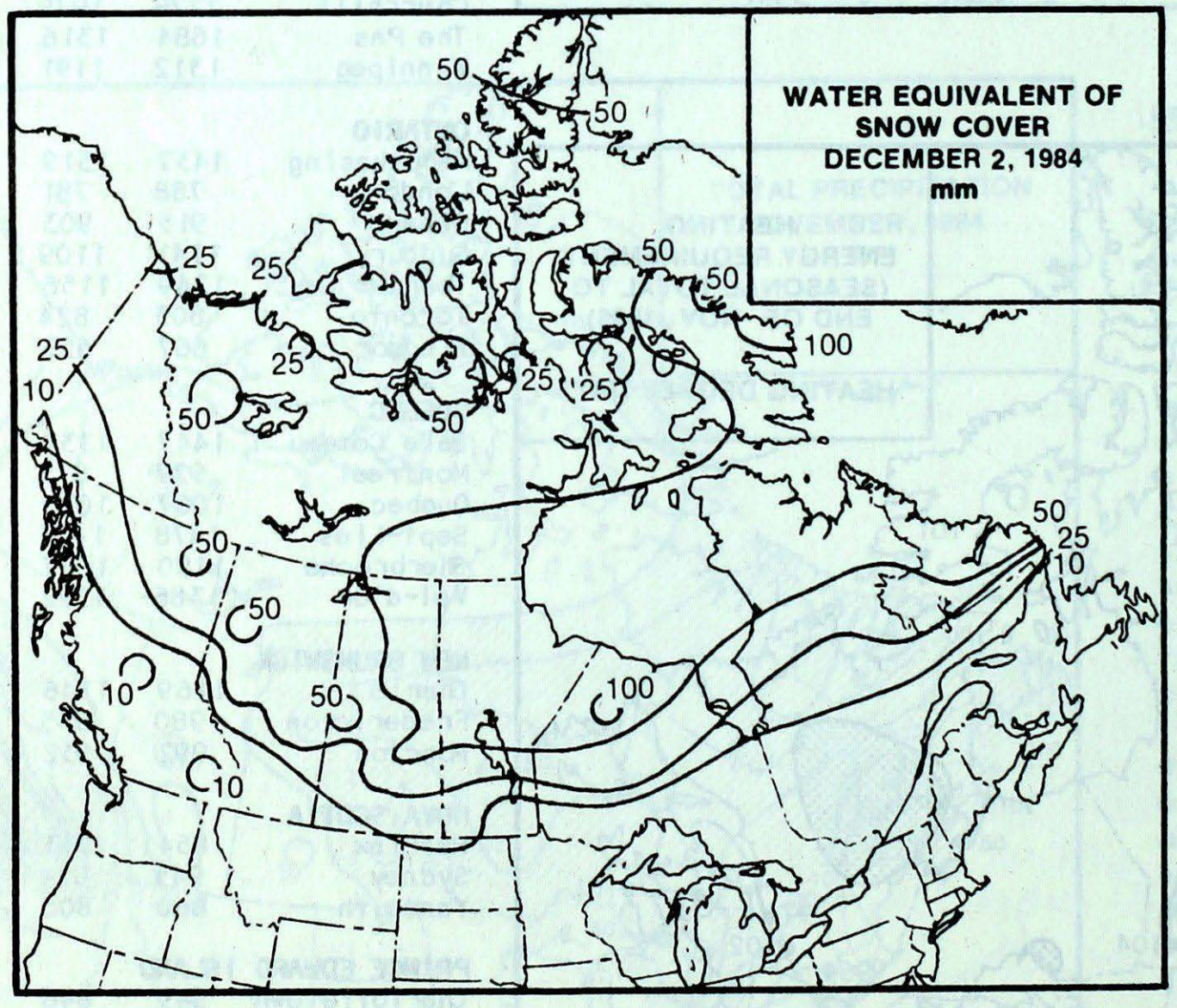


SEASONAL TOTAL OF HEATING DEGREE-DAYS TO END OF NOVEMBER

	1984	1983	NORMAL
BRITISH COLUMBIA			
Kamloops	1056	853	890
Penticton	980	844	833
Prince George	1711	1471	1451
Vancouver	832	780	783
Victoria	929	831	811
YUKON TERRITORY			
Whitehorse	2181	2095	1865
NORTHWEST TERRITORIES			
Frobisher Bay	2797	2861	2611
Inuvik	2995	2837	2690
Yellowknife	2252	1896	1996
ALBERTA			
Calgary	1619	1351	1316
Edmonton Mun.	1628	1333	1328
Grande Prairie	1988	1551	1506
SASKATCHEWAN			
Estevan	1381	1164	1179
Regina	1552	1279	1299
Saskatoon	1619	1306	1339
MANITOBA			
Brandon	1500	1254	1283
Churchill	2229	1979	2150
The Pas	1684	1316	1479
Winnipeg	1312	1191	1208
ONTARIO			
Kapuskasing	1437	1319	1405
London	788	781	795
Ottawa	915	903	906
Sudbury	1141	1109	1128
Thunder Bay	1249	1156	1240
Toronto	805	824	784
Windsor	667	655	666
QUÉBEC			
Baie Comeau	1447	1331	1363
Montréal	927	875	831
Quebec	1067	1039	1031
Sept-Iles	1478	1473	1436
Sherbrooke	1190	1097	1131
Val-d'Or	1386	1292	1342
NEW BRUNSWICK			
Charlo	1169	1146	1082
Fredericton	980	945	961
Moncton	992	932	946
NOVA SCOTIA			
Halifax	854	733	772
Sydney	945	874	864
Yarmouth	860	806	822
PRINCE EDWARD ISLAND			
Charlottetown	949	846	878
NEWFOUNDLAND			
Gander	1289	1175	1130
St. John's	1111	1123	1087

SNOWFALL





Snow Cover Water Equivalent

The amount of water which would result when snow is melted, measured in millimetres.

SEASONAL SNOWFALL TOTALS (CM) TO END OF NOVEMBER

	1984	1983	NORMAL
Whitehorse	43.2	29.0	45.2
Yellowknife	65.4	67.8	56.7
Prince George	65.3	15.4	50.0
Vancouver	2.2	0.0	2.8
Edmonton Nam.	66.7	19.7	26.5
Calgary	46.5	21.3	35.7
Regina	55.8	20.4	24.2
Winnipeg	29.8	19.7	27.3
Thunder Bay	11.8	38.9	33.1
Muskoka	19.5	54.6	43.5
Toronto	0.6	11.8	8.9
Windsor	11.0	7.6	11.6
Ottawa	6.0	58.6	25.5
Montréal	9.0	69.1	22.9
Québec	7.8	35.2	38.3
Fredericton	8.0	16.6	22.7
Shearwater	2.4	0.2	9.5
Charlottetown	17.4	5.3	24.2
Goose Bay	133.8	175.3	85.7
St. John's	13.3	19.1	25.6

December Snow

Historical: On December 11 and 12, 1944 a severe storm swept southeastern Canada. In the lower Great Lakes and St. Lawrence River valley of Ontario and Quebec wind and snow conditions were particularly bad. A total of 52 cm of snow fell in 24 hours at Toronto, 48.3 cm on the climatological day of December 11, paralyzing transportation in the city.

Usual: Christmas Snowfall

	Chance of a White Christmas (%)	Average Snow-depth (cm) on December 31
Vancouver	7	3.0
Edmonton	98	15.0
Calgary	65	7.0
Regina	93	17.0
Winnipeg	100	19.0
Toronto	56	6.0
Ottawa-Hull	82	18.0
Montreal	80	28.0
Quebec City	100	46.0
Halifax	50	Trace
St. John's	62	13.0

