

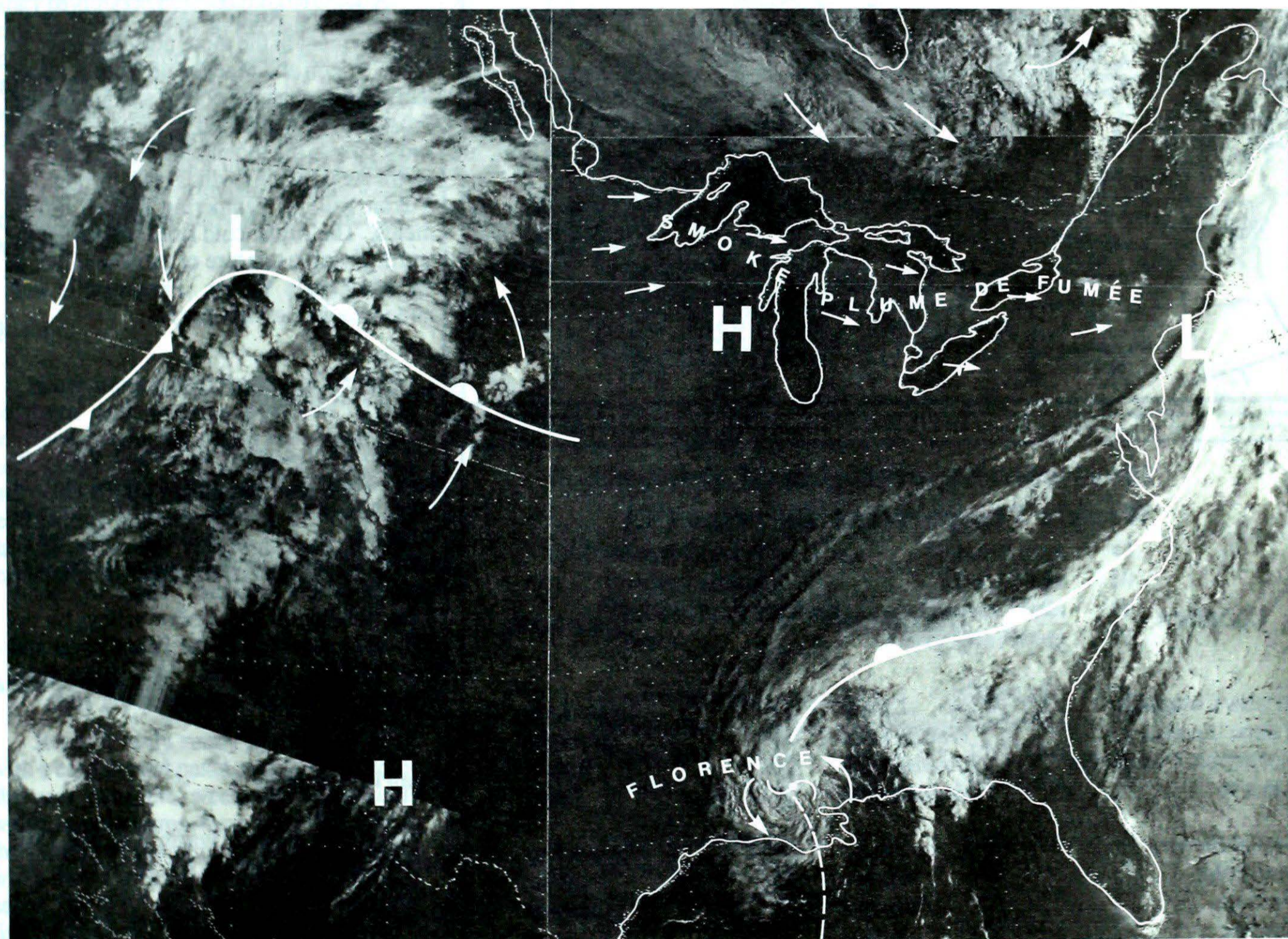


Climatic Perspectives

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September 6 to 12, 1988

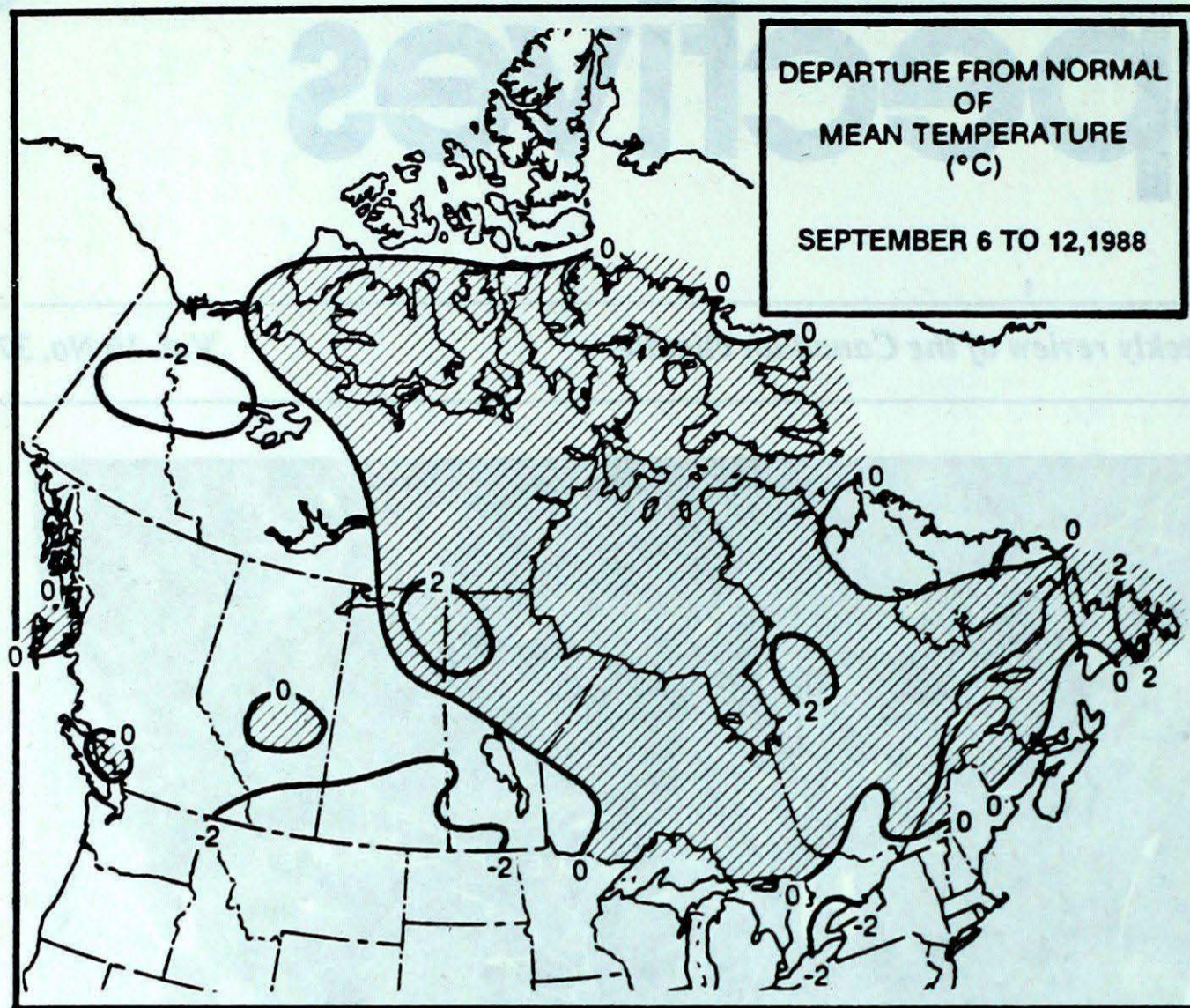
A weekly review of the Canadian climate

Vol. 10 No. 37



This NOAA 10 satellite photo of September 10, 1988, shows the remnants of hurricane Florence affecting the southern Gulf States. Further to the north, an elongated band of smoke, the result of major forest fires burning in the American northwest, can be seen (a slightly lighter grey shading) drifting over the Great Lakes. Also evident is the storm which brought snow to the higher elevations of the Rockies, and much needed moisture to the fire ravaged mountain states.

