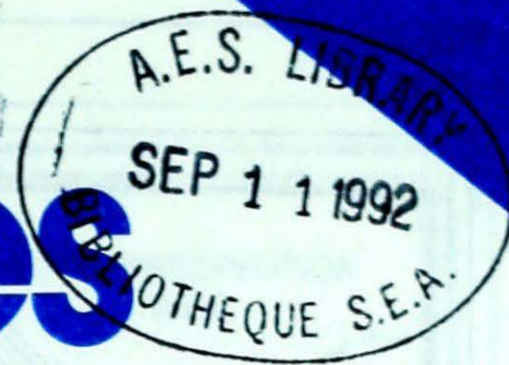




Climatic Perspectives



July 6, to 12, 1992

A weekly review of Canadian climate and water

Vol. 14 No. 28

Where has summer gone?

Although summer officially began as of the third week of June, residents of central and eastern Canada are still patiently waiting for the summer weather to arrive. In Ontario, summer was first reported missing on June 20, when afternoon highs struggled to reach a lowly 10 C, becoming the coldest first day of summer ever recorded in Ontario.

Western Canada had a warm, dry spring, with above-normal temperatures, a carryover from the very warm temperature anomaly observed during the winter months. In contrast, a mostly below-normal temperature regime covered the eastern half of the country. In Ontario, May and June were very dry, although, what precipitation did fall, seemed to always occur on a weekend, giving the perception that the two months leading into summer were also wet and unsettled.

During the last four weeks (since mid-June) cold Arctic air has been streaming southwards across the eastern Prairies into Ontario and Quebec, and an associated below-normal temperature pattern centred over Manitoba and Quebec has expanded eastwards into Atlantic Canada. At the same time, the oscillating storm tracks, which separate the Arctic and Polar air masses to the north, from the Tropical and Maritime air masses to the south, have been driven much further south than their normal summertime position. Eastward moving disturbances have also been quite active due to the strongly contrasting air masses they separate. As a result, in the last two weeks, frequent and

sometimes heavy rainfalls have occurred across southern Canada.

One might ask what is causing this unusual, or more correctly, fickle weather pattern this year? Surface weather systems and frontal disturbances are steered by the upper level wind flow in our atmosphere. These upper winds move rapidly from west to east, or the circulation can take the form of high amplitude waves, which slowly shift in time around the hemisphere. Meteorologists generally refer to this 50 kPa upper circulation, (approximately 5,000 metres ASL - see page 4) in order to extrapolate the motion of weather systems and for long range prediction.

For the last few months, an upper atmospheric ridge of high pressure has persisted over western Canada, keeping that part of the country unusually warm and dry. In turn, an upper trough of low pressure has lingered over eastern Canada. The result has been a northwesterly circulation between these two features (the area east of the upper ridge and west of the upper trough), which has been drawing cool Arctic air from the higher latitudes southwards over eastern Canada. On the other hand, above-normal temperatures have been experienced in the

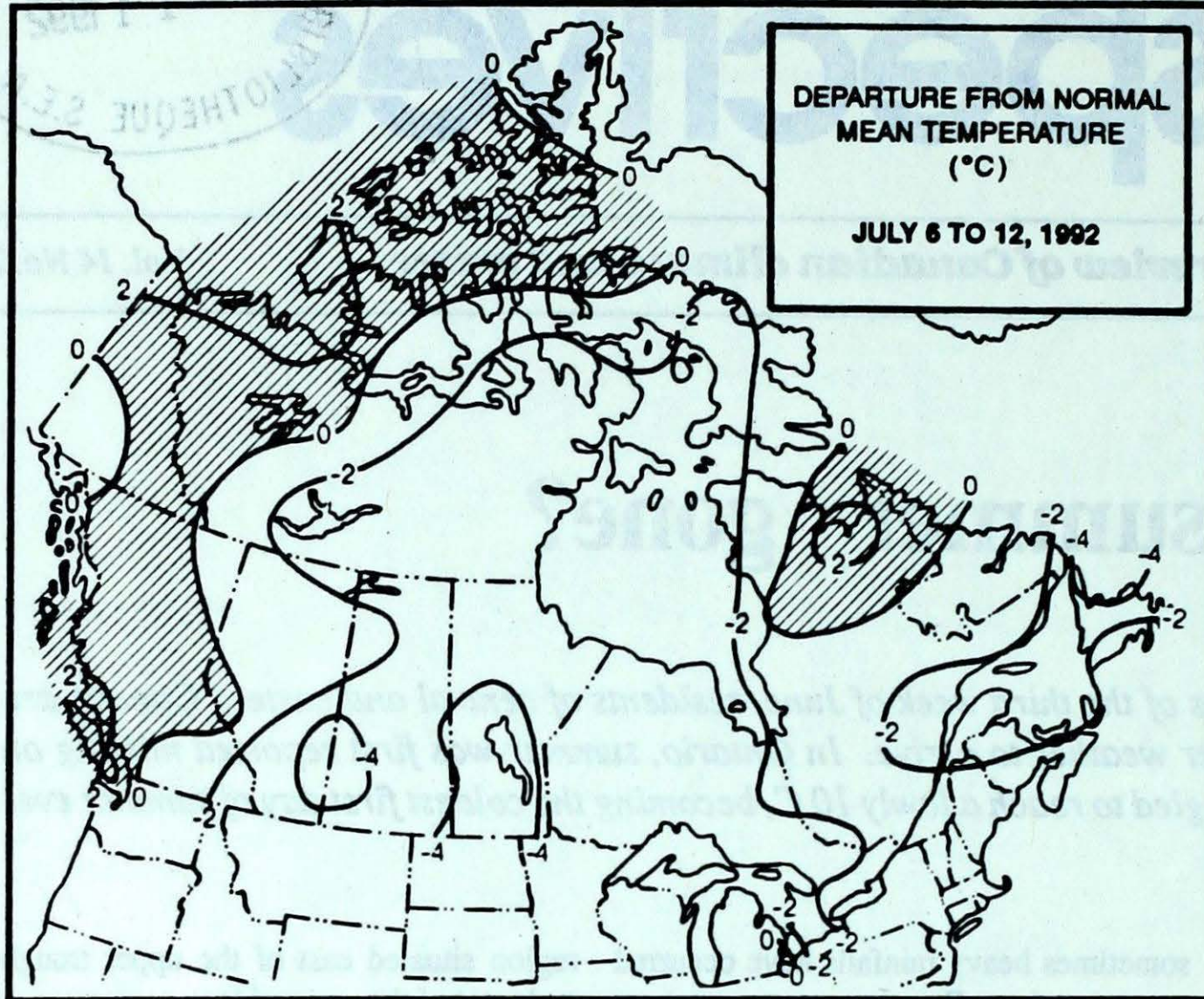
region situated east of the upper trough and west of the upper ridge.

