

Ensemble Forecast of A Canadian Prairie Winter Snowstorm

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Staff walked to parking lot at
The National Hydrology Research
Centre in Saskatoon;
(Photographs by Davison, Bruce NHRC)



Pedestrian crossing
bridge during the
blizzard on 10 January
2007 in Saskatoon.
(Photograph by Geoff
Howe-- the Canadian Press)

Outline

- Weather conditions and synoptic pattern development.
- PASPC forecast of the event.
- Deterministic forecasts from operational CMC GEM Global.
- Ensemble forecasts from NAEFS.
- Summary & Discussion

A map of the United States divided into regions, with numbers indicating the count of states in each region that have a specific number of states with a specific number of states. The numbers are as follows:

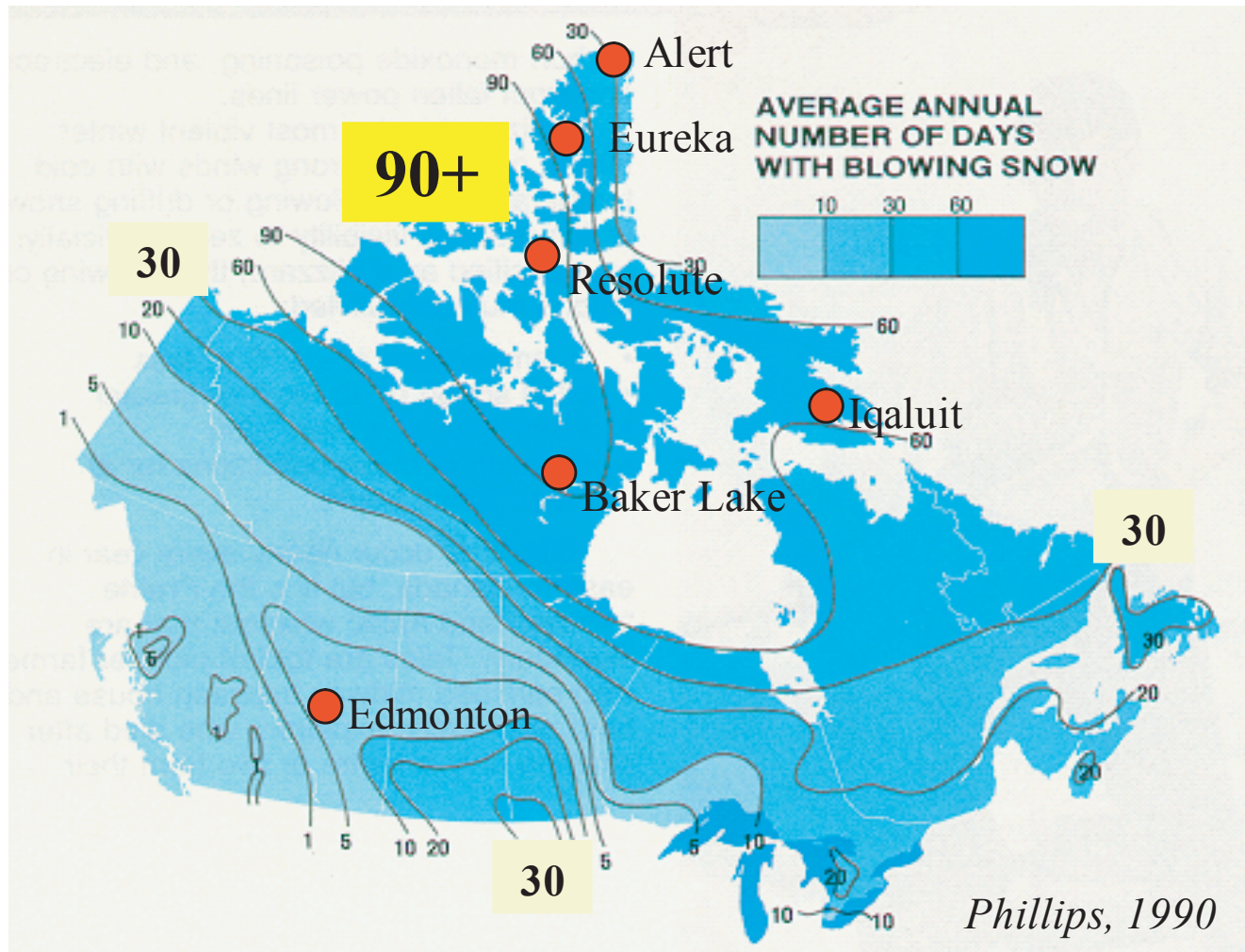
- 17 (12)
- 10 (6)
- 19 (14)
- 10
- 12
- 8
- 9
- 13
- 20
- 21
- 16
- 17
- 5
- 4
- 7
- 4
- 3
- 1

[illegible]

A map of the United States divided into 17 numbered regions. The regions are defined by black outlines. A red line outlines a specific set of regions in the central and western parts of the country. The regions included in the red outline are 10, 12, 13, 14, 15, 16, and 17. The regions outside the red outline are 1, 2, 3, 4, 5, 6, 7, 8, 9, and 11.

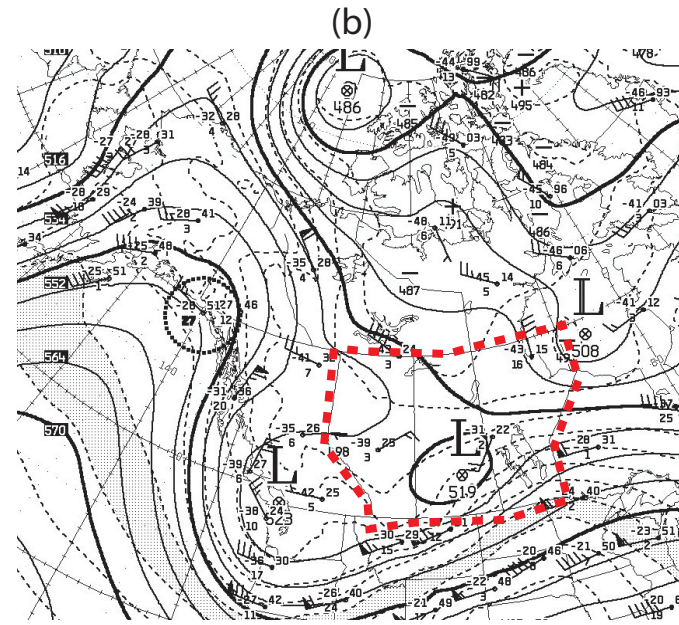
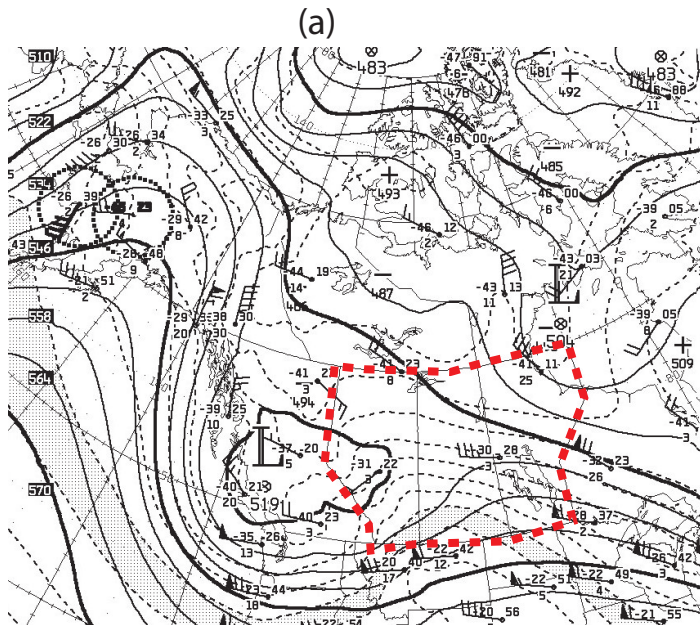
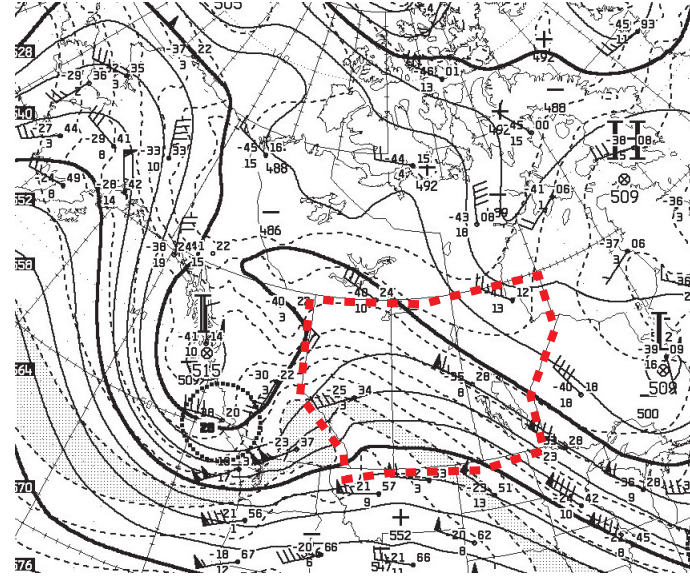
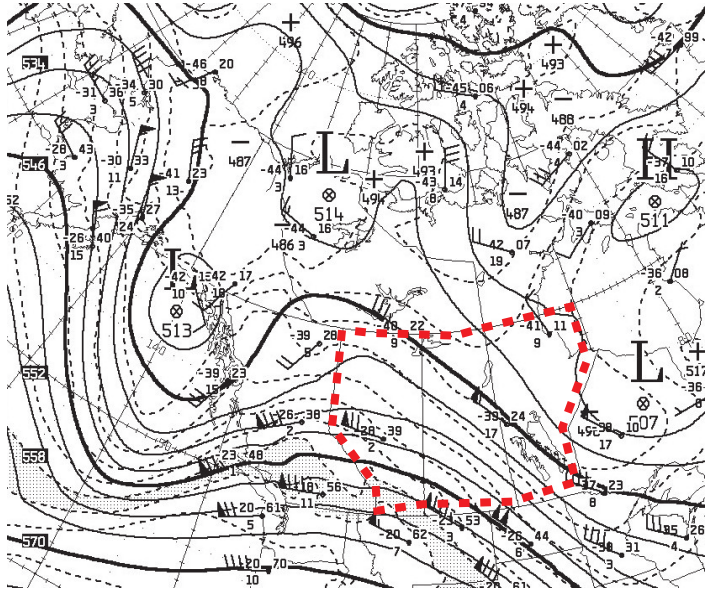
a) snowfall accumulation (cm), b) worst visibility (km) c) maximum wind (km/h), and d) blizzard duration(hours) for the 9-11 January 2007 snowstorm.

The Climatology of Blowing Snow Days over Canada



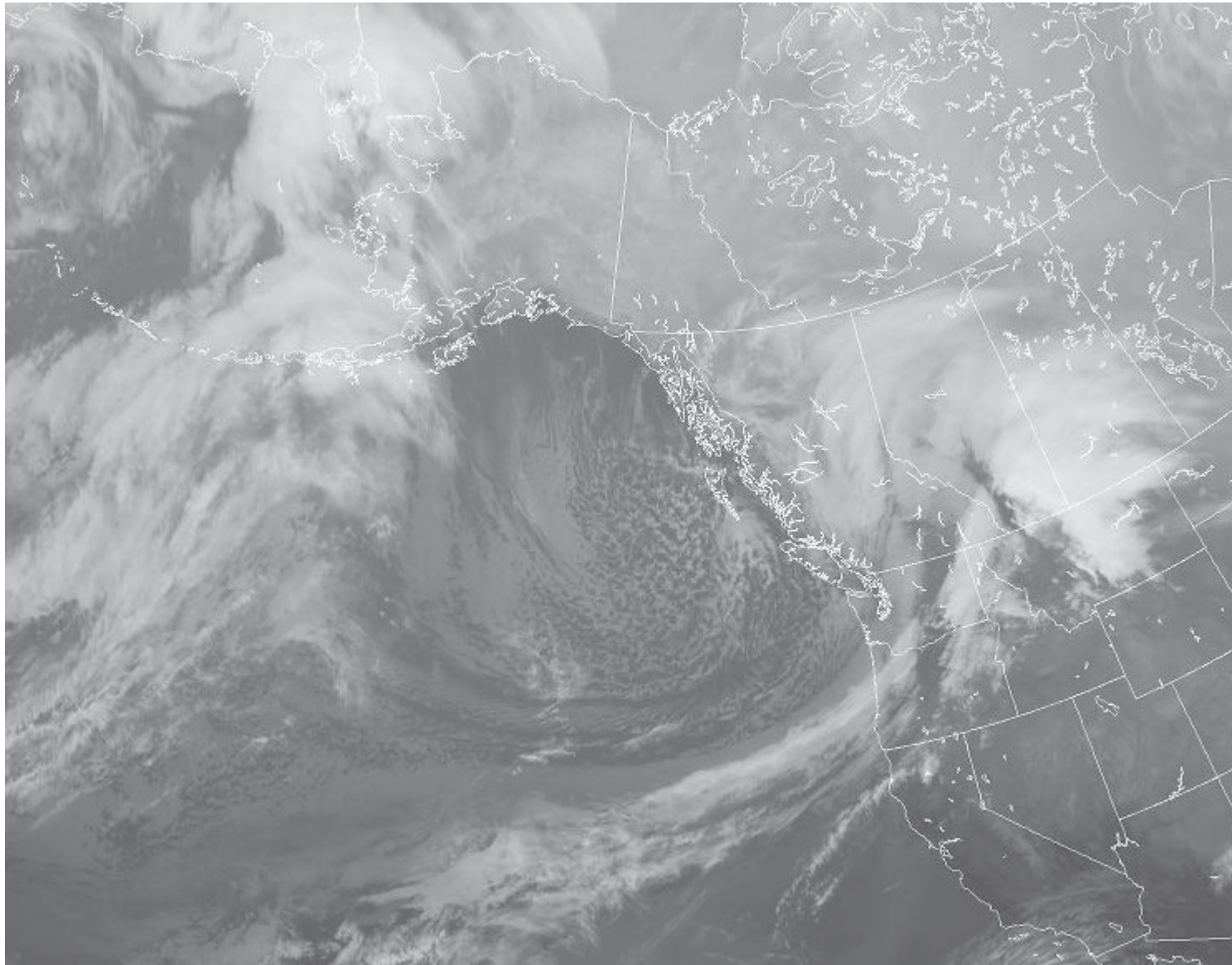
(reprint from Phillips, 1990)

