Examining the GFS Model in a Busted Snow Event: 15 – 16 January 2003

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Introduction

- One of the goals of the National Oceanic and Atmospheric Administration’s (NOAA) strategic plan for the 21st century is to provide information, services, and products that support the United States society and economy with safe and efficient transportation systems (NOAA 2005).
- Currently, one reason that critical weather information and products fall short of national needs and expectations is due to an incomplete understanding of meteorological processes (NOAA 2005).
- On 15 – 16 January 2003, a major winter storm had been forecasted to impact the entire lower Missouri River Valley and the St. Louis, MO county warning forecast area with up to 8 inches of snow.
- Up to that date during the 2002 – 2003 winter season, the GFS had exhibited superior performance and was the model of choice for this event.

- The poster will examine:
  - The GFS model run available to the St. Louis NWSFO forecasters when the winter storm warning was issued for the county wide area.
  - The Rapid Update Cycle’s (RUC) analysis of the event.
  - How the dprog/dt method can be quantitatively applied to diagnose model trends in comparison to existing conceptual models.

Analysis

- An evaluation of trends in lagged forecasts.
- Example: dGFS dprog/dt is negative, meaning that more recent NWP forecasts are treating deeper with the surface situation.
- Most common approach is a qualitative analysis, overlapping two different forecasts valid at the same time.

GFS dProg/dt

- My method:
  - Plot the difference of the most recent GFS forecast with the previous forecast, 12 hours earlier.
  - Quantitative approach.
  - Easier to pick out patterns with the trends.

GFS Forecasts – 1200 UTC 15 January 2003 Run

Conclusions

- This forecast was not only a bust in the LSX CWA, but also in surrounding offices and nationally at NHC.
- In LSX CWA: Everyone would see 4-5 inches with higher amounts in banding. But in this case, there needed to be mesoscale forcing in combination with large-scale forcing to overcome the dry air at the surface.
- In addition, an increasingly stable environment needed to be overcome by mesoscale processes.
- dprog/dt is another tool to interrogate the model.
- Preliminary research indicates that subtle changes in the QPF field and the lack of forcing for mesoscale winter precipitation may have been able to give clues that the GFS was overestimating. To what degree?
- This research was made possible by the NOAA-CSTAR program.
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