

Weather During the Copper-Nickel Project

This section discusses actual weather occurrences during the period 1 June 1976 to 1 January 1978. Although 1976 was rather atypical from the standpoint of the extreme degrees of the summer and fall, the year 1977 stands out as a year in which weather followed rather typical patterns, even with about the normal allotment of unusual occurrences.

The region experiences weather shaped by three kinds of air masses -- continental polar, maritime polar, and maritime tropical. Continental polar air is that which has been shaped by a stay over ~~the~~ North America. ^{In this report, we refer to it often as simply "continental" air.} It may have substantial water content if it has lingered over the southern part of the United States for several days or more, but it differs from maritime tropical air in that it is never quite as moist and its moisture content is never quite as high as that of maritime tropical air. But this air is essentially shaped in the north of Canada. Certainly, it is air that has moved in from the oceans, but which has lost its

moisture ~~can~~ characteristics by losing heat and moisture as a result of continental visit. The land cannot supply the mass^{ad moisture} to the air that the oceans can, and radiation to space is ~~is~~ easier to remove heat while the land surface is easier to remove moisture through condensation and sublimation. In addition, the precipitation process removes moisture which the land cannot resupply, and the Canadian Rockies steal much of the moisture from the raw material air as it crosses them. Continental polar air arriving in the Copper Nickel region is cool and dry when it comes from the north -- but it can be warm and sometimes even quite moist when it comes from the south. Such air is that which moved south of the Region but never reached the tropical ocean. ^{of} Maritime ~~polar~~ polar air which arrives in the Copper Nickel Region is almost entirely from the Pacific Ocean -- in this report ~~and~~ it is referred to often as "Pacific air". This air is ^{essentially} that which crosses the mountains of the United States west rather than the Canadian Rockies. ~~The Pacific air is~~ Such air is associated with a general flow of the air stream from west to east -- "zonal flow", in meteorological jargon.

This Pacific air is characteristically warm and dry, but not quite as dry as continental air. The warming is due to the descent of air from ^{over} the high mountains -- the "polar" appellation to this air's name is thus somewhat misleading. This air is responsible generally for the warmer weather that sometimes occurs in the winter in the Copper-Nickel Region.

Maritime tropical air is a rare visitor to the Copper-Nickel Region. In order to ^{import} ~~import~~ it this far inland, a strong southerly flow must be set up for a substantial period of time. This essentially cannot occur in the cold season -- it is virtually impossible for maritime tropical air to reach the region except from May through September.

Figures -- and -- ^{are event graphs which} give the air masses present in the Copper-Nickel Region from June 1, 1976 to December 31, 1977. The shaded areas designate the presence of continental polar air, the unshaded the presence of maritime polar (Pacific) air, except where the designation, MT, indicates maritime tropical air.

As would be expected, the continental polar air predominates, with maritime tropical air being rare. Noteworthy, perhaps, are the generally long stays of each type of air mass -- interestingly, short stays of Pacific air ^{are} generally due to a storm center passing over the region, ~~so~~ with Pacific air coming in behind a warm front rather than behind a cold front. Pacific air coming in behind cold fronts generally results in a long stay.

Note that the entire month of September, 1976 was ruled by continental air, while Pacific air ruled as long as ^{about} a fortnight in April, 1977, ^{May, 1977,} and from October 27 to November 9, 1977. The longest stay of maritime tropical air was almost 3 days in July, 1977. No maritime tropical air entered the region in 1976. One does not appear to be a seasonal preference to the domination of either continental air or Pacific air from the data period of the project -- ~~the data~~ it can be said that Pacific air can enter the region at any time of the year.

1. Introduction

The general pattern that is seen in the Coppen-Michel Region is for a cold air mass to move ^{under northwest flow aloft} ~~from~~ from northwestern Canada, crossing the region from the northwest. The air mass may then overspread the entire United States east of the Rockies. While the air flow is still from the northwest, a minor wind-shift line (which may exist for a quarter day to a day or so) may cross the Region, giving some ^{short-lived cloudbursts} ~~brief~~ showers. Following this, another surge of cold air may move from the northwest, along with a minor low pressure area, bringing precipitation as it passes. Several more such surges may occur.

