Examination of an Overachieving Snowfall Event: 19-20 December 2008
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Introduction

- Weak (1,004 hPa) Colorado Low produced a significant winter storm as it moved across the Upper Mississippi Valley and into the Great Lakes in 21 hours during 18-19 December 2008.
- Initially, a strong mid-level short wave and upper-level jet streak interaction helped to enhance synoptic-scale lift and northward transport of moisture ahead of the surface low.
- Band of heavy snow (~4”) fell from southeast Nebraska through southern Wisconsin and into southern Lower Michigan.
- Major ice storm (~1.5”) fell from northeast Nebraska, southeast Iowa, western and central Illinois, and into northern Indiana.

Synoptic Overview

19 December 2008 - 0600 UTC

- Precipitation shield along ahead of warm front extending from weak surface low over eastern Kansas.
- Well-defined position 850 hPa jet, maximum jet at north of surface warm front.
- Stratospheric jet streaks present on either side of precipitation shield: 1) broad 130-kt maximum centered roughly eastward across central Missouri into western Kentucky.
- Direct thermal circulation (DTC) evident underneath entrance region of eastern jet streak north of frontal zone.
- Strong coupling signal seen in ageostrophic circulation between the two jets (directly over frontal zone).
- Deep sloping frontogenetic region coincident with significant moisture transport over frontal zone.

19 December 2008 - 1200 UTC

- Surface low undergoes cyclogenesis (1006 hPa) in 2 hours into western Pennsylvania, while stratospheric jet streaks persist. Precipitation continues to develop from surface warm front.
- Northern 130-kt jet streak still evident in vicinity of surface warm front, coincident with southern half of precipitation shield.
- Cold front and shortwave continue in conjunction with surface frontogenesis. Extended precipitation regions.
- Northern jet streak maximum extends briefly across central Ohio to Kentucky.
- Northern jet streak continues to slide eastward while southern jet maximum lengthens considerably as it approaches the Midwest.
- Sloped frontogenetic region still present, but much weaker than previous analysis.

19 December 2008 - 1800 UTC

- Surface low undergoes cyclogenesis (1005 hPa) in 2 hours into western Pennsylvania.
- Surface low increases in intensity as it moves into western Pennsylvania, while stratospheric jet streaks persist.
- Precipitation continues to develop from surface warm front.
- Northern 130-kt jet streak still evident in vicinity of surface warm front, coincident with southern half of precipitation shield.
- Cold front and shortwave continue in conjunction with surface frontogenesis. Extended precipitation regions.
- Northern jet streak maximum extends briefly across central Ohio to Kentucky.
- Northern jet streak continues to slide eastward while southern jet maximum lengthens considerably as it approaches the Midwest.
- Sloped frontogenetic region still present, but much weaker than previous analysis.

20 December 2008 - 0000 UTC

- Surface low 1005 hPa MOVES off the New Jersey shore. Precipitation shield begins to lose definition, while cold front moves across the New York State line.
- Precipitation continues to develop from surface warm front.
- Jet coupling still evident at this time, but slightly weaker than at previous times.
- Frontal zone less compact as well, with pronounced convectively unstable layer still present to the south.
- Sloped frontogenetic region still present, but much weaker than previous analysis.