The Ice Season In the Southern Beaufort - 1984

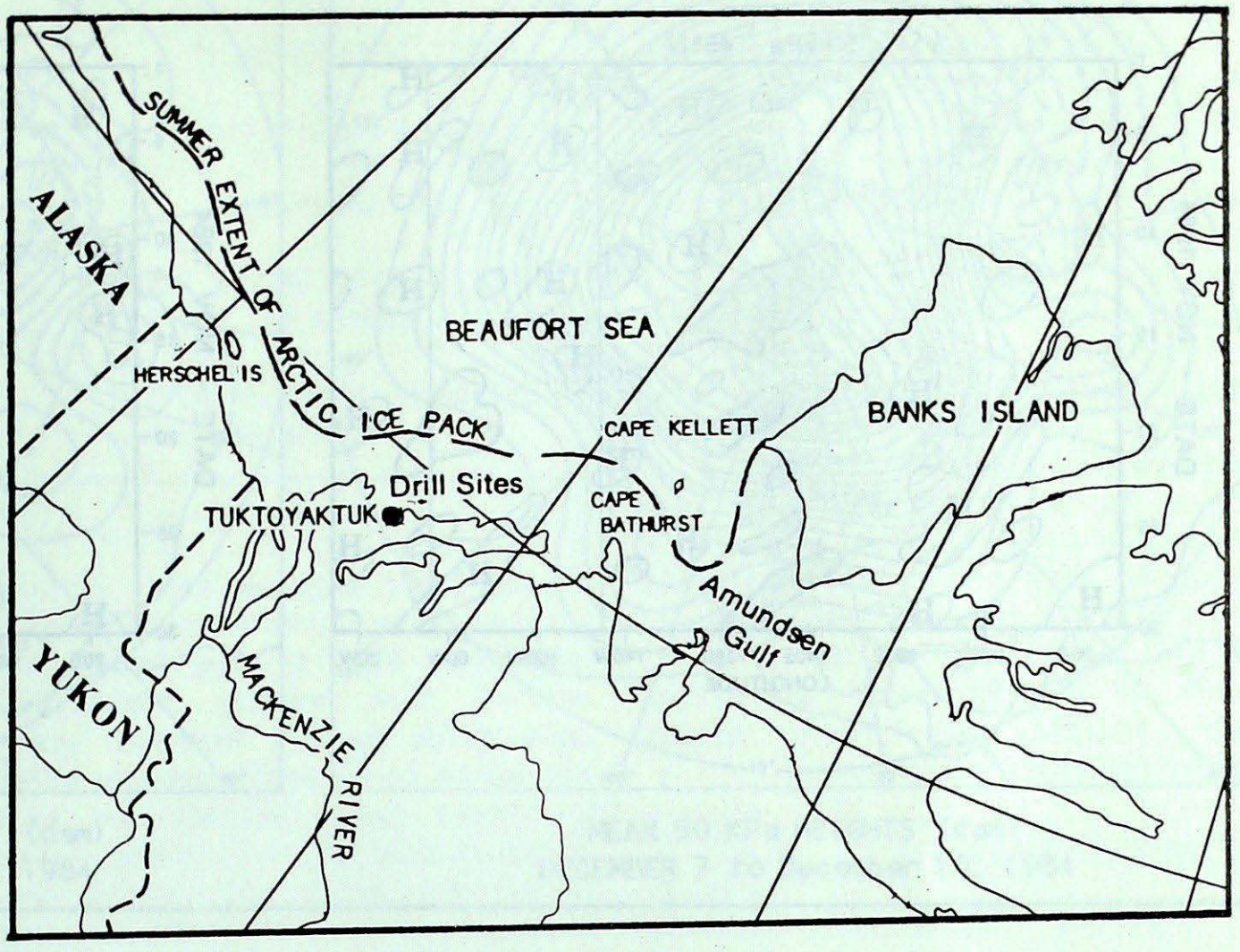
by

Bruce R. Ramsay
Ice Centre, Ottawa

The winter of 1983-84 across the southern Beaufort was relatively normal both in terms of weather and ice development. By May, freezing degree day accumulations at most locations were very close to mean values. The old ice boundary, located near 71 degrees north, was a little further south than normal, but the ice regime off the Tuktoyaktuk Peninsula and through the offshore drilling area was unexceptional. The ice in Amundsen Gulf had consolidated normally, with the edge being a concave arc running from Cape Kellet on Banks Island to the Baillie Islands off Cape Bathurst.

Mild temperatures in May, June and July brought an early break-up to this region. Temperatures during these three months averaged well above normal. The fast ice along the Tuktoyaktuk Peninsula had fractured completely by late June, while Amundsen Gulf and the Western Waterway fractured in early July. A good open water lead quickly established itself in early July all along the coast, east of Herschell Island. However, the north Alaskan Coast region did not share in this favourable weather and clearing of the coastal route around Point Barrow was quite slow. Supply vessel traffic in and out of Tuktoyaktuk Harbour was initiated early this year. Both Gulf and Dome Petroleum were able to move onsite at the southern drilling locations well before the end of June.

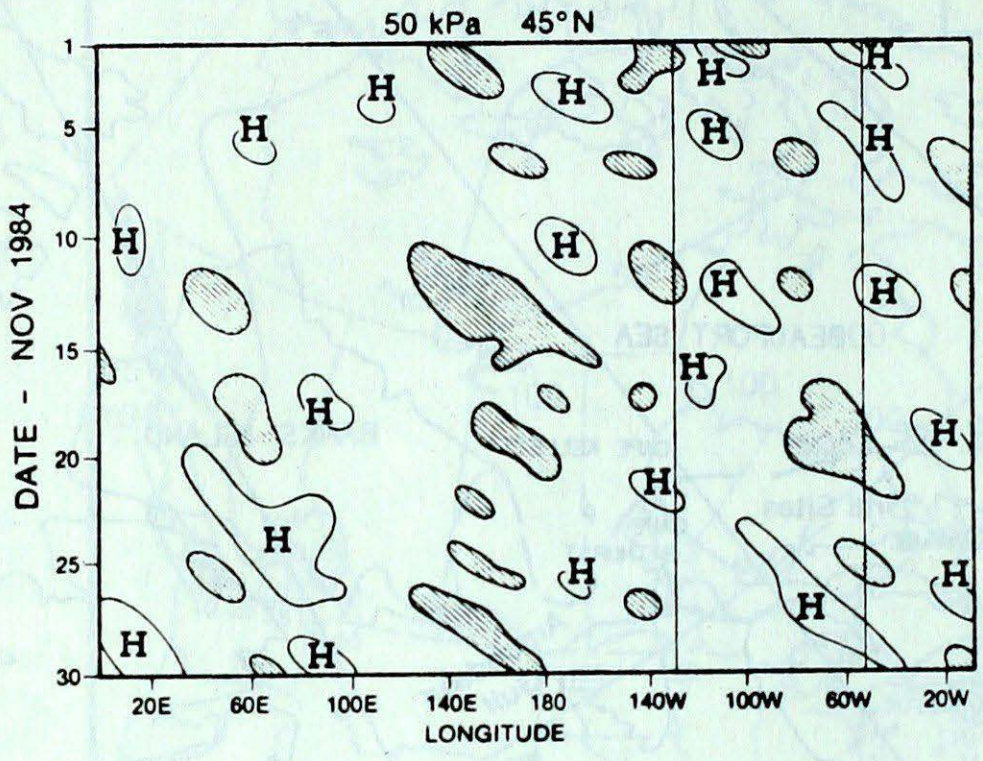
After an early break-up, temperatures across the southern Beaufort averaged near normal for the rest of the brief summer. However, unfavourable winds during the latter part of July and throughout August prevented complete clearing of the drilling area, and areas of 1st year and old ice continued to drift in the vicinity of the drill sites. Thus, the deployment of Dome's drillships to the more northerly drill sites was impeded,

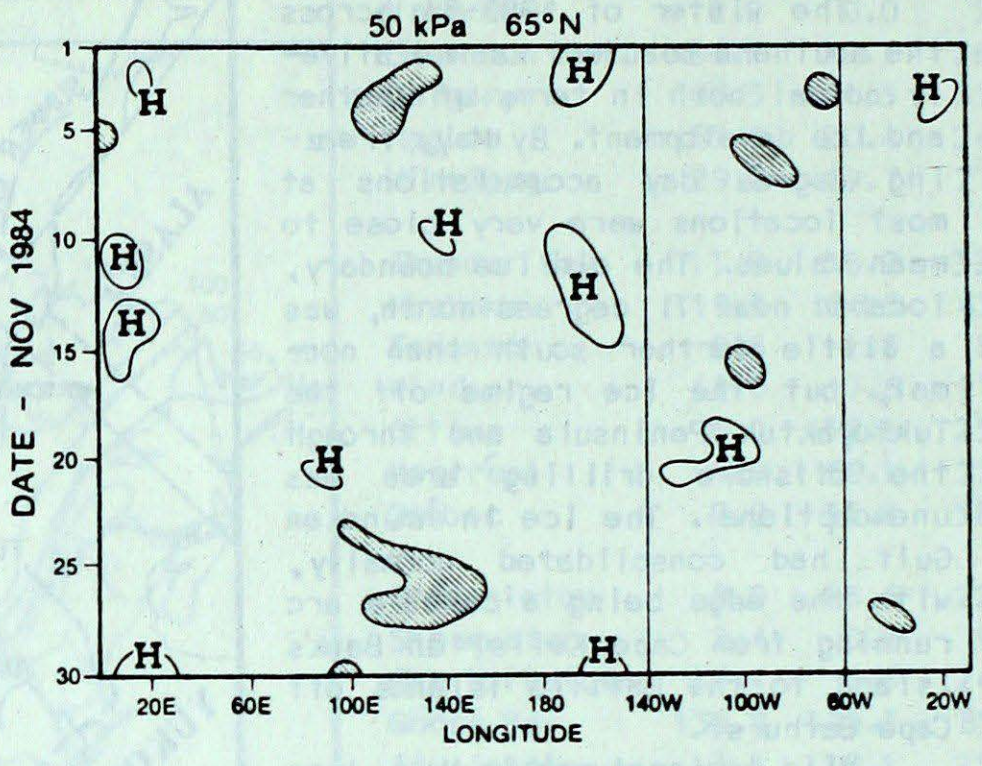


and it was not until July 30 that all four drillships were able to arrive on location. Throughout the season, frequent ice intrusions interrupted operations forcing the ships offsite. The Gulf rig "Kulluk", however, had a better season as it is capable of operating in heavier ice conditions than the drillships, and was deployed further south for much of the season. A consistent period of offshore winds finally occurred beginning in September, which completely cleared the drillsite areas at which time all four of Dome's drillships were able to move back onsite. Imperial Oil's operations within or near the landfast ice boundary were particularly wave - sensitive, but the southern intrusions of ice dampened wave action in these areas, and thus 1984 was a good season; in addition conditions overall were favourable for Imperial Oil's island and berm construction projects.