We don't know exactly what controls the flow pattern of these upper level winds, but we do know that this past winter's well publicized El Nino event (warming of the eastern Pacific waters) has had some influence on the upper atmospheric circulation. The eruption of Mount Pinatubo, in the Philippines, one year ago, and the volcanic ash and sulphur that it spewed into the atmosphere is another source of speculation.

So where has summer gone? It has been alive and well in western Canada!

Look ahead...

For the week of July 20, near to below-normal temperatures are expected for most of Canada. Temperatures will be about 2 degrees below normal over the eastern half of Ontario and the southern half of Quebec. Above-normal temperatures will persist across the Arctic Islands and the Yukon. Precipitation will fall over southern British Columbia, the southern parts of Alberta, southwestern Quebec and the Atlantic provinces.



**Weekly normal
temperatures (°C)**

| | max. | min. |
|---------------------------|------|------|
| Whitehorse A | 21.2 | 8.0 |
| Iqaluit A | 11.1 | 3.4 |
| Yellowknife A | 21.1 | 12.1 |
| Vancouver Int'l A | 21.5 | 12.4 |
| Victoria Int'l A | 21.0 | 10.6 |
| Calgary Int'l A | 23.1 | 9.5 |
| Edmonton Int'l A | 22.3 | 9.7 |
| Regina A | 26.1 | 11.8 |
| Saskatoon A | 25.3 | 11.8 |
| Winnipeg Int'l A | 26.3 | 13.8 |
| Ottawa Int'l A | 25.9 | 14.2 |
| Toronto (Pearson Int'l A) | 26.4 | 13.5 |
| Montréal Int'l A | 25.5 | 15.0 |
| Québec A | 24.7 | 12.8 |
| Fredericton A | 25.4 | 12.3 |
| Saint John A | 21.9 | 11.0 |
| Halifax (Shearwater) | 21.2 | 12.5 |
| Charlottetown A | 22.9 | 13.3 |
| Goose A | 21.7 | 10.5 |
| St John's A | 20.3 | 10.1 |

Weekly temperature and precipitation extremes

| | Maximum temperature (°C) | Minimum temperature (°C) | Heaviest precipitation (mm) |
|-----------------------|-----------------------------|-----------------------------|--------------------------------|
| British Columbia | Lytton 30 | Fort Nelson A 5 | Fort St John A 33 |
| Yukon Territory | Shingle Point A 25 | Komakuk Beach A 2 | Shingle Point A 24 |
| Northwest Territories | Norman Wells A 30 | Cape Hooper A -2 | Cape Dorset A 19 |
| Alberta | Fort McMurray A 28 | Fort McMurray A 1 | Pincher Creek (aut) 63 |
| Saskatchewan | Moose Jaw A 27 | North Battleford A 3 | Yorkton A 126 |
| | Regina A 27 | | |
| Manitoba | Gretna (aut) 26 | Grand Rapids A 0 | Brandon A 40 |
| Ontario | Windsor A 29 | Moosonee A 0 | Petawawa A 93 |
| Quebec | Kuujuuaq A 27 | Chibougamau A 0 | Maniwaki 63 |
| New Brunswick | Fredericton A 27 | St-Léonard A 7 | Moncton A 37 |
| | | | Saint John A 37 |
| Nova Scotia | Greenwood A 26 | Sydney A 7 | Sable Island 62 |
| Prince Edward Island | Charlottetown A 23 | East Point (aut) 10 | Charlottetown A 29 |
| Newfoundland | Goose A 28 | Cartwright 0 | St Lawrence 102 |

Across The Country...

| | | |
|--------------------------|------------------|----|
| Highest Mean Temperature | Windsor A (Ont.) | 22 |
| Lowest Mean Temperature | Alert (N.W.T.) | 1 |