MSC 500mb analyses

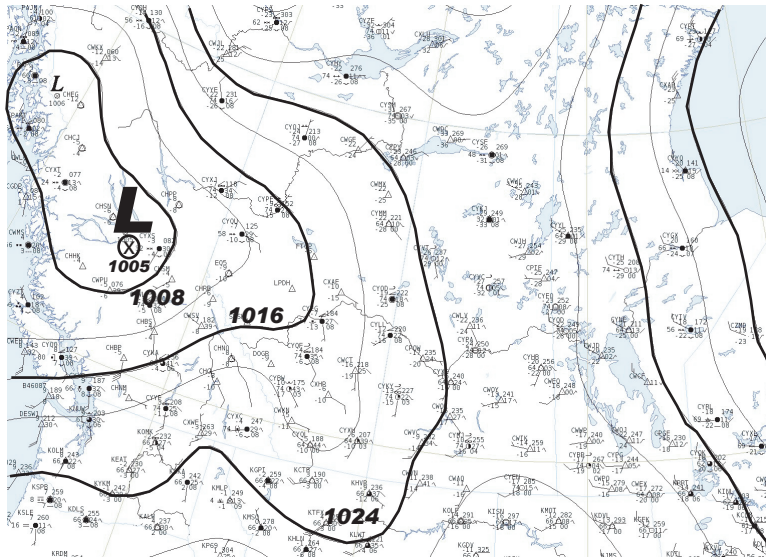


MSC 500mb analyses with Geopotential height (solid line) and 1000-500mb thickness (dashed line) at (a) 12 UTC 09 Jan, (b) 00 UTC 10 Jan, (c) 12 UTC 10 Jan, and (d) 00 UTC 11 Jan.

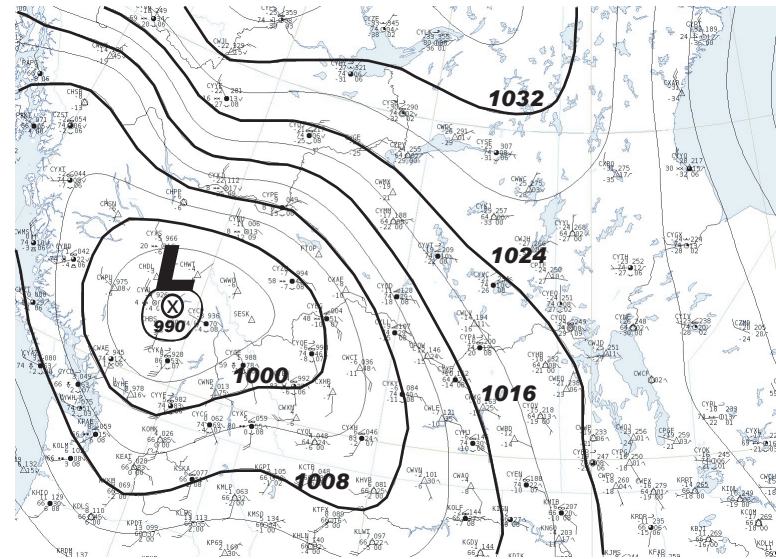
GOES 11u Satellite Image at 0000 UTC 10 January 2007



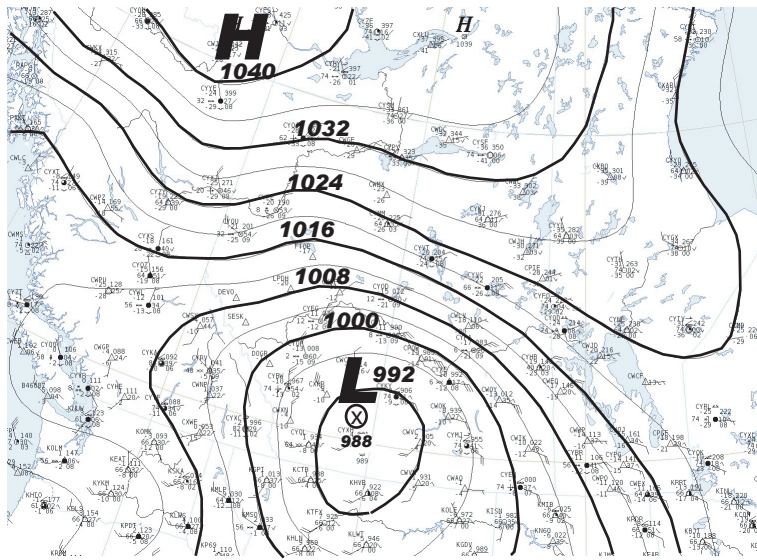
MSC Surface Analyses



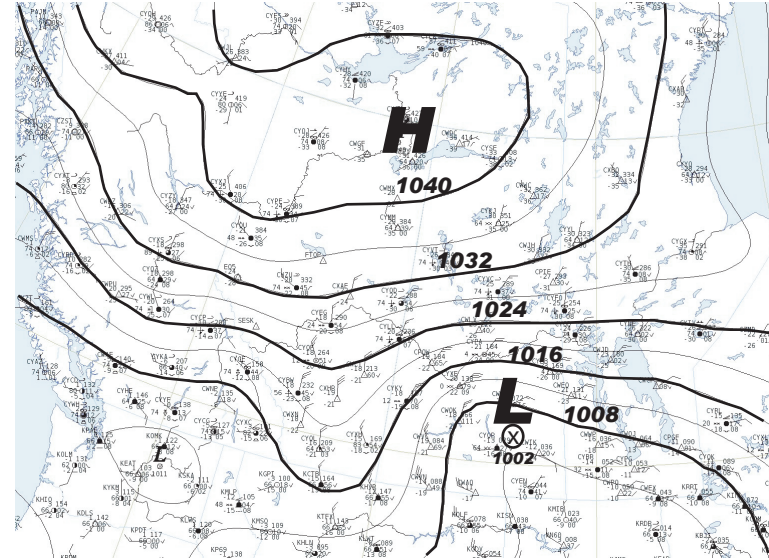
(a)



(b)



(c)

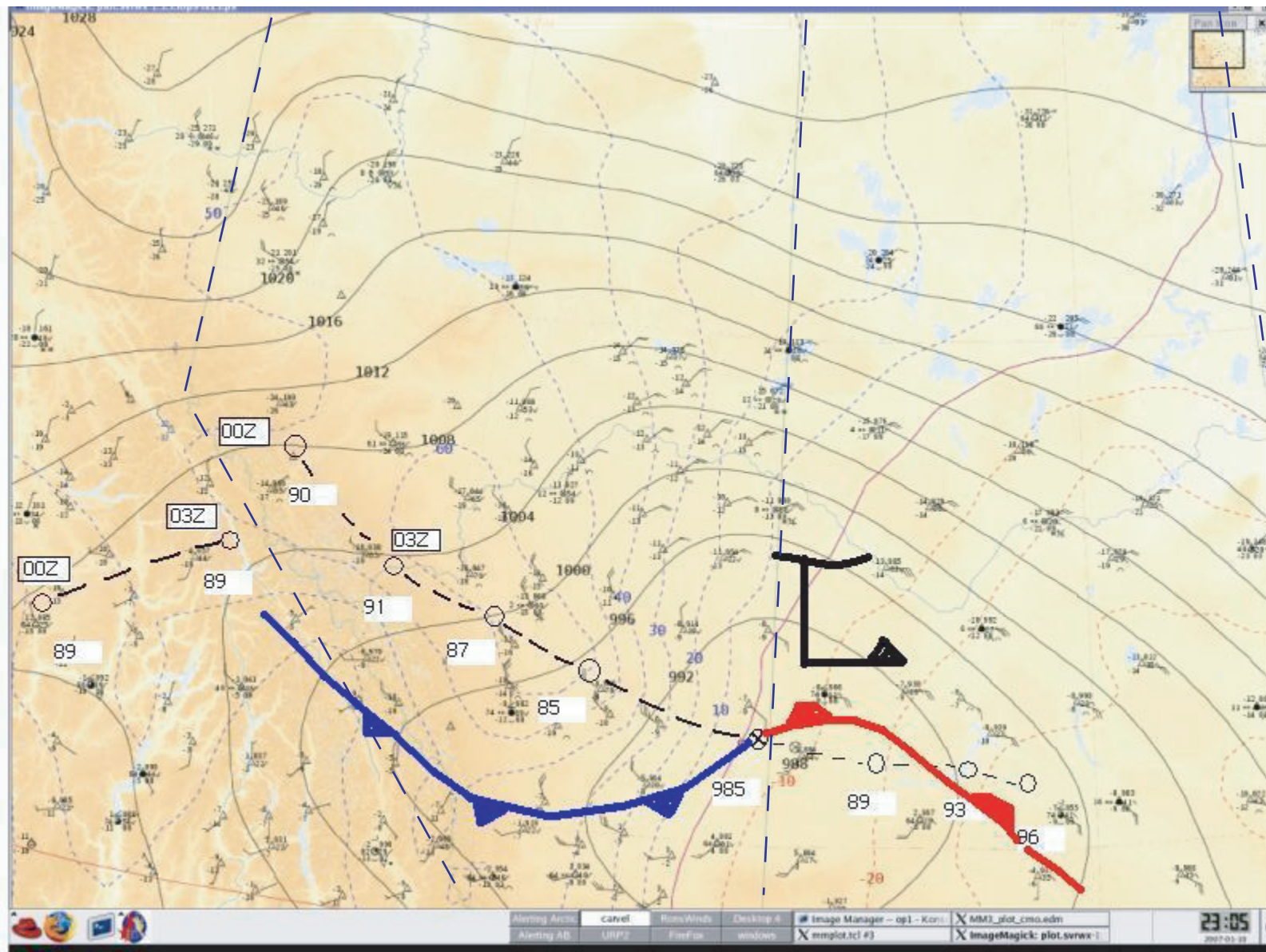


(d)

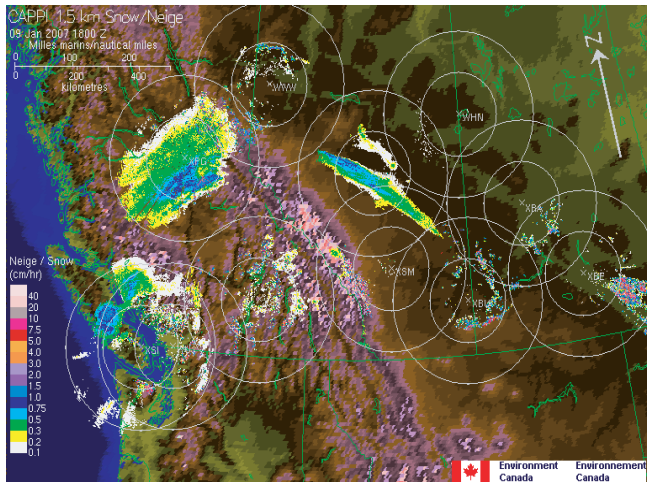
MSC Surface analyses at (a) 12 UTC 09 Jan, (b) 00 UTC 10 Jan, (c) 12 UTC 10 Jan, and (d) 00 UTC 11 Jan.