Even though September mean temperatures were above normal, oceanographic soundings taken throughout the month showed very low water heat content. This was because the waters had little opportunity to warm up due to the frequent intrusions of ice throughout the summer months. Thus initial freeze-up was just waiting for the first autumn cold snap, which occurred during the last few days of September when mean daily temperatures dropped well below freezing. By the first week of October, new ice growth was well under way in the vicinity of the drill sites about one to two weeks ahead of normal. A return to relatively mild temperatures in mid-October slowed ice development somewhat, but a cold snap during the last few days of the month accelerated ice growth again, and by the end of October, thin 1st year shore fast ice had developed along the Tuktoyaktuk coast. The early advent of freeze-up brought a halt to drillship operations and all ships were offsite and heading for winter anchorage by October 24.

Time-longitude (Hovmöller) diagrams of 50 kPa heights at latitudes 45°N and 65°N



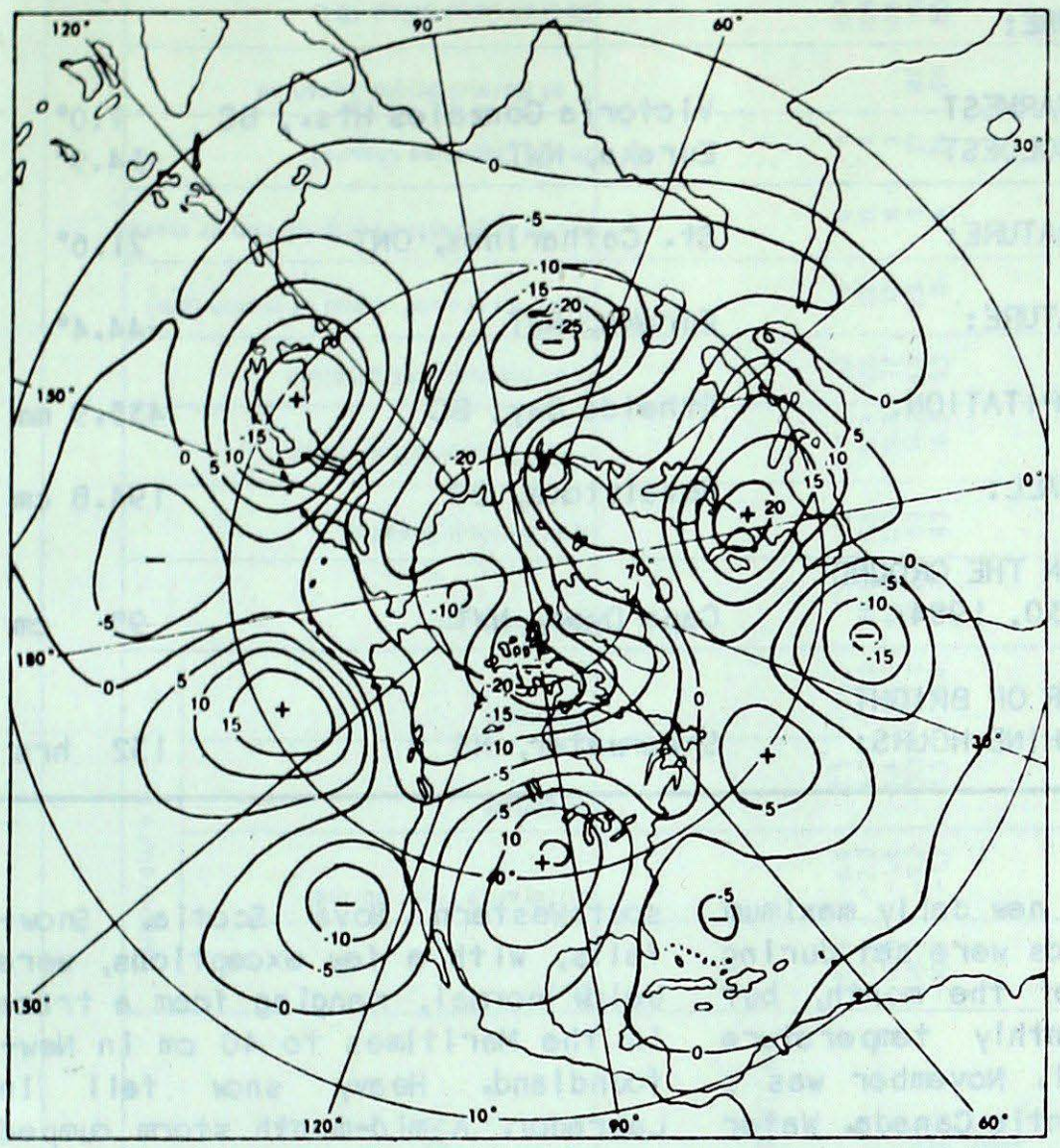


Hovmöller diagrams provide a convenient means for analyzing the time progression or regression of long waves in the atmosphere. The diagrams presented here for the month of November were obtained by averaging the heights of the 50 kPa pressure surface along each ten degrees of longitude around the hemisphere within the latitude parallels of 40°N to 50°N and 60°N to 70°N. The averaged values are plotted at the appropriate longitude each day and contours of height are drawn on the resulting diagrams, which are labelled 45°N and 65°N respectively for each latitude band. Only the maximum and minimum contours are shown here for the sake of simplicity. The vertical lines represent the approximate western and eastern boundary of Canada at the appropriate latitude of the diagram. Because distance versus time is plotted, then the slope of the troughs ("shaded") and ridges (labelled "H") represents their speed. A slope towards the east (or right hand side of the diagram) represent progression, while a slope towards the west is retrogression. Long waves govern the behaviour of atmospheric storm impluses with shorter wavelengths. Furthermore, longwaves, which may remain quasi-stationary at particular longitudes for considerable periods of time can lead to droughts in ridge regions or excessive precipitation in trough regions. From the climate monitoring (and to a limited extent climate prediction) point of view, these diagrams and their variations depict 50 kPa information in a very practical form.

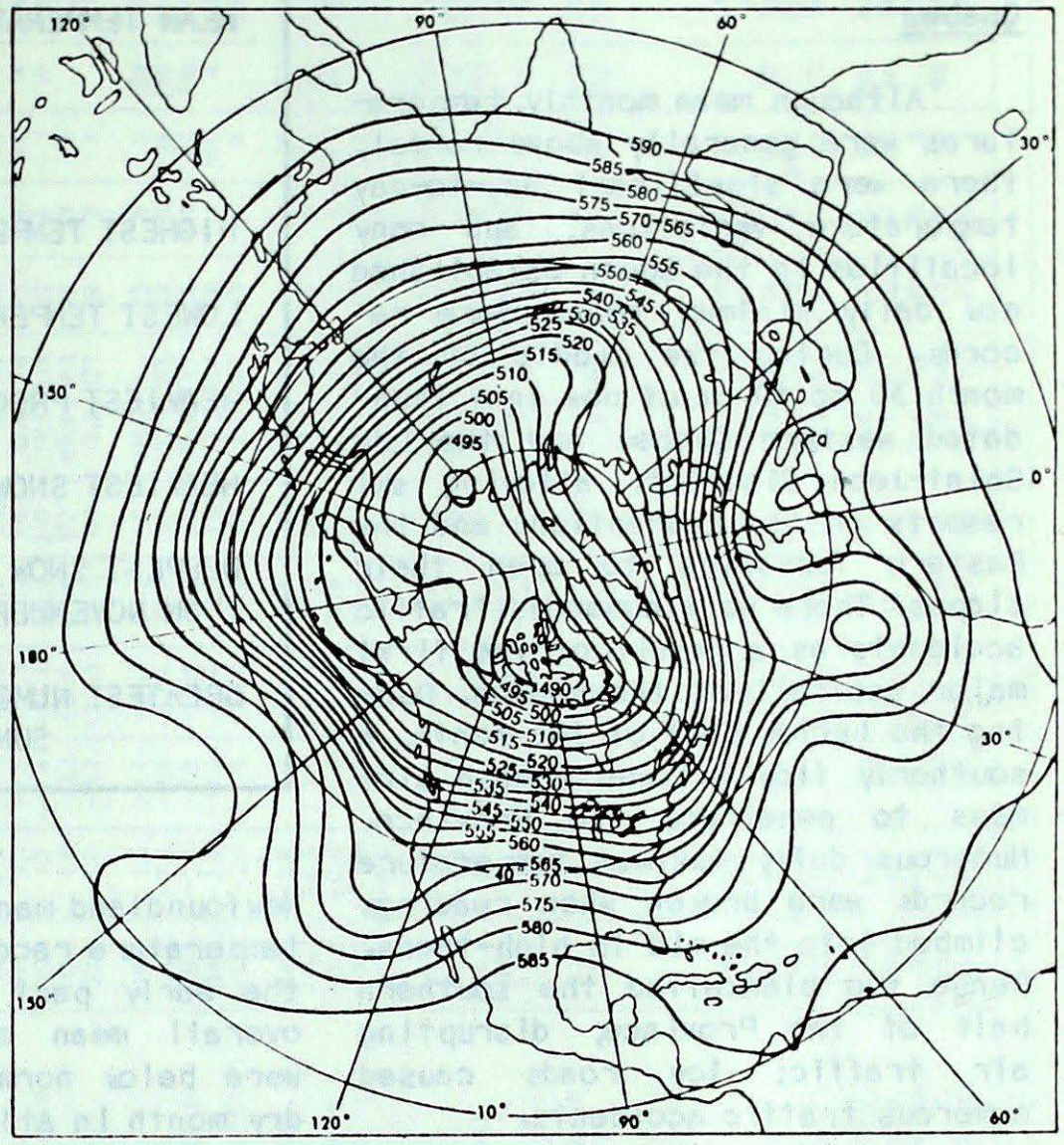
During November, at 45°N, the atmosphere reorganized itself from 5 waves around the hemisphere, to 4 waves during the last week, to 3 waves at month's end. A long-wave ridge prevailed over western Canada from November 1st to approximately the 22nd, and then progressed quickly eastwards to the Atlantic, by November 30th. A longwave trough at about 100°W progressed slowly across the country during the month. At 65°N, 3 waves were evident around the hemisphere at the beginning of the month, but reorganized into 2 waves about the 10th. The ridge at 20°E (Scandinavia) remained stationary throughout the month blocking the flow at this latitude band.