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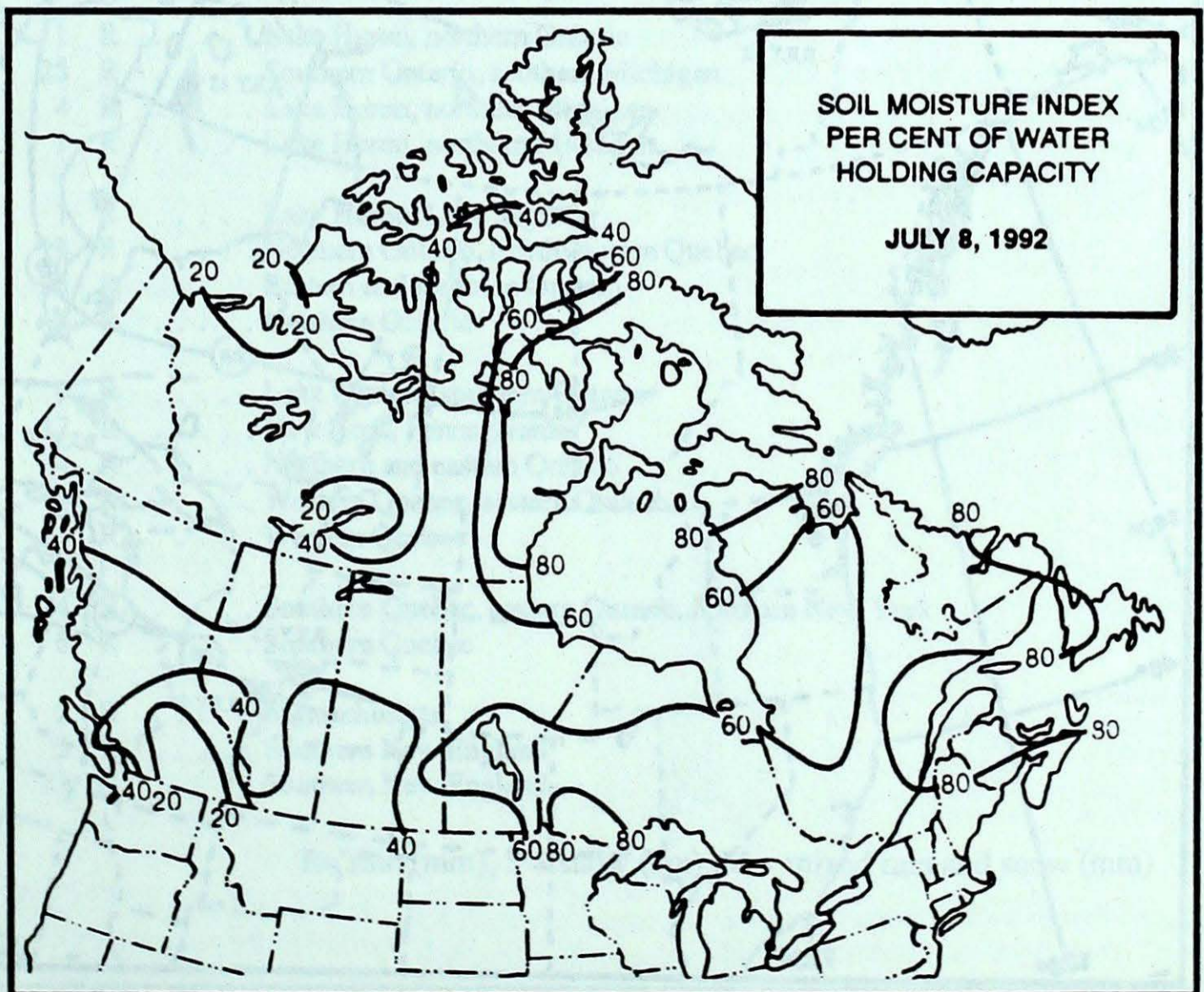
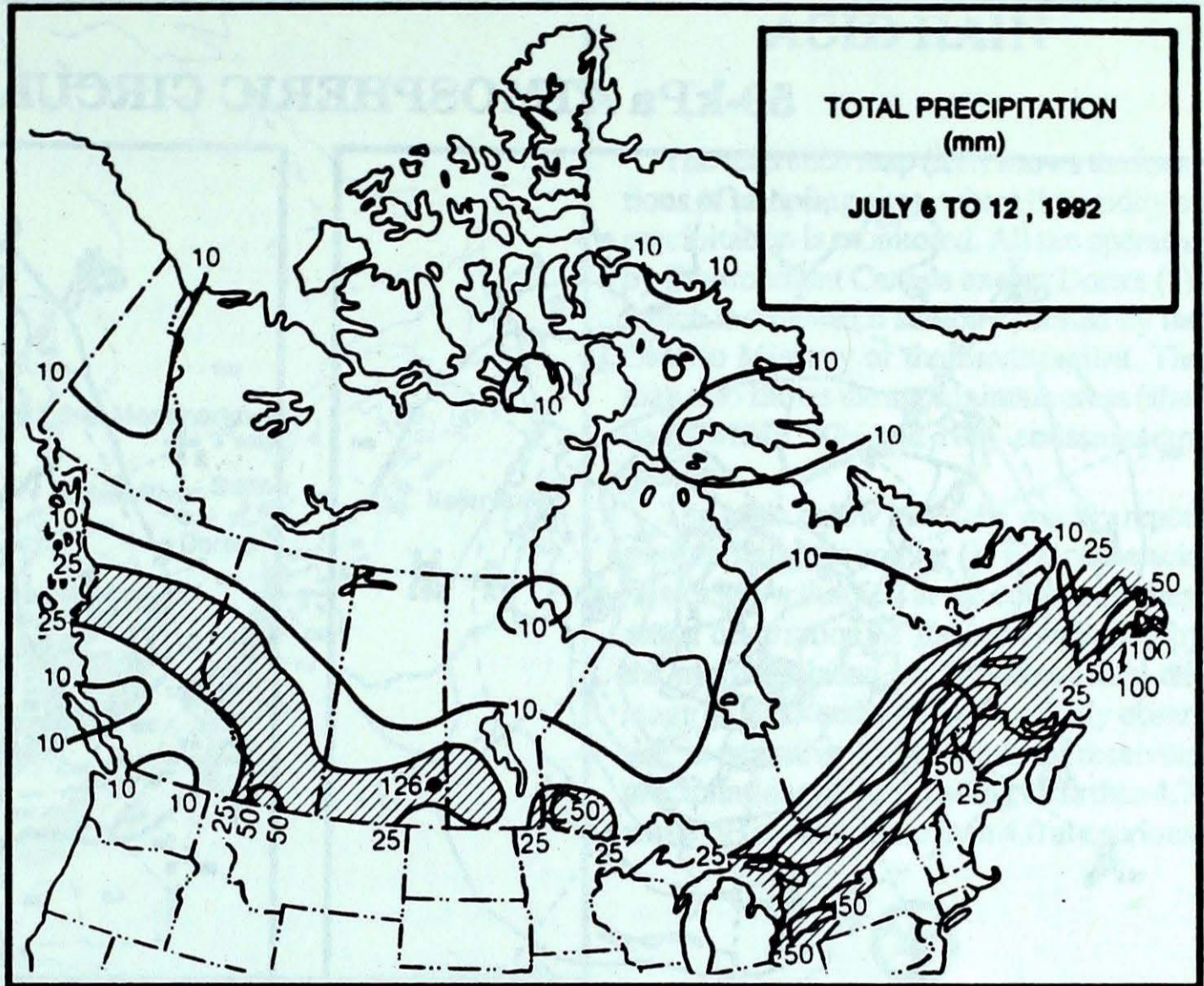