With a shift in upper air pattern from northwest to west wind, air over the Pacific will move eastward to replace the cold continental air over the eastern portion of the continent. A large low pressure system is characteristically found at the northern flank of the ~~Pacific~~ Pacific front. This front, crossing the Coppen-Michel Region, has behind it mild air, which brings ^{winter and so} ~~the~~ thaws in January. The ~~first~~ initial Pacific surge may be a warm front, so that its arrival is preceded by southerly winds and precipitation. Fine weather with westerly winds (between southwest and northwest)

Typically, ~~pattern of weather in the region~~

~~for~~ the general flow of the ~~upper air~~ air stream ~~the~~ in ~~through~~ the troposphere to the Region varies from between northwest and southwest. Such large-scale flow generally persists from a particular direction for periods of time varying from almost a week to a month. Changes may be shorter or longer than this, however. Typically, a cold front crosses the region about once every 4-2 days. With northwesterly flow, a series of continental cold fronts may pass, while during westerly to southwesterly flow, a series of Pacific fronts may pass. A changing pattern will see one type of air mass replace another. If a Pacific air mass replaces continental air, the leading edge of the air mass ^{often arrives as} ~~is~~ a warm front rather than a cold front.

Several Pacific fronts may pass over in succession,
so that a warm weather regime is set up. If
the storm center on the northern flank of the cold front
is too strong, or if it passes too close to the
Region, cold air may be drawn into the Region
from the northeast. Many continental polar
fronts ^{enter} ~~are drawn into~~ the Region in this fashion.
Characteristically they are well-marked with
a sharp temperature drop, low clouds, and
precipitation. They are responsible for commentaries
on "sudden change in the weather".

Such a front may stall to the south, over
Iowa or vicinity. The next low pressure system
coming from the west may then induce the front
to move north, crossing the Region as a warm
front, with precipitation ahead of it. Since
this event is associated with an approaching low
pressure area, the stay of warm air is usually
for only a half-day or so, and is followed by
more cold continental air from the northwest.

Sometimes the storm system may move from west to east ~~to the south of the region~~ over southern Minnesota and Wisconsin. Then there is no change of air mass at the surface, but rather a backing of the wind from northeasterly to northwesterly. This situation brings rain or snow of long duration, usually resulting in copious amounts. This is a common situation in March and April, ^{and again in November,} accounting for the heavy snows sometimes experienced in those months.

In the warm season, several days of low pressure over the western United States may allow maritime tropical air in ahead of a storm system. The days of such air may be from hours, if the low ~~storm~~ pressure center passes close. In languid situations, the tropical air may be around for up to a week.

One other instance merits special mention.

A cold front may overtake a warm front, and the result is ^{termed} an occlusion. In an occlusion, precipitation and clouds occur both ahead of and behind the front; in contrast, a warm front has most of the cloudiness and heavy precipitation ahead of it, while a cold front has most of the heavy precipitation ~~behind~~ at and behind the leading edge.

Like a cold front, the occlusion is generally marked by a ^{sharp} wind shift from southerly to westerly or northwesterly (except when thunderstorms occur, in which case the ^{small-scale, sharp} wind systems generated by the ^{thunder} storms overshadow the large-scale wind). Warm fronts crossing the region are generally diffused, and sometimes several hours transpire before the wind shift becomes clearly evident to the casual observer.

Between ^{coast} frontal passages, a period of rising barometer followed by a ~~rest of~~ crest ~~is~~ and a succeeding drop in barometer occurs. This is due to regions of high pressure between the frontal systems. Such regions are characterized by ^{generally} sinking air, although ~~some~~ sub-regions of rising air may exist therein in any of the three dimensions.