- **First autumn snow - the Alberta foothills**
- **Forest fire smoke drifts across the Great Lakes**



ACROSS THE COUNTRY . .

Yukon and Northwest Territories

Vigorous low pressure disturbances crossed the northern half of the country, producing windy conditions. Small craft warnings were issued for Great Slave Lake. Gale warnings were posted for the western Arctic. Typical autumn weather affected the Territories, with low stratus ceilings and fog along the Arctic coast. Winter is already evident in the more northern regions. In the Yukon and Mackenzie Valley, all the leaves have changed colour and are falling. Frost has been reported in most areas, and snow covers the mountains above the 1600 metre level. Strong winds blew through the Yukon valleys, hampering aircraft movements. The Arctic cold front sagged southward, giving a mixture of snow and rain to the Mackenzie Valley. Freeze-up is well underway in the high Arctic.

British Columbia

Weather conditions varied from one location to the next. For the most part the weather was pleasant, with varying amounts of sun and cloud, but heavy showers were associated with approaching troughs of low pressure. There was some local flooding in the interior valleys on the 9th. Wet snow fell in the Peace River and Fort Nelson Districts. A killing frost covered the central interior on the 10th.

Prairie Provinces

After a record warm Labour Day weekend much cooler air infiltrated the province. For the most part the week was cool with varying amounts of cloud and precipitation. Frost covered parts of central and northern Alberta over the weekend. Heavy snow covered the higher elevations of the foothills on the 19th. A mixture of rain and snow was reported in southern Alberta.

In the two eastern provinces, near thirty degree maximum temperatures dropped to the teens by the middle of the week. Two disturbances gave substantial precipitation, with amounts as high as 65 mm in southern Manitoba and 33 mm in northern Saskatchewan. There was frost in Saskatchewan.

Weekly Temperature Extreme (°C)

| Location | Maximum | Minimum |
|--|---------|-----------------|
| British Columbia Lytton | 31 | Dease Lake -3 |
| Yukon Territory Watson Lake | 19 | Burwash -9 |
| Northwest Territories Ennadai Lake | 20 | Eureka -12 |
| Alberta Medicine Hat | 34 | Jasper -3 |
| Saskatchewan Elbow | 34 | Hudson Bay -2 |
| Manitoba Gretna | 28 | Dauphin 0 |
| Ontario Windsor | 28 | Moosonee -1 |
| Quebec Gaspe | 26 | Chevery -1 |
| | | Val D'or |
| New Brunswick Chatham | 26 | St Stephen 2 |
| Nova Scotia Greenwood | 24 | Truro 3 |
| Prince Edward Island Summerside | 23 | Charlottetown 6 |
| Newfoundland Badger | 24 | Badger 1 |

Across The Country...

Warmest Mean Temperature Windsor (ONT) 18
 Coolest Mean Temperature Eureka (NWT) -6

(Period: 88.09.06/88.09.12)

Ontario

On September 10 and 11, considerable high level smoke, the result of huge forest fires burning in the northwestern U.S, was pushed eastward by the jet stream. The smoke became quite noticeable over southern and central Ontario during the weekend, causing hazy sunshine. At least two commercial jetliners had to make emergency landings at Pearson International Airport, when the aircraft air exchange systems pumped smoke into the cabin at flight altitudes of between 5 and 10 thousand metres, alarming passengers and setting off cockpit smoke sensors. Weatherwise, it was a pleasantly cool autumn-like week, with a fair amount of sunshine interspersed between scattered showers and thunder-showers.

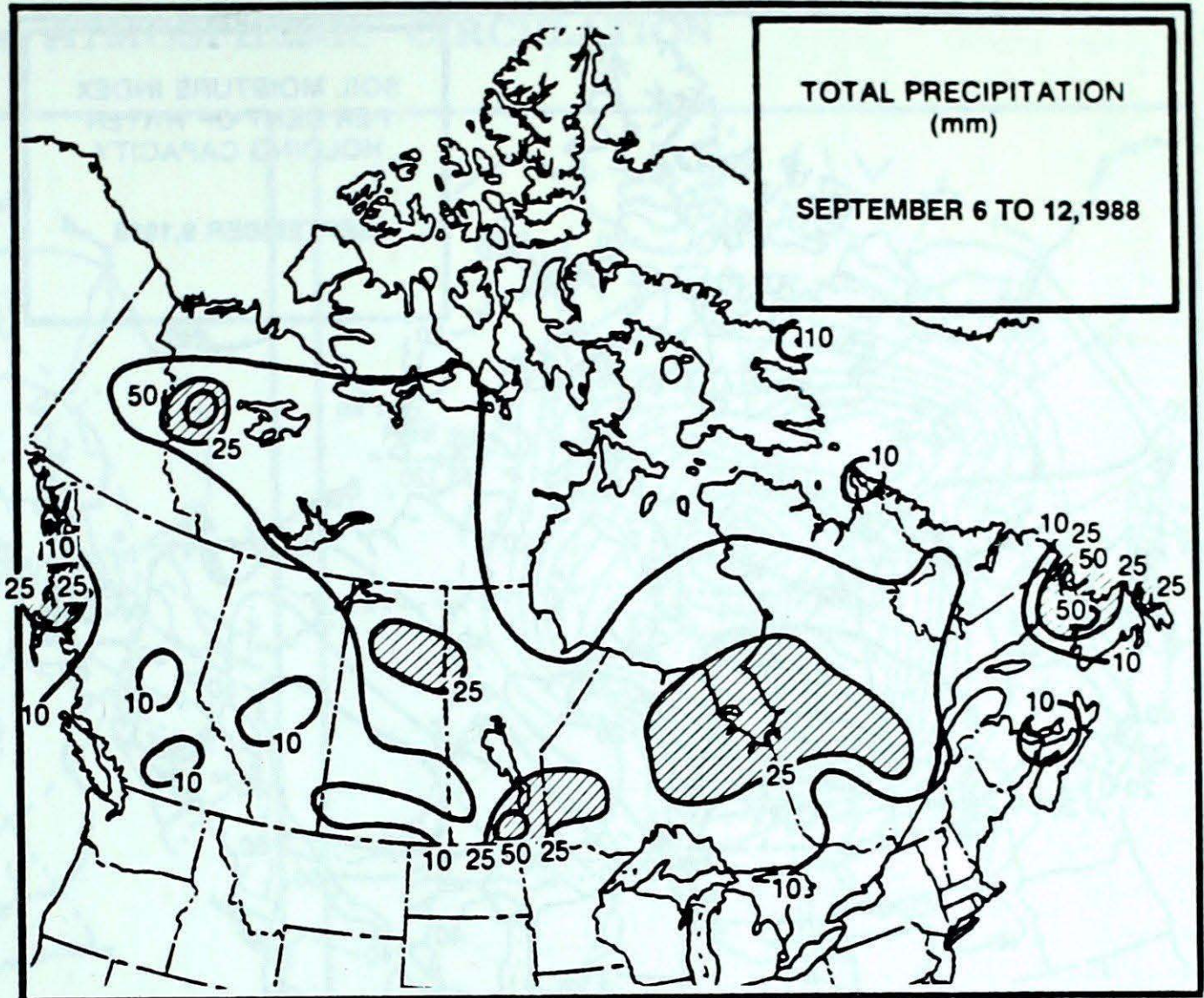
Quebec

Slow moving disturbances affected the northern and western portions of the province, producing strong winds and significant rainfalls. Elsewhere, it was sunny and cool, with a number of new daily low temperature records during the first two days of the week. Temperatures gradually moderated towards the end of the period.