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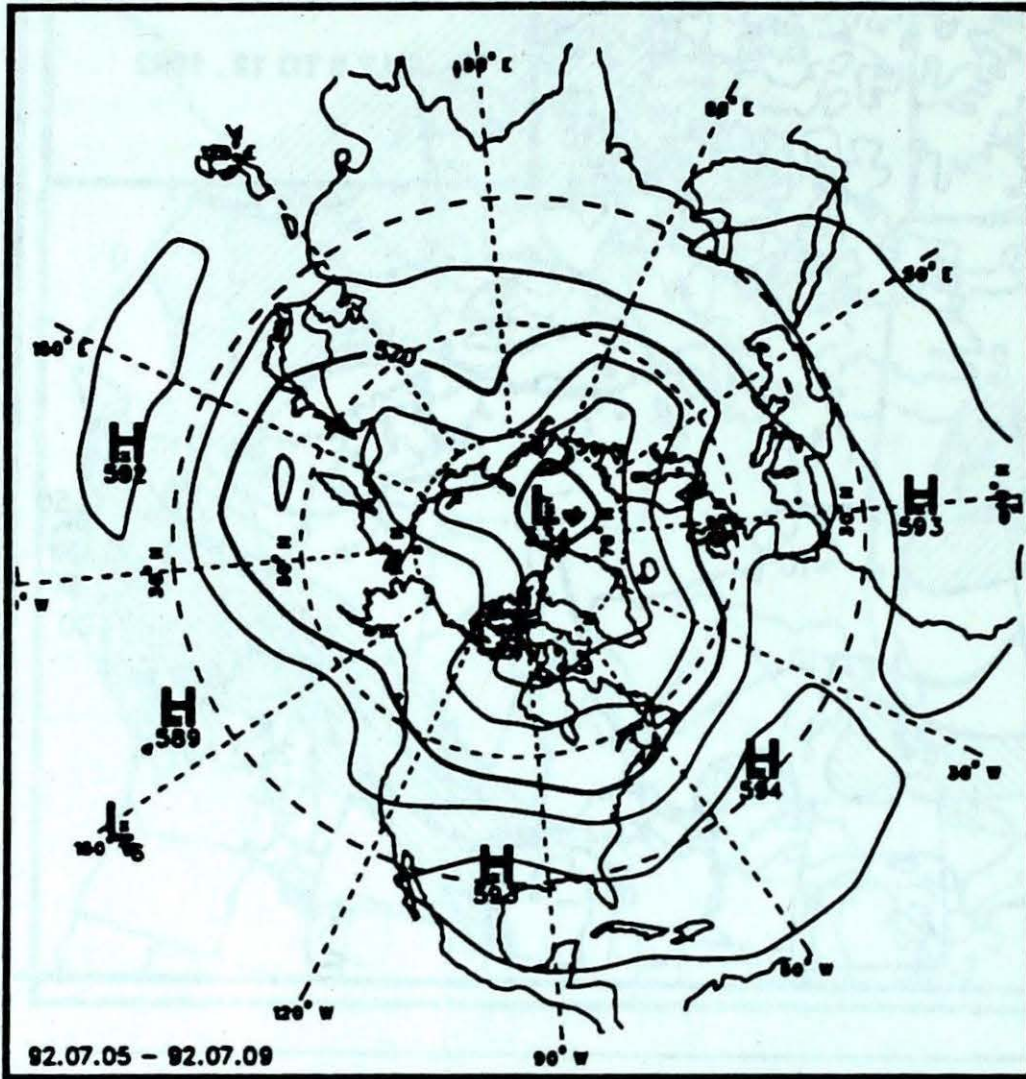
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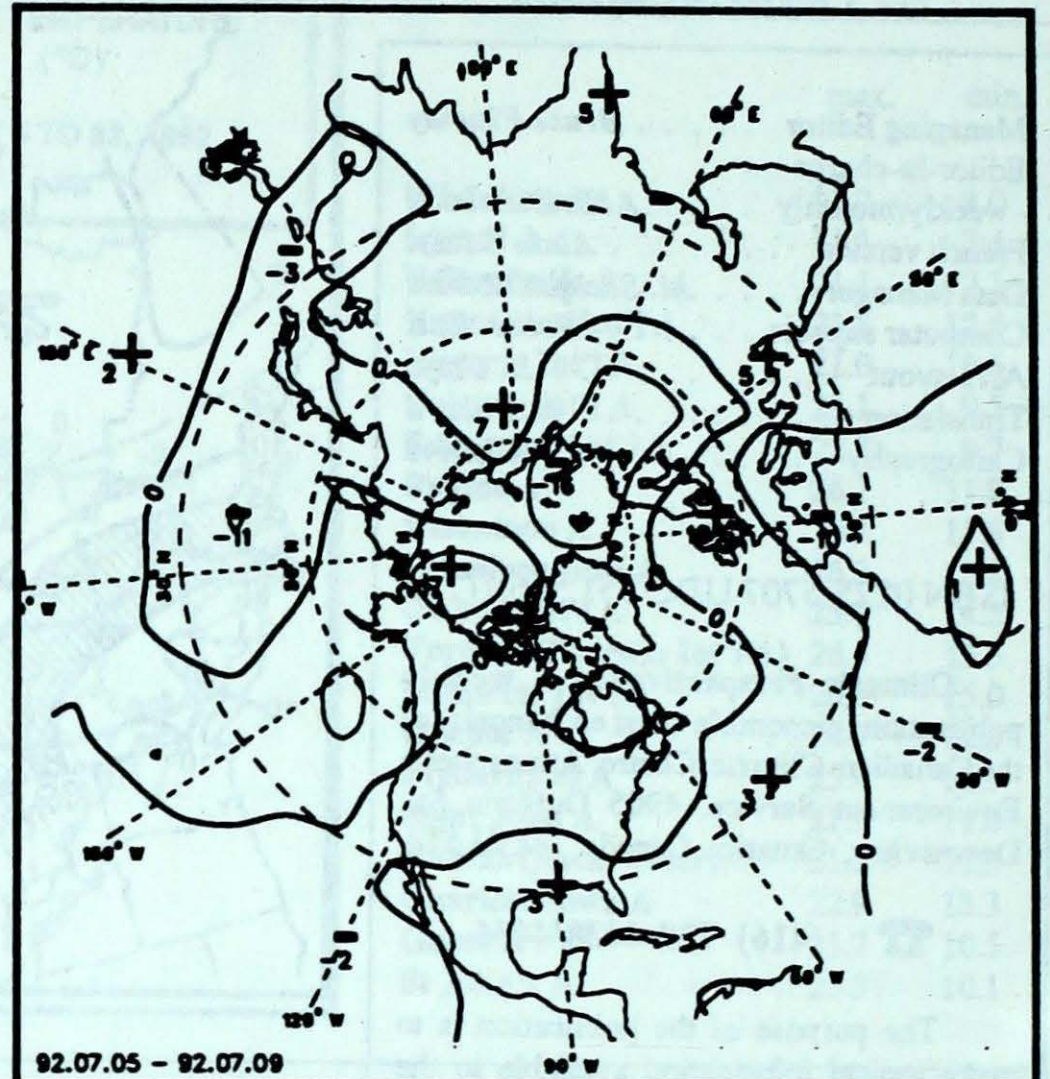