The climatological 50 kPa circulation for November shows a weak Atlantic ridge near 20°W with a more weakly defined European trough near 10°E. During November 1984, the atmospheric circulation maps on page 7B show the reorganization from 5 waves to a more wintry 4 wave pattern at 50°N latitude, a blocking trough-ridge couplet was positioned over the eastern Atlantic and Scandinavia. Over Canada the flow was more zonal than normal, with a very weak and broad trough over the eastern half of the country and a weaker than normal ridge over the west coast.

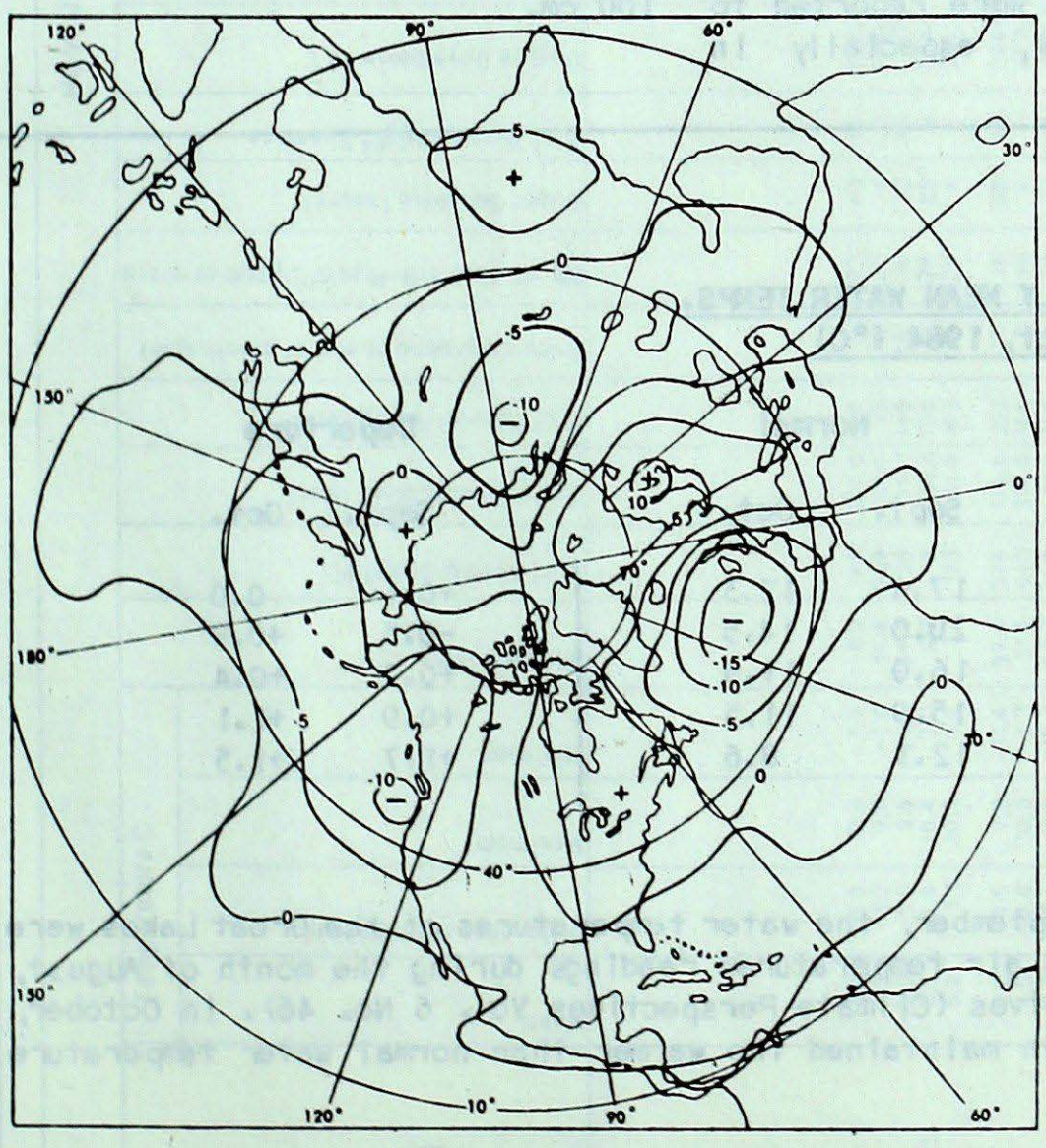
50 KPa ATMOSPHERIC CIRCULATION



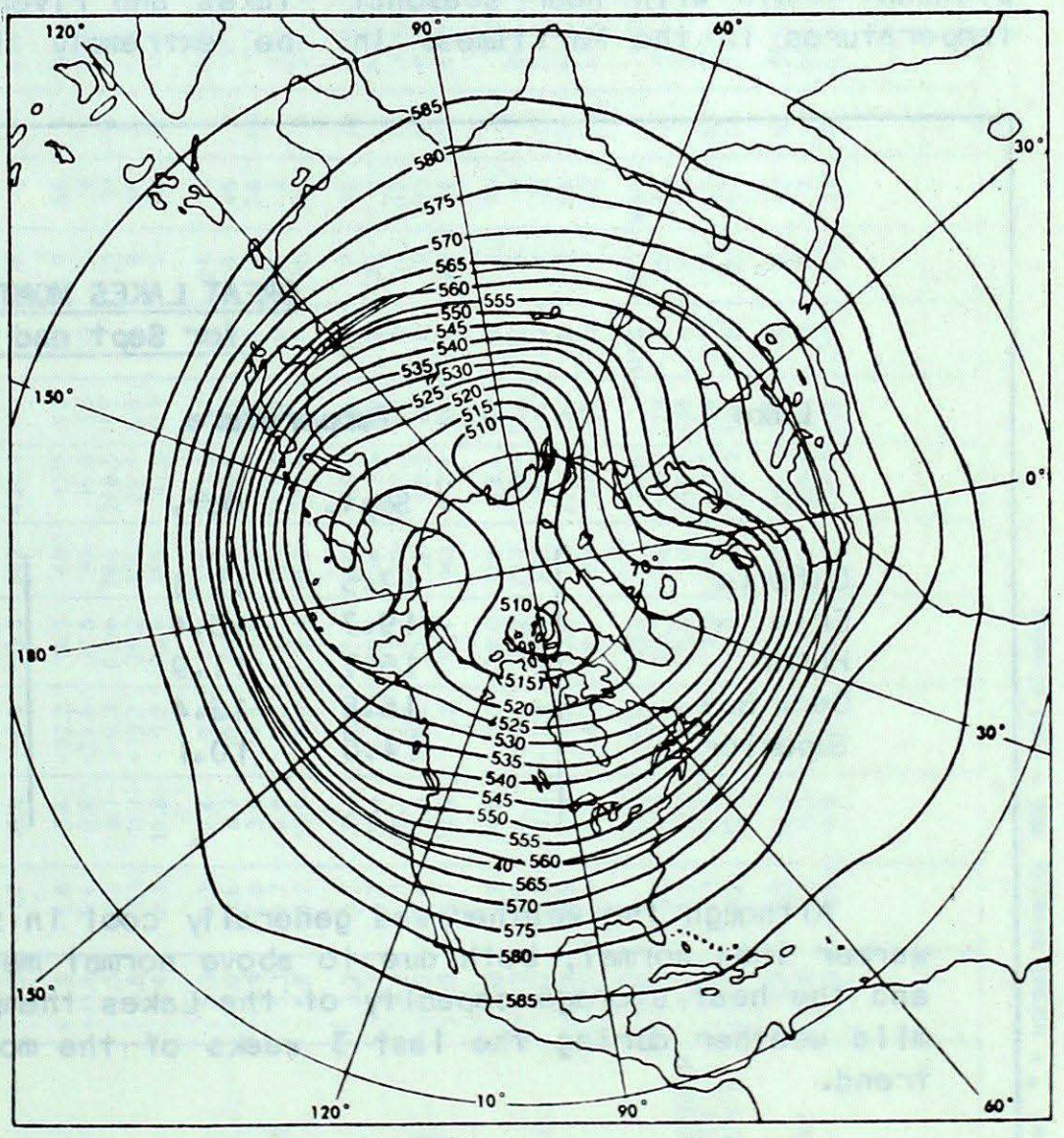
MEAN 50 KPa HEIGHT ANOMALY (dam)
DECEMBER 7 to December 10, 1984