~~High pressure systems~~

The exact center of high pressure systems will ^{not} usually pass right over, ^{and often not even near,} the Region, so a pressure "ridge" is usually experienced after a frontal passage. If the ~~low~~ ^{high} ^{pressure} center passes to the ~~south~~ south of the Region, winds will back from northwest through west to southwest and then southeast. If the high pressure center passes to the north, winds ^{veer} ~~back~~ from northwest to northeast to southeast.

If the high pressure center passes over or near the region, the wind ^{will be light and variable, and} may drop to dead calm. This gives a warm, sunny day or a cold, clear night.

On occasion, ~~the~~ high pressure system, ^{extending from the surface to heights of 10 kilometers or more} will become stalled over the region or at least somewhere in the mid-continental area. ~~In such~~ This ~~bring~~ can bring many days of hot, clear weather. High pressure, ^{over mid-continent} not only favors warm, ^{sinking} ~~settling~~ air and sunshine, but also flow of Pacific air, warm and dry after crossing the western mountains.

An appreciation of the interplay of the fronts and air masses can be obtained from the following review of the weather in the Region from ~~June~~ June 1, 1976 to December 31, 1977.

Table — gives a synopsis of the frontal systems, (with fronts occurring to March 1978 in addition), which are numbered similarly in the texts according to cold front passages. Warm fronts are numbered in the text with the designation W preceded by the number of the previous cold front. On occasion, a cold front "backs up" to become a warm front, then advances once again. In such a case, the cold front retains the same number originally designated, along with the letter R following. Similarly, ~~the front~~ front may back up once more, so a warm front can also have the letter R, designating a return. Multiple R's ~~also~~ indicate multiple returns. Front numbers begin with the first front in June, 1976 and again with the first front in 1977, and again with the first front in 1978.

The Table ~~also~~ gives the time of passage of the fronts, the kind of air mass ~~of~~^{at} which they are the leading edge, and the general pattern following the front.

The table and text are not only instructional to get a ~~handle~~ handle on the kind of weather ~~to~~ to be expected in the Region, but are also useful to identify weather taking place during Copper-Nickel experiments and projects, as well as ^{elsewhere} relating the data in this report to actual weather occurrence.

1976

1. Continental air mass crossed 0230 1 June. ~~Winds began~~ ^{as front stalled immediately south of Region} southeasterly under fair skies on 1 June, ~~to 2 June~~ ^{dying to calm} at night. Winds died to calm at night.

1-W Warm,
Clear all day except for a few cumulus after warm Pacific front early in morning 2 June. Fair, warm, with little more than a few ^{dissolved} cumulus, southerly winds by day, calm by night, through wee. hours of 6 June. Clouds appeared just before dawn 7 June with ^{afternoon and nighttime} thunderstorms.

2. Pacific cold front moved across ^{at 0530 8 June} with ^{initial} westerlies yielding to light and variable winds remainder of 8 June. Fair skies at night, but clouding up around dawn.

2W Front retracted as warm front crossing around 1200 9 June. Brisk southwesterlies and hot temperatures in afternoon.

3. Towering cumulus in afternoon grew into thunderclouds by evening, ~~with~~ with mesoscale systems along front which passed around 1900 9 June. Variable cloudiness with limited cumulus activity 10 June with moderate westerly winds.

4. Continental front from north 0530 ¹¹ June. Cool day with only high clouds, no cumulus activity on 11 June. Easterly winds through morning of 12 June. Thunderstorm activity all of afternoon, early evening of 12 June.

1976

4W

warm air readvanced on evening of 12 June.
warm, partly cloudy night.

Wrap-around

5. ~~Pacific~~ front crossed 0530 13 June, coming from southwest. Brisk southwesterlies by day 13 June, with ~~the~~ stratocumulus, cirrus clouds.