Track of Surface Low

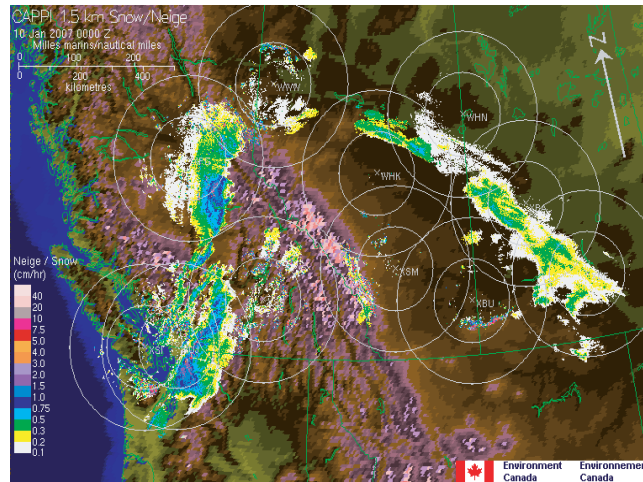
on 1200 UTC January 10 sfc analysis



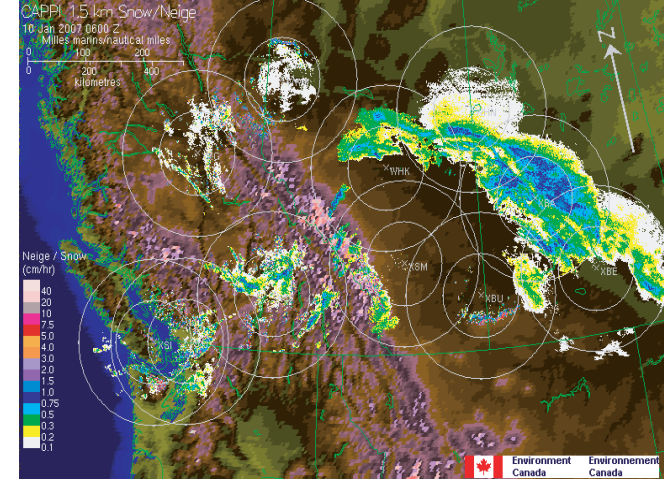
MSC Composite Radar Image



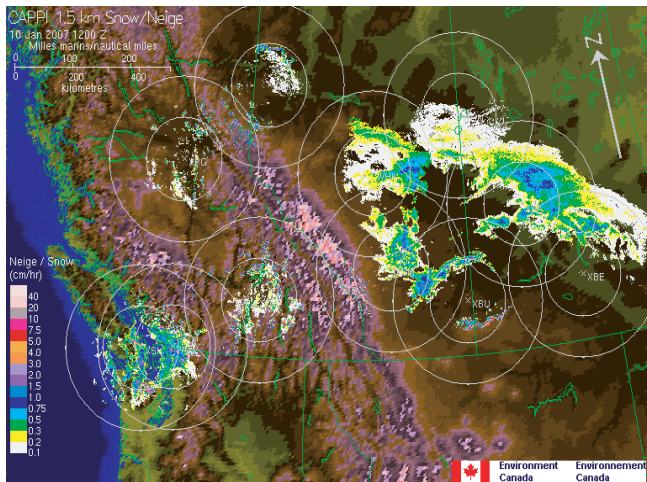
(a)



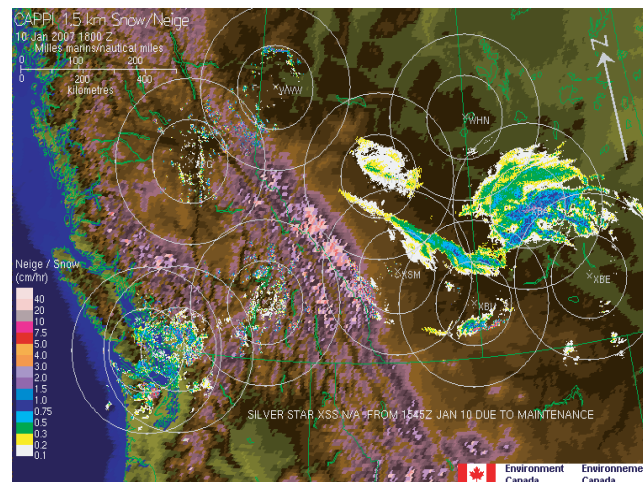
(b)



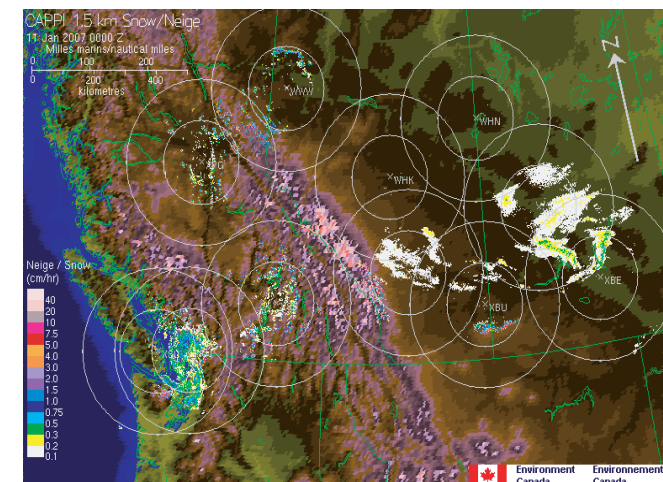
(c)



(d)



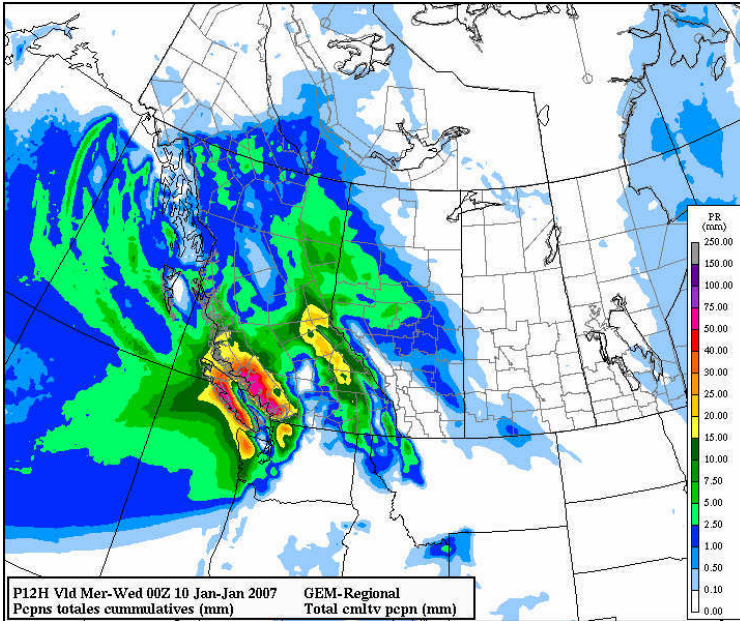
(e)



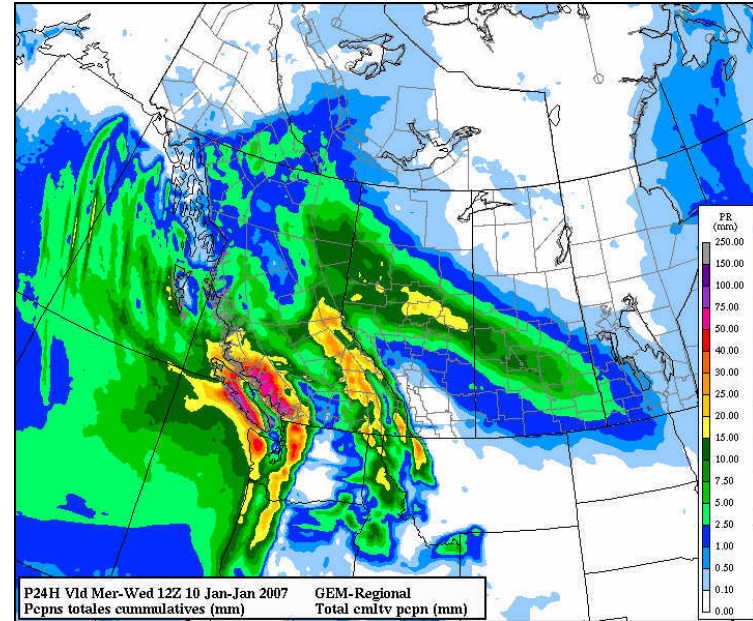
(f)

MSC composite radar image at CAPPI 1.5 km showing the evolution of the precipitation at (a) 1800 UTC 09 Jan, (b) 0000 UTC 10 Jan, (c) 0600 UTC 10 Jan, (d) 1200 UTC 10 Jan, (e) 1800 UTC 10 Jan and (f) 0000 UTC 11 Jan. (loop)

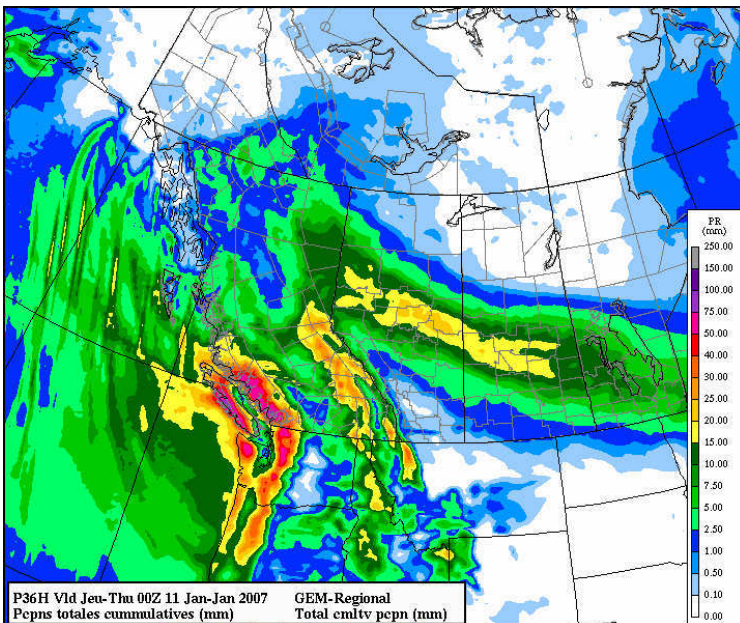
Total Accumulation



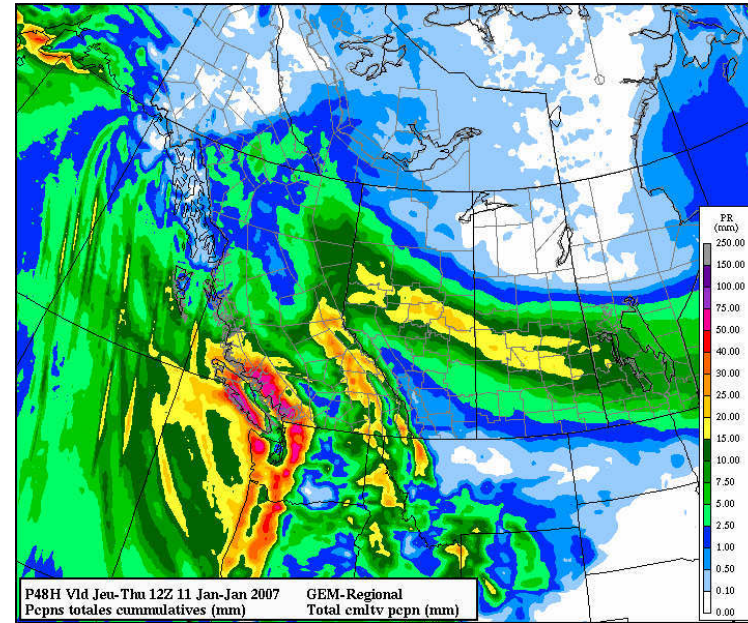
Total Accumulation (0-12h)



Total Accumulation (0-24h)



Total Accumulation (0-36h)



Total Accumulation (0-48h)

PASPC handling of the Event

1. Senior forecasters come to operations to help the forecast.
2. WPM/management pay additional attention.
3. Additional forecaster called in.
4. Media desk.
5. Forecast/FO45/Watches/ Warnings.

FOCN45 WWG

FOCN45 CWWG 081300

SIGNIFICANT WEATHER DISCUSSION ISSUED BY THE PRAIRIE AND ARCTIC STORM
PREDICTION CENTRE OF ENVIRONMENT CANADA AT 7:00 AM CST MONDAY JANUARY
8 2007.

.....

.....