MEAN 50 KPa HEIGHTS (dam)
DECEMBER 7 to December 10, 1984



MEAN 50 kPa HEIGHT ANOMALY (dam)
NOVEMBER, 1984



MEAN 50 kPa HEIGHTS (dam)
NOVEMBER, 1984

... (Cont'd from page 2B)

CLIMATIC EXTREMES - NOVEMBER 1984

MEAN TEMPERATURE:		
WARMEST	Victoria Gonzales Hts., BC	7.0°
COLDEST	Eureka, NWT	-34.9°
HIGHEST TEMPERATURE:	St. Catharines, ONT	21.6°
LOWEST TEMPERATURE:	Eureka, NWT	-44.4°
HEAVIEST PRECIPITATION:	Ethelda Bay, BC	435.9 mm
HEAVIEST SNOWFALL:	Revelstoke, BC	194.8 cm
DEEPEST SNOW ON THE GROUND ON NOVEMBER 30, 1984:	Cape Dyer, NWT	95 cm
GREATEST NUMBER OF BRIGHT SUNSHINE HOURS:	Shearwater, NS	132 hrs

Quebec

Although mean monthly temperatures were generally above normal, there were significant day-to-day temperature variations, and many localities in the South established new daily minimum temperature records. During the middle of the month 30 to 40 cm of new snow inundated western Quebec and the Lac Saint-Jean District, allowing ski resorts in the Laurentians and the Eastern Townships to open their slopes. There were numerous traffic accidents as a result of the first major snowfall of the season. During the latter part of the month, a southerly flow allowed a mild airmass to penetrate the Province. Numerous daily maximum temperature records were broken when readings climbed into the mid to high-teens. Dense fog blanketted the southern half of the Province, disrupting air traffic; icy roads caused numerous traffic accidents.

Atlantic Provinces

It was a sunny and relatively pleasant month with near seasonal temperatures in the Maritimes. In Newfoundland many new daily maximum temperature records were set during the early part of the month, but overall mean monthly temperature were below normal. November was a dry month in Atlantic Canada. Water shortages were evident in many areas of Nova Scotia and New Brunswick. Many wells and streams have dried up, and water levels in some lakes and rivers were reported to be extremely low, especially in southwestern Nova Scotia. Snowfalls, with a few exceptions, were below normal, ranging from a trace in the Maritimes to 40 cm in Newfoundland. Heavy snow fell in Labrador. A mid-month storm dumped more than 55 cm of snow in a two-day period, breaking daily snowfall records. In many cases total snowfall amounts for the month exceeded 100 cm.

GREAT LAKES MONTHLY MEAN WATER TEMPS. for Sept and Oct, 1984 (°C)

Lake	Temperature		Normal		Departure	
	Sept.	Oct.	Sept.	Oct.	Sept.	Oct.
Ontario	17.5	12.3	17.4	12.3	+0.1	0.0
Erie	19.7	15.4	20.0	14.5	-0.5	+0.9
Huron	16.7	11.9	16.0	11.5	+0.7	+0.4
Geo. Bay	16.8	12.4	15.9	11.3	+0.9	+1.1
Superior	14.0	10.1	12.3	8.6	+1.7	+1.5

Although the weather was generally cool in September, the water temperatures of the Great Lakes were warmer than normal, both due to above normal mean air temperatures readings during the month of August, and the heat storage capacity of the Lakes themselves (Climate Perspectives Vol. 6 No. 46). In October, mild weather during the last 3 weeks of the month maintained the warmer than normal water temperature trend.

NOVEMBER 1984

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
BRITISH COLUMBIA													
ABBOTSFORD	5.1	-0.5	12.0	-3.4	8.2	149	302.0	157	0	23	43	60	386.4
ALERT BAY	4.5	-1.2	9.6	-1.0	14.4	209	201.5	95	0	23	X		406.4
BLUE RIVER	-3.3	-1.0	5.5	-24.5	134.4	238	111.1	149	58	16	22	48	MSG
CAPE ST. JAMES	6.5	-0.4	10.4	2.0	0.2	5	194.1	104	0	26	85	*	344.5
CAPE SCOTT	5.8	-1.1	10.5	0.6	7.1	173	341.0	103	0	24	X		365.8
CASTLEGAR	1.2	-0.5	7.8	-11.4	97.4	324	179.6	222	27	16	38	66	506.5
COMOX	4.5	-0.8	10.8	-2.3	51.2	640	314.8	164	3	19	X		403.7
CRANBROOK	-1.9	-0.1	7.6	-16.2	57.3	245	61.7	186	19	10	72	*	596.1
DEASE LAKE	-12.6	-4.1	4.7	-29.2	24.9	72	14.8	51	15	6	66	109	919.4
ETHELDA BAY	3.5	-1.7	10.0	-4.0	35.0	343	435.9	110	0	18	X		436.4
FORT NELSON	-17.8	-5.8	5.4	-32.2	19.3	68	12.0	53	32	7	66	*	1076.6
FORT ST. JOHN	-11.6	-5.6	9.0	-28.6	27.5	89	16.6	53	10	5	X		890.2
HOPE	3.5	-1.2	8.7	-6.3	63.4	380	368.5	165	2	21	21	74	435.5
KAMLOOPS	0.5	-1.1	11.7	-13.7	26.2	226	28.4	129	4	9	54	77	523.9
KELOWNA	1.4	0.3	10.8	-11.2	20.4	159	41.8	173	2	9	56	97	498.3
LANGARA	5.3	-0.3	12.4	0.3	21.4	375	233.6	117	0	24	X		426.7
LYTTON	1.0	-1.6	8.7	-10.0	78.2	355	100.6	141	16	14	46	71	511.7
MACKENZIE	-5.9	-2.0	3.0	-24.5	38.6	78	36.0	59	10	12	24	49	713.7
MCINNES ISLAND	5.3	-0.7	9.8	0.6	8.0	133	283.8	92	0	25	X		381.4
MERRY ISLAND	6.8	-0.2	10.9	0.3	3.6	360	210.4	160	0	20	44	*	337.6
PENTICTON	3.2	0.2	11.1	-8.4	13.9	181	35.3	148	TR	7	46	78	443.5
PORT ALBERNI	3.7	-1.2	10.1	-2.0	38.2	304	403.5	140	0	22	11		443.5
PORT HARDY	4.2	-1.1	10.7	-2.0	13.2	330	217.7	89	0	23	40	65	414.2
PRINCE GEORGE	-4.5	-1.6	5.9	-25.4	52.3	132	48.3	96	8	12	35	55	675.2
PRINCE RUPERT	2.9	-0.9	10.3	-7.9	12.4	141	172.4	64	0	20	54	110	451.8
PRINCETON	0.8	1.7	9.0	-11.7	28.0	120	33.4	88	6	9	79	*	MSG
QUESNEL	-4.2	-2.4	6.3	-24.7	58.2	203	55.7	130	22	13	X		665.6
REVELSTOKE	0.2	-0.5	7.8	-12.8	194.8	381	181.9	214	42	17	21	51	536.7
SANDSPIT	4.9	-0.6	12.9	-1.3	2.0	37	230.3	127	0	18	86	134	403.3
SMITHERS	-4.7	-2.4	5.6	-16.2	38.4	100	38.1	65	6	9	32	70	679.9
STEWART	MSG		MSG	MSG	MSG		MSG		MSG	MSG	MSG		MSG
TERRACE	-1.1	-1.4	6.3	-9.8	28.3	58	141.2	78	2	15	40	71	571.9
VANCOUVER HARBOUR	6.6	-0.2	12.1	0.0	0.0	0	295.6	138	0	21	X		340.7
VANCOUVER INT'L	6.0	0.1	11.9	-2.7	2.2	79	237.2	158	0	21	45	66	358.9
VICTORIA GONZ. HTS	7.0	-0.2	12.0	1.1	0.0	0	130.3	136	0	14	62	74	329.0
VICTORIA INT'L	5.7	-0.3	12.3	-2.1	3.6	157	224.3	171	0	18	52	67	366.8
VICTORIA MARINE	6.5	-0.1	11.2	0.4	0.7	50	265.4	143	0	21	X		345.0
WILLIAMS LAKE	-4.5	-1.9	5.0	-19.2	48.7	157	37.9	120	24	12	56	76	676.4

