Environment Canada / Environnement Canada
Atmospheric Environment / Environnement atmosphérique

A WEEKLY REVIEW OF CANADIAN CLIMATE

CLIMATIC PERSPECTIVES

THE CANADIAN CLIMATE CENTRE,
ATMOSPHERIC ENVIRONMENT SERVICE,
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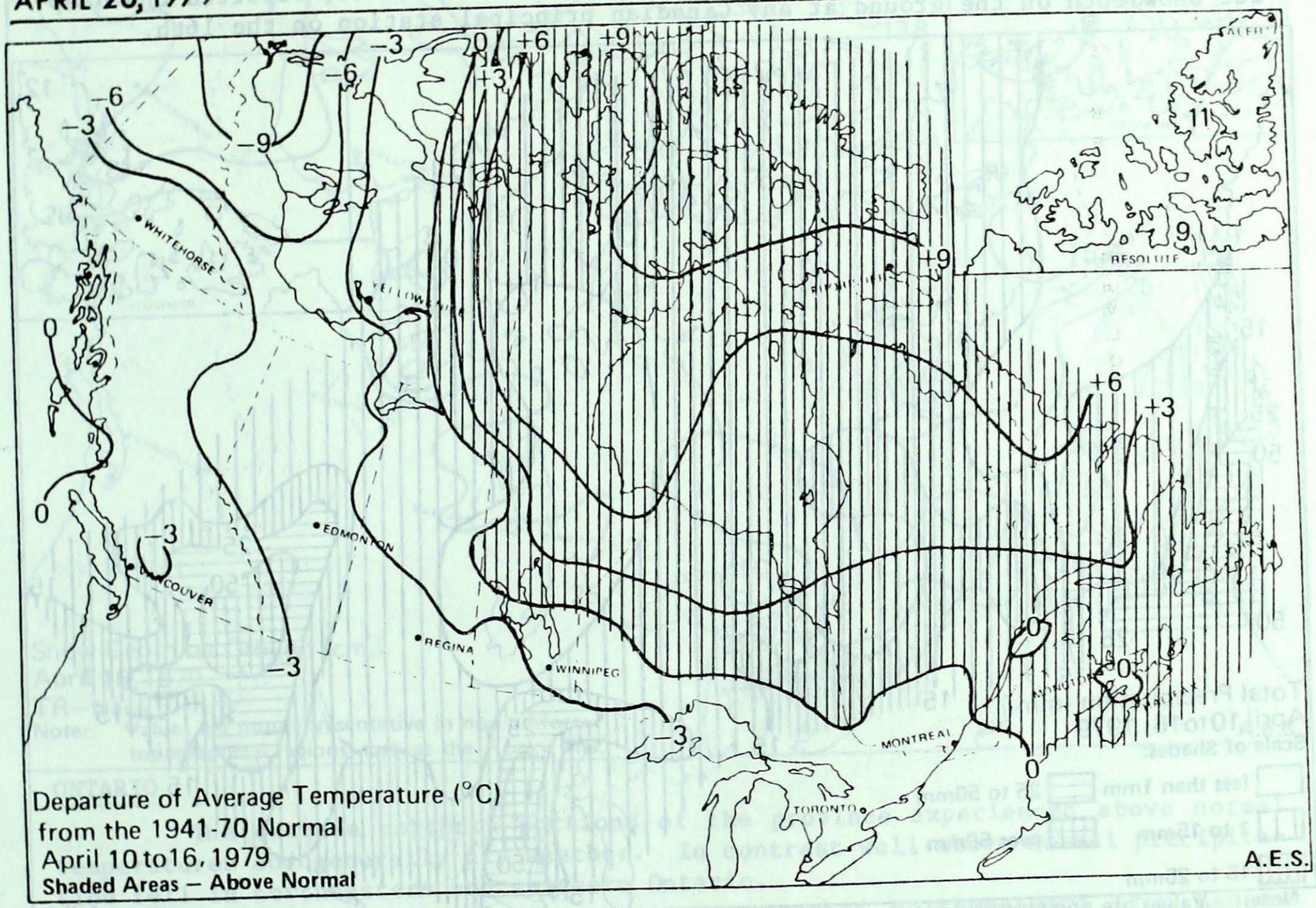
APRIL 20, 1979 VOL. 1 NO. 10



Departure of Average Temperature (°C)
from the 1941-70 Normal
April 10 to 16, 1979
Shaded Areas – Above Normal

A.E.S.

WEATHER HIGHLIGHTS FOR THE WEEK - APRIL 10 - 16, 1979

Widespread Flooding in Southwestern Ontario

17 hours of rainfall on April 13th and 14th combined with the melting of snow which fell in the previous week produced widespread flooding throughout river systems, particularly the Thames and the Grand Rivers in southwestern Ontario.

Overall, a strong meridional (sinuous) atmospheric flow pattern produced generally cool, wet weather throughout southern Canada and sharply contrasting surface temperature anomalies in the far north. Anomalies ranged from +11°C in the eastern Arctic to -11°C in the western Arctic.