6. Fresh, continental polar air mass arrived 1800 13 June. Fine day with ^{moderate} northwesterly winds 14 June. Nocturnal thunderstorms 14-15 June. Skies clouded 15 June with drizzle, fog as occlusion moved ^{near} ~~just south~~ of Region. Winds backed from light northeasterly to northwesterly by end of 15 June. Low clouds, northwesterly winds backed to southeasterly following barometric pressure crest 100.99 kPa at 1657 16 June. Showers broke out wee hours of 17 June, with afternoon thunderstorms.

7. Mesoscale systems marked ^{leading edge} new continental ~~the~~ polar air mass arriving around 1730 17 June. Skies partly cloudy with low clouds, rain showers, ~~rather~~ brisk northwesterly winds on 18 June, followed by ^{lighter} ~~rather~~ northwesterlies and ~~the~~ moderate convective activity on 18 June. Calm night of 18-19 June with patchy ground fog. Fair skies, no cumulus, brisk southwesterlies ^{by day} ~~southwesterlies~~ 20, 21 June. High cloudiness largest of 21-22 June.

1976

8. New continental front ~~passed~~ 1200 22 June. Mild day, light westerlies, only a few cumulus developed under broken layer of alto cumulus.

8W New front retreated about ~~1500~~ 1700 22nd June. Brisk ~~southwesterlies~~, southeasterlies, hazy, limited cumulus activity 23rd 24 June. Rain broke at very late on 24 June as occlusion moved toward Region

8-R Occlusion ahead of Pacific air crossed at 0330 25 June accompanied by ~~rain~~ heavy, steady rain. ~~Variable cloudiness followed occlusion, clearing in evening of 25 June.~~

8-R Cold front of continental polar air ^{returned} ~~reformed~~ ~~in the~~ occlusion, crossing Region 0900 25 June. ^{Rain ended 1230 25 June.} ~~Variable~~ ~~cloudiness~~ followed by clearing in evening.

8. Old cold front (?) returned 0230 26 June. Variable cloudiness ended in thunderstorms in evening.

8RR Pacific air returned 2100 26 June. Starry night followed by fair day with cumulus. But no actual thunderstorms 27-28 June.

1976

8. RRR - Final return of continental polar cold front 8 at 0555 29 June. Arrived from northeast. ~~At~~ Air unstable, with afternoon thunderstorms. Cleared off at night. Followed by fair with sds, with only limited cumulus development, northerly winds.

Fine day 1 July with only limited cumulus activity, northeasterly winds. After calm night, 2 July fine day with limited cumulus activity, easterly winds, rising barometer. Barometric crest 102.60 kPa 1157 3 July followed by light northerly winds 3, 4 July with sunny skies and only small cumulus by day. After calm night July 4-5, south to west winds 5 July, fair skies.

Finally, on 6 July, thunderstorms broke at end dawn.

9. ~~and~~ New Pacific front passed at 1243 6 July. Afternoon, evening thunderstorms in area. Fair on 7 July with ~~northeasterly~~ northwesterly winds. Barometric peak 101.69 kPa at 0558 8 July. ~~Followed by~~ Nighttime thunderstorms.

9W Pacific warm front ~~is~~ barely sight region. Cumulus and cirrus, ~~westerly~~ wind.

10. Pacific ^{old} front moved in 1430 9 July. ~~Nocturnal thunderstorms~~ ~~expanding~~ ~~strong~~ after midnight. Nocturnal thunderstorms, followed by dense fog in wee hours.

11. Fresh continental front came in 1830 10 July. Fine weather, fresh northwesterly winds 11 July. Barometric crest 101.97 kPa at 0055 12 July with calm winds and patchy ground fog. Fine ~~at~~ sky, light southeasterlies 12 July. Increasing cloudiness, ~~but~~ brisk southeasterlies 13 July.