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YUKON TERRITORY													
BURWASH	-12.6	-4.4	2.5	-36.7	1.9	12	1.9	12	3	0	X		1070.9
DAWSON	-17.5	-2.3	4.2	-38.2	39.6	155	27.6	128	22	11	X		1065.4
MAYO	-16.8	-1.6	-1.4	-36.3	43.8	172	18.8	77	17	9	X		1042.8
WATSON LAKE	-19.0	-5.2	-3.1	-38.0	19.6	53	14.2	45	23	3	37	86	1109.5
WHITEHORSE	-10.5	-1.7	1.5	-29.4	19.8	83	10.5	53	8	4	29	50	854.0
NORTHWEST TERRITORIES													
ALERT	-27.1	-0.5	-12.0	-39.5	4.6	53	4.6	55	46	1	NIL	*	1353.9
BAKER LAKE	-20.2	0.1	-2.5	-31.5	12.9	74	12.9	78	25	4	NIL	*	1144.8
CAMBRIDGE BAY	-22.1	1.7	-10.4	-36.8	18.9	210	17.5	227	22	6	1	10	1203.0
CAPE DYER	-12.9	1.8	-2.1	-31.4	117.4	172	96.6	163	95	13	X		928.7
CAPE PARRY	-22.4	-4.4	-6.7	-30.3	24.3	161	12.2	127	20	2	X		1213.0
CLYDE	-16.4	1.0	-1.7	-31.2	24.2	148	MSG		35	6	5	129	1033.1
COPPERMINE	-21.9	-2.2	-3.5	-33.4	29.0	192	22.1	155	18	8	26	216	1212.0
CORAL HARBOUR	-18.9	-1.4	-2.5	-29.6	15.6	86	15.6	87	25	1	62	110	1106.7
EUREKA	-34.9	-3.4	-19.2	-44.4	2.2	73	2.2	88	28	1	NIL	*	1588.5
FORT RELIANCE	-16.1	-2.1	2.6	-29.2	18.2	71	10.2	47	18	4	X		1023.2
FORT SIMPSON	-18.3	-2.6	1.8	-33.2	19.6	75	13.6	56	19	3	26	51	1087.6
FORT SMITH	-16.1	-4.5	3.7	-32.9	27.2	94	16.7	64	38	5	44	101	1023.0
FROBISHER BAY	-13.8	-0.8	-1.0	-26.5	26.4	72	22.0	64	13	6	45	98	952.7
HALL BEACH	-19.6	1.9	-2.4	-32.0	24.3	188	22.7	180	26	5	X		1132.5
HAY RIVER	-16.2	-4.9	5.7	-32.9	20.1	51	20.1	54	27	5	X		1025.9
INUVIK	-26.8	-6.1	-11.5	-37.1	7.6	34	4.4	25	12	1	14	78	1295.3
MOULD BAY	-26.8	-0.2	-16.1	-37.2	3.2	73	3.1	84	13	1	0	*	1343.6
NORMAN WELLS	-24.6	-6.4	-6.7	-37.1	13.1	62	11.2	54	12	4	32	100	1278.4
POND INLET	MSG		MSG	MSG	MSG		MSG		MSG	MSG	X		MSG
RESOLUTE	-23.0	1.5	-9.3	-33.1	4.4	72	3.7	65	12	1	0	0	MSG
SACHS HARBOUR	-23.7	-1.7	-10.1	-35.7	2.1	29	2.6	10	1	0	0	0	1249.6
YELLOWKNIFE	-17.0	-2.9	1.0	-35.6	31.0	103	21.4	87	19	5	64	152	1048.8
ALBERTA													
BANFF	-4.7	-0.8	6.0	-24.0	25.2	78	25.2	81	19	MSG	X		MSG
BROOKS	-7.5	-4.4	7.0	-28.5	17.0	136	13.8	93	5	MSG	X		MSG
CALGARY INT'L	-5.4	-2.7	11.7	-27.0	7.2	44	5.3	42	TR	2	114	92	702.4
COLD LAKE	-11.0	-4.8	3.7	-27.2	36.8	174	26.3	130	20	6	MSG		870.7
CORONATION	-10.1	-5.2	5.1	-26.9	19.2	121	14.0	93	14	4	92	71	842.1
EDMONTON INT'L	-9.9	-4.4	9.0	-28.5	15.7	87	12.5	75	20	5	86	84	837.7
EDMONTON MUN.	-8.5	-4.8	7.3	-24.2	18.1	117	17.4	111	20	7	101	94	794.5
EDMONTON NAMAO	-9.7	-4.8	8.3	-26.5	24.3	145	16.4	91	15	6	X		830.9
EDSON	-10.0	-4.8	8.9	-33.1	17.6	72	11.8	64	23	4	92	98	840.5
FORT CHIPEWYAN	-15.3	-5.2	8.0	-36.0	22.0	86	22.0	92	21	MSG	X		MSG

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NOVEMBER 1984

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FORT MCMURRAY	-12.2	-4.0	5.8	-31.0	31.7	109	19.8	79	16	6	83	100	911.8
GRANDE PRAIRIE	-12.5	-6.5	7.8	-29.5	32.2	87	22.6	81	23	6	77		916.4
HIGH LEVEL	-16.4	-5.7	8.3	-34.4	22.3	82	19.1	75	32	6	66	94	1026.6
JASPER	-5.7	-1.8	6.4	-26.0	24.0	98	20.0	68	8	8	65		710.7
LETHBRIDGE	-1.8	-1.0	11.3	-26.6	5.5	29	5.5	33	0	3	108	93	592.2
MEDICINE HAT	-3.9	-2.3	9.9	-26.6	10.4	74	11.0	75	TR	3	129	115	656.5
PEACE RIVER	-13.1	-5.0	3.8	-29.5	20.6	94	20.3	101	23	7	X		932.1
RED DEER	-8.8	-4.2	9.9	-28.4	8.3	55	6.7	44	1	2	X		803.9
ROCKY MTN HOUSE	-8.9	-5.3	12.7	-30.3	12.8	65	6.8	38	4	4	X		805.5
SLAVE LAKE	-11.3	-5.3	3.5	-27.6	31.1	150	19.0	91	24	7	83	84	878.7
SUFFIELD	-6.6	-4.3	6.7	-23.1	13.7	98	11.8	80	3	5	121	100	735.8
WHITECOURT	-9.6	-3.3	8.6	-30.2	35.8	163	24.9	106	13	7	X		825.9
SASKATCHEWAN													
BROADVIEW	-7.5	-2.0	5.2	-22.5	32.2	216	32.9	246	27	4	84	77	764.2
COLLINS BAY	-16.2	-3.7	2.1	-28.8	68.6	125	51.6	118	31	10	56	*	1026.7
CREE LAKE	-15.5	-5.1	1.6	-39.6	50.2	179	32.4	155	23	6	77	122	1005.9
ESTEVAN	-4.1	-0.5	10.0	-20.6	16.4	110	14.1	87	9	3	108	90	674.8
HUDSON BAY	-9.7	-2.6	7.0	-30.1	70.2	249	51.2	206	41	7	80	*	832.0
KINDERSLEY	-9.4	-4.2	4.9	-27.0	15.4	151	11.7	94	1	3	X		822.9
LA RONGE	-13.6	-5.7	2.8	-34.5	53.7	153	51.5	194	39	10	X		949.2
MEADOW LAKE	-11.6	-5.0	2.3	-15.1	21.8	116	21.2	99	17	5	80	*	890.1
MOOSE JAW	-5.2	-1.6	10.6	-21.6	14.9	80	14.2	85	4	4	100	91	694.9
NIPAWIN	-11.1	*	3.5	-28.1	33.5	*	25.8	*	29	8	70	71	873.0
NORTH BATTLEFORD	-9.8	-4.0	5.6	-25.3	28.9	211	23.3	163	15	6	X		835.7
PRINCE ALBERT	-11.3	-4.1	3.3	-29.2	28.3	163	27.2	160	20	7	85	100	877.9
REGINA	-6.5	-1.4	6.6	-22.4	11.0	77	9.1	67	6	3	94	91	736.9
SASKATOON	-8.6	-2.9	5.4	-25.3	20.6	158	18.8	126	10	4	X		797.3
SWIFT CURRENT	-5.2	-1.5	9.7	-25.3	10.2	68	10.2	65	5	3	92	83	680.5
URANIUM CITY	-15.8	-4.5	1.6	-33.4	68.7	157	38.9	135	44	11	X		1016.2
WYNYARD	-8.7	-3.0	6.3	-23.2	20.4	110	19.2	100	11	4	93	99	800.0
YORKTON	-8.3	-2.4	5.2	-22.4	40.5	208	40.3	200	32	5	87	97	790.9
MANITOBA													
BISSETT	-5.4	0.4	7.4	-21.8	4.2	13	23.5	70	TR	6	81	113	701.0
BRANDON	-6.4	-0.7	7.6	-21.5	21.1	127	28.6	158	13	5	X		735.6
CHURCHILL	-12.6	-0.5	1.2	-24.7	64.4	155	50.3	130	25	11	61	123	918.3
DAUPHIN	-7.7	-2.5	8.9	-25.2	51.8	216	58.0	230	35	5	95	102	771.7
GILLAM	-12.2	-0.1	1.2	-31.2	78.2	176	56.2	164	30	10	X		905.2
GIMLI	-5.7	-1.1	4.6	-20.1	14.4	50	36.4	122	5	5	112	118	709.2
ISLAND LAKE	-9.0	-0.6	6.8	-24.5	76.1	152	58.2	148	40	9	X		811.4
LYNN LAKE	-16.3	-4.0	0.8	-35.3	55.8	149	54.7	167	44	9	41	66	1027.4
NORWAY HOUSE	-10.0	*	3.6	-30.0	56.7	*	52.4	*	24	10	X		839.9
PILOT MOUND	-5.0	0.1	9.1	-21.3	11.3	59	37.5	174	8	4	X		691.1