Atlantic Canada

It was mainly sunny in the Maritimes, with a cold frontal passage setting off some showers over the weekend. Unusually warm temperatures were recorded during the middle of the period. Strong westerly winds swept across the Gulf of St. Lawrence early Tuesday morning, capsizing three fishing boats with the loss of lives.

Strong westerlies affected Newfoundland for most of the period, producing a mixture of sun, cloud and occasional showers. A strengthening storm, approaching the Island during the weekend, gave 20 to 40 millimetres of rain and temperature readings in the twenties. In Labrador, a few showers early in the week gave way to periods of rain and scattered thunder-showers Saturday, as a deepening low moved across the south. In it's wake strong northwesterly winds were reported along the coast. Near freezing temperatures were registered in the more northern locations.

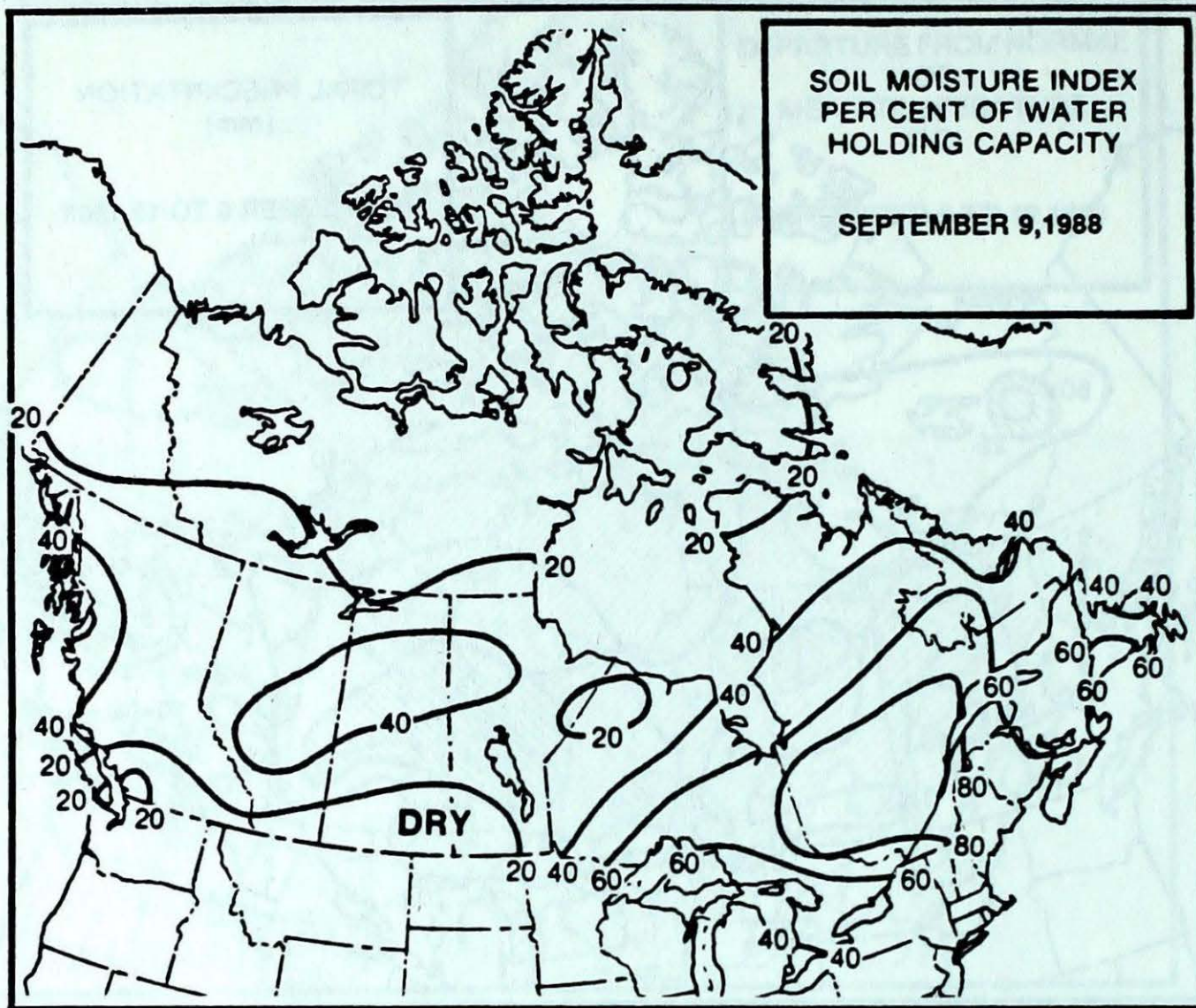


Heaviest Weekly Precipitation (mm)

| | | |
|---------------------------------|--------------------|----|
| British Columbia | Prince Rupert | 43 |
| Yukon Territory | Drury Creek | 28 |
| Northwest Territories | Norman Wells | 68 |
| Alberta | Rocky Mtn House | 46 |
| | | |
| Saskatchewan | Cree Lake | 35 |
| Manitoba | Portage La Prairie | 65 |
| Ontario | Red Lake | 39 |
| Quebec | Bagotville | 33 |
| | | |
| New Brunswick | Saint John | 8 |
| Nova Scotia | Inverness | 11 |
| Prince Edward Island | East Point | 35 |
| Newfoundland | St Anthony | 82 |

Front cover - Hurricane Florence

Florence reached hurricane strength prior to landfall on Friday, September 9, becoming the first Atlantic hurricane of the season. Although not a major storm, it did sport winds of 140 km/h near and to the right of the centre, which moved inland near New Orleans during the night. The central pressure dropped to 98.7 kPa or 29.15 inches. Heavy rains of 125 to 250 millimetres affected Louisiana, southern Mississippi and Alabama and the Florida panhandle. Storm surge tides of one to two metres hit the coastal areas to the east of the centre. At the same time as this storm was pounding the Gulf coast, weather forecasters were already keeping an eye on another tropical depression, which had formed southwest of the Canary Islands.