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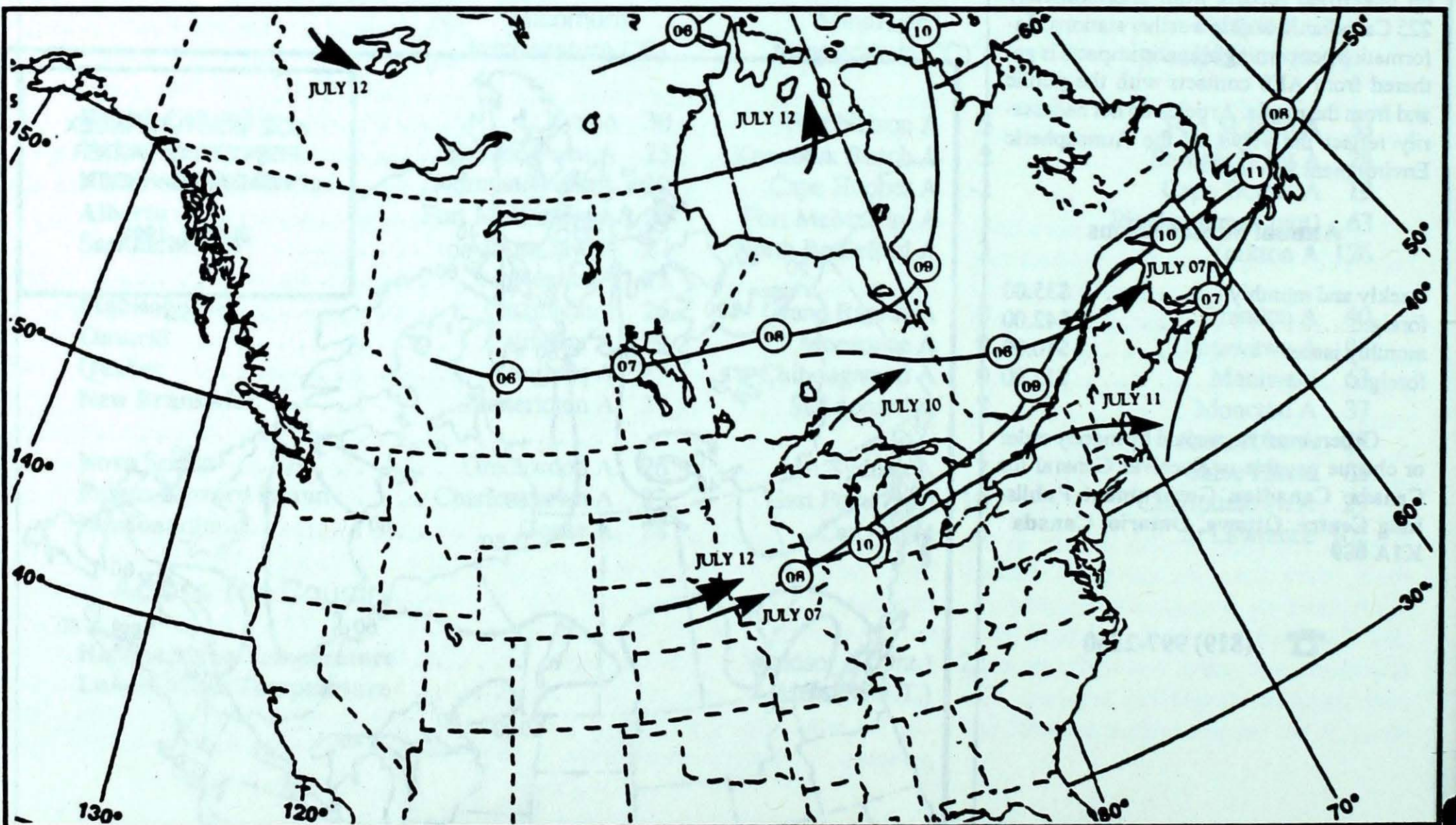
50-kPa ATMOSPHERIC CIRCULATION