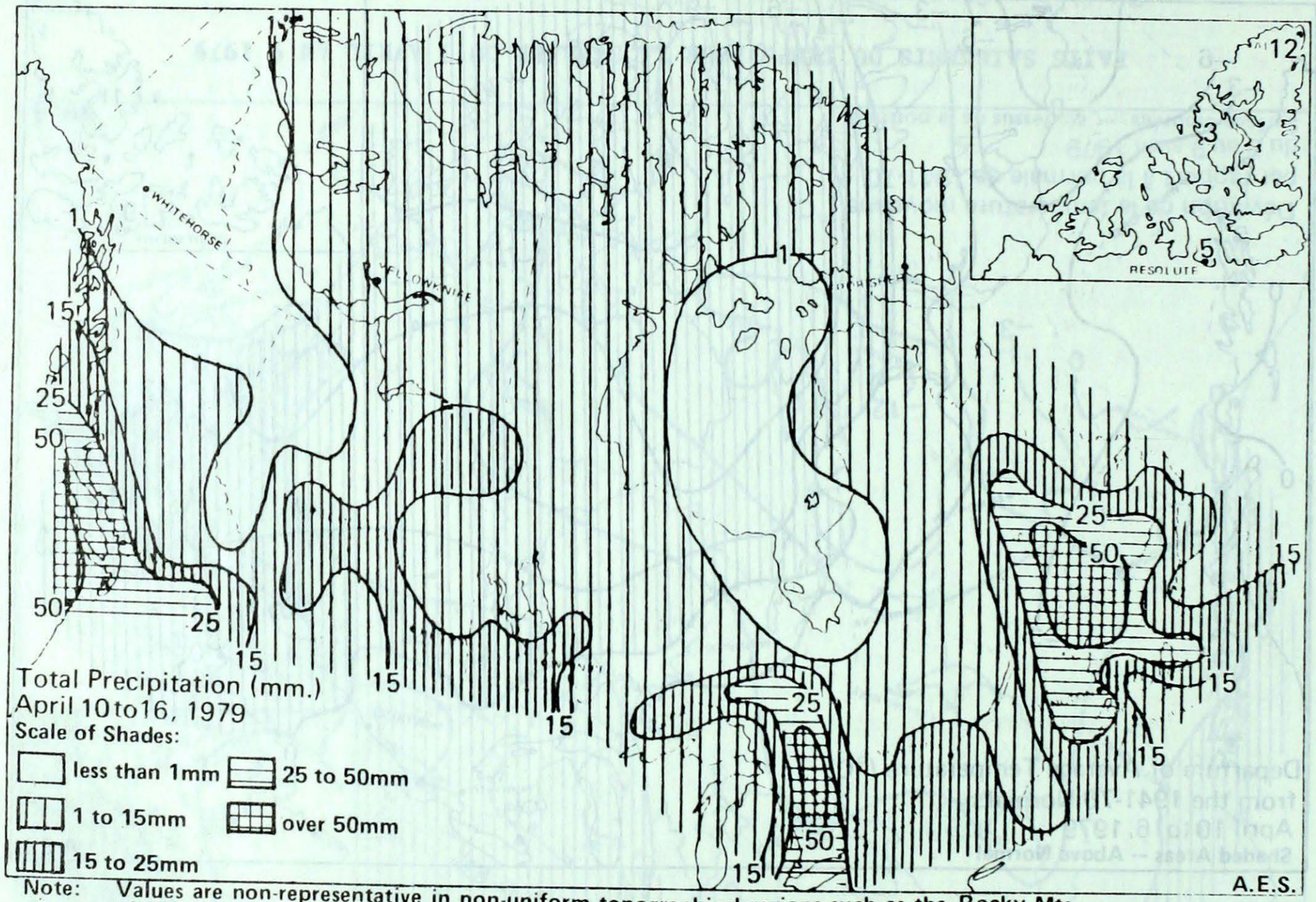
NOTE: The data shown in this publication are based on unverified reports from approximately 170 Surface Synoptic reporting stations of the Atmospheric Environment Service.

YUKON AND NORTHWEST TERRITORIES

The extremely sinuous atmospheric flow produced sharply contrasting surface temperature patterns in Canada's Arctic and Sub-arctic regions. Weekly temperature anomalies ranged from +11°C on Baffin and Ellesmere Islands in the east to -11°C at the Mackenzie Delta in the western Arctic. For example, the temperature rose to 2°C at Cape Dyer and Frobisher on the 10th and 11th respectively. At Inuvik, in the Mackenzie Delta region, the temperature dipped to -39°C on the 13th.

Above normal precipitation fell throughout the central Arctic and Subarctic; elsewhere it was seasonably dry.

Cape Dyer in southeastern Baffin Island, with 138 cm, reported the deepest snowdepth on the ground at any Canadian principal station on the 16th.



Note: Values are non-representative in non-uniform topographical regions such as the Rocky Mts.

BRITISH COLUMBIA

Weekly temperatures averaged 1°C to 4°C below the 1941-1970 normal throughout the province except the central coastal area where temperatures were near normal. During the period several localities in the southern Interior recorded maximum temperatures of 14°C

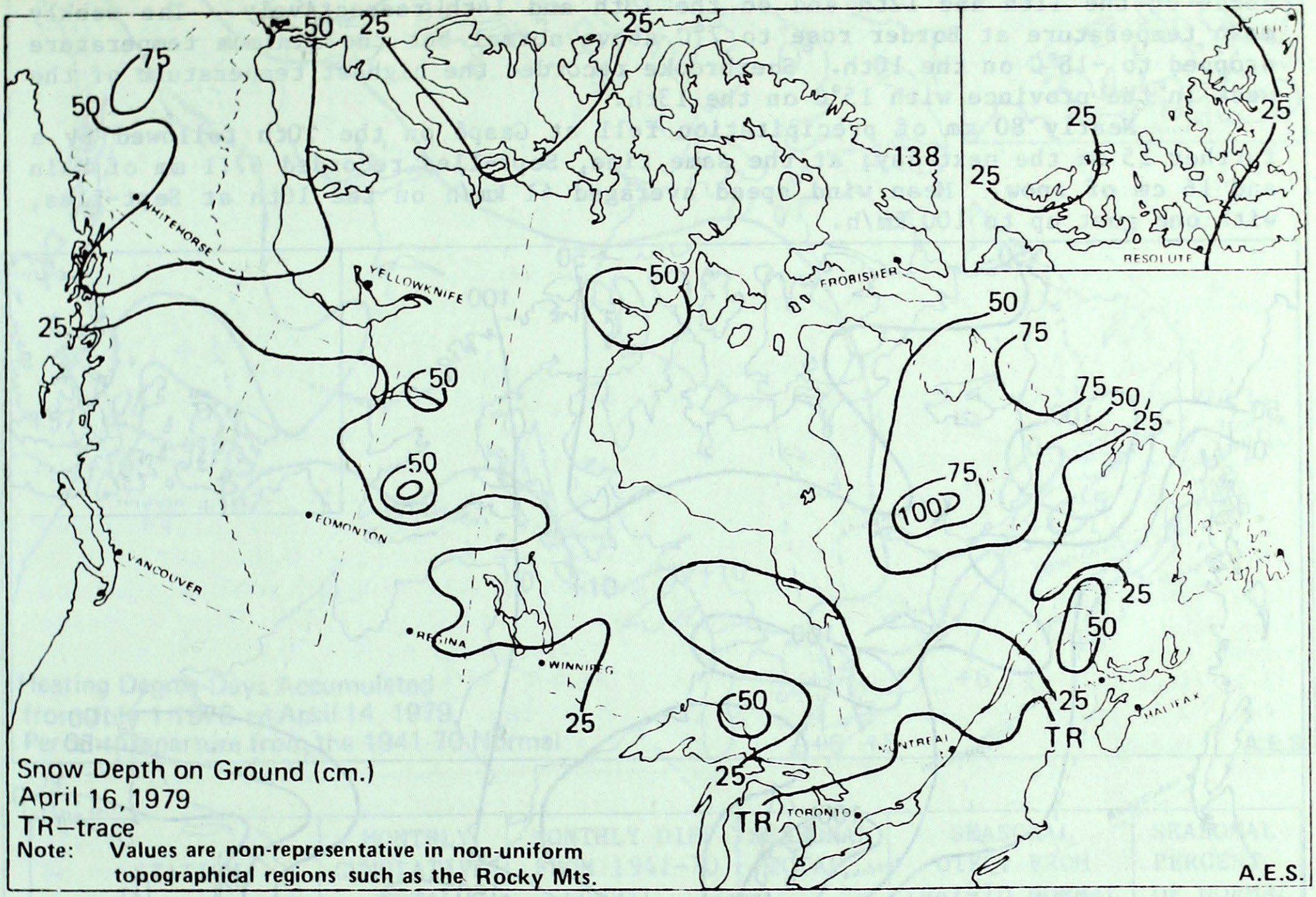
Precipitation was light in the north and above normal in the south. For example, Bull Harbour on Vancouver Island received 66.1 mm compared to the 1941-1970 average of 27.1 mm.