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Managing Editor P.R. Scholefield
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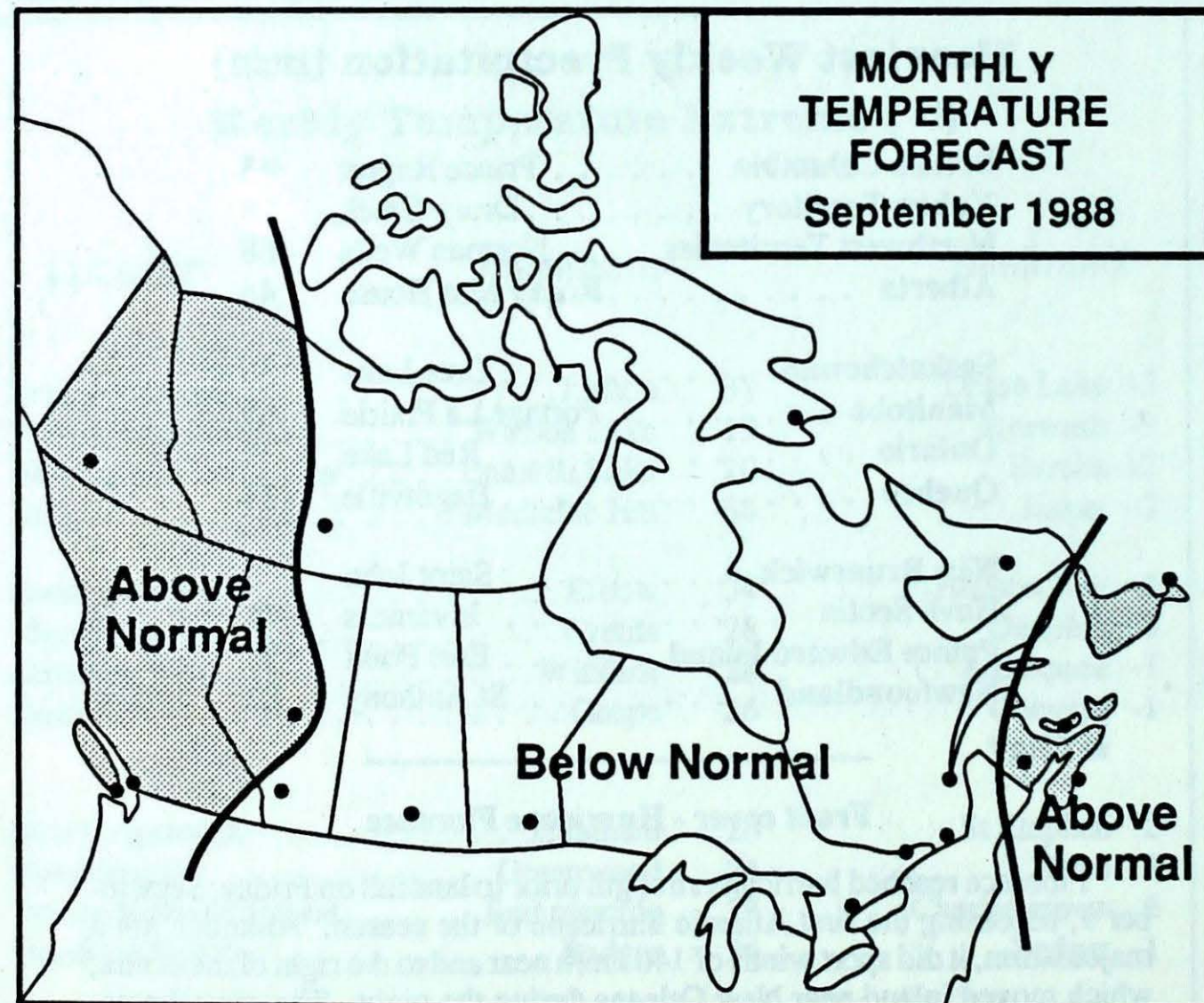
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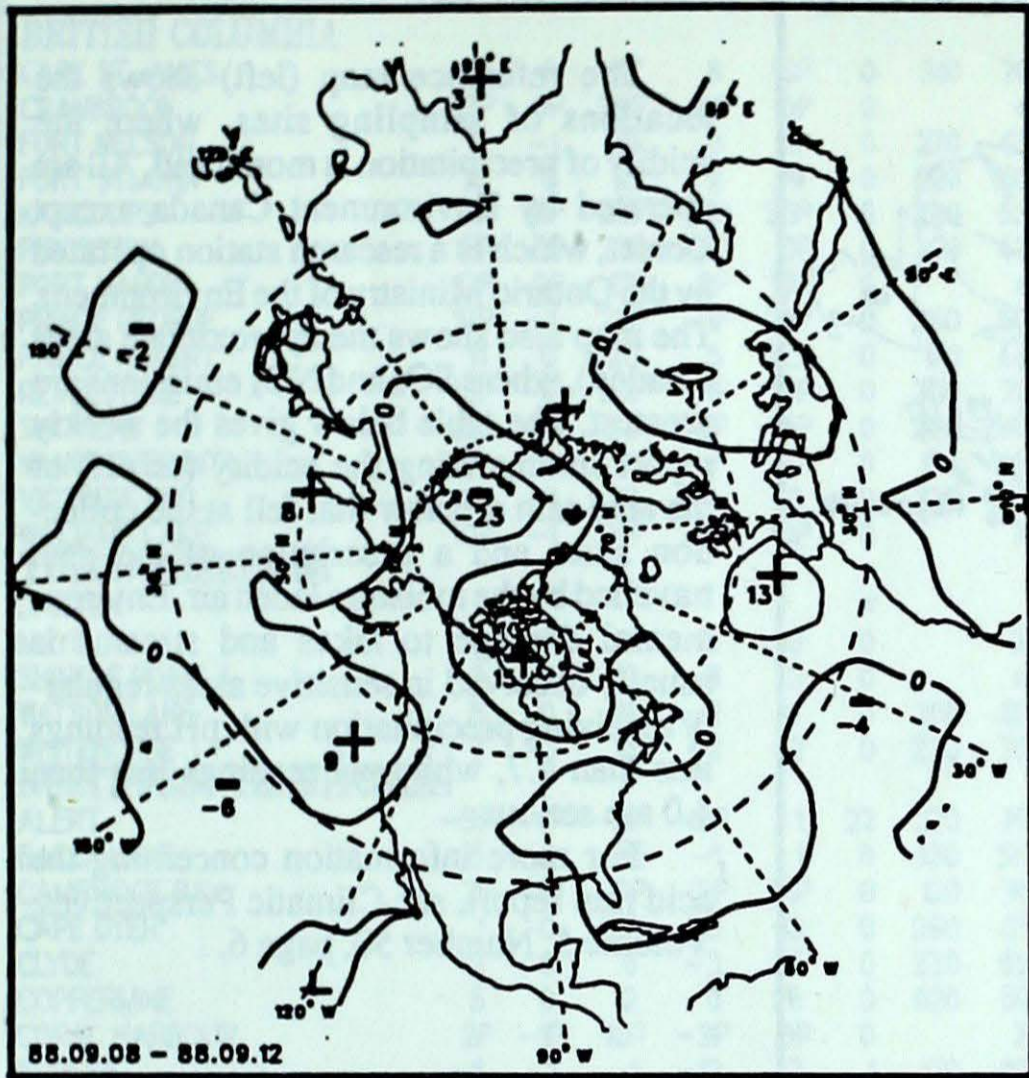
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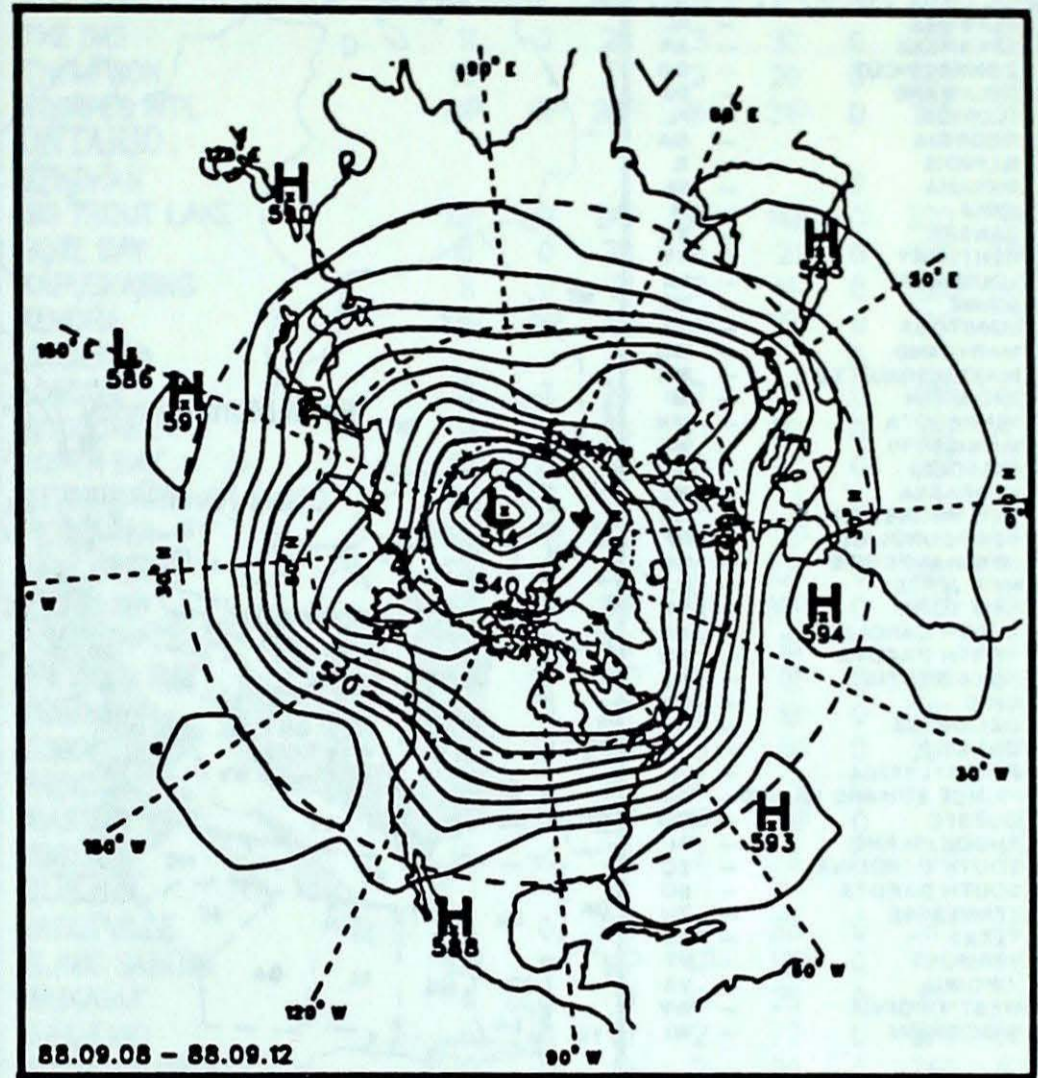
Normal temperatures for the month of September, °C