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



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

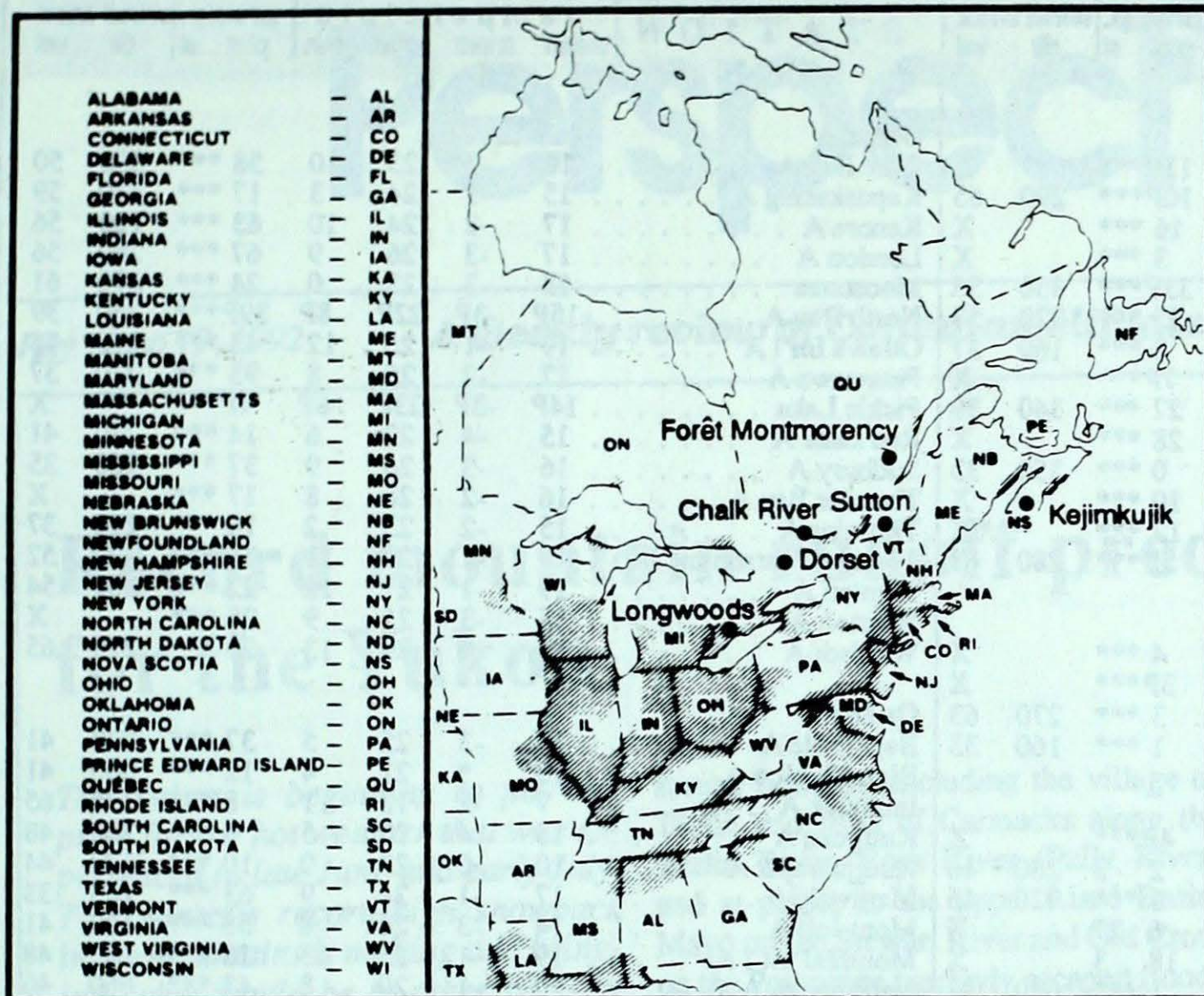


Tracks of low pressure centres at 12:00 U.T. each day during the period.

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 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.



- ALABAMA -- AL
- ARKANSAS -- AR
- CONNECTICUT -- CO
- DELAWARE -- DE
- FLORIDA -- FL
- GEORGIA -- GA
- ILLINOIS -- IL
- INDIANA -- IN
- IOWA -- IA
- KANSAS -- KA
- KENTUCKY -- KY
- LOUISIANA -- LA
- MAINE -- ME
- MANITOBA -- MT
- MARYLAND -- MD
- MASSACHUSETTS -- MA
- MICHIGAN -- MI
- MINNESOTA -- MN
- MISSISSIPPI -- MS
- MISSOURI -- MO
- NEBRASKA -- NE
- NEW BRUNSWICK -- NB
- NEWFOUNDLAND -- NF
- NEW HAMPSHIRE -- NH
- NEW JERSEY -- NJ
- NEW YORK -- NY
- NORTH CAROLINA -- NC
- NORTH DAKOTA -- ND
- NOVA SCOTIA -- NS
- OHIO -- OH
- OKLAHOMA -- OK
- ONTARIO -- ON
- PENNSYLVANIA -- PA
- PRINCE EDWARD ISLAND -- PE
- QUEBEC -- QU
- RHODE ISLAND -- RI
- SOUTH CAROLINA -- SC
- SOUTH DAKOTA -- SD
- TENNESSEE -- TN
- TEXAS -- TX
- VERMONT -- VT
- VIRGINIA -- VA
- WEST VIRGINIA -- WV
- WISCONSIN -- WI