PRAIRIE PROVINCES

It was generally cool and wet for most of the week throughout the provinces, the exception being northern Manitoba where precipitation was light and weekly temperatures averaged up to 7°C above normal. Some warming developed in

southern Alberta and southwestern Saskatchewan on the 16th when Medicine Hat, Alberta, recorded a maximum temperature of 17°C.

The 10-20 mm of precipitation which fell in central Alberta will be of some benefit to forage and pasture lands. Up to 25 mm fell in southeastern Saskatchewan and 15 mm to 25 mm of precipitation was measured in southern Manitoba. Snowdepths remained substantial throughout northern Saskatchewan and most of Manitoba.



Snow Depth on Ground (cm.)
April 16, 1979
TR—trace
Note: Values are non-representative in non-uniform topographical regions such as the Rocky Mts.

A.E.S.

ONTARIO

The extreme northern portions of the province experienced above normal temperatures and generally dry weather. In contrast well above normal precipitation fell in northeastern and southern Ontario.

A deep surface low pressure system tracked northwestward from Kansas April 11th, to northwestern Ontario early April 14. The associated frontal wave brought large amounts of precipitation to southern Ontario in a 17 hour period from late Friday to early Saturday morning. During the storm, Windsor recorded 38.8 mm of rain, London 46.4 mm, and Mount Forest 61.3 mm. Combined with the melting of the record April snowfalls, the result was widespread flooding throughout the Thames River and Grand River systems. During the 14th and 15th some 200 homes suffered water damage in south Chatham as the Indian and MacGregor Creeks crested. The Thames River was expected to crest 5 metres above normal at Chatham late April 17.

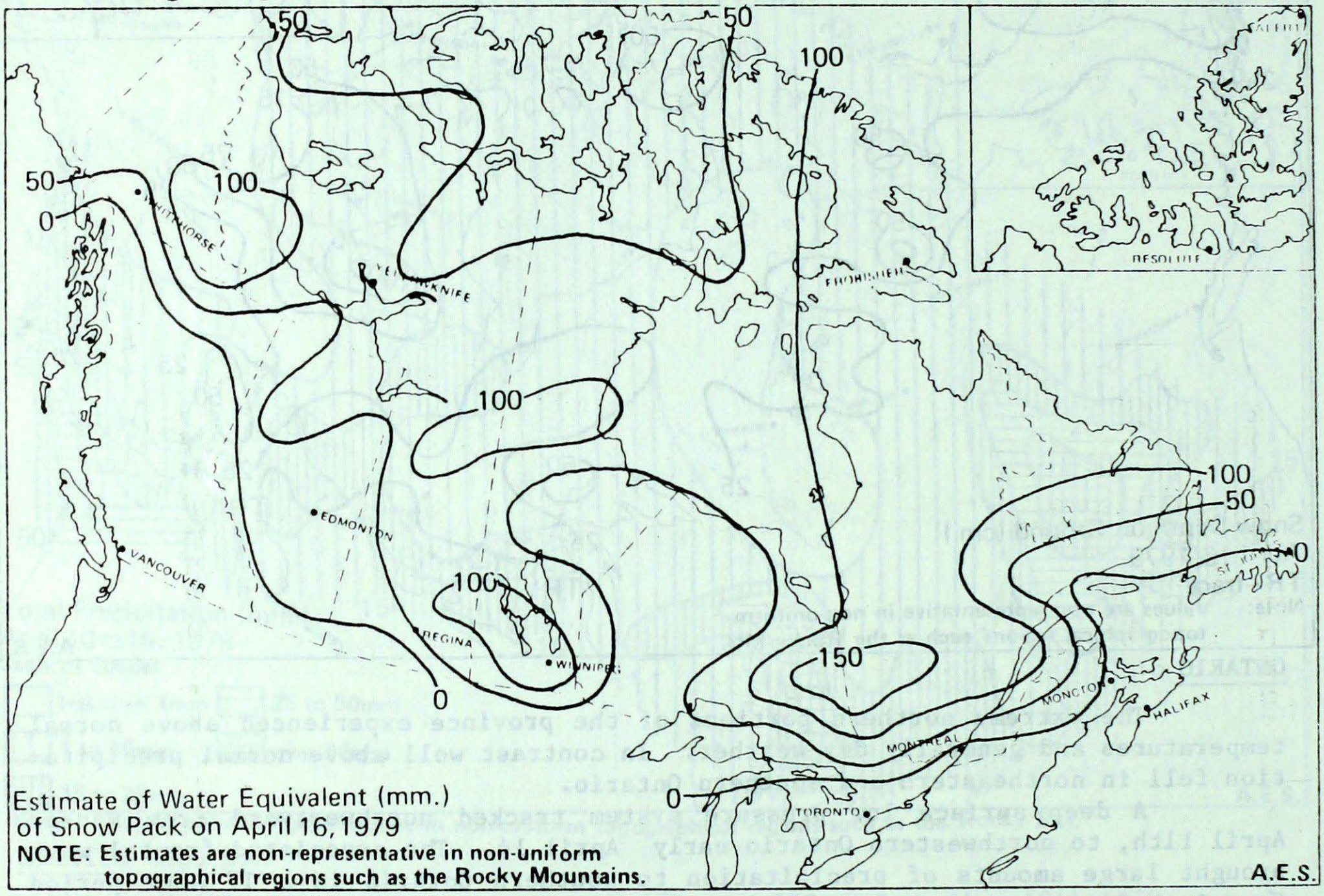
To the north of metro Toronto, strong easterly winds during the latter part of the week pushed considerable ice on shore on the northwest end of Lake Simcoe. Ice piled up to 10 metres high and as far as 20 metres in from shore damaged boats, boathouses and cottages.