| | | | | | |
|-------------|----|----------|----|---------------|----|
| Whitehorse | 8 | Edmonton | 10 | Quebec | 13 |
| Yellowknife | 7 | Regina | 12 | Fredericton | 13 |
| Iqaluit | 2 | Winnipeg | 12 | Halifax | 15 |
| Vancouver | 14 | Toronto | 16 | Charlottetown | 14 |
| Victoria | 14 | Ottawa | 14 | Goose Bay | 9 |
| Calgary | 11 | Montreal | 15 | St. John's | 12 |

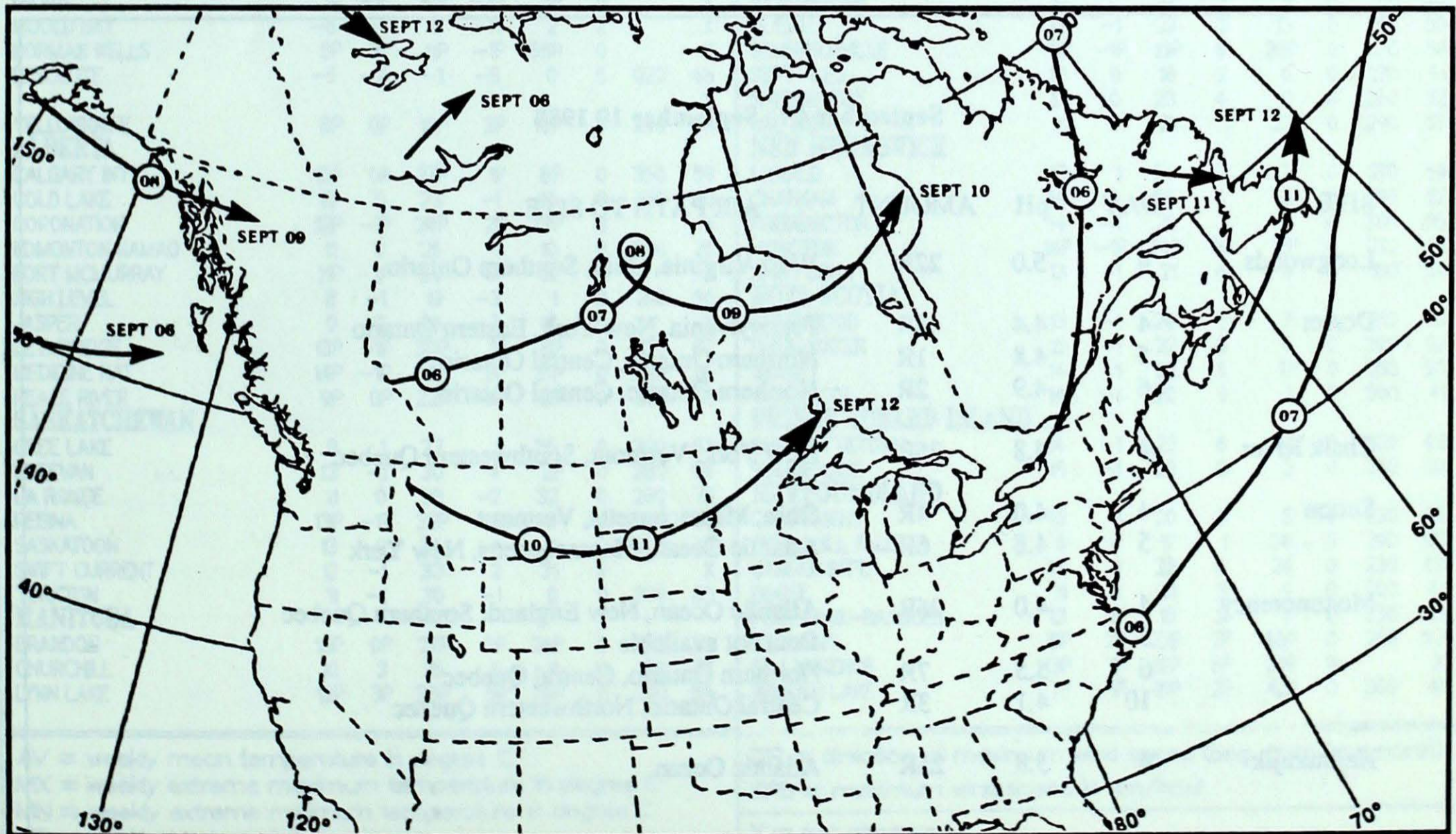
50 kPa ATMOSPHERIC CIRCULATION



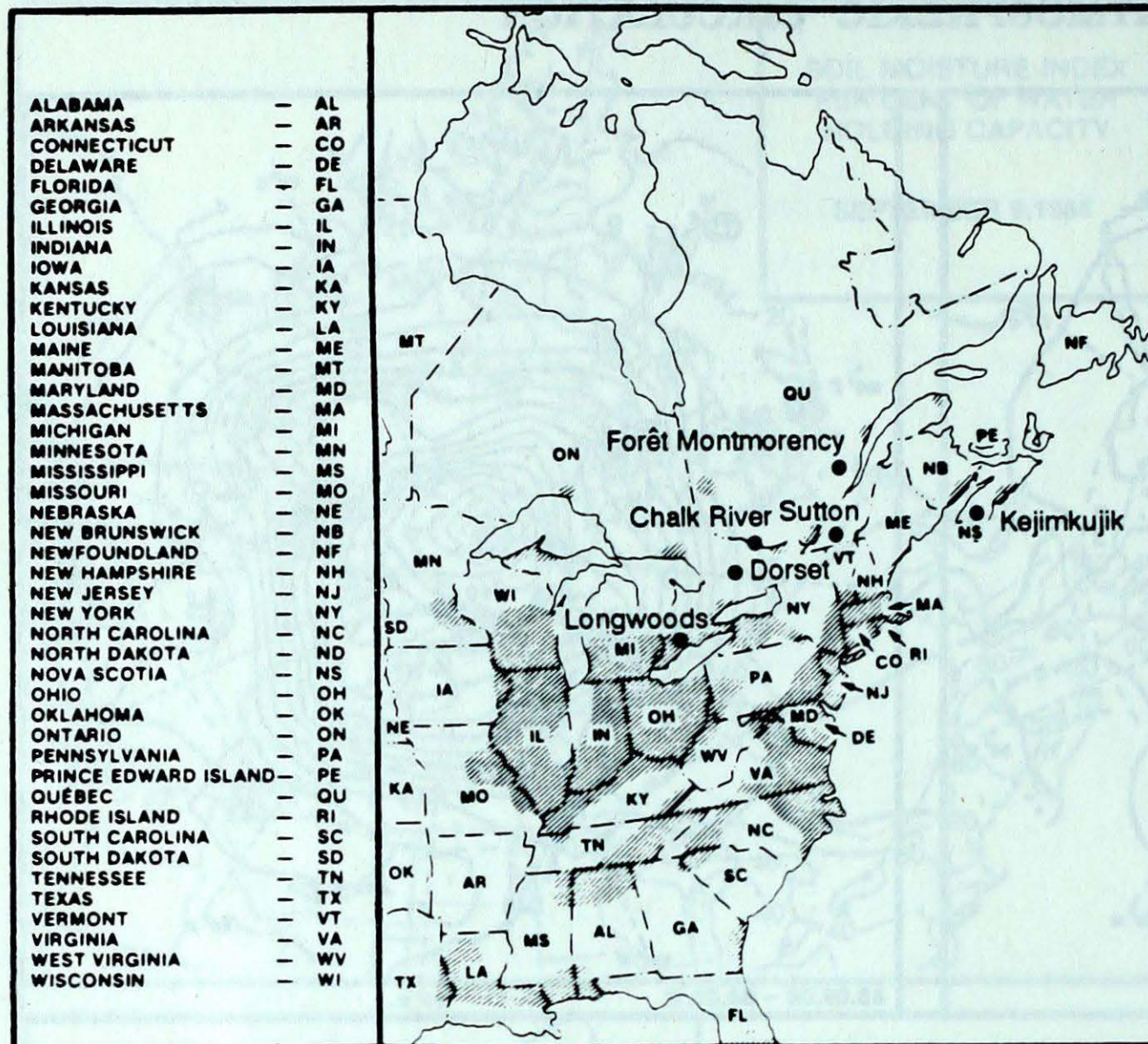
Mean geopotential height anomaly
50 kPa level (10 decameter intervals)