1976

Okabana
Pastor

12. Cold occlusion arrived 1530 13 July with thunderstorms. Followed by fair night 13-14 July with shallow ground fog. Pressure crest 101.00 kPa centered on 1357 14 July. Showers on wet hours of 15 July.
13. New continental cold front at 0730 15 July followed by brisk northwesterlies, stratocumulus overcast 15 July. Clearing at night. Fresh ^{Northwesterly} winds, cool, with limited cumulus activity on 16, 17 July. Fine weather with winds backing from westerly to ^{generally} southerly on 18-19 July.
14. New continental front ²⁰³⁰ 19 July amid thunderstorm mesosystems. Followed by variable cloudiness, northwesterlies on 20th, ~~with~~ skies cleared in ~~evening~~ late afternoon, winds died to calm in evening. Barometric crest 1021.3 centered at 0858 21 July, followed by light southeasterly winds.
- 14W Warm front brought in warmer air ~~starting~~ starting around 1930 21 July. Warm with brisk southwesterlies during day of 22 July.

1976

15. Pacific front arrived 2030 22 July amid thunderstorms.
 Fine day 23 July with ~~the~~ fresh northwesterlies.
 Barometric crest 102.27 kPa ~~25-2~~ at 0558 24 July.

16. Continental polar front from northeast at 0630 24 July.
 Fine day with only limited cumulus activity. Barometric
 crest 102.33 kPa at 0937 24 July. But thunderstorms, showers
 broke at just as 25 July began, ~~with~~ ~~the~~ lasting through the
 wee ~~hours~~ hours. Partly cloudy in the morning ^{of 25 July} occasional light
 showers.

16W - Pacific warm front, southwesterly winds ~~25~~ at 1730 25 July.
 Thunderstorms in region all afternoon

17. Cold front arrived amid more thunderstorms at 2130 25 July.
 Northwesterly winds, fine weather on 26 July yielded to general southeasterlies
 27 July after barometric crest 101.50 kPa 0757 27 July. Morning thunderstorms
 28 July followed by northwesterly winds. Second barometric crest 101.42 kPa
 0457 29 July, followed by southerlies under partly cloudy skies. A few afternoon
 showers and evening thunderstorms in region 29 July. Variable cloudiness,
 northwesterlies 30, 31 July, 1, 2 August, with some thunderstorm activity in
 afternoon of 1 August. Major barometric crest 102.71 kPa ~~25~~ at 0558 2 August
 followed by ^{fine weather} southwesterlies 3 ~~4~~ August, ~~2~~ Rain on 4 August with
 general southeasterly winds.

1976

18. Cold front from north at 1930 4 August with low stratus, a little evening rain. Rising barometer, ^{cool} north wind, clears 5 August. Fine weather, variable wind, barometric crest at 102.53 kPa 0858 6 August, followed by excellent day on 7 August. Just a bit of cumulus activity, mild temperatures, light southwesterlies. General southeasterly wind, afternoon ^{and evening} thunderstorms 8 August, followed by brisk southeasterlies, thunderstorms moving, afternoon, and evening on 9 August into wee hours of 10 August.

19. ^{Continental} Cold front, followed by fog, 0430 10 August, variable cloudiness, ~~low~~ variable winds 10 August

20. Pacific cold front 2230 ~~at~~ 10 August, followed by fog during night. Scattered thunderstorms, ^{light winds} afternoon of 11 August.

21. ~~Pacific~~ Continental cold front 0130 12 August followed by mostly cloudy day, light northwesterlies, showers 12 August; ~~then~~ more the same 13 August except for southeasterly winds. Fine day with light easterlies 14 August, with more fine weather, light and variable winds 15 August with barometric pressure peak at 102.58 kPa 0955 15 August. Sunny skies, gentle southeasterlies 16 August, with ~~more~~ variable cloudiness, brisk southeasterlies 17 August. Low overcast ~~over~~ before dawn 18 August.

1976

22W

Warm air moved in 0830 18 August. Hazy, hot, high dew points on 18th-19th-20th ~~18th-19th~~ August with Thunderstorms morning of 19 August.

21

Pacific cold front 0730 21 August followed by fine day, southwesterly winds.