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PORTAGE LA PRAIRIE	-5.3	-1.2	9.9	-19.2	21.8	190	36.5	124	12	4	X		699.0
THE PAS	-10.3	-2.8	4.7	-25.2	44.3	138	36.1	125	33	7	62	92	847.7
THOMPSON	-13.7	-1.8	0.4	-31.8	62.5	185	56.5	182	22	8	57	85	947.6
WINNIPEG INT'L	-4.9	-0.4	7.9	-20.5	10.2	47	26.6	106	5	5	111	122	586.5
ONTARIO													
ATIKOKAN	-3.7	0.9	11.8	-22.0	19.6	48	46.6	114	6	22	MSG		650.7
EARLTON	-1.6	0.9	13.2	-13.2	11.2	29	70.8	100	TR	9	X		587.1
GERALDTON	-4.2	1.3	8.0	-22.2	26.3	47	73.4	119	4	11	X		665.0
GORE BAY	2.0	0.1	12.4	-8.8	15.0	59	104.9	129	0	11	X		48.0
HAMILTON RBG	3.7	-0.8	21.2	-8.5	1.4	19	66.9	102	0	7	106	*	MSG
HAMILTON	3.3	-0.1	20.1	-8.7	3.2	28	76.7	112	0	8	X		441.5
KAPUSKASING	-3.2	1.2	9.7	-14.6	20.6	33	47.0	59	TR	14	X		636.7
KENORA	-4.2	0.4	10.2	-18.4	24.1	65	34.9	86	2	8	X		664.8
KINGSTON	3.2	-0.2	15.5	-11.0	1.9	13	80.4	96	0	14	112	144	444.4
LANSDOWNE HOUSE	-6.5	0.9	4.8	MSG	41.7	88	65.5	140	10	15	X		735.3
LONDON	3.4	0.3	18.3	-6.1	3.3	14	71.3	84	0	9	89	120	439.3
MOOSONEE	-3.6	0.9	8.8	-15.9	29.7	63	43.4	65	TR	11	25	49	648.0
MOUNT FOREST	1.2	-0.4	17.4	-11.4	7.0	19	105.4	110	0	9	83	142	505.1
MUSKOKA	1.3	0.2	17.2	-14.6	19.5	48	119.7	119	0	13	X		503.2
NORTH BAY	0.7	1.7	15.9	-14.3	16.4	48	120.9	140	0	11	52	80	559.8
OTTAWA INT'L	1.6	0.4	18.6	-10.4	6.0	26	72.2	93	0	12	100	*	492.3
PETAWAWA	0.2	0.3	17.2	-15.8	9.8	52	66.7	101	0	8	X		532.8
PETERBOROUGH	1.6	-0.5	18.0	-11.9	6.4	40	76.6	110	0	10	X		493.6
PICKLE LAKE	-6.8	0.8	6.0	-18.4	54.4	112	63.2	129	15	10	X		742.8
RED LAKE	-5.7	0.1	6.5	18.6	14.0	42	39.9	100	1	9	71	*	710.3
ST. CATHARINES	4.6	-0.1	21.6	-6.2	2.5	30	43.9	70	0	9	X		403.5
SARNIA	4.1	-0.1	18.4	-7.9	4.3	27	112.6	145	0	9	94	102	415.6
SAULT STE. MARIE	0.9	0.2	11.7	-13.8	28.9	70	93.3	109	1	15	MSG		513.6
SIMCOE	3.4	-0.2	20.0	-9.5	3.4	21	78.0	99	0	11	X		437.2
SIOUX LOOKOUT	-4.4	0.9	9.5	-21.5	19.6	43	51.1	102	2	10	X		672.4
SUDBURY	0.6	1.8	13.3	-13.7	9.8	31	89.3	115	0	22	MSG		555.8
THUNDER BAY	-2.1	0.5	10.3	-15.4	4.0	13	32.1	61	TR	5	100	115	595.7
TIMMINS	-2.8	1.0	10.8	-15.8	28.0	46	68.7	87	2	9	X		620.1
TORONTO	4.8	-0.1	18.2	-6.1	0.2	3	69.8	102	0	7	MSG		395.4
TORONTO INT'L	2.7	-0.6	20.9	-9.6	0.6	7	69.9	111	0	7	X		458.3
TORONTO ISLAND	4.8	0.2	18.0	-6.2	0.4	7	66.6	104	0	7	X		395.2
TRENTON	2.3	-0.9	17.8	-10.2	1.8	14	75.0	87	0	9	X		470.5
TROUT LAKE	-8.7	0.3	3.8	-23.9	104.2	*	95.1	231	90	13	38	*	800.9
WATERLOO-WELL	2.1	-0.5	19.5	-9.5	24.0	168	76.0	105	0	8	X		478.7
WAWA	-1.0	*	-16.8	MSG	11.9	*	67.7	*	2	11	X		568.2
WIARTON	3.5	0.6	18.8	-7.5	43.0	109	110.3	116	0	12	62	102	445.1
WINDSOR	3.9	-0.5	18.6	-7.5	11.0	96	70.3	108	0	8	X		421.0

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QUEBEC													
BAGOTVILLE	-1.7	0.3	13.6	-14.8	49.6	105	117.7	160	6	14	X		591.0
BAIE COMEAU	-1.3	0.5	7.6	-15.2	17.8	50	117.2	146	TR	10	87	*	579.3
BLANC SABLON	-2.2	-1.8	8.4	-14.1	23.2	64	49.8	51	13	11	78	*	574.9
CHIBOUGAMAU	-4.0	1.4	9.0	-23.9	38.3	72	84.4	110	TR	14	34	68	660.6
KUUJJUAQ	-7.5	0.8	2.7	-20.4	59.5	166	64.8	162	34	7	29	56	764.0
GASPE	0.4	0.6	15.0	-13.2	12.0	39	57.2	68	0	8	100	*	528.2
INUKJUAK	-8.0	-0.8	1.5	-26.6	57.2	151	48.4	122	34	13	41	147	780.7
LA GRANDE RIVIERE	-5.3	*	4.9	-16.0	70.4	*	75.5	*	8	16	38	*	697.4
MANIWAKI	0.2	0.5	16.4	-13.4	10.0	39	80.4	109	TR	11	74	113	535.1
MATAGAMI	-2.9	2.3	9.8	-13.4	41.7	99	64.8	101	1	14	26	57	628.6
MONT JOLI	0.2	0.5	12.0	-10.4	22.9	65	135.5	182	0	13	83	109	536.2
MONTREAL INT'L	2.2	0.2	15.9	-11.3	9.0	42	87.7	108	TR	10	82	96	474.1
MONTREAL M INT'L	1.2	*	17.6	-12.5	5.0	*	90.6	*	TR	9	83	*	503.1
NATASHQUAN	-1.8	-0.7	7.8	-14.9	12.6	39	88.0	76	0	10	97	114	592.1
NITCHEQUON	-7.1	1.2	6.2	-23.2	49.9	99	46.0	73	3	15	32	94	753.2
KUUJJUARAPIK	-4.2	0.7	5.1	-19.5	60.8	116	86.2	141	6	19	25	66	664.5
QUEBEC	0.5	0.7	14.3	-13.4	7.8	23	113.2	117	TR	14	88	118	525.1
ROBERVAL	-1.1	1.1	12.5	-17.7	78.1	164	128.8	172	1	10	7	*	569.0
STE AGATHE DES MONTS	0.7	2.2	12.6	-15.8	15.8	38	105.0	104	TR	14	66	94	559.1
ST HUBERT	1.9	0.1	15.5	-11.0	10.9	45	89.2	100	0	11	X		480.2
SCHEFFERVILLE	-8.4	0.6	5.4	-22.6	41.3	68	36.8	59	10	13	36	*	771.4
SEPT-ILES	-2.0	0.5	7.8	-14.9	29.0	57	108.8	109	2	11	85	91	599.7
SHERBROOKE	1.6	1.2	15.8	-17.6	26.4	72	83.1	92	TR	12	87	*	549.2
VAL D'OR	-2.8	0.6	12.0	-19.5	57.9	121	114.2	144	TR	16	38	65	624.5
NEW BRUNSWICK													
CHARLO	0.2	0.5	12.9	-12.2	15.7	42	66.3	79	0	12	90	96	534.5
CHATHAM	1.9	1.0	16.2	-9.5	3.6	14	46.6	46	0	10	119	120	484.1
FREDERICTON	2.5	1.1	16.8	-10.8	8.0	39	41.3	39	0	8	130	*	463.8
MONCTON	2.6	0.6	17.3	-9.4	8.1	37	38.1	35	0	7	118	122	463.8
SAINT JOHN	3.4	1.1	15.5	-8.3	4.2	49	48.0	33	0	6	128	132	439.3