Mean geopotential height
50 kPa level (10 decameter intervals)



Storm track - Position of storm at 12 GMT during the period: September 6 to 12, 1988



ACID RAIN REPORT

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 SO₂ 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.

For more information concerning the acid rain report, see Climatic Perspectives, Volume 5, Number 50, page 6.

September 4 to September 10 1988

| SITE | DAY | pH | AMOUNT | AIR PATH TO SITE |
|-------------|-----|-----|--------|--|
| Longwoods | 4 | 5.0 | 22R | West Virginia, Ohio, Southern Ontario |
| Dorset | 4 | 4.4 | 18R | Pennsylvania, New York, Eastern Ontario |
| | 5 | 4.8 | 1R | Northern Ontario, Central Ontario |
| | 6 | 4.9 | 2R | Northern Ontario, Central Ontario |
| Chalk River | 4 | 4.8 | 25R | New York, Vermont, Southwestern Quebec |
| | 5 | 4.0 | 4R | Ohio, Massachusetts, Vermont |
| Sutton | 4 | 4.0 | 4R | Ohio, Massachusetts, Vermont |
| | 5 | 4.8 | 6R | Atlantic Ocean, Massachusetts, New York |
| | 6 | 4.0 | 26R | Atlantic Ocean, New England, Southern Quebec |
| | 10 | 4.1 | 3R | Central Ontario, Northwestern Quebec |
| Montmorency | 5 | | | Data not available |
| | 6 | 5.5 | 7R | Northern Ontario, Central Quebec |
| Kejimikujik | 4 | 5.8 | 25R | Atlantic Ocean |

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

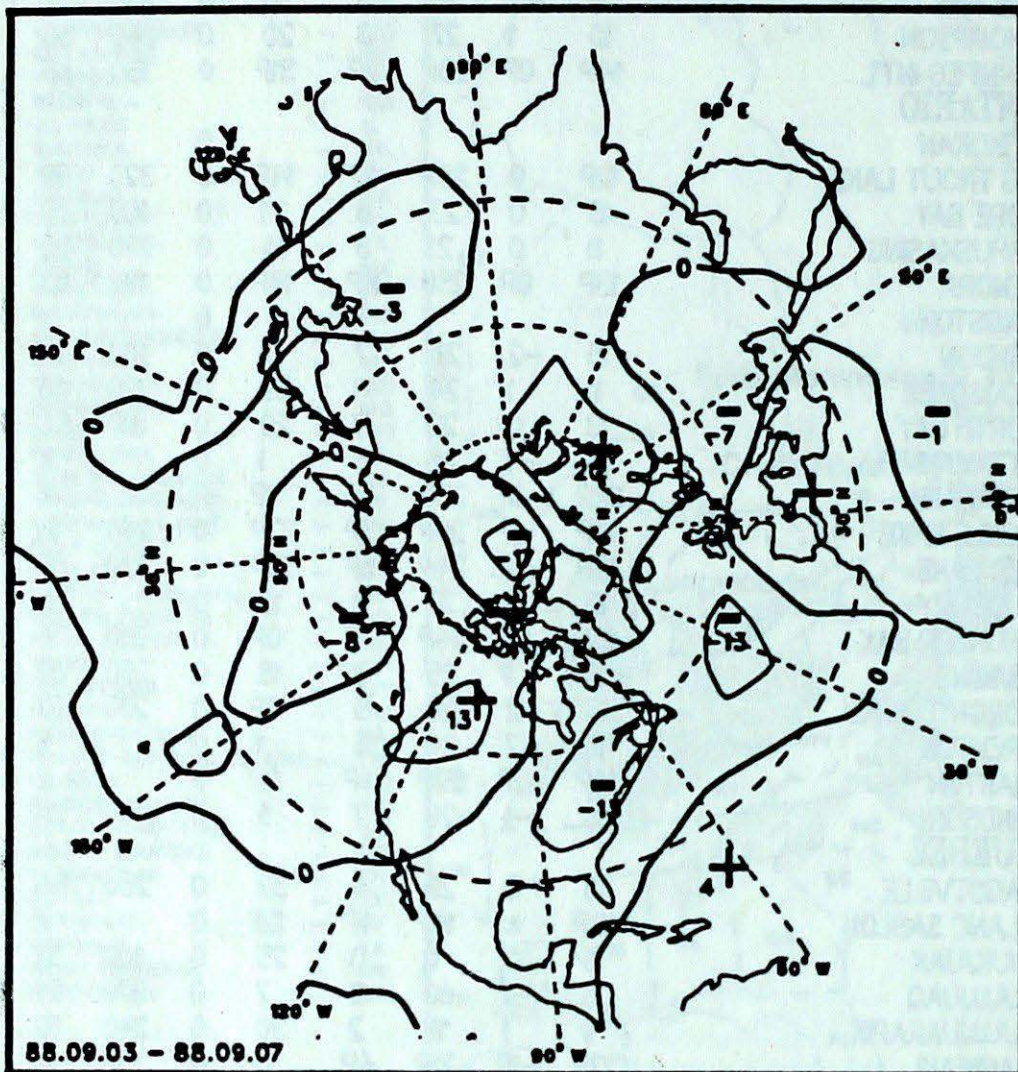
STATISTICS FOR THE WEEK ENDING 0600 GMT September 13, 1988