22

~~Pacific~~ Continental cold front ~~1800~~ ¹⁸⁰⁰ 21 August followed by fine weather, light northerlies on 22 August.

~~22. Continental cold front~~

22W. Warm front of Pacific air moved in 0830 23 August.

Clear day 23, 24 August with ^{southwesterly winds,} barometric crest 102.50 kPa centered on 0830 23 August. ^{H27 24 August.} Variable cloudiness, hazy 25 August with moderate southerlies.

23.

Thunderstorms morning of 26 August ~~with Pacific~~ with ^{Pacific} cold front 0825 26 August. Fair, hazy afternoon ^{and evening} 26 August.

24.

Pacific front 0630 27 August brought ~~fine~~ partly cloud, cool, dry day with brisk westerlies lasting through night of 27-28 August

25.

Continental cold front arrived ¹⁰³⁰ 28 August. Brisk ~~northwesterlies~~ ^{westerlies}, ~~broken~~ broken stratocumulus clouds followed on ~~22~~ day of 28 August. Barometric crest 103.03 at 0758 29 August, with fine day and light, variable winds. Fine weather, light winds through morning of ~~28~~ 31 August.

26-W continued polar
n warm front passage 1730 2 September followed by
sudden winds, partly cloudy skies to night of 2-3 September

Barometric crest ~~102.22~~ 102.22 kPa at 0758 5 September,
followed by fine weather,
a brisk southerlies.

27W - Continental polar warm front 0730 6 September followed
by ^{deer skiers,} hot temperatures, brisk southwesterlies through afternoon
of 7 September. Sky smoky afternoon of 7 September
from forest fires.

28. Continental cold front passage 1940 7 September; with thunderstorms.
Mostly cloudy, northwest winds, 8, 9 September. Barometric crest
102.71 ~~9~~ 0856 9 September. ~~Mostly fog~~ with westerly winds
September, ^{except for} ~~with~~ smoke in air restricting visibility both days.
Partly cloudy, sun ~~unseen~~, more smoke in air 12 September.

29. Continental polar cold front passed 0630 13 September followed by low overcast, drizzle, northwest winds on 13, 14, 15 September. Slept off by 15 September after barometric crest of 102.96 0657 15 September. Light, variable winds 15-16 ~~15~~ September with fine weather except for morning ground fog morning of 16 September. Fine weather 17-18 September with light southerlies. Sky clouded, rain fell in advance of front 19 September.

30. Continental cold front invaded from northwest ⁰⁹³⁰ 19 September. ~~Barometric crest 2255 19 September at 101.97 kPa.~~
~~Partly cloudy~~ Variable cloudiness, ^{some} showers, northerly winds 19, 20, 21 September. ~~Partly cloudy~~

31. Continental cold front passed from northeast 1630 21 September followed by lowering clouds, rain around dawn 22 September.

32. Continental ^{cold} front 22 September followed by cool weather, northwest winds 22, 23 September. Barometric crest 102.37 at 2056 23 September.

33. New ^{continental} cold front 1230 24 September. Fine weather to noon 25 September, with showers afternoon and evening of 25 September and weather at 26 September. Barometric crest 102.22 kPa 0155 25 September, followed by ~~some~~ gentle southerlies on 25 September.

1976

34

Fresh continental air mass moved in at 0730 26 September followed by low overcast, ^{northerly winds, occasional drizzle} all day on 26 September, clearing up on 27 September. Barometric crest 102.38 kPa at 1050 27

September. Completely clear sky all 24 hours 29 September with light ^{south} westerly winds switching to northwesterly with continental cold front passage at 0730 29 September.

35

35W ^{clear} ~~fair~~ all day except for some morning fog, haze. Warm front passage around 0630 30 September, followed by light southwesterlies, warm temperatures into mid-80s.

36

~~Continental~~ ^{Pacific} air mass moved in 0530 1 October, followed by clear skies, gentle northerly winds. Barometric crest 102.04 kPa 0758 2 October, ~~followed by~~ followed by sunny sky, light southeasterly winds.

