HIGHLY LOCALIZED BANDED SNOW – FEB 11, 2006: REVIEW OF THE FORECAST PROCESS FOR A MISSED EVENT

15th Annual Joint U.S./Canadian Great Lakes Operational Meteorology Workshop

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Overview
• Synoptic setting
• Forecast tools available that night
• Forecast progression
• Radar review
• Banded snow checklist
• Model analysis
• Summary
SPI 00z and 12z RUC

Period of snow accum
Period of snow accum
Period of snow accumulation
4 am Forecast – Feb 11, 2006

• Today...Cloudy. Flurries this morning... then scattered snow showers this afternoon. Highs in the mid 30s. North winds 10 to 15 mph. Chance of snow 40 percent.
Let’s see how that is going...
606 am Update – Feb 11, 2006

- Rest of Today...Occasional snow this morning...then scattered snow showers this afternoon. Snow accumulation of 1 to 2 inches. Highs in the mid 30s. North winds 10 to 15 mph. Chance of snow 80 percent.
615 am phone calls

• Sheriff Depts –
  – Dusting
  – It’s Snowing??

• COOP reported 2 inches already in Springfield area.
620 am Update – Feb 11, 2006

• Rest of Today...Occasional snow this morning...then scattered snow showers this afternoon. Snow accumulation of 1 to 3 inches. ...
Feb 11 - 09 to 1315z
715 am - Phone call from MIC –
Lives directly in the snow band 😞

• How’s it going?

• 4 inches here already. 😊
720 am Update – Feb 11, 2006

• Rest of Today...Occasional snow this morning...then scattered snow showers this afternoon. Snow accumulation of 2 to 4 inches...
Shift briefing 😞

- Humble pie.
  - Dreaded accumulating flurries.

- Not sure what’s causing it. Shouldn’t get too much more. 😊

- Bye!

- Made mistake of not issuing some sort of headline before I left.
1000 am Update – Feb 11, 2006

• Rest of Today...Occasional snow this morning...then scattered snow showers this afternoon. Snow accumulation of 3 to 6 inches. ...
Snow Advisory (thanks to day shift)

- What counties to include?
  - Sporadic coverage
- Wording to use?
  - Wide variability of snowfall
- Issued WSW until 6 pm for 3 to 6 inches.
WSW Coverage

Snow Persisting till 10PM
Light Snow/Lot + Nothing
10+ dBZ isosurface
Facing Northeast
35+ dBZ isosurface
Facing East
IR Sat – 500 Ht/Vort 07z-18z
Snow Band Checklist

Presence of (1”/hr):

- limited dry air advection in near surface.
- near saturated low-mid level RH present (1000-500mb >85%)

Favorable thermodynamic profile for snow (i.e. cloud top temp <-9°C, no melting layers)

Sloped region of mid-level 2-D frontogenesis / Deformation axis in 800-600mb range (Banacos 2003; Schumacher 2003)

Relative minimum in wind speed (<20kt) within 850-700mb region (col point aloft) and/or uniform deep-layer shear profile, absence of substantial hodograph curvature (Banacos 2003)
Snow Band Checklist (cont.)

Enhancement of (1-3”/hr, 5”/hr in extreme cases):

- Saturation through dendrite growth layer (-12 to –16°C) coincident with strong UVV (high precipitation efficiency)

- Presence of negative EPV in a saturated area above a maximum of frontogenesis -- elevated potential or slantwise instability (convective snow potential, band multiplicity)

- Typically associated with major, deepening cyclones

(Shumacher and Schultz, 1999; Novak et al. 2002; Trapp et al. 2000)
Banded Snow Conceptual Models

- Conceptual models of synoptic and mesoscale environments of banded cyclones from (a) Nicosia and Grumm (1999) and (b) Novak et al. (2003).
Large-scale deformation zones are BY FAR AND AWAY the most common means of manifesting areas of frontogenesis within the 850-500mb layer.