| STATION | TEMPERATURE | | | | PRECIP. | | WIND MX | | STATION | TEMPERATURE | | | | PRECIP. | | WIND MX | |
|------------------------------|-------------|-----|-----|------|---------|-----|---------|-----|-----------------------------|-------------|-----|-----|----|---------|-----|---------|-----|
| | AV | DP | MX | MN | TP | SOG | DIR | SPD | | AV | DP | MX | MN | TP | SOG | DIR | SPT |
| BRITISH COLUMBIA | | | | | | | | | | | | | | | | | |
| CAPE ST. JAMES | 13 | 0 | 17 | 8 | 18P | 0 | 310 | 70 | THE PAS | 11 | -2 | 28 | 3 | 30 | 0 | 260 | 74 |
| CRANBROOK | 13P | 0P | 29P | 0P | 5P | 0 | | * | THOMPSON | 10 | 1 | 27 | 3 | 20 | 0 | 240 | 56 |
| FORT NELSON | 8 | -1 | 20 | 0 | 9 | 0 | 270 | 43 | WINNIPEG INT'L | 14P | 0P | 28P | 5P | 31P | 0 | 180 | 65 |
| FORT ST. JOHN | 10 | 0 | 21 | 2 | 9 | 0 | 020 | 56 | ONTARIO | | | | | | | | |
| KAMLOOPS | 16P | 0P | 28P | 5P | 25P | 0 | 230 | 63 | ATKOKAN | | | | | | | | 0 |
| PENTICTON | 17P | 0P | 28P | 6P | 0P | 0 | 300 | 43 | BIG TROUT LAKE | 12P | 0 | 24P | 4P | 14P | 0 | 320 | 59 |
| PORT HARDY | 12P | 0P | 17P | 6P | 13P | 0 | | * | GORE BAY | 15 | 0 | 23 | 6 | 21 | 0 | 180 | 59 |
| PRINCE GEORGE | 10P | -1 | 23P | 0P | 26P | 0 | 260 | 50 | KAPUSKASING | 11 | 0 | 21 | 3 | 14 | 0 | 220 | 56 |
| PRINCE RUPERT | 11 | 0 | 20 | 5 | 43 | 0 | 170 | 48 | KENORA | 13P | 0P | 25P | 8P | 16P | 0 | 190 | 63 |
| REVELSTOKE | 13P | -1P | 24P | 4P | 10P | 0 | 350 | 78 | KINGSTON | | | | | | | | 0 |
| SMITHERS | 10P | 0P | 21P | -1P | 4P | 0 | 280 | 46 | LONDON | 15 | -2 | 24 | 7 | 2 | 0 | 210 | 41 |
| VANCOUVER INT'L | 15 | 0 | 21 | 7 | 0 | 0 | 150 | 48 | MOOSONEE | 11 | 1 | 24 | -1 | 29 | 0 | 120 | 46 |
| VICTORIA INT'L | 13 | -1 | 23 | 4 | 0 | 0 | 220 | 85 | NORTH BAY | 13 | 0 | 22 | 3 | 29 | 0 | 310 | 54 |
| WILLIAMS LAKE | 10P | -1 | 24P | -1P | 10P | 0 | | X | OTTAWA INT'L | 14 | -1 | 24 | 6 | 1 | 0 | | X |
| YUKON TERRITORY | | | | | | | | | PETAWAWA | 13P | -1P | 23P | 4P | 1P | 0 | | X |
| DAWSON | | | | | | | | * | PICKLE LAKE | 12P | 1P | 25P | 7P | 22P | 0 | 240 | 61 |
| MAYO | 6 | -2 | 14 | -3 | 10 | 0 | | X | RED LAKE | 12P | -1P | 24P | 5P | 39P | 0 | 270 | 65 |
| SHINGLE POINT A. | 2 | -2 | 12 | -5 | 3 | 0 | | * | SUDBURY | 13 | 0 | 22 | 3 | 18 | 0 | | X |
| WATSON LAKE | 8 | 0 | 19 | -2 | 4 | 0 | 260 | 65 | THUNDER BAY | 13P | 0P | 24P | 2P | 0P | 0 | 310 | 56 |
| WHITEHORSE | 7 | -1 | 16 | -2 | 2 | 0 | 230 | 78 | TIMMINS | 12 | 1 | 25 | 2 | 18 | 0 | 250 | 67 |
| NORTHWEST TERRITORIES | | | | | | | | | TORONTO INT'L | 15 | -2 | 26 | 5 | 0P | 0 | 270 | 37 |
| ALERT | -8P | -1P | -2P | -15P | 1 | 22 | 220 | 76 | TRENTON | 15 | -2 | 24 | 6 | 1 | 0 | | X |
| BAKER LAKE | 5 | 1 | 11 | -1 | 1 | 0 | 130 | 56 | WIARTON | 14P | -2P | 22P | 4P | 0P | 0 | | X |
| CAMBRIDGE BAY | 2P | 1P | 9P | -3P | 31P | 0 | 120 | 78 | WINDSOR | 18 | -1 | 28 | 7 | 5 | 0 | 190 | 39 |
| CAPE DYER | 1 | 0 | 7 | -3 | 13 | 0 | 290 | 65 | QUEBEC | | | | | | | | |
| CLYDE | 2 | 0 | 5 | -3 | 7 | 0 | 330 | 65 | BAGOTVILLE | 13 | 0 | 23 | 4 | 33 | 0 | 280 | 46 |
| COPPERMINE | 5 | 0 | 12 | 0 | 28 | 0 | 020 | 59 | BLANC SABLON | 10P | * | 16P | 4P | 12P | 0 | | X |
| CORAL HARBOUR | 2P | -1P | 10P | -3P | 0P | 0 | | X | INUKJUAK | 6 | 0 | 11 | 0 | 25 | 0 | 100 | 52 |
| EUREKA | -6 | -1 | -1 | -12 | 2 | 1 | 170 | 59 | KUUJUAQ | 6 | -1 | 10 | 2 | 7 | 0 | 270 | 56 |
| FORT SMITH | 9 | 0 | 18 | -2 | 8 | 0 | | X | KUUJUARAQ | 9 | 1 | 19 | 2 | 30 | 0 | 240 | 52 |
| IQUALUIT | 5 | 2 | 12 | 1 | 9P | 0 | 060 | 33 | MANIWAKI | 12P | -1P | 21P | 4P | 7P | 0 | 250 | 41 |
| HALL BEACH | 2 | 1 | 5 | -3 | 0 | 0 | 340 | 43 | MONT JOLI | 14 | 2 | 22 | 5 | 6 | 0 | 280 | 107 |
| INUVIK | 3P | -1P | 10P | -3P | 5P | 0 | | X | MONTREAL INT'L | 15 | -1 | 25 | 6 | 0 | 0 | 260 | 48 |
| MOULD BAY | -6 | -1 | 0 | -11 | 2 | 2 | | X | NATASHQUAN | 10 | 0 | 17 | 2 | 9 | 0 | 250 | 67 |
| NORMAN WELLS | 5P | -3P | 11P | -1P | 68P | 0 | | X | QUEBEC | 13 | -1 | 22 | 3 | 13 | 0 | 240 | 50 |
| RESOLUTE | -5 | -2 | -1 | -8 | 0 | 5 | 020 | 48 | SCHIEFFERVILLE | 6P | -1P | 15P | 1P | 28P | 0 | 330 | 59 |
| | | | | | | | | X | SEPT-ILES | 10 | 0 | 18 | 2 | 6 | 0 | 270 | 61 |
| | | | | | | | | X | SHERBROOKE | 12 | 0 | 23 | 4 | 0 | 0 | 280 | 52 |
| | | | | | | | | X | VAL D'OR | 11 | 0 | 21 | -1 | 23 | 0 | 290 | 57 |
| YELLOWKNIFE | 8P | 0P | 19P | 3P | 13P | 0 | 290 | 56 | NEW BRUNSWICK | | | | | | | | |
| ALBERTA | | | | | | | | | CHARLO | 13 | 1 | 24 | 3 | 2 | 0 | 270 | 59 |
| CALGARY INT'L | 12P | 0P | 27P | 1P | 8P | 0 | 350 | 59 | CHATHAM | 14 | 0 | 26 | 4 | 2 | 0 | 290 | 52 |
| COLD LAKE | 10 | 0 | 23 | -1 | 10 | 0 | 310 | 70 | FREDERICTON | 14 | -1 | 25 | 3 | 0 | 0 | 300 | 56 |
| CORONATION | 12P | -1P | 24P | 2P | 13P | 0 | | * | MONCTON | 14P | -1P | 24P | 4P | 2P | 0 | 290 | 61 |
| EDMONTON NAMAO | 11 | 0 | 25 | 1 | 10 | 0 | 290 | 76 | SAINT JOHN | 13 | -1 | 21 | 4 | 8 | 0 | 310 | 59 |
| FORT MCMURRAY | 11P | 1P | 21P | 0P | 5P | 0 | | X | NOVA SCOTIA | | | | | | | | |
| HIGH LEVEL | 8 | -1 | 19 | -3 | 1 | 0 | 310 | 56 | GREENWOOD | 13 | -1 | 24 | 3 | 7 | 0 | 260 | 50 |
| JASPER | 9 | -2 | 24 | -3 | 10 | 0 | | X | SHEARWATER | 15 | -1 | 22 | 8 | 4 | 0 | 300 | 52 |
| LETHBRIDGE | 13P | -1P | 30P | 1P | 6P | 0 | 270 | 87 | SYDNEY | 14 | -1 | 22 | 6 | 7P | 0 | 260 | 50 |
| MEDICINE HAT | 14P | -1P | 34P | 3P | 15P | 0 | 230 | 56 | YARMOUTH | 14 | -1 | 20 | 9 | 1 | 0 | 300 | 41 |
| PEACE RIVER | 9P | 0P | 22P | -3P | 2P | 0 | 270 | 52 | PRINCE EDWARD ISLAND | | | | | | | | |
| SASKATCHEWAN | | | | | | | | | CHARLOTTETOWN | 14 | -1 | 22 | 6 | 14 | 0 | 320 | 43 |
| CREE LAKE | 9 | 1 | 23 | 1 | 35 | 0 | 300 | 63 | SUMMERSIDE | 15 | -1 | 23 | 8 | 2 | 0 | 260 | 52 |
| ESTEVAN | 13 | -1 | 30 | 4 | 2P | 0 | 280 | 94 | NEWFOUNDLAND | | | | | | | | |
| LA RONGE | 11 | 0 | 28 | -2 | 32 | 0 | 280 | 72 | CARTWRIGHT | 10 | 1 | 20 | 3 | 5 | 0 | 230 | 70 |
| REGINA | 13P | -1P | 32P | -1P | 14P | 0 | 280 | 83 | CHURCHILL FALLS | 8 | 0 | 17 | 1 | 34 | 0 | 290 | 63 |
| SASKATOON | 13 | 0 | 34 | 1 | 4 | 0 | 300 | 78 | GANDER INT'L | 14 | 1 | 23 | 4 | 26 | 0 | 230 | 69 |
| SWIFT CURRENT | 12 | -1 | 33 | 2 | 31 | 0 | | X | GOOSE | 11 | 1 | 21 | 3 | 4 | 0 | 200 | 61 |
| YORKTON | 11 | -1 | 30 | -1 | 0 | 0 | 300 | 85 | PORT-AUX-BASQUES | 13 | 0 | 18 | 5 | 7 | 0 | 330 | 65 |
| MANITOBA | | | | | | | | | ST JOHN'S | 15P | 2P | 22P | 7P | 48P | 0 | 260 | 63 |
| BRANDON | 13P | 0P | 27P | 3P | 24P | 0 | 250 | 89 | ST LAWRENCE | 13P | 1P | 19P | 8P | 20P | 0 | | X |
| CHURCHILL | 10 | 3 | 25 | 4 | 9 | 0 | 100 | 57 | WABUSH LAKE | 7P | -1P | 15P | 2P | 42P | 0 | 300 | 41 |
| LYNN LAKE | 12P | 3P | 28P | 5P | 26P | 0 | 310 | 54 | | | | | | | | | |