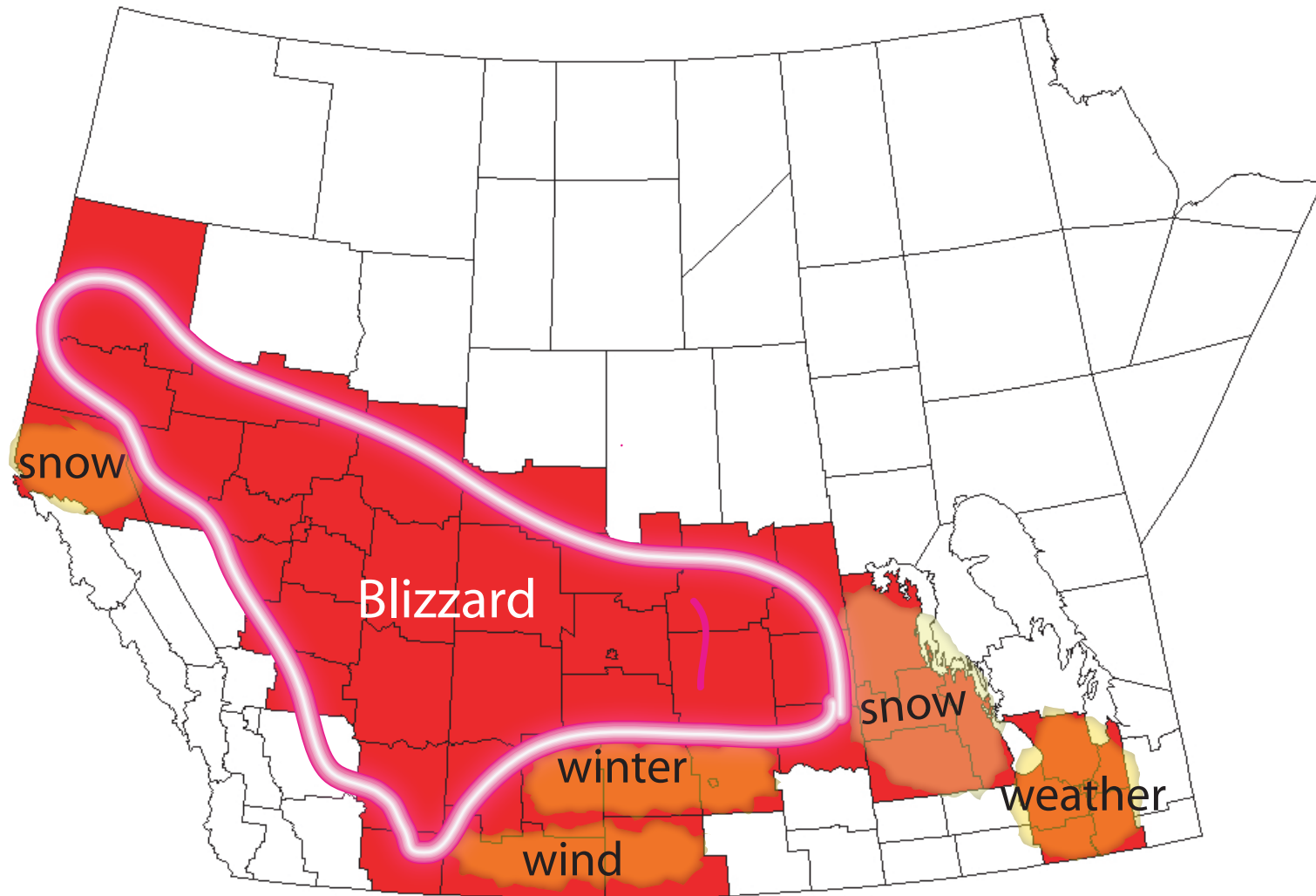
.....

NEXT STORM TO COME THROUGH THE PRAIRIES WILL APPEAR LATE TUESDAY OVER
EXTREME WESTERN ALBERTA AND MOVE INTO SASKATCHEWAN BY LATE WEDNESDAY.
RECENT MODEL RUNS SEEM TO BE VERY CONSISTENT IN TRACK AND INTENSITY
OF THIS SYSTEM AND IT WILL LIKELY PRODUCE WIDESPREAD HEAVY SNOWFALL/
BLIZZARD CONDITIONS FOR ALBERTA ON WEDNESDAY. WINTER STORM WATCH MAY
SERVE US WELL TO GIVE PUBLIC A HEADS UP ON WHATS COMING.

END/GERLYAND/YUN

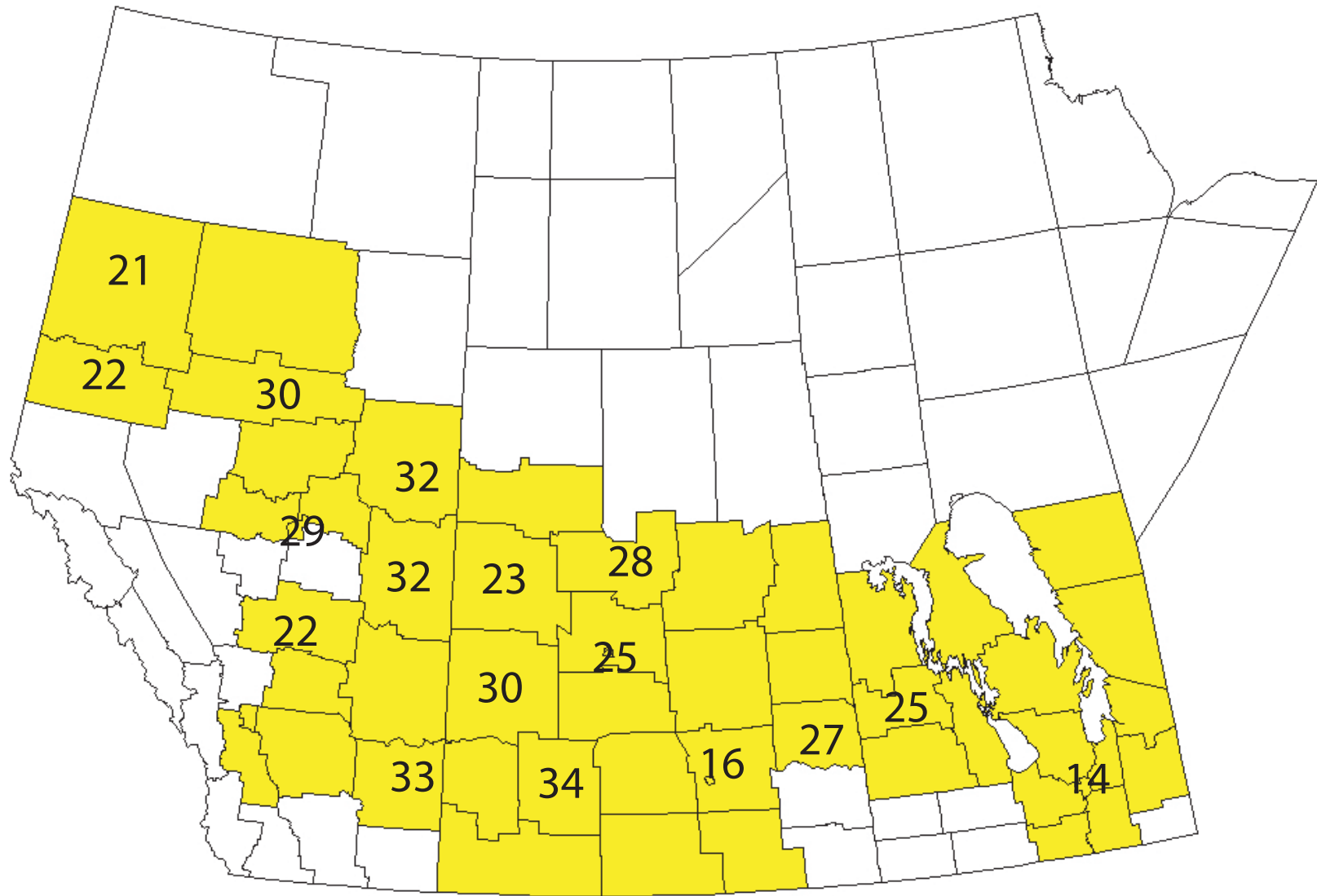
** Winter storm watches were issued late that day for central AB and SK.

Severe Weather Warnings Issued by the PASPC



The Prairie public forecast regions with severe weather warnings issued (the shading area) by the PASPC during the event.

Winter Storm Watches Issued by the PASPC



The Prairie public forecast regions with Severe Weather Watches issued (the shading area) by the PASPC during the event. The lead time of the watch is also displayed.

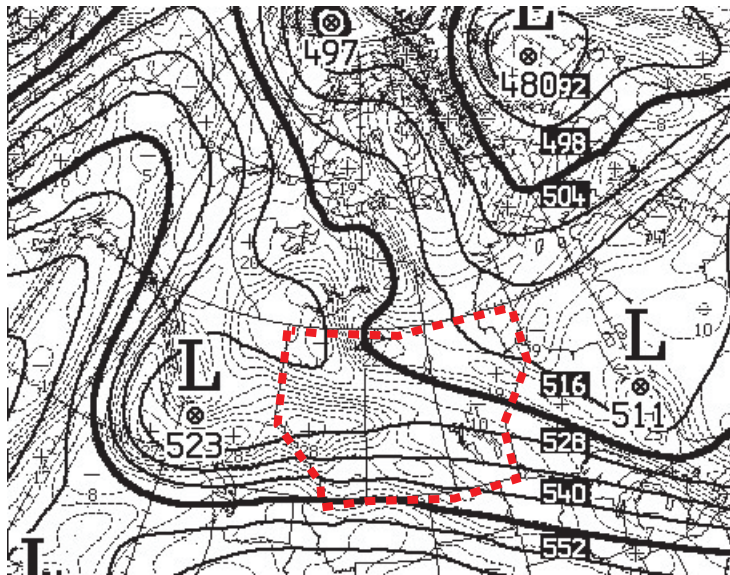
Can We Do Better?

1. Canadian satisfaction
2. WMO / THORPEX
3. Future role of human forecaster
4. What can help us to give the public a longer prepare time for the HIW ?

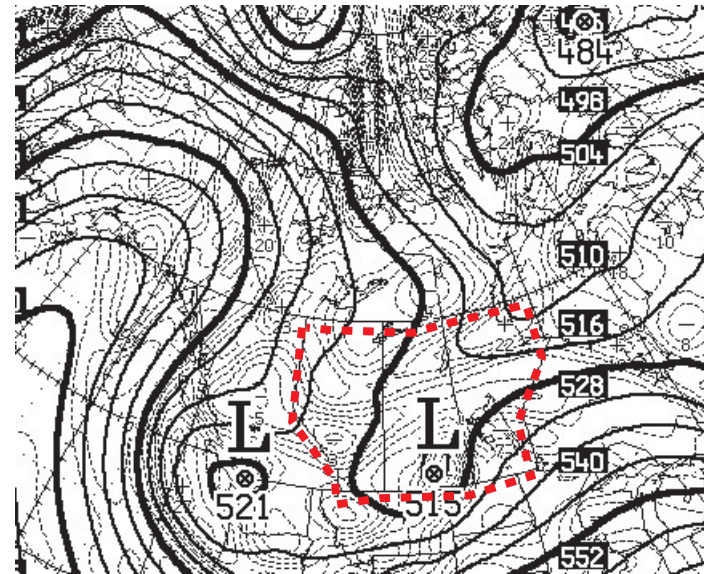
GEM/Global ?

EPS?

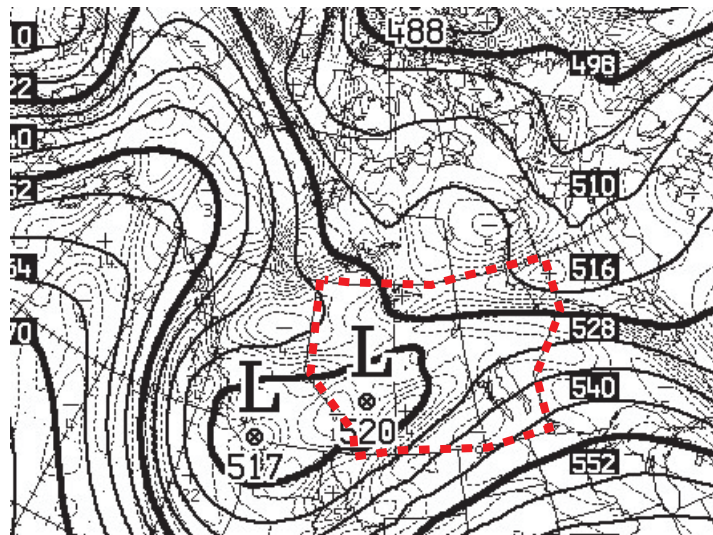
GEM Global 500mb Forecasts



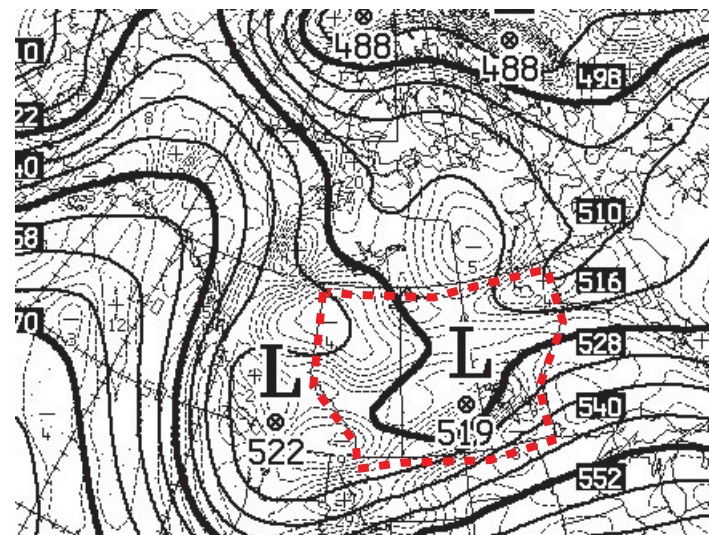
(a)