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NOVA SCOTIA													
EDDY POINT	3.8	-0.5	15.1	-7.0	17.2	147	92.6	63	0	15	111	112	426.8
GREENWOOD	0.4	-3.5	0.2	MSG	0.8	5	0.3	0	0	1	X		0.4
HALIFAX INT'L	4.0	0.6	17.5	-6.5	4.2	35	36.7	24	0	7	X		428.3
SABLE ISLAND	6.6	-0.7	16.5	-1.2	0.0	0	110.9	81	0	14	84	119	342.2
SHEARWATER	4.6	0.0	16.2	-5.6	2.4	31	38.3	27	0	8	132	122	400.8
SYDNEY	3.5	-0.3	15.4	-7.3	13.4	112	109.7	68	0	14	94	126	434.0
TRURO	2.8	-0.1	19.2	-8.6	6.6	51	36.6	31	0	9	86	102	457.4
YARMOUTH	5.5	0.3	18.0	-5.4	2.4	38	38.8	29	0	12	121	136	375.1
PRINCE EDWARD ISLAND													
CHARLOTTETOWN	3.0	0.1	17.8	-7.1	17.2	80	60.0	50	0	10	X		450.5
SUMMERSIDE	3.2	0.2	16.0	-6.3	9.5	56	54.9	55	0	11	85	89	442.6
NEWFOUNDLAND													
ARGENTIA	3.7	-1.3	13.7	-5.3	2.0	62	74.2	70	NIL	9	X		431.1
BATTLE HARBOUR	-2.2	-1.6	9.0	-15.2	20.5	*	85.3	137	5	13	X		595.2
BONAVISTA	2.8	-0.6	15.0	-5.1	10.0	89	75.4	78	0	14	X		457.4
BURGEO	2.7	-0.5	11.3	-6.8	4.0	34	96.0	54	0	12	83	105	465.2
CARTWRIGHT	-2.5	-0.7	6.3	-13.2	102.4	221	113.3	142	35	15	71	102	615.3
CHURCHILL FALLS	-6.9	1.0	5.6	-22.1	86.7	122	79.0	101	32	16	48	93	748.2
COMFORT COVE	0.8	-1.1	19.4	-9.3	32.0	96	72.9	68	10	12	X		484.1
DANIEL'S HARBOUR	1.0	-0.8	14.6	-9.0	30.0	115	98.8	96	0	14	55	111	510.0
DEER LAKE	1.0	0.0	15.2	-12.9	13.0	37	94.7	88	0	12	X		511.0
GANDER INT'L	1.0	-0.8	18.0	-7.9	37.8	119	73.6	69	10	14	95	143	511.3
GOOSE	-3.8	0.0	8.3	-20.1	117.9	207	117.0	156	15	14	71	107	652.6
HOPEDALE	MSG		MSG	MSG	MSG		MSG		MSG	MSG	X		MSG
PORT-AUX-BASQUES	2.9	-0.3	10.5	-5.7	17.0	149	129.6	83	0	14	26	*	452.9
ST ANTHONY	-2.1	-1.2	8.4	11.1	21.2	46	61.0	53	1	10	X		602.6
ST JOHN'S	2.8	-0.6	17.8	-6.2	10.7	50	100.6	62	0	14	99	144	455.6
ST LAWRENCE	3.1	-0.5	12.1	-6.0	8.0	89	78.7	54	0	13	X		437.3
STEPHENVILLE	2.5	-0.4	15.7	-6.8	30.1	123	147.4	120	0	16	44	81	465.3
WABUSH LAKE	-6.7	1.4	5.5	-22.3	89.2	131	73.8	96	6	12	MSG		739.9

X = Not observed * = normal missing MSG = data missing

NOVEMBER 1984 NOVEMBRE

STATION	Temperature °C Température °C: Mean Moyenne	Difference from Normal Ecart à la normale	Maximum Maximale	Minimum Minimale	Snowfall (cm) Chute de neige (cm)	Total Precipitation (mm) Précipitation totale (mm)	% of Normal Precipitation % de précipitation normale	Snow on ground at end of month (cm) Neige au sol à la fin du mois (cm)	No. of days with Precip. 1.0 or more (mm) Nombre de jours de préc. 1.0 ou plus (mm)	Bright sunshine (hours) Durée de l'insolation (heures)	Degree Days above 5°C Degrés-jours au-dessus de 5°C: This Month Présent mois	Since Jan. 1st Depuis le 1er janv.	Mean Dew Point °C Point de rosée moyen °C
AGROCLIMATOLOGICAL STATIONS AGROCLIMATOLOGIQUES													
BRITISH COLUMBIA COLOMBIE-BRITANNIQUE													
Agassiz	4.9	-1.1	12.5	-8.0	20.0	308.2	146	0	22	50	23.0	2042.5	
Summerland	2.8	0.3	10.0	-9.5	15.8	37.0	146	2	8	71	8.5	1971.5	
ALBERTA													
Beaverlodge	-10.2	-5.1	8.0	-30.5	28.0	28.0	104	15	10	79	0.0	1146.7	
Ellerslie	-10.4	-5.5	9.0	-30.5	17.5	13.0	79	15	4	87	0.0	1370.2	
Lacombe	-8,4	-4.0	8.0	-28.0	10.0	6.7	48	3	3	73	0.0	1287.5	
Lethbridge													
Vauxhall													
Vegreville	-10.8	-4.7	5.5	-31.0	14.0	14.0	96	16	7		0.0	1368.6	
SASKATCHEWAN													
Indian Head	-7.1	-2.0	7.5	-22.0	21.0	21.0	123	14	5		0.0	1701.0	
Melfort	-10.2	-3.3	4.0	-24.0	19.2	19.2	102	34	4		0.0	1604.5	
Regina	-7.6	-1.9	7.0	-24.5	5.2	14.4	107	4	2		0.0	1562.0	
Saskatoon	-8.6	-3.1	5.0	-24.0	19.2	19.2	120	5	5	87	0.0	1782.0	
Scott													
Swift Current South	-4.8	-0.9	9.5	-25.0	11.0	12.8	98	8	4	99	0.0	1734.2	
MANITOBA													
Brandon	-6.3	-1.3	11.5	-21.6	24.6	28.9	145	15	4	99	0.0	1731.8	
Glenlea	-5.0	-0.1	9.5	-20.0	8.4	23.8	98	2	6	114	0.0	1799.8	
Morden	-4.6	-1.1	11.0	-18.5	6.0	23.0	90	5	2	96	0.0	2006.3	
ONTARIO													
Delhi	2.9	-0.8	20.0	-10.0	1.0	76.0	92	0	9	96	29.5	2160.8	
Elora	1.5	-0.4	18.7	-10.2	0.8	80.6	123	0	8		17.3	1842.2	
Guelph	2.0	-0.5	19.5	-11.0	0.2	63.5	85	0	9	89	23.0	1939.2	
Harrow	3.2	-1.3	18.0	-8.0	3.4	69.3	103	0	10	119	42.6	2465.6	
Kapuskasing													
Ottawa	1.9	0.3	18.5	-10.4	2.5	73.8	100	0	10	97	14.7	2105.5	
Smithfield	2.9	-0.1	17.0	-9.5	2.5	85.3	97	0	8		23.3	2061.5	
Vineland Station	4.8	-0.3	21.7	-5.9	0.2	48.2	73	0	7	96	45.2	2251.8	
Woodslee													
QUEBEC													
La Pocatiere	0.8	0.4	13.5	-10.0	7.0	105.6	135	0	11	99	2.8	1588.3	
L'Assomption	1.4	0.3	15.5	-12.5	3.6	84.6	102	0	11	68	11.6	1945.0	
Normandin	-3.2	-0.3	11.5	-23.5	36.4	44.8	76	1	10	70	0.0	1392.7	
Ste. Clothilde													
NOVA SCOTIA NOUVELLE-ECOSSE													
Kentville													
Nappan													
PRINCE EDWARD ISLAND ILE-DU-PRINCE-EDOUARD													
Charlottetown													
NEWFOUNDLAND TERRE-NEUVE													
St. John's West	2.6	-0.9	19.5	-6.5	3.0	84.1	50	0	15	101	27.4	1407.3	