SITE day pH amount AIR PATH TO SITE

July 5 to 11 1992

| | | | | | | |
|-------------|----|-----|----|---|-------|---|
| Longwoods | 08 | 3.9 | 31 | R | ..... | Western Ohio, southern Indiana |
| Dorset * | 06 | 4.6 | 1 | R | ..... | Lake Huron, northern Ontario |
| | 08 | 3.9 | 25 | R | ..... | Southern Ontario, southern Michigan |
| | 10 | 4.4 | 4 | R | ..... | Lake Huron, northern Michigan |
| | 11 | 4.5 | 1 | R | ..... | Lake Huron, northern Michigan |
| Chalk River | 05 | 4.8 | 1 | R | ..... | Lake Huron, Lake Superior |
| | 06 | 4.6 | 13 | R | ..... | Northern Ontario, Northwestern Quebec |
| | 08 | 4.2 | 23 | R | ..... | Eastern and southern Ontario |
| | 10 | 4.7 | 4 | R | ..... | Northern Ontario |
| Sutton | 05 | 4.6 | 9 | R | ..... | Lake Ontario, southern Ontario |
| | 08 | 4.4 | 17 | R | ..... | New York, Pennsylvania |
| | 09 | 4.4 | 4 | R | ..... | Northern and eastern Ontario |
| | 10 | 5.0 | 1 | R | ..... | Western Quebec, eastern Ontario |
| | 11 | 5.3 | 6 | R | ..... | Western Quebec |
| Montmorency | 05 | 5.0 | 24 | R | ..... | Southern Quebec, eastern Ontario, northern New York |
| | 06 | 5.1 | 6 | R | ..... | Southern Quebec |
| Kejimikujik | 05 | 4.3 | 2 | R | ..... | Massachusetts |
| | 06 | 4.2 | 3 | R | ..... | Southern New England |
| | 09 | 4.6 | 11 | R | ..... | Southern New England |

R= rain (mm), S = snow (cm), M = mixed rain and snow (mm)