(b)



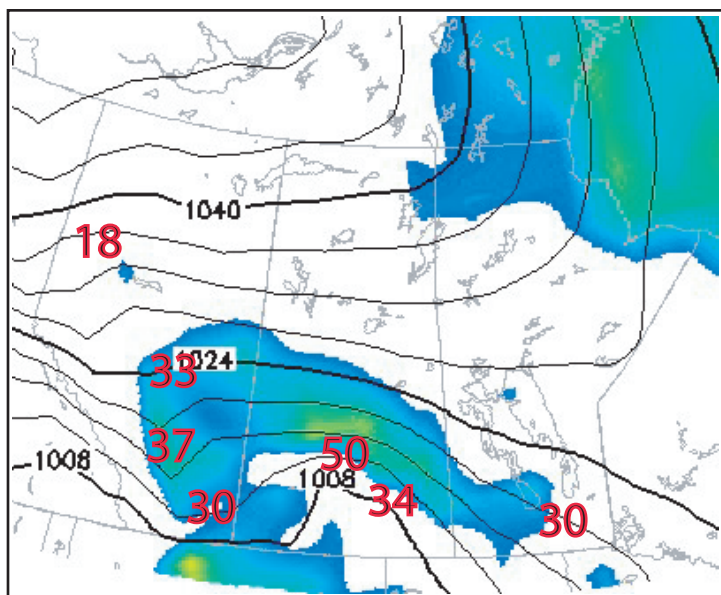
(c)



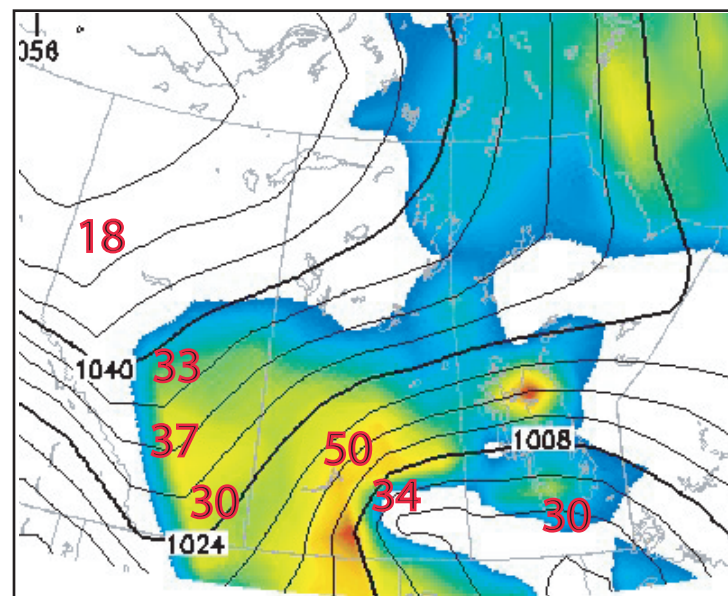
(d)

500mb geopotential height forecasts of GEM global model valid at 00 UTC 11 January 2007: (a) 120-h forecast, (b) 96-h forecast, (c) 72-h forecast, (d) 48-h forecast.

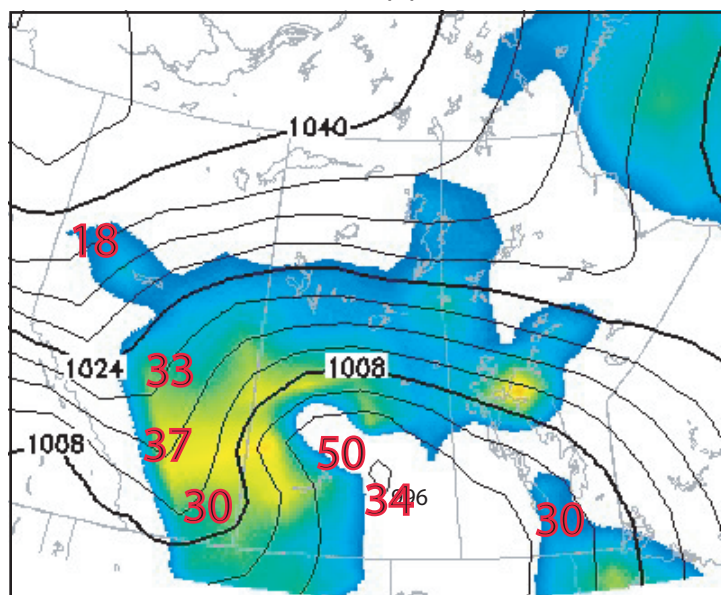
GEM Global MSLP/Wind Forecasts



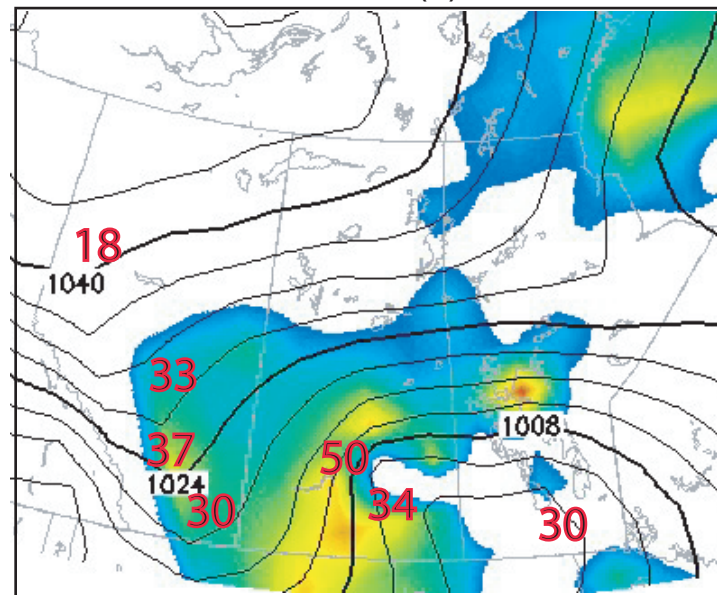
(a)



(b)



(c)



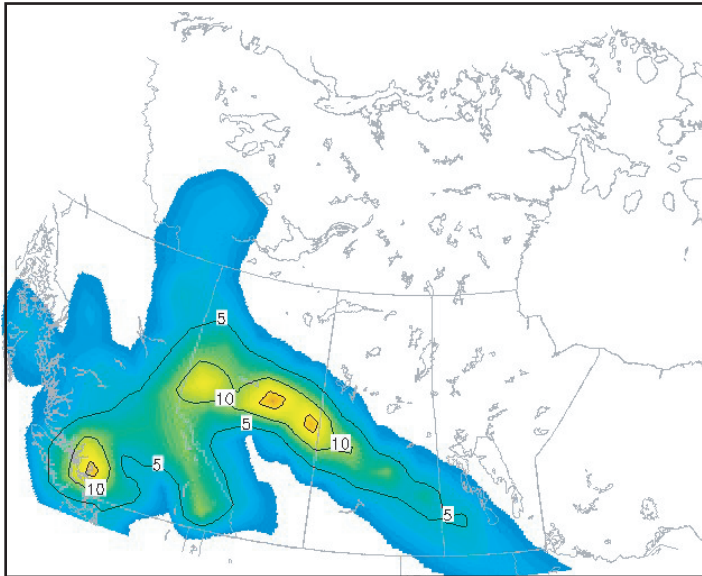
(d)



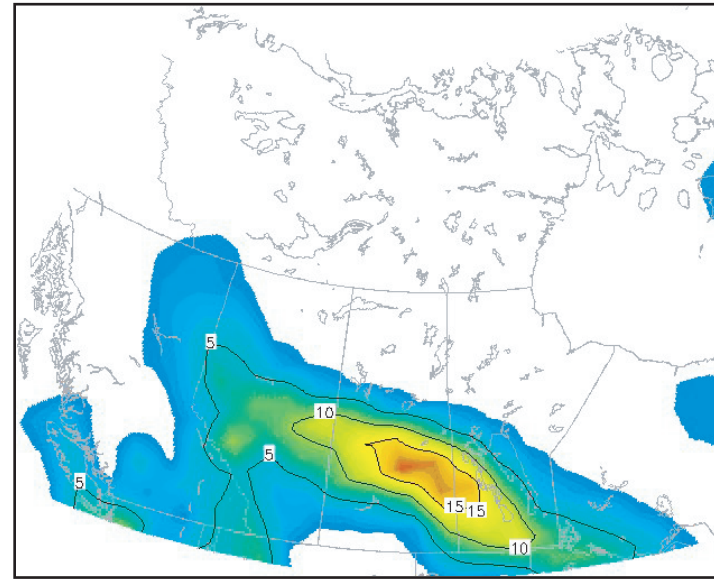
MSLP & SFC wind speed forecasts of GEM global model valid at 00 UTC 11 January

2007: (a) 120-h forecast, (b) 96-h forecast, (c) 72-h forecast, (d) 48-h forecast. (with observed wind speed labeled in red)

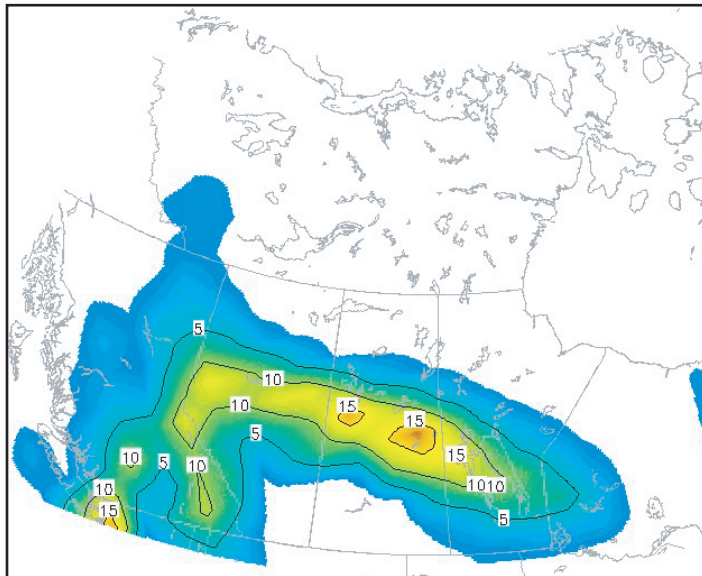
GEM Global 24-h QPF Forecasts



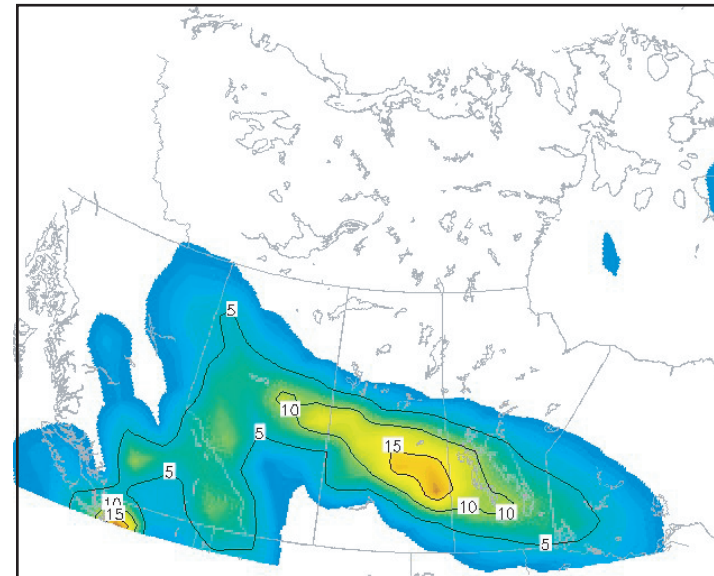
(a)



(b)



(c)

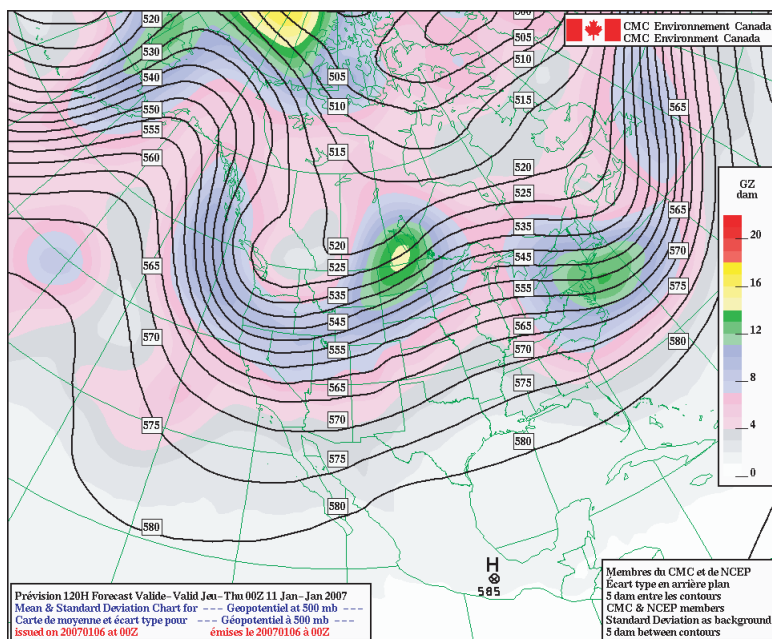


(d)