April continues to be a cloudy, wet and cool month throughout the province. Precipitation values in many localities are already above April records. E.g. Toronto has recorded 87 mm compared to the 1941-70 normal of 67 mm.

QUEBEC

Rather sunny weather prevailed from the 11th to 13th over the southern and western portions of the province but clouds moved over afterwards; nevertheless, temperatures were stable and daily anomalies were less than 5°C. Elsewhere, inclement weather predominated over eastern and western areas mostly characterized by large amounts of precipitation and strong winds, especially at the beginning of the week; however, warm air set a few daily records in some localities. Schefferville and Sept-Iles both recorded two consecutive new high minimum records on the 11th and 12th and on the 13th and 14th respectively. The weekly mean temperature at Border rose to 7°C above normal but the minimum temperature dropped to -18°C on the 10th. Sherbrooke recorded the highest temperature of the week in the province with 15°C on the 13th.

Nearly 80 mm of precipitation fell at Gaspé on the 10th followed by a further 15 mm the next day; at the same time, Sept-Iles recorded 67.1 mm of rain and 16 cm of snow. Mean wind speed averaged 41 km/h on the 10th at Sept-Iles, with one gust up to 100 km/h.



Estimate of Water Equivalent (mm.)
of Snow Pack on April 16, 1979
NOTE: Estimates are non-representative in non-uniform topographical regions such as the Rocky Mountains.

A.E.S.

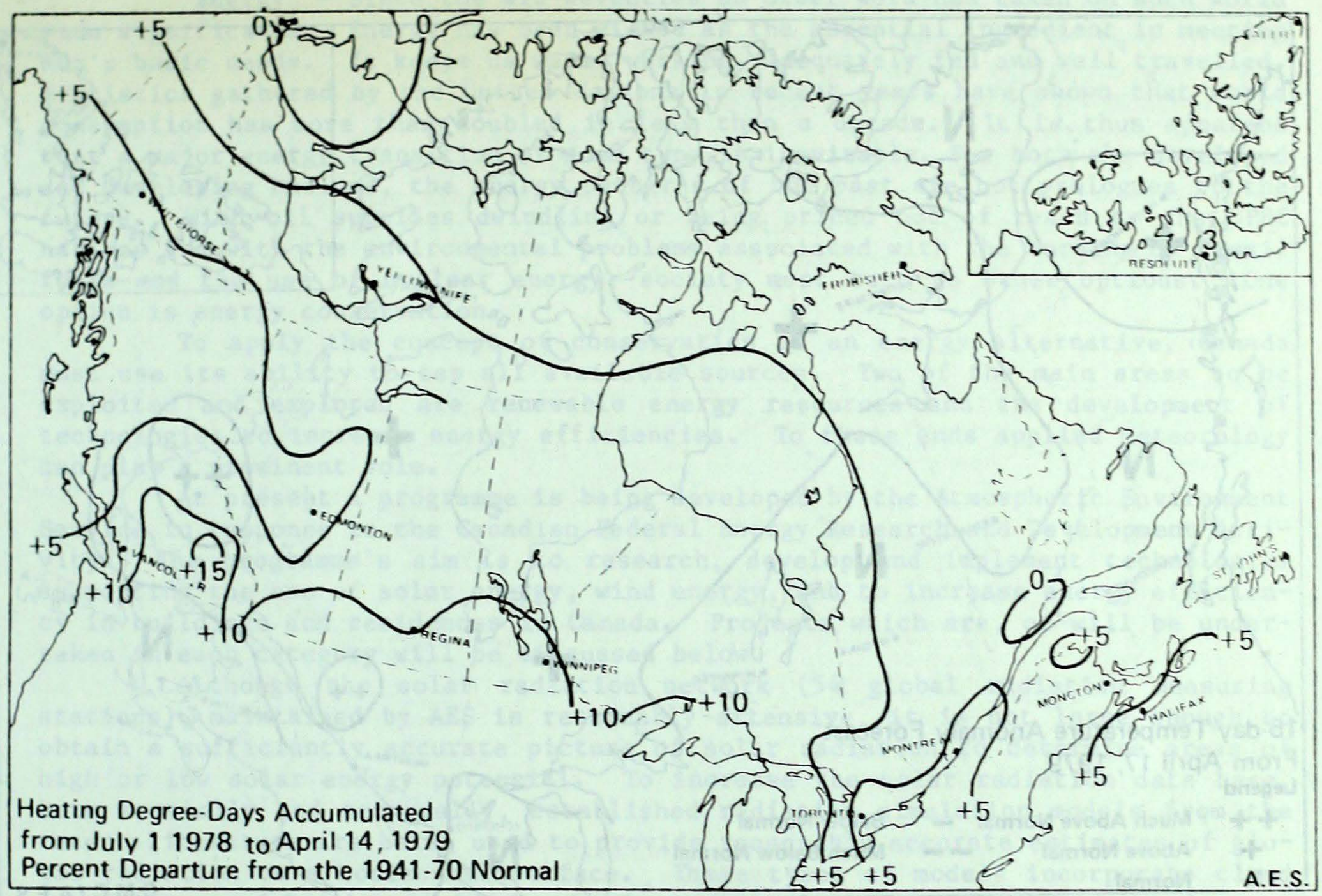
ATLANTIC PROVINCES

With the exception of some heavy rainfalls, 30 mm to 40 mm on the 10th, particularly in New Brunswick and Cape Breton Island, the remainder of the period was generally dry. Yarmouth, Nova Scotia, reported a total of only 0.8 mm for the period. Measurable precipitation was reported on 1 to 3 days in the Maritimes while in Newfoundland precipitation was more frequent, especially along the eastern coastal section.