- Does NOT require a strong surface cyclone, only a low-mid tropospheric baroclinic zone – which is often developed through horizontal deformation and is associated w/ a col point aloft.

- Moore and Blakely, 1988 — No strong sfc cyclone can lull a forecaster into neglecting heavy snow.

- Col point aloft = strong cue to investigate Fgen and banding potential

Binacos, 2003
Boston, MA Surface Observations

BOS 13 UTC  1 1/2SM –SN
BOS 14 UTC  1/2 SM  SN
BOS 15 UTC  1/2 SM  SN  SNINCR 1/2
BOS 16 UTC  1/2 SM  SN  SNINCR 1/3
BOS 17 UTC  1/2 SM  SN  SNINCR 2/4
BOS 18 UTC  1/4 SM +SN  SNINCR 2/6
BOS 19 UTC  1/4 SM +SN  SNINCR 2/8
BOS 20 UTC  1/4 SM +SN  SNINCR 2/10
BOS 21 UTC  1/4 SM  SN  SNINCR 1/10
BOS 22 UTC  1/4 SM -SN
BOS 23 UTC  2 SM –SN
BOS 00 UTC  10 SM
30 miles southwest of SPI
Deformation and Frontogenesis

- 700 mb Deformation - image
- 700 mb Frontogenesis – light blue lines
- 700 mb Height – green lines
12hr NAM fcst – Valid 12z Feb 11

700 mb HT/Deform/2D Fgen
3hr RUC fcst – Valid 12z Feb 11
700 mb HT/Deform/2D Fgen
12hr GFS fcst – Valid 12z Feb 11

700 mb HT/Deform/2D Fgen
12hr NAM tcs – valid 12z Feb 11

-12 to -18°C Dendritic Zone – shaded & Omega

Neg EPV - shaded

RH >80% - shaded
Any Isentropic signals?
12hr GFS – valid 12z Feb 11

280K Isen - Cond Pres Deficit shaded <40 mb, Pressure (green), Specific Humidity (blue), Wind (tan)
12hr NAM – valid 12z Feb 11

280K Isen – Cond Pres Deficit shaded <40 mb, Pressure (green), Specific Humidity (blue), Wind (tan)
2hr RUC – valid 12z Feb 11

280K Isen - Cond Pres Deficit shaded <40 mb, Pressure (blue), Specific Humidity (green), Wind (tan)
0hr RUC – valid 16z Feb 11

280K Isen – Cond Pres Deficit shaded <40 mb, Pressure (blue), Specific Humidity (green), Wind (tan)
Summary & Conclusions

• No strong signals in the synoptic pattern for much more than scattered snow showers.

• Specific humidity on Isentropic level 280K only 1 g/kg. All QPF fields were minimal. (5-6 mm snow).

• Be careful of complacency in the absence of a strong surface low. Low to mid level baroclinic zone will suffice.

• Main banded snow params – Col point aloft, Fgen directly below EPV, EPV 950 - 850 mb, 700 mb deformation.

Post analysis indicates conflicting banded snow indicators, even from 00hr model output. GFS had the best signal at T-12hrs.
– Enough to sway forecast toward these snow amounts?

• Be vigilant to jump on the bands once they develop and add 3 to 5 cm/hr (1-2”/hr) snow rates to the forecast for the next several hours.
Storm takes 2 casualties

'Odd' snowstorm hits parts of Central Illinois

John Sharp of Rochester unloads goose decoys from his vehicle after a multiple-vehicle accident Saturday on Interstate 55 between Clear Lake and Sangamon avenues. Sharp said he was northbound when cars started piling up in front of him. After he came to a stop, he said he was hit three or four times. Police say 18 vehicles were involved in the pile-up.

Parts of city see 7 inches of snow

By AMANDA REAVY

Sgt. Jack Campbell with the Sangamon County
References


Thank You

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