| STATION | temperature | | | | precip. ptot st | wind max | | STATION | temperature | | | | precip. ptot st | wind max | |
|------------------------------|-------------|------|-----|-----|--------------------|----------|-----|--|-------------|------|-----|-----|--------------------|----------|-----|
| | mean | anom | max | min | | dir | vel | | mean | anom | max | min | | dir | vel |
| British Columbia | | | | | | | | Ontario | | | | | | | |
| Blue River A | 16P | 0P | 26P | 7P | 11P*** | | X | Gore Bay A | 16 | -3 | 23 | 10 | 58 *** | 300 | 50 |
| Cape St James | 13P | 0P | 16P | 10P | 10P*** | 290 | 65 | Kapuskasing A | 15 | -1 | 24 | 3 | 17 *** | 330 | 59 |
| Cranbrook A | 15 | -2 | 24 | 9 | 16 *** | | X | Kenora A | 17 | -2 | 24 | 10 | 63 *** | 120 | 56 |
| Fort Nelson A | 16 | -1 | 28 | 5 | 3 *** | | X | London A | 17 | -3 | 26 | 9 | 67 *** | 280 | 56 |
| Fort St John A | 15P | -1P | 25P | 5P | 33P*** | 350 | 35 | Moosonee | 13 | -3 | 23 | 0 | 24 *** | 270 | 61 |
| Kamloops A | 20 | -1 | 29 | 12 | 23 *** | 220 | 57 | North Bay A | 15P | -3P | 22P | 8P | 39P*** | 250 | 39 |
| Penticton A | 19 | -1 | 28 | 11 | 3 *** | 160 | 37 | Ottawa Int'l A | 19 | -1 | 25 | 12 | 43 *** | 270 | 48 |
| Port Hardy A | 16P | 2P | 20P | 12P | 7P*** | | X | Petawawa A | 17 | -2 | 25 | 8 | 93 *** | 270 | 37 |
| Prince George A | 16 | 1 | 26 | 6 | 27 *** | 340 | 39 | Pickle Lake | 14P | -3P | 23P | 6P | 4P*** | | X |
| Prince Rupert A | 13 | 0 | 16 | 10 | 28 *** | | X | Red Lake A | 15 | -4 | 22 | 6 | 14 *** | 240 | 41 |
| Smithers A | 17 | 2 | 27 | 8 | 0 *** | 350 | 33 | Sudbury A | 16 | -3 | 24 | 9 | 37 *** | 360 | 35 |
| Vancouver Int'l A | 17 | 0 | 24 | 13 | 10 *** | | X | Thunder Bay A | 16 | -2 | 26 | 8 | 17 *** | | X |
| Victoria Int'l A | 16 | 0 | 23 | 10 | 12 *** | | X | Timmins A | 15 | -2 | 23 | 2 | 14 *** | 210 | 37 |
| Williams Lake A | 15P | 0P | 24P | 8P | 5P*** | 280 | 43 | Toronto(Pearson Int'l A) | 19 | -1 | 27 | 11 | 36 *** | 220 | 52 |
| Yukon Territory | | | | | | | | Québec | | | | | | | |
| Komakuk Beach A | 10 | 3 | 24 | 2 | 4 *** | | X | Bagotville A | 15 | -3 | 25 | 5 | 37 *** | 070 | 41 |
| Teslin (aut) | 14P | * | 21P | 8P | 3P*** | | X | Blanc Sablon A | 10 | * | 21 | 4 | 12 *** | 060 | 41 |
| Watson Lake A | 16 | 1 | 25 | 9 | 3 *** | 270 | 63 | Inukjuak A | 7 | -2 | 18 | 1 | 8 *** | 190 | 65 |
| Whitehorse A | 15 | 0 | 24 | 6 | 1 *** | 160 | 33 | Kuujuuaq A | 15 | 4 | 27 | 5 | 4 *** | 200 | 48 |
| Northwest Territories | | | | | | | | New Brunswick | | | | | | | |
| Alert | 1P | -2P | 5P | -1P | 4P*** | | X | Fredericton A | 17 | -2 | 27 | 9 | 24 *** | 310 | 63 |
| Baker Lake A | 7 | -4 | 15 | 1 | 2 3 | 280 | 46 | Miscou Island (aut) | 14P | -4P | 21P | 10P | 0P*** | | |
| Cambridge Bay A | 6 | -2 | 15 | 2 | 1 *** | 020 | 46 | Moncton A | 17 | -2 | 25 | 10 | 37 *** | 350 | 50 |
| Cape Dyer A | 5 | 0 | 10 | 1 | 6 27 | | X | Saint John A | 16 | -1 | 24 | 9 | 37 *** | 300 | 56 |
| Clyde A | 3 | -1 | 12 | 0 | 18 3 | | X | Nova Scotia | | | | | | | |
| Coppermine A | 12 | 2 | 25 | 4 | 1 *** | 070 | 41 | Greenwood A | 18 | -1 | 26 | 11 | 15 *** | 270 | 57 |
| Coral Harbour A | 5 | -4 | 11 | 0 | 6 3 | 050 | 48 | Shearwater A | 17 | 0 | 24 | 11 | 20 *** | 140 | 48 |
| Eureka | 4P | -1P | 9P | 1P | 9P*** | | X | Sydney A | 15 | -3 | 24 | 7 | 20 *** | 180 | 56 |
| Fort Smith A | 14 | -3 | 26 | 5 | 0 *** | 350 | 32 | Yarmouth A | 14 | -1 | 21 | 9 | 23 *** | 250 | 37 |
| Hall Beach A | 5 | -1 | 11 | 0 | 5 3 | 350 | 35 | Prince Edward Island | | | | | | | |
| Inuvik A | 16 | 2 | 29 | 5 | 3 *** | 330 | 39 | Charlottetown A | 16 | -2 | 23 | 11 | 29 *** | 160 | 44 |
| Iqaluit A | 6 | -1 | 15 | 2 | 15 *** | | X | East Point (auto) | 14 | * | 18 | 10 | 0 *** | | |
| Mould Bay A | 6 | 2 | 11 | 0 | 0 3 | | X | Newfoundland | | | | | | | |
| Norman Wells A | 17 | 0 | 30 | 4 | 2 *** | 300 | 56 | Cartwright | 13 | 0 | 26 | 0 | 4 *** | 330 | 41 |
| Resolute A | 5 | 1 | 12 | 1 | 1 *** | 340 | 63 | Churchill Falls A | 13 | -1 | 24 | 2 | 4 *** | 310 | 52 |
| Yellowknife A | 14 | -3 | 26 | 8 | 2 *** | 140 | 39 | Gander Int'l A | 12 | -5 | 22 | 4 | 22 *** | 120 | 50 |
| Alberta | | | | | | | | 92/07/06-92/07/12 | | | | | | | |
| Calgary Int'l A | 13 | -3 | 24 | 4 | 29 *** | 020 | 54 | Environment Canada Environnement | | | | | | | |
| Cold Lake A | 15 | -2 | 25 | 6 | 3 *** | 030 | 41 | CLIMATIC PERSPECTIVES : A WEEKLY REVIEW OF | | | | | | | |
| Edmonton Namao A | 15 | -2 | 25 | 6 | 41 *** | 260 | 41 | NADIAN CLIMATE AND WEATHER | | | | | | | |
| Fort McMurray A | 15 | -2 | 28 | 1 | 5 *** | 190 | 33 | Vol: 14 No: 28 Date: 920706 | | | | | | | |
| High Level A | 14 | -1 | 27 | 4 | 3 *** | 350 | 48 | 1005959D | | | | | | | |
| Jasper | * | * | 23 | * | * *** | | X | OTM | | | | | | | |
| Lethbridge A | 15 | -4 | 26 | 7 | 34 *** | 270 | 59 | no observation | | | | | | | |
| Medicine Hat A | 15 | -5 | 25 | 9 | 27 *** | 280 | 50 | less than 7 days of data | | | | | | | |
| Peace River A | 14 | -2 | 24 | 5 | 27 *** | | X | missing data when going | | | | | | | |
| Saskatchewan | | | | | | | | Manitoba | | | | | | | |
| Cree Lake | 14 | -2 | 26 | 4 | 0 *** | 360 | 41 | Brandon A | 14 | -5 | 24 | 5 | 40 *** | 020 | 41 |
| Estevan A | 16 | -4 | 26 | 6 | 15 *** | 290 | 46 | Churchill A | 8 | -3 | 25 | 2 | 12 *** | 260 | 52 |
| La Ronge A | 15 | -2 | 24 | 7 | 7 *** | 320 | 46 | Lynn Lake A | 13 | -3 | 26 | 1 | 4 *** | 320 | 46 |
| Regina A | 17 | -2 | 27 | 7 | 6 *** | 060 | 48 | The Pas A | 13 | -5 | 21 | 5 | 14 *** | 350 | 93 |
| Saskatoon A | 16 | -2 | 26 | 7 | 23 *** | 020 | 44 | Thompson A | 12 | -4 | 26 | 0 | 1 *** | 230 | 37 |
| Swift Current A | 15 | -3 | 24 | 9 | 27 *** | 270 | 61 | Winnipeg Int'l A | 17 | -3 | 26 | 7 | 19 *** | 210 | 52 |
| Yorkton A | 15 | -4 | 23 | 6 | 126 *** | 300 | 113 | | | | | | | | |

mean = mean weekly temperature, °C
 max = maximum weekly temperature, °C
 min = minimum weekly temperature, °C
 anom = mean temperature anomaly, °C
 ptot = weekly precipitation
 st = snow thickness on the ground in cm
 dir = direction of max wind deg. from north
 vel = wind speed in km/h

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