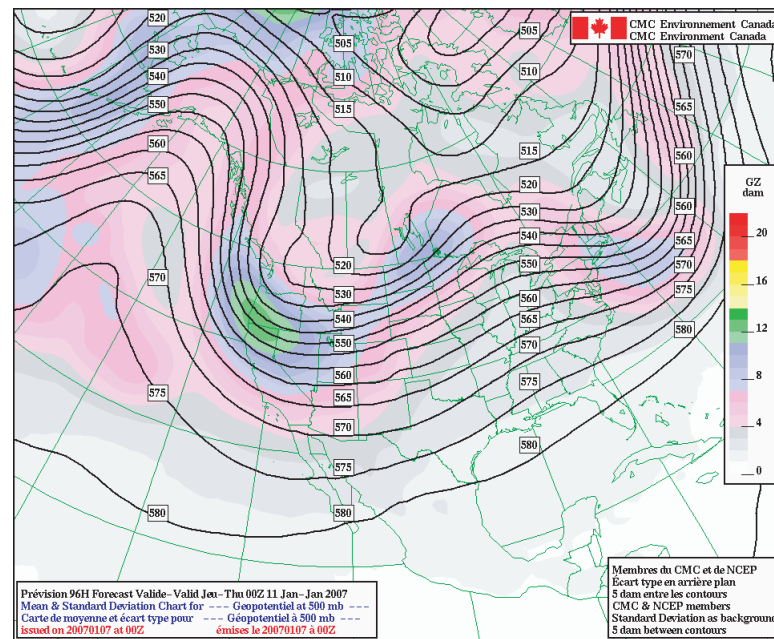


QPF forecasts of GEM global model valid from 00 UTC 10 January to 00 UTC 11 January 2007: (a) 120-h forecast, (b) 96-h forecast, (c) 72-h forecast, (d) 48-h forecast.

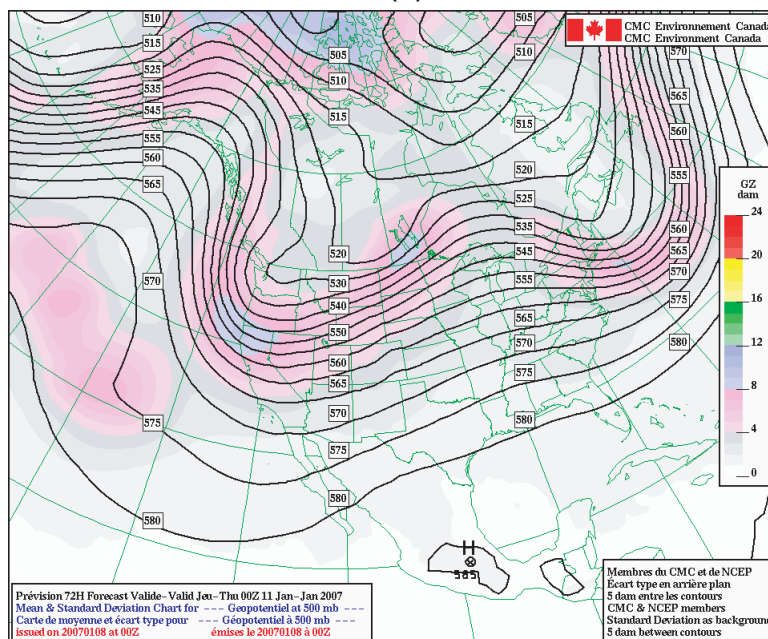
NAEFS 500 mb forecasts



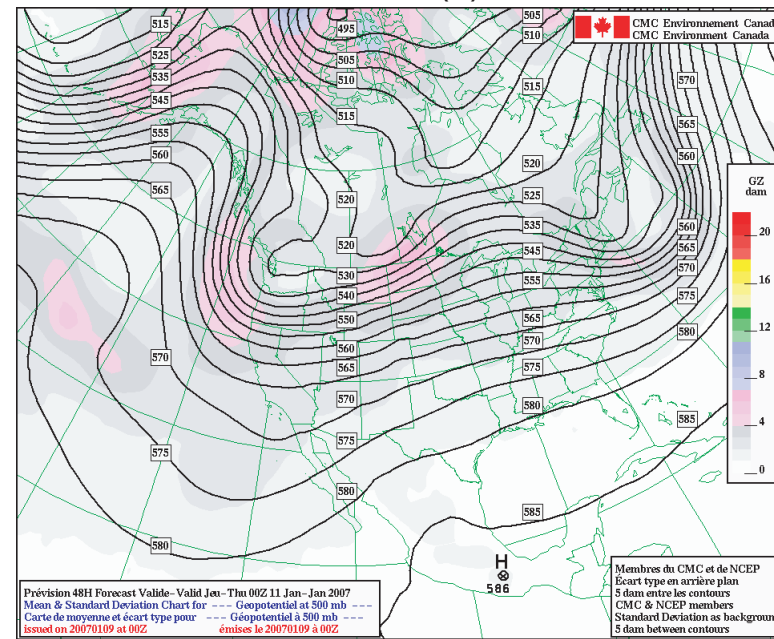
(a)



(b)



(c)

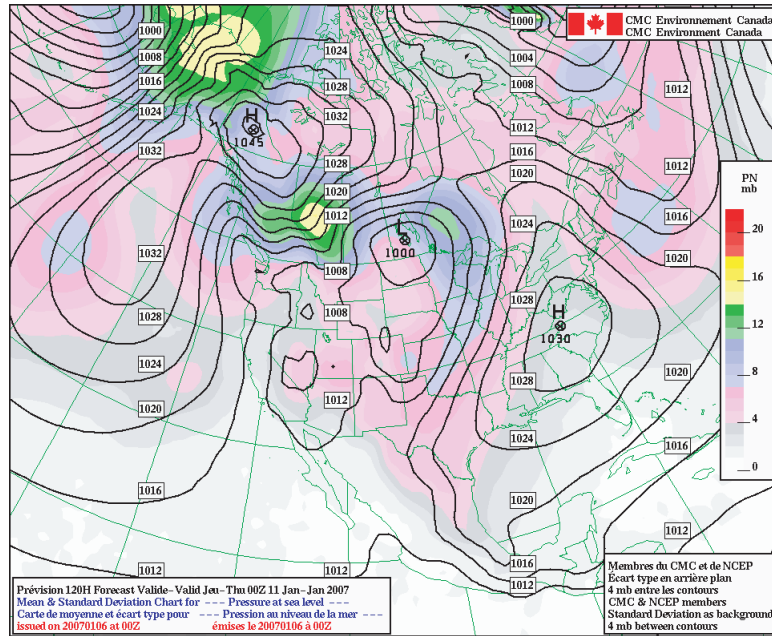


(d)

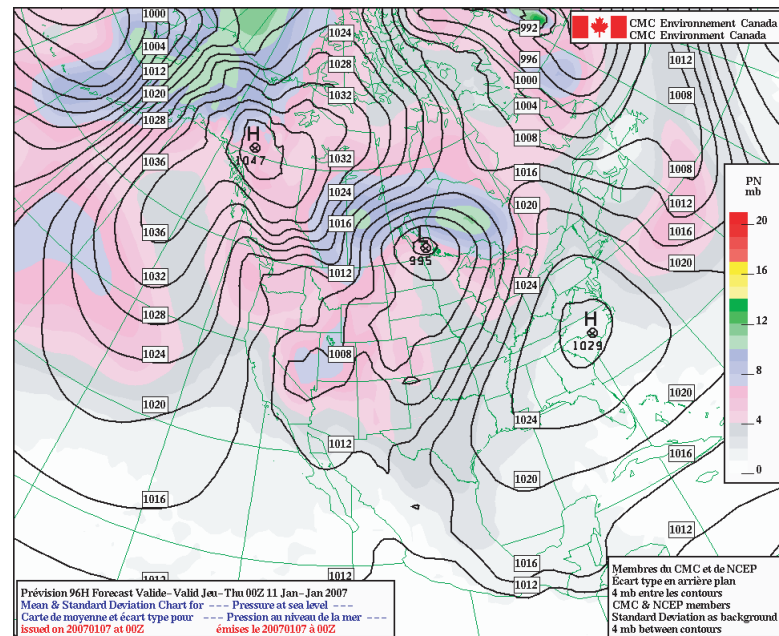
500 mb geopotential height forecasts of NAEFS valid at 00 UTC 11 January 2007:

(a) 120-h forecast, (b) 96-h forecast, (c) 72-h forecast, (d) 48-h forecast.

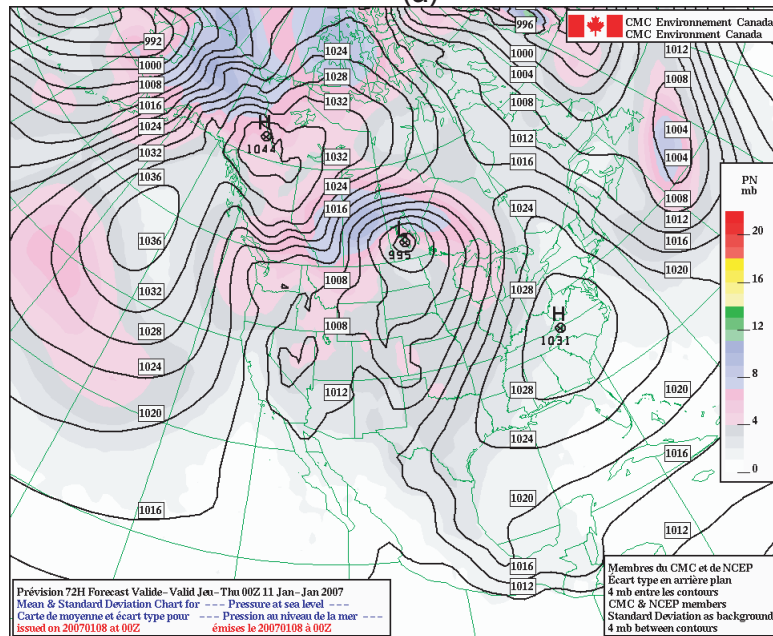
NAEFS MSLP Forecasts



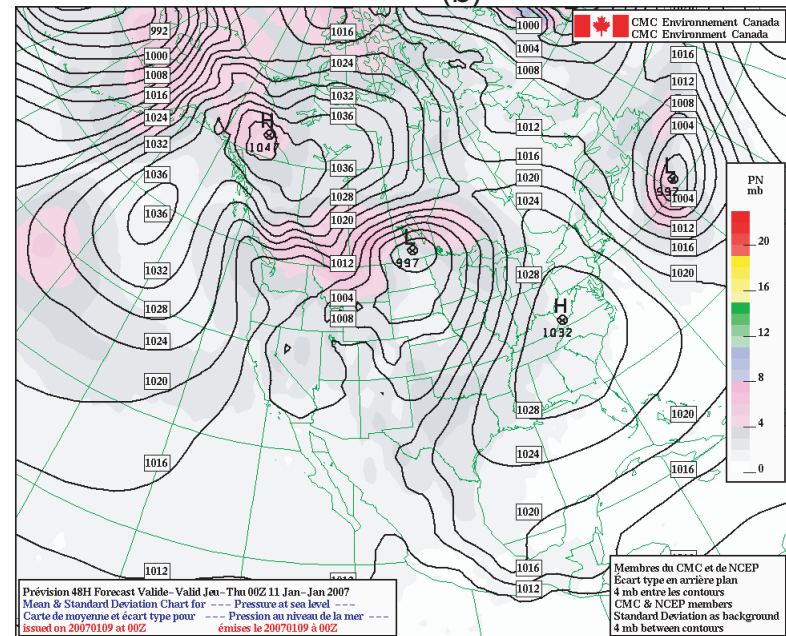
(a)



(b)



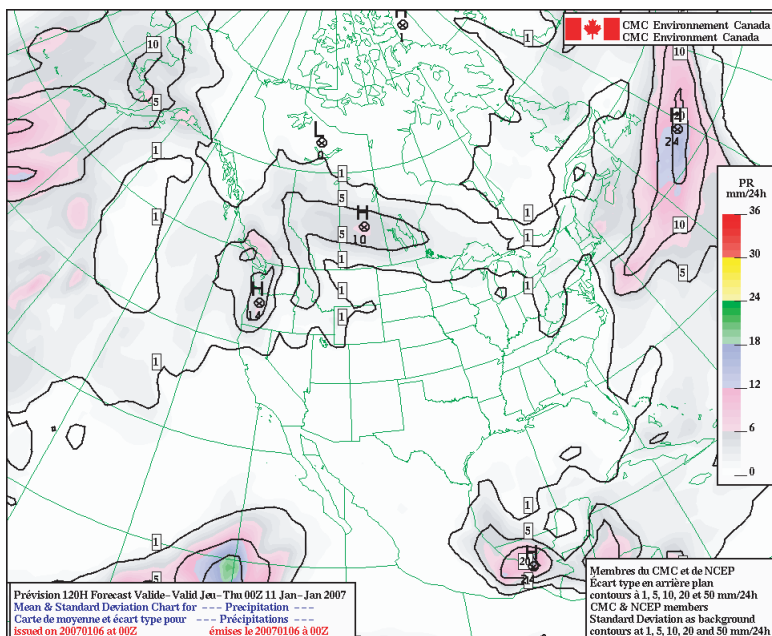
(c)



