Appendix 8E

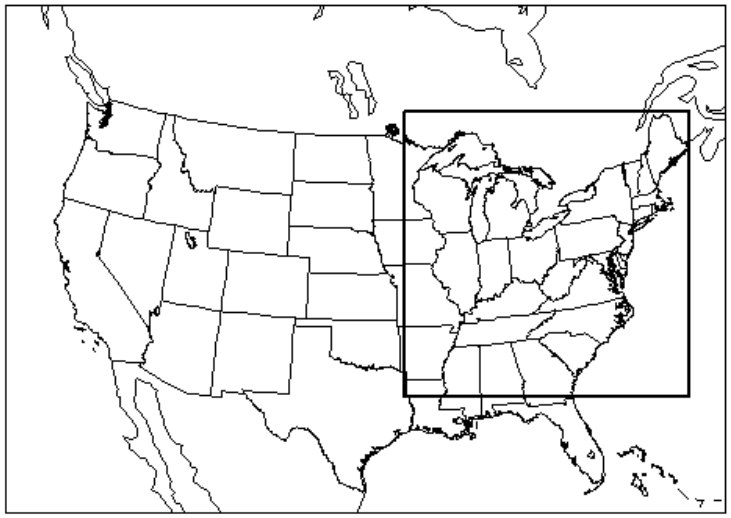
MM5 Model Evaluation
Document #1

Meteorological Data Analysis

Urban, Regional Modeling and Analysis Section
Division of Air Resources
New York State Department of Environmental Conservation

November 16, 2005

OTC Air Quality Modeling Domains



36km Domain (145x102x22)

12km Domain (172x172x22)

MM5 input and output files were received from UMD for entire 2002 in 128 3.5-day chunks with 12-hour overlapping period between adjacent pieces

Evaluation was limited to 12km air quality modeling domain for 12km MM5 output files over the 5-month period of may to September 2002

Surface observation datasets include NCAR ds472.0 (around 800 stations) and CASTNet data (around 50 stations)

- METSTAT program from Environ was used to examine surface wind speed and direction, temperature and humidity