Temperatures were generally near normal throughout the Maritimes with several locations recording a daily maximum of 14°C during the period. In Labrador above normal values were reported during the first half of the period dropping to near normal values during the latter half. Both Gore Bay and Hopedale, Labrador recorded record high minimum temperatures, 1°C and 0°C respectively, on the 12th.

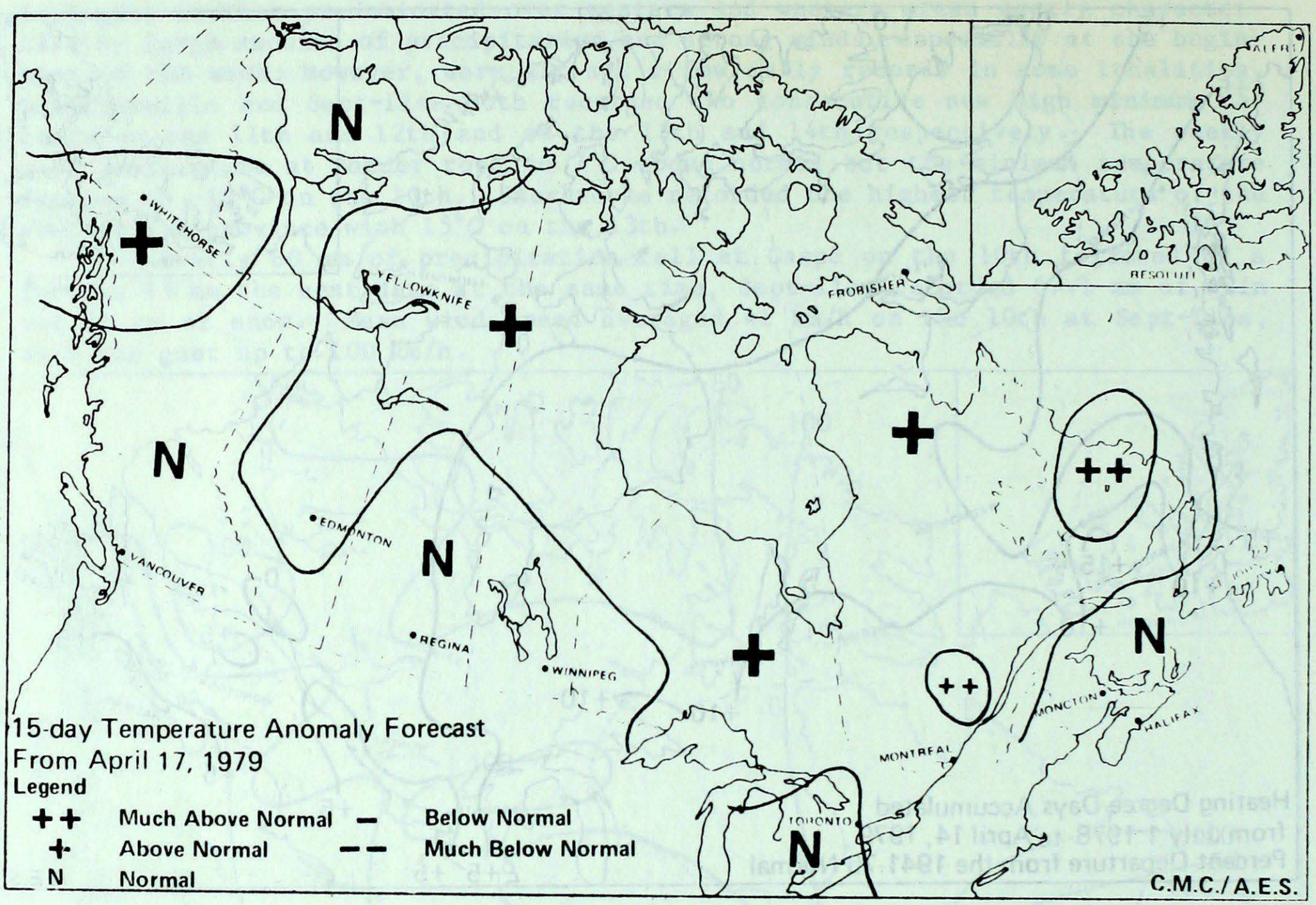
Some minor shipping problems occurred at Notre Dame Bay on the northeast coast of Newfoundland as wind caused ice to congest the bay.

HEATING DEGREE-DAY SUMMARY TO APRIL 14, 1979



STATION	MONTHLY CUMULATIVE TOTAL	MONTHLY DIFF. FROM 1941-70 NORMAL	SEASONAL TOTAL	SEASONAL DIFF. FROM 1941-70 NORMAL	SEASONAL PERCENT OF NORMAL
Resolute	567.0	-44.0	10834.5	344.5	103
Inuvik	567.0	70.0	8693.5	-183.5	98
Whitehorse	287.5	5.5	6370.0	261.0	104
Vancouver Int'l A	143.5	6.5	2763.0	150.0	106
Edmonton Mun A	283.0	55.0	5209.0	144.0	103
Calgary Int'l A	272.5	41.5	5069.5	351.5	107
Regina	343.5	99.5	5946.0	554.0	110
Winnipeg Int'l A	339.5	95.5	6063.0	683.0	113
Thunder Bay	304.0	55.0	5632.0	538.0	111
Windsor	198.5	33.5	3471.0	181.0	106
Toronto Int'l A	230.0	39.0	3877.5	187.5	105
Ottawa Int'l A	219.0	17.0	4394.5	115.5	103
Montreal Int'l A	214.5	13.5	4352.0	255.0	106
Quebec	241.5	4.5	4825.5	257.5	106
Saint John, N.B.	226.5	-1.5	4210.5	79.5	102
Halifax	212.0	1.0	3709.0	205.0	106
Charlottetown	239.0	1.0	4103.0	130.0	103
St. John's, Nfld.	248.0	-4.0	4098.0	165.0	104

15 DAY TEMPERATURE ANOMALY FORECAST



Forecast Method

Analogue technique based on point prediction at 70 Canadian stations.

Temperature Scale

Each temperature class is designed to contain 20% of the historically observed 15 day means pertinent to specific location and time of year:

Station	Current Temperature Anomaly (ΔT) Forecast	
Dawson	Near Normal	($-0.6°C < \Delta T < 0.6°C$)
Frobisher	Above Normal	($0.8°C < \Delta T < 2.8°C$)
Trenton	Above Normal	($0.5°C < \Delta T < 1.7°C$)
Vancouver	Near Normal	($-0.3°C < \Delta T < 0.3°C$)

Note: Anomaly denotes departure from the 1949-73 mean.