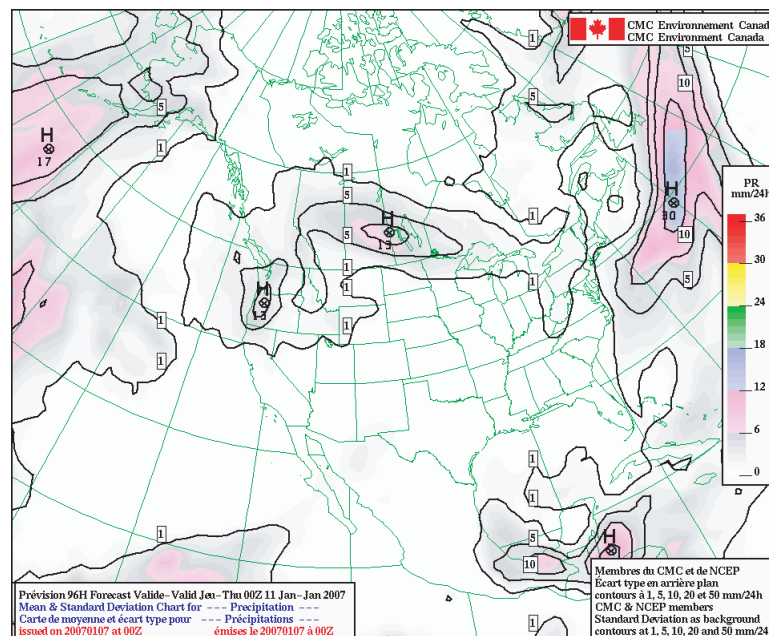
(d)

MSLP forecasts of NAEFS valid at 00 UTC 11 January 2007: (a) 120-h forecast, (b) 96-h forecast, (c) 72-h forecast, (d) 48-h forecast.

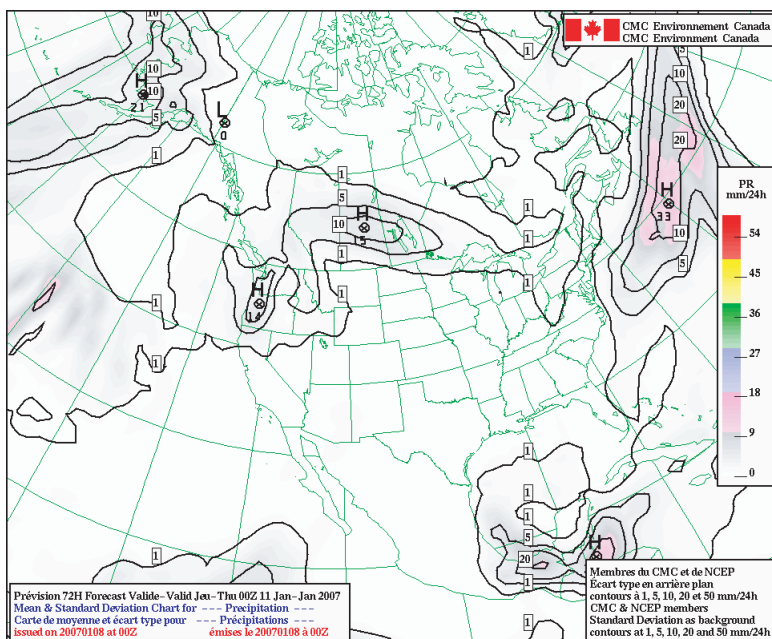
NAEFS 24-h QPF Forecasts



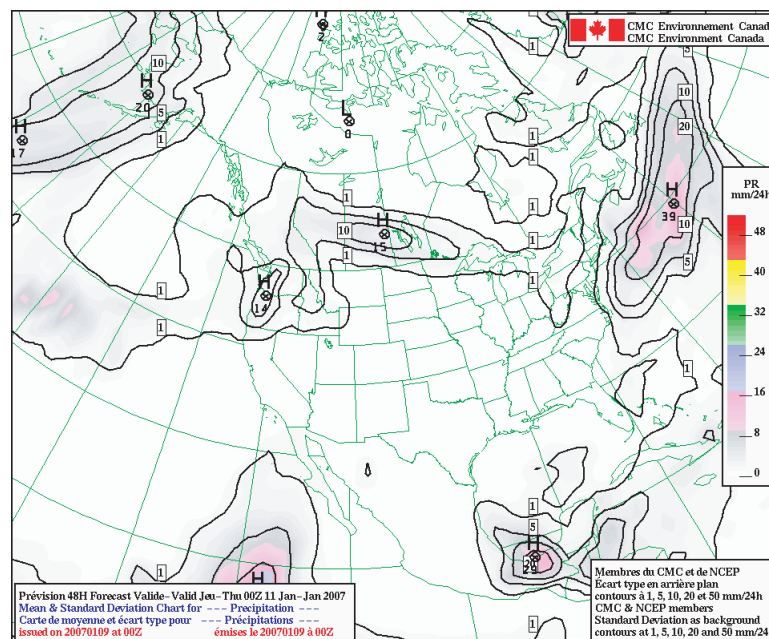
(a)



(b)



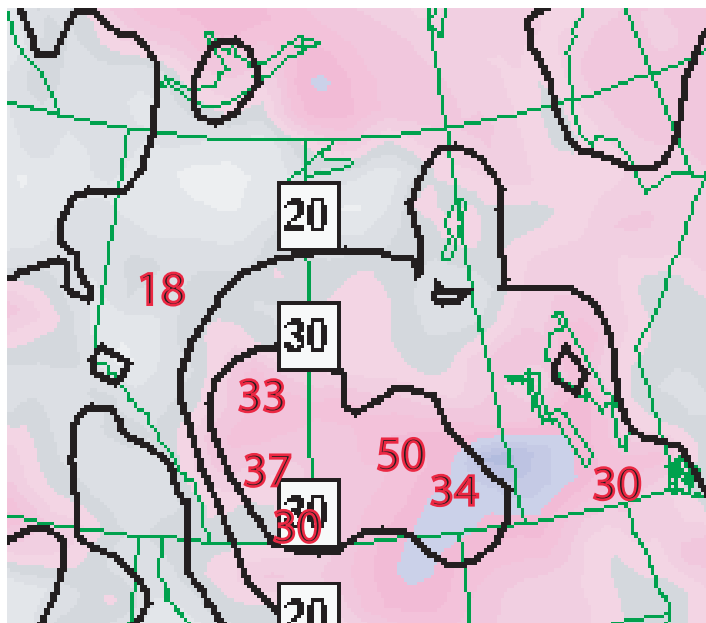
(c)



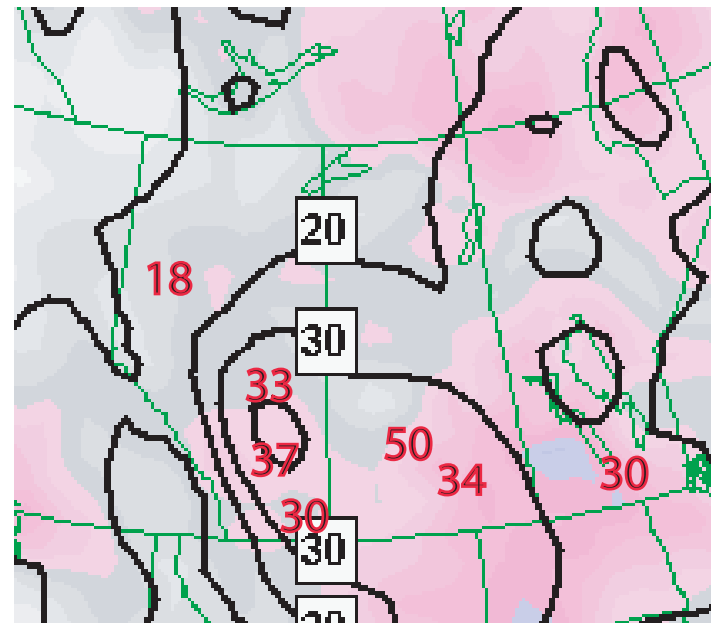
(d)

24-h QPF forecasts of NAEFS valid from 00 UTC 10 January to 00 UTC 11 January 2007: (a) 120-h forecast, (b) 96-h forecast, (c) 72-h forecast, (d) 48-h forecast.

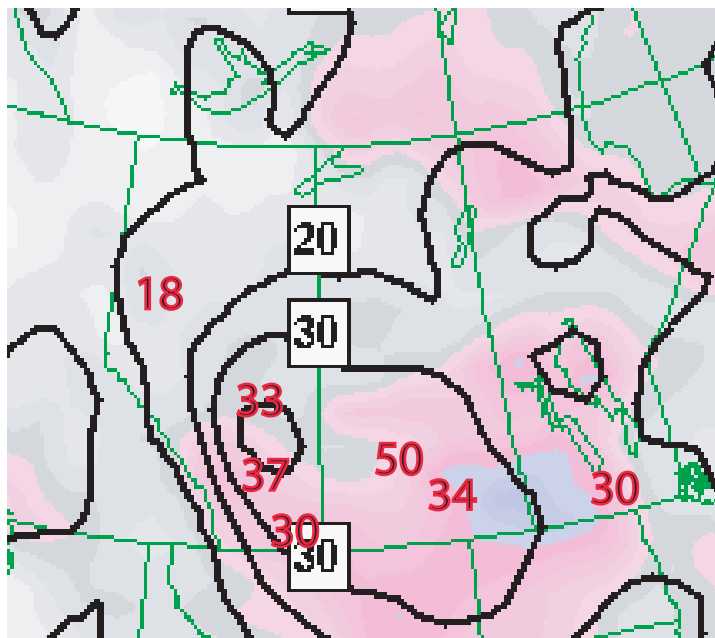
NAEFS Wind Forecasts



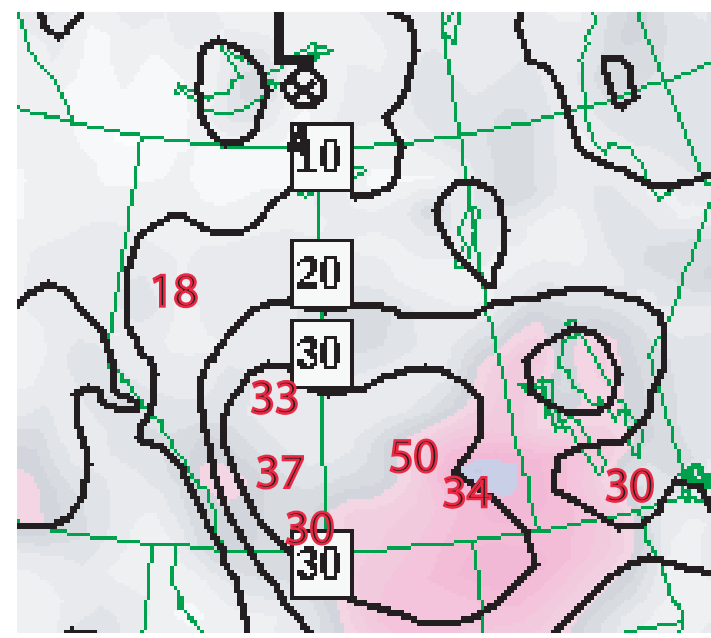
(a)



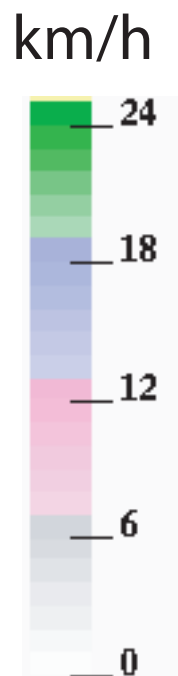
(b)



(c)