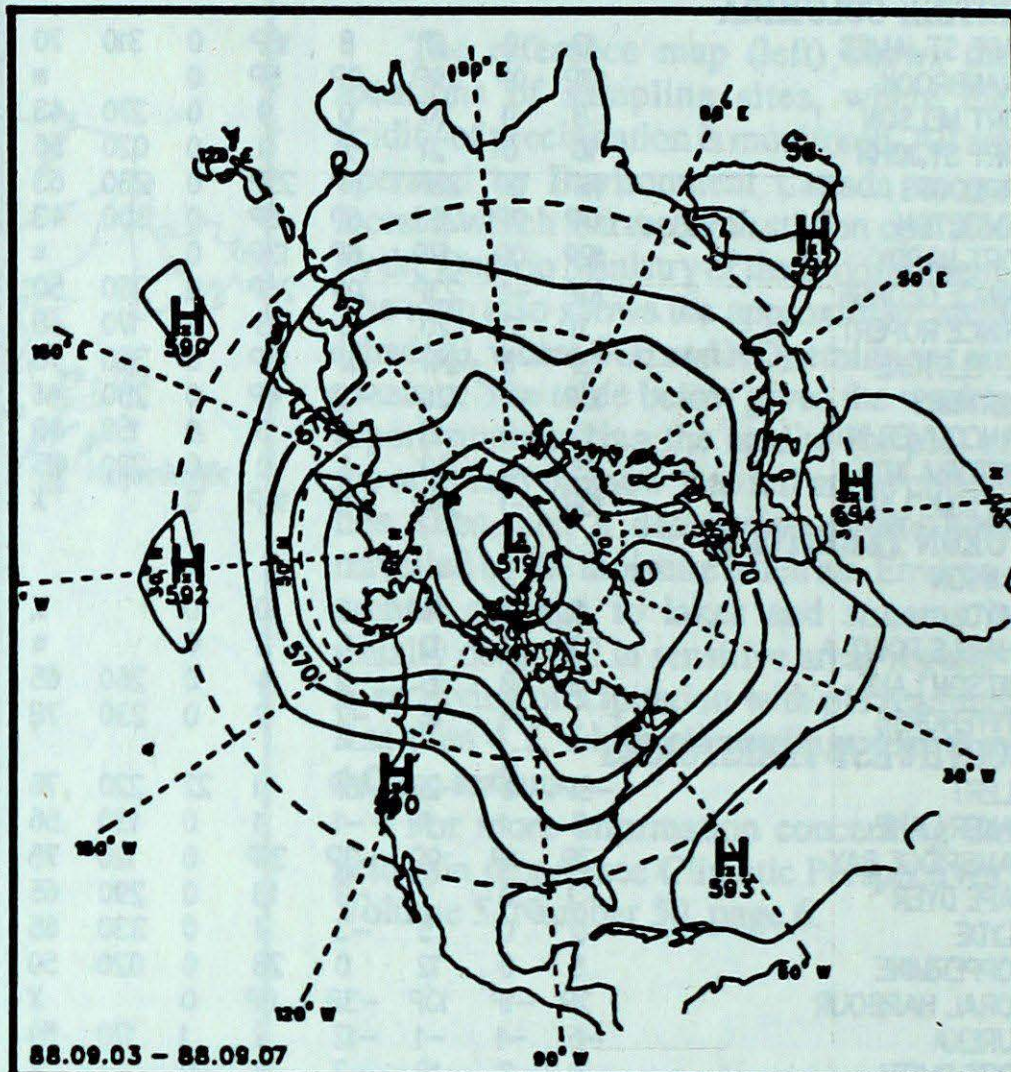
AV = weekly mean temperature in degree C
 MX = weekly extreme maximum temperature in degree C
 MN = weekly extreme minimum temperature in degree C
 TP = weekly total precipitation in mm
 DP = departure of mean temperature from normal in degree C
 SOG = snow depth on ground in cm, last day of the period

DIR = direction of maximum wind speed (deg. from true north)
 SPD = maximum wind speed in km/hour
 X = not observed
 P = value based on less than 7 days
 * = missing

50 kPa ATMOSPHERIC CIRCULATION



Mean geopotential height anomaly
50 kPa level (10 decameter intervals)



Mean geopotential height
50 kPa level (10 decameter intervals)