ENERGY AND APPLIED METEOROLOGY

"Energy" - Since the mid-seventies no other word has taken on such world wide significance. Energy has been viewed as the essential ingredient in meeting man's basic needs. It keeps us warm, working, adequately fed and well travelled. Statistics gathered by the United Nations in recent years have shown that world consumption has more than doubled in less than a decade. It is thus apparent that a major energy transition of some type is inevitable. For both the developed and developing nations, the energy patterns of the past are not prologues to the future. With oil supplies dwindling or being priced out of reach by the OPEC nations and with the environmental problems associated with the burning of fossil fuels and the use of nuclear energy, society must turn to other options. One option is energy conservation.

To apply the concept of conservation as an energy alternative, Canada must use its ability to tap all available sources. Two of the main areas to be exploited and explored are renewable energy resources and the development of technologies to increase energy efficiencies. To these ends applied meteorology can play a prominent role.

At present a programme is being developed by the Atmospheric Environment Service in response to the Canadian Federal Energy Research and Development Activity. The programme's aim is to research, develop and implement technologies supporting the use of solar energy, wind energy, and to increase energy efficiency in buildings and residences in Canada. Projects which are, or will be undertaken in each category will be discussed below.

Although the solar radiation network (54 global radiation measuring stations), maintained by AES is reasonably extensive, it is not large enough to obtain a sufficiently accurate picture of solar radiation to determine areas of high or low solar energy potential. To increase the solar radiation data base, both spatially and temporally, established radiation simulation models from the recent literature are being used to provide reasonably accurate estimates of global radiation on a horizontal surface. These types of models incorporate cloud cover, hours of bright sunshine and other meteorological parameters commonly measured at hourly weather reporting stations. Related to this work, a project to study the feasibility of using satellite information as input into various models to estimate solar radiation at the surface across Canada is being pursued.

While horizontal radiation values provide an overall view of the potential energy, more specific studies such as the availability of solar energy on tilted surfaces at various azimuths are required for more site specific work. Such a project is currently underway for various locations in Canada. Also computed will be time series analysis of frequencies of occurrence below selected threshold values for the evaluation of storage requirements in solar energy systems. As an extension to this study optimum solar reflector angle and azimuth for various end uses such as domestic hot water, heating, swimming pool heating, and space heating at selected locations will be determined. In conjunction with these studies, archived data files within AES have been updated, streamlined and made more accessible to users.

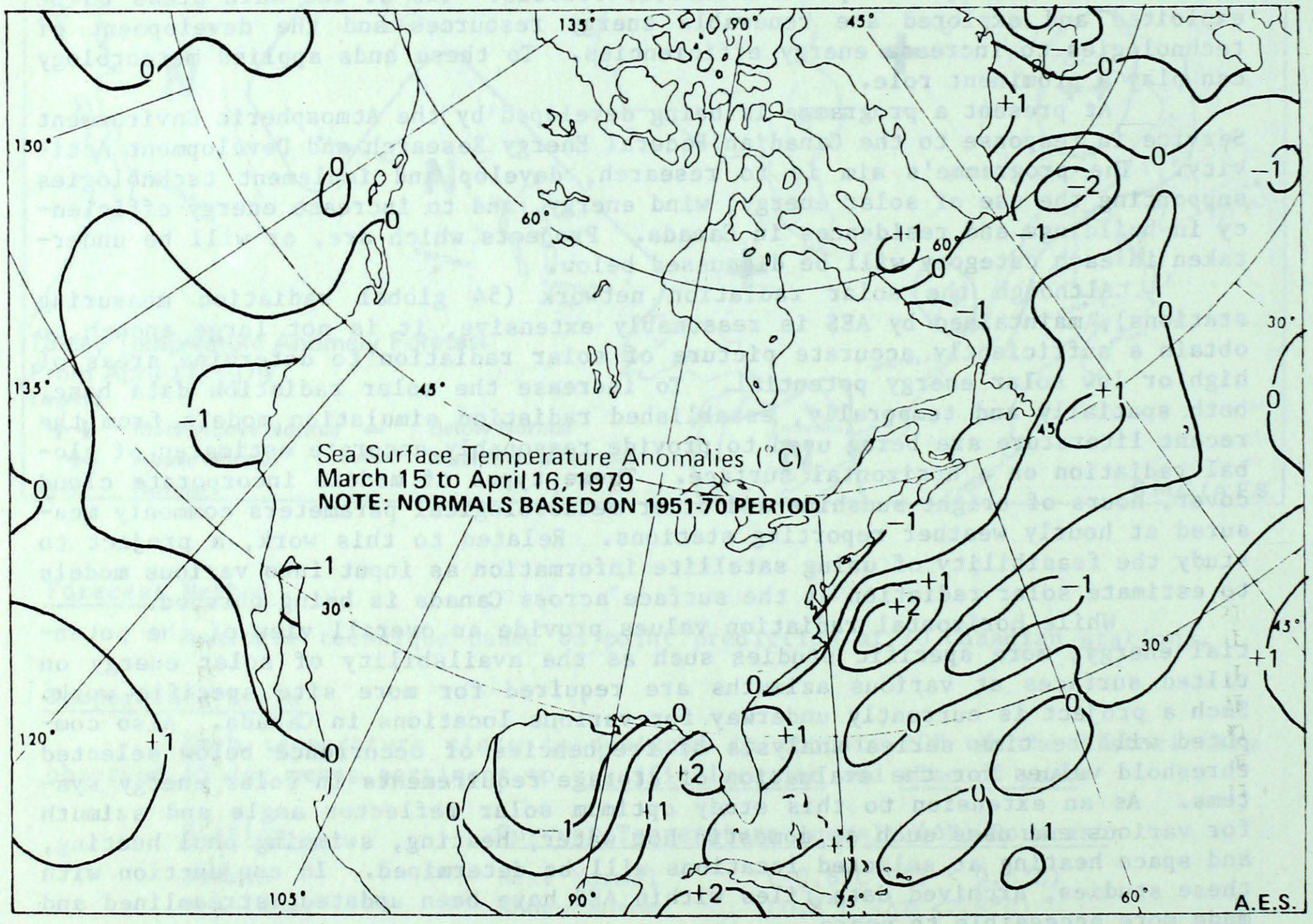
With regard to wind energy, studies to standardize wind measurements to a common height and examination of techniques to develop vertical wind profiles are being investigated. In addition, numerical models which will duplicate topographical effects on wind fields are being examined. Various statistical procedures such as time series analysis will also be conducted and relationships between energy demand and wind energy availability will be determined.