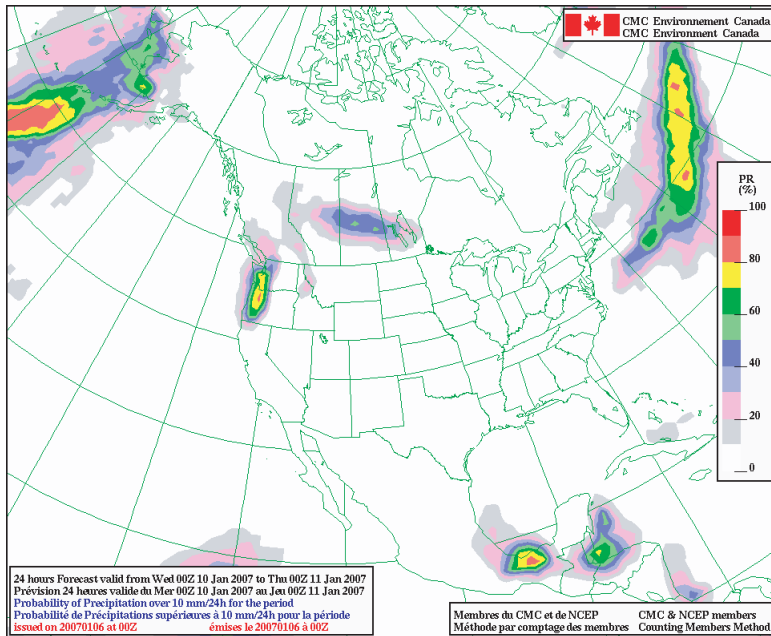


(d)

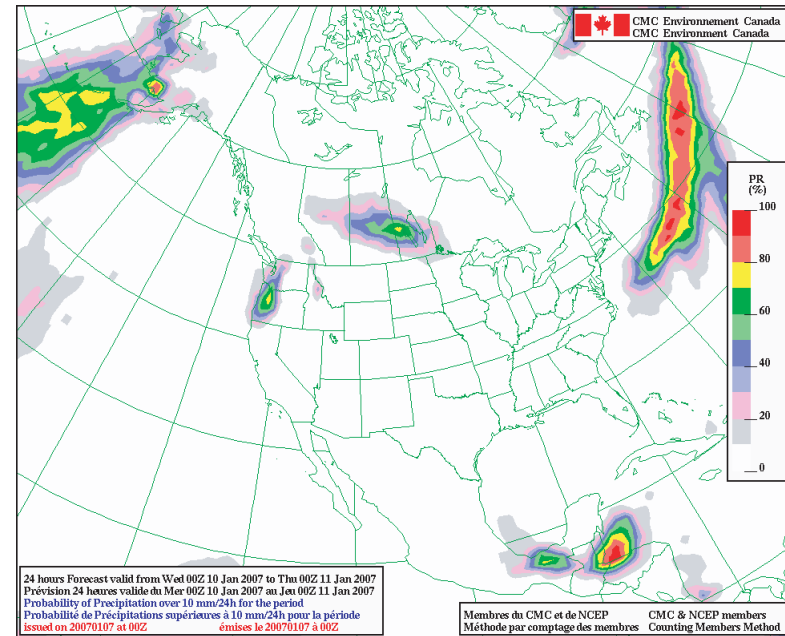


NAEFS wind speed (km/h) forecast valid from 00 UTC 10 January to 00 UTC 11 January 2007: (a) 120-h forecast, (b) 96-h forecast, (c) 72-h forecast, (d) 48-h forecast.

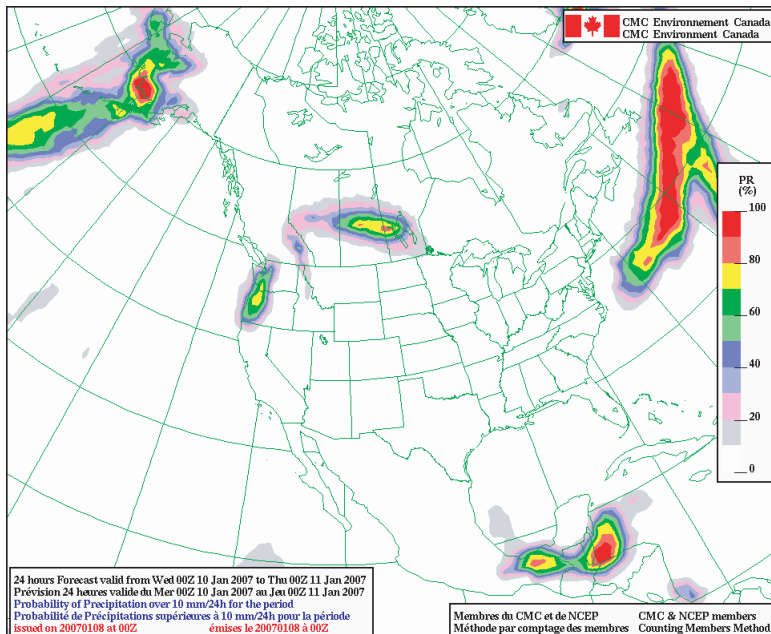
NAEFS Forecast Probability of “24-h precipitation in excess of 10 mm”



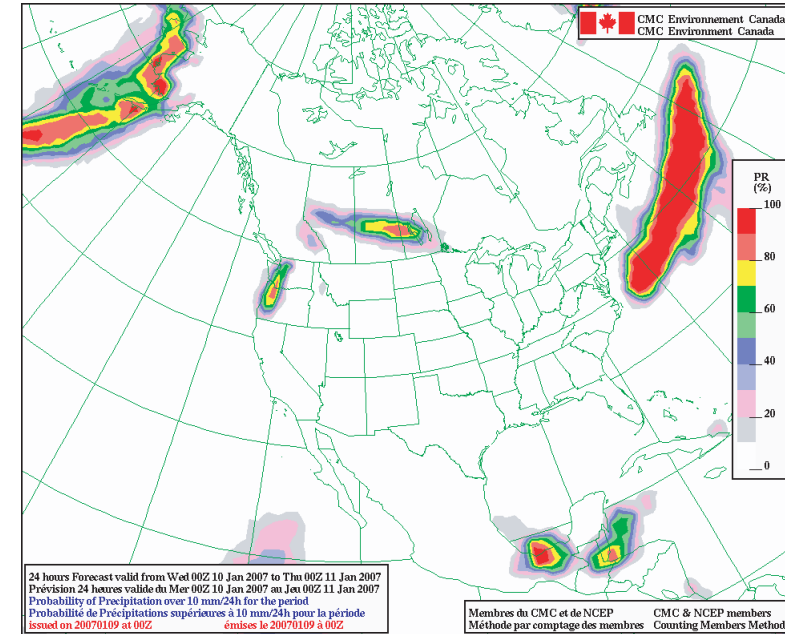
(a)



(b)



(c)



(d)

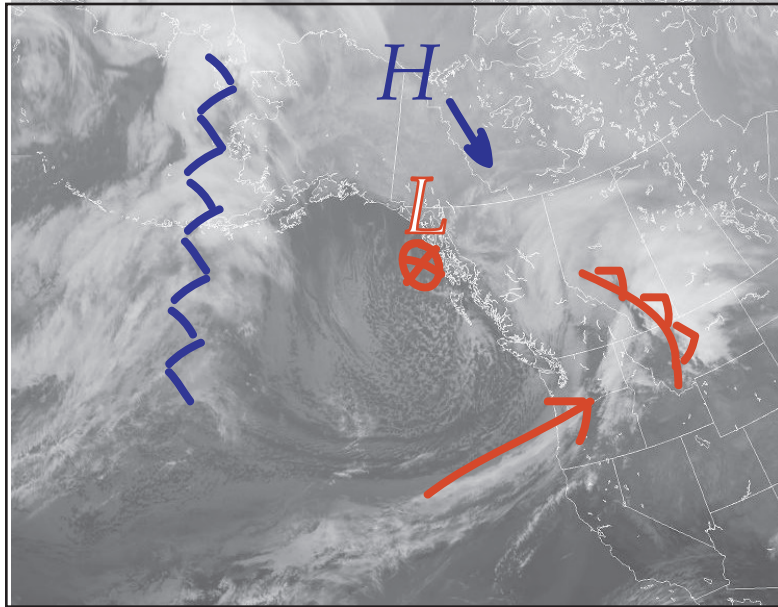
Forecast Probability of “24-h precipitation in excess of 10 mm” of NAEFS valid from 00 UTC 10 January to 00 UTC 11 January 2007: (a) 120-h forecast, (b) 96-h forecast, (c) 72-h forecast and (d) 48-h forecast.

Summary & Discussion

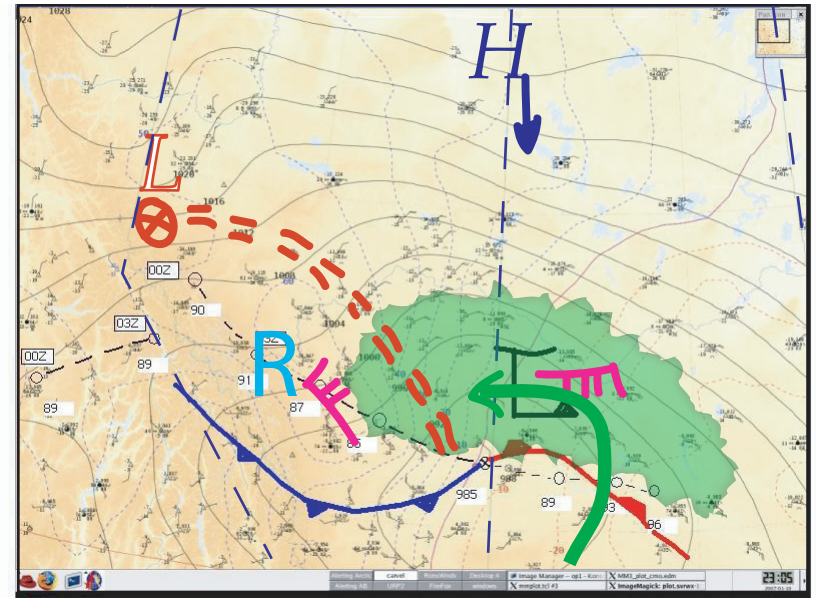
1. This was one of the most severe winter snowstorms over the Canadian Prairies during the last few years.
2. The event was handled relatively well by the PASPC.
3. Ensemble products can help forecasters improve the medium range HIW forecast .

Thanks & Questions

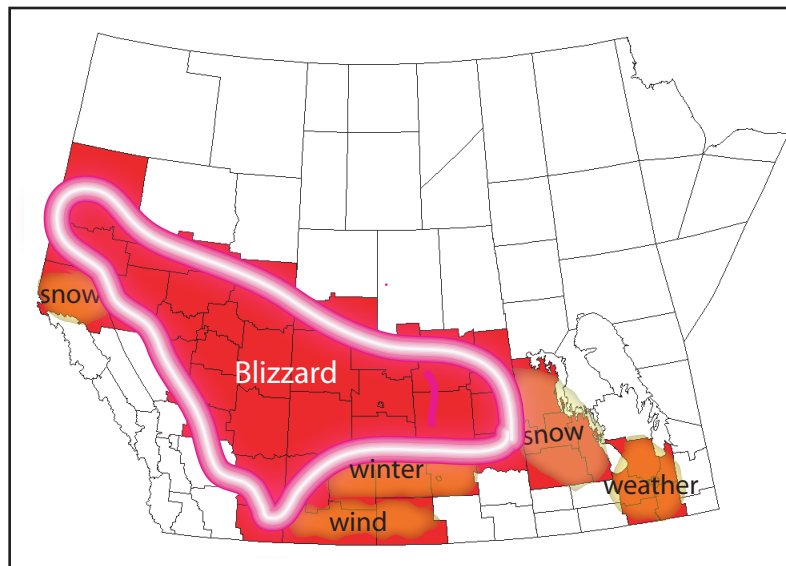
Conceptual Model



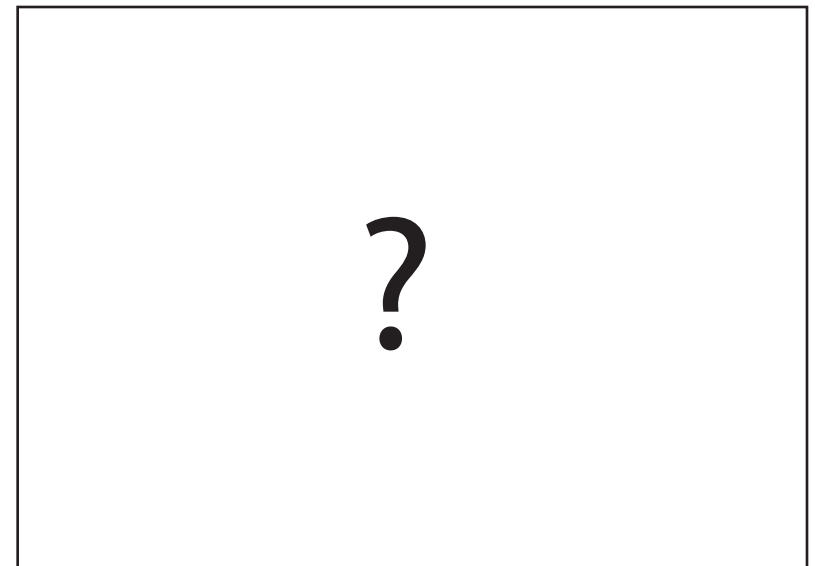
0000 UTC January 10



1200 UTC January 10



Warnings issued by PASPC



Variations