37

Continental ^{from north} air mass moved in ²³³⁰ 2 October. Followed by brisk southeasterly winds ^{fine weather} on 3 October, with rain broke down 4 October.

38

Sharp cold front passage 0500 4 October followed by clearing ~~the~~ skies mid-morning, northwesterly winds backing to southwesterly, which then veered to northwest again on 5 October. Stratus overcast developed from mid-morning on 5 October to wee hours of 6 October.

1976

(78 continued)

Clouded up again before dawn 6 October, with ~~the~~ overcast and northwesterly winds through afternoon of 7 October.

First snow showers of season mid-morning 7 October.

Barometric crest 103.10 kPa at 0856 7 October.

Southerly winds began before dawn 8 October, with overcast skies and snow showers most of day on 8 October. Some rain showers ~~evening~~ late afternoon of 8 October.

39. Continental polar cold front passed 2330 8 October. Foggy in wee hours with low overcast. Low overcast all day 9 October, with ~~the~~ dense fog again wee hours of 10 October.

39W. Pacific warm front passed 1100 10 October from southwest. Much warmer, with sunny skies, fresh southerly winds on 10, 11 October.

40. Pacific cold front arrived 0330 12 October. Occasional cloudiness, moderate northwesterly winds 12, 13 October. Barometric crest 101.80 kPa 0849 13 October. Sky became overcast late on 13 October with fresh southeasterlies before dawn 14 October.

1976

40.W. Pacific warm front 1130 14 October, short-lived warm front. Brisk southwesterlies, temperatures into 60's, fair skies

41. Sharp continental polar cold front ^{passed} 1230 14 October, sky partially obscured by blowing dust from Canada with frontal passage. Dust extended from surface to 8000 feet above surface, ^{and reduced visibility to 1 1/2 miles.} Late ~~at~~ in the day, and into ~~the~~ 15 October, blowing dust mixed with smoke from forest fires, reducing visibility to 4 miles. Sky became overcast in late evening with rain to wee hours of 15 October, followed by drizzle around dawn and occasional snow showers rest of day on 15 October, as brisk northwesterly winds blew. Snow showers, northwesterly winds through 16 October. Barometric crest 103.27 kPa 1057 17 October, followed by light, variable winds and clearing skies. Variable cloudiness, light winds, some snow 18, 19 October, with dense fog before dawn 19 October. Sky became overcast early on 20 October, with light snow beginning 0325 20 October as fresh southerly winds blew.

1976

42.

Sharp continental polar cold front passed 1130
29 October. Followed by fresh northwesterly winds,
low clouds, snow showers on 20, 21 October,
variable cloudiness, light northwesterlies 22 October,
mostly fair skies, light and variable winds 23 October,
variable cloudiness, light northwesterlies 24 October,
partly cloudy, light northerlies 25 October, clear
skies except for a few cumulus, light northeasterlies 26
October, with barometric crest at 103.70 kPa centered
on 0556 ²⁸ 27 October. Breeze southerlies after
crest on 27, ²⁸ October with warming temperatures, fair skies.
Clear with light winds 29 October, ~~first~~ morning at
30 October.

43. Pacific cold front passed 1130 29 October followed
by fair skies, light, variable winds 30, 31 October.

43w Pacific warm front passed ~~1130~~ ⁰⁹³⁰ 1 November,
Breeze southerly winds, fair skies

44. Pacific cold front moved over at 2330 1 November.
Followed by moderate northwesterlies.

1976

45. Sharp continental polar cold front 0830 2 November.
Heavy, ^{northerly} winds with gusts to gale velocity, brought in
blowing dust mid-afternoon, reducing visibility
to 4 miles. Some stratocumulus activity with
light ~~snow~~ showers early evening, with snow
showers, ^{from stratocumulus} most of day on 3 November to dawn
4 November. Northwesterly winds died with barometric
crest at 102.74 kPa 1058 4 November. Winds backed
to southwesterly in evening of 4 November, but
variable cloudiness endured through ^{main of} 5 November