In the area of energy efficiency, the AES has developed a model which evaluates the effect of wind speed, temperature, insolation, nocturnal cloud cover and humidity on heat loss. It is felt that this model will provide a more meaningful evaluation of heating requirements than the heating degree day now in

use. Also, a project to develop a "typical" or reference year of data for use in simulation and design models is being undertaken.

The demand for energy will continue to increase as the developed nations strive to maintain their existing lifestyles and the developing nations push to improve theirs. In order to achieve these goals a concerted effort towards efficient use of energy is necessary. This can be accomplished by energy conservation which not only applies better efficiency but also the exploitation and exploration of alternative sources. In implementing conservation, applied meteorology can play a significant role. The Atmospheric Environment Service under the Federal Energy Activity has taken on this role and has initiated a planned programme to aid in the development of renewable resources and energy efficiency in residences and buildings in Canada.

D.C. McKay



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TEMPERATURE AND PRECIPITATION DATA FOR THE WEEK ENDING 0600 G.M.T. APRIL 17, 1979

Station	Temperature (°C) Average	Departure from Normal	Extreme Maximum	Extreme Minimum	Precip. (mm) Total	Departure from Normal
BRITISH COLUMBIA						
Abbotsford	6	- 2	12	- 1	42.9	17.9
Blue River	M	M	M	M	M	M
Bull Harbour	5	- 2	11	- 1	66.1	39.0
Castlegar A	6	- 1	12	- 3	26.8	19.3
Cranbrook A	4	- 1	12	- 3	17.8	16.3
Comox A	6	- 2	12	- 1	30.4	14.7
Estevan Point	M	M	M	1	57.8	3.1
Fort Nelson A	- 1	- 3	6	- 8	0.0	- 4.8
Fort St. John A	- 2	- 4	5	- 6	2.7	- 2.9
Kamloops A	6	- 2	14	- 4	5.0	3.0
Lytton	7	- 3	14	1	18.4	13.1
Penticton A	6	- 3	14	- 3	5.5	0.0
Port Hardy A	5	- 1	11	- 1	32.8	7.9
Prince George A	2	- 2	10	- 5	1.6	- 6.2
Prince Rupert A	4	0	11	- 2	13.9	-32.7
Quesnel A	4	- 1	11	- 4	6.4	0.2
Revelstoke A	M	M	M	M	M	M
Smithers A	3	- 1	9	- 4	2.0	- 3.3
Terrace A	5	0	12	- 1	4.2	-14.4
Vancouver Int'l A	7	- 2	13	0	29.8	16.4
Victoria Int'l A	6	- 2	13	0	23.4	11.6
Williams Lake A	2	- 2	9	- 4	12.0	4.9
YUKON TERRITORY						
Dawson A	-10	- 8	4	-23	0.0	- 2.9
Mayo A	- 4	- 3	5	-12	0.2	- 2.2
Watson Lake A	- 2	- 2	7	-13	0.2	- 4.5
Whitehorse A	- 1	- 1	6	-11	0.0	- 2.5
NORTHWEST TERRITORIES						
Alert	M	M	- 6	M	2.0	0.1
Baker Lake	- 9	8	- 2	-23	1.6	- 1.1
Cambridge Bay A	-15	7	- 5	-26	5.3	3.7
Cape Dyer	- 5	M	2	-11	10.4	M
Chesterfield Inlet	- 9	8	- 4	-20	0.0	- 2.4
Clyde	- 9	11	0	-16	1.4	- 0.4
Coppermine	-19	- 1	-14	-28	15.9	13.0
Coral Harbour	- 9	9	- 2	-14	0.4	- 1.6
Ennadai	- 7	7	0	-13	7.8	2.3
Eureka	-18	11	- 3	-32	3.1	2.9
Fort Simpson	- 8	- 4	- 1	-22	3.5	- 1.0
Fort Smith A	- 6	- 3	1	-18	3.0	- 1.7
Frobisher Bay A	- 7	9	2	-15	2.1	- 3.5
Hay River A	-10	- 5	- 2	-18	2.7	- 1.7
Inuvik A	-26	-11	-18	-39	1.2	- 2.6
Mould Bay	-27	- 3	-15	-34	4.3	3.7
Norman Wells A	-16	- 8	-11	-24	0.9	- 2.6
Resolute A	-15	9	- 5	-24	5.3	4.0
Sachs Harbour	M	M	-18	M	1.8	1.1
Yellowknife A	-10	- 2	- 3	-18	7.1	5.6
ALBERTA						
Banff	1	- 2	8	- 4	2.0	- 3.9
Calgary Int'l A	- 1	- 5	7	- 7	8.2	3.5
Cold Lake A	0	- 3	6	- 5	12.5	7.1
Coronation A	- 2	- 5	7	- 6	21.4	18.0
Edmonton Mun. A	0	- 5	4	- 6	15.6	11.1
Edmonton Namao A	- 1	- 5	5	- 8	18.0	14.3
Edson A	- 2	- 5	5	- 9	11.2	3.1
Fort Chipewyan	- 4	- 3	5	-18	9.2	5.4
Fort McMurray A	- 2	- 3	8	- 9	8.8	4.3
Grande Prairie A	- 1	- 4	5	- 7	0.6	- 3.5
Jasper	1	- 2	7	- 6	0.4	- 6.0
Lethbridge A	2	- 4	14	- 4	5.8	- 0.8
Medicine Hat A	2	- 5	17	- 5	13.8	10.6
Peace River A	- 2	- 4	6	- 8	0.0	- 5.0
Red Deer A	- 1	- 5	3	- 5	11.3	6.0
Rocky Mountain House	- 1	- 4	4	- 5	6.7	- 1.9
Vermilion A	- 1	- 4	4	- 5	13.5	8.8
Whitecourt	- 1	- 4	6	- 6	9.7	5.1
SASKATCHEWAN						
Broadview	- 2	- 4	3	- 8	15.7	10.1
Buffalo Narrows	- 1	M	8	-10	18.0	17.1
Cree Lake	- 3	M	6	-20	15.4	M
Estevan A	0	- 4	3	- 3	24.6	18.7
Hudson Bay	M	M	6	M	M	M
Kindersley	0	- 5	9	- 5	6.0	3.0
La Ronge A	1	0	8	- 8	4.5	1.7
North Battleford A	- 2	- 5	3	- 9	18.3	15.0
Prince Albert A	0	- 2	4	- 8	10.1	5.5
Regina A	0	- 4	3	- 4	24.1	19.9
Saskatoon A	- 1	- 4	4	- 6	18.2	14.8
Swift Current A	- 1	- 5	8	- 7	10.4	6.3
Uranium City	- 4	M	3	-20	12.1	M
Wynyard	- 1	- 5	3	- 6	12.3	10.5
Yorkton A	- 1	- 3	3	- 7	13.4	10.0
MANITOBA						
Bissett	2	- 3	11	-11	16.3	11.8
Brandon A	0	- 3	4	-10	21.0	15.6
Churchill A	- 5	7	4	-21	2.2	- 4.5
Dauphin A	- 1	- 4	4	-16	18.5	12.7
Gillam A	0	M	10	-20	4.7	M
Gimli	0	- 2	6	-11	12.3	4.7
Lynn Lake	1	- 1	10	- 5	18.0	M
Norway House	1	M	9	-13	1.7	M
Pilot Mound	- 1	- 5	5	-10	M	M
Portage la Prairie	0	- 4	6	-13	M	M
The Pas A	1	2	8	- 6	9.8	2.3
Thompson A	2	4	10	-10	1.8	- 7.2
Winnipeg Int'l A	1	- 3	6	- 8	24.6	16.3
ONTARIO						
Armstrong A	- 1	0	6	-18	M	M
Atikokan	1	- 3	11	-16	11.4	- 6.0
Earlton A	2	0	7	- 9	19.1	6.4
Geraldton	0	- 2	10	-22	16.8	4.7
Gore Bay A	4	0	11	- 5	17.2	3.6
Kapuskasing A	0	- 1	10	-17	37.6	26.0
Kenora A	2	- 1	10	- 7	13.0	3.0
Kingston A	4	- 2	12	- 3	M	M
Lansdowne House	1	4	9	-13	2.2	- 6.9
London A	4	- 2	15	- 8	48.2	29.3
Moosonee	- 1	1	10	-22	0.0	- 8.3
Mount Forest	2	- 2	10	-10	65.7	50.2
Muskoka A	4	0	14	- 7	18.1	1.8
North Bay A	3	0	11	- 7	16.0	- 0.6
Ottawa Int'l A	5	- 1	14	- 4	20.0	4.2
Petawawa A	3	M	12	- 7	12.0	M
Pickle Lake	1	2	9	-16	12.7	2.5
Red Lake A	1	0	10	-12	9.2	5.6
Simcoe	M	M	M	- 5	M	M
Sioux Lookout A	1	0	10	-13	13.6	3.9
Sudbury A	2	- 2	8	- 8	64.8	51.9
Thunder Bay A	2	0	12	-13	24.4	12.8
Timmins A	1	- 1	9	-13	27.4	14.5
Toronto Int'l A	4	- 2	12	- 6	24.0	8.6
Trenton A	5	- 1	12	- 4	16.8	1.3
Trout Lake	1	5	8	-19	3.2	- 2.9
Wawa A	1	M	10	-17	8.4	M
Wiarton A	4	- 1	11	- 5	47.2	30.6
Windsor A	7	- 1	17	- 2	48.4	33.9
QUEBEC						
Bagotville A	3	1	13	- 6	6.6	- 4.2
Baie Comeau	1	1	9	- 6	19.4	9.2
Border	- 4	7	2	-18	8.1	- 0.8
Chibougamau	0	M	12	-12	11.0	M
Fort Chimo A	- 5	5	5	-14	8.2	4.4
Gaspé A	2	2	9	- 3	103.4	97.6
Grindstone Island	1	1	5	- 3	26.0	12.1
Inoucdjouac	- 8	3	1	-13	3.2	- 0.3
Maniwaki	4	- 1	14	- 5	M	M
Matagami A	0	M	10	-18	0.0	M
Mont Joli A	0	- 2	6	- 7	42.6	27.1
Montréal Int'l A	5	- 1	14	- 4	15.4	- 0.8
Natashquan A	3	3	9	- 3	56.3	42.7
Nitchequon	- 2	4	9	-11	6.4	- 1.1
Port Menier	2	2	8	- 4	M	M
Poste de la Baleine	- 2	5	12	-14	0.0	- 7.3
Québec A	3	0	10	- 5	9.8	- 8.7
Riviere du Loup	2	0	10	- 3	5.5	- 3.7
Roberval A	2	- 1	11	- 6	4.9	- 0.8
Schefferville A	- 3	5	4	-11	42.8	37.2
Sept-Iles A	2	3	7	- 3	83.7	72.7
Sherbrooke A	3	- 1	15	- 5	14.0	0.1
Val d'Or A	1	- 1	9	-11	4.8	- 6.2
NEW BRUNSWICK						
Charlo A	2	1	13	- 5	42.1	38.1
Chatham A	4	1	14	- 2	40.9	17.8
Fredericton A	4	0	13	- 5	34.7	14.5
Moncton A	2	0	13	- 4	32.4	10.2
Saint John A	3	1	11	- 4	31.2	5.2
NOVA SCOTIA						
Greenwood A	4	0	14	- 4	17.3	- 0.3
Shearwater A	4	0	10	- 2	15.7	- 5.4
Sydney A	2	0	11	- 5	41.5	19.4
Truro	M	M	M	M	M	M
Yarmouth A	5	1	12	- 2	10.5	-10.6
PRINCE EDWARD ISLAND						
Charlottetown	3	1	13	- 4	14.4	- 5.0
Summerside	2	0	14	- 3	14.0	- 5.2
NEWFOUNDLAND						
Battle Harbour	- 1	2	3	- 4	7.3	- 8.7
Cartwright	0	3	5	- 5	14.5	- 1.9
Deer Lake	3	2	8	- 2	16.4	11.0
Gander Int'l A	1	0	8	- 4	11.7	-12.8
Goose A	1	3	7	- 5	8.7	- 6.8
Hopedale	- 2	4	2	- 6	11.7	4.2
St. Anthony	- 1	M	2	- 6	18.1	M
St. John's A	1	0	6	- 3	20.4	-13.4
Stephenville A	3	2	11	- 4	11.0	- 3.7
Wabush Lake	- 1	4	5	-12	52.0	45.6

M-Denotes missing data