46. ~~Cold~~ Continental cold front passed 1030 5 November,
Followed by ~~low~~ fair skies, west ~~to north~~ winds

47. Fresh continental cold front 2130 5 November
followed by fair skies, brisk northwesterlies by day
through 7 November. Some overcast stratocumulus
early afternoon of 6 November. Barometric crest
103.29 kPa 1057 7 November. ^{Brisk} ~~Southerly~~ winds, variable
cloudiness 8 November

47W

Pacific warm front crossed 0030 9 November
for brief visit of mild air. Replaced by
overcast, some snow.

48:

Continental polar cold front moved in 1230
9 November. Followed by low overcast, snow,
fresh northwesterly winds, snow 9 November,
yielding to clear skies, moderate northwesterlies
afternoon of 10 November to near dawn 11 November.
Overcast skies, ^{frequent} snow, moderate northwesterlies rest
of 11 November to late afternoon of 12 November.
Barometric crest 103.54 kPa 1057 12 November
Followed by clear skies, westerly winds through
dawn of 16 November.

49.

Pacific cold front passed 1130 16 November.
Followed by clear skies 16 November, but some variable
cloudiness and a trace of snow during day 17 November.
~~Barometric crest 100~~ ~~Southwest to~~
Southwest to westerly winds, generally falling barometer
followed frontal passage.

50.

New Pacific front 0830 18 November. Strong northwesterlies
following passage, with ~~afternoon~~ visibilities reduced
to 5 to 7 miles during rest of day by blowing
dust. Fair skies 18 November, with stratocumulus ~~cloud~~

1976

~~deck~~ developing 19 November ^{over fresh northwesterly winds.} Barometric crest
101.33 kPa, but northwesterly winds, ^{low cloud deck} continued through
20 November.

51. Pacific cold front 1330 20 November. Followed by
scattered clouds, northerly winds

52. New Pacific cold front ¹⁷³⁰ ~~1730~~ 20 November. Followed by mostly
low overcast, ^{occasional} ~~some~~ showers, brisk northwesterlies
through evening of 23 November. Barometric crest
102.41 kPa centered on 0748 23 November, followed by
winds backing to southwest by evening of 23 November.
Brief clearing evening of 23 November followed by overcast,
snow, southerly winds till noon 24 November, ~~followed~~
low overcast broke up evening of 24 November, but
more ~~some~~ overcast skies, snow morning of 25 November.
Southerly winds, mostly light, continued to time of
~~the~~ next frontal passage.

53. Pacific warm front arrived around 0930 25 November
~~Followed~~ Followed by ^{continued} snow, light southwesterlies.

1976
53. Continental polar front from northwest invaded
1430 25 November. Followed by improving skies,
light northerly winds rest of 25 November into
early 26 November. But dense fog morning of 26
November, followed by daytime overcast and light
snow showers. Clearing evening of 26 November;
fine weather most of 27 November except for
diurnal stratocumulus, very light snow showers during
daylight hours. Winds remained moderate
from northwest to barometric crest 102.26 kPa
1557 27 November, backing then to ^{light} southwesterly.
Falling barometer, cold, mostly northwesterly winds
28 November with generally fair skies but some ice
fog, ice crystals in morning hours to noon. Variable
cloudiness by day, very light snow, moderate northwesterly
winds 29 November, ~~was~~ followed by clearing skies, ice fog,
ice crystals night of 29-30 November. Fair skies,
light westerlies on 30 November with rather steady
barometer. Daytime ~~stratocumulus~~ snow 1 December
with winds ~~back to~~ veering to northeast, rising barometer
in response to shifting high pressure system.
Barometric peak 103.50 kPa 0958 2 December, followed
by light ^{southerly} winds, lowering clouds, snow on
evening of 2 December. Snow ~~was~~ ^{much} of 3, 4 December
with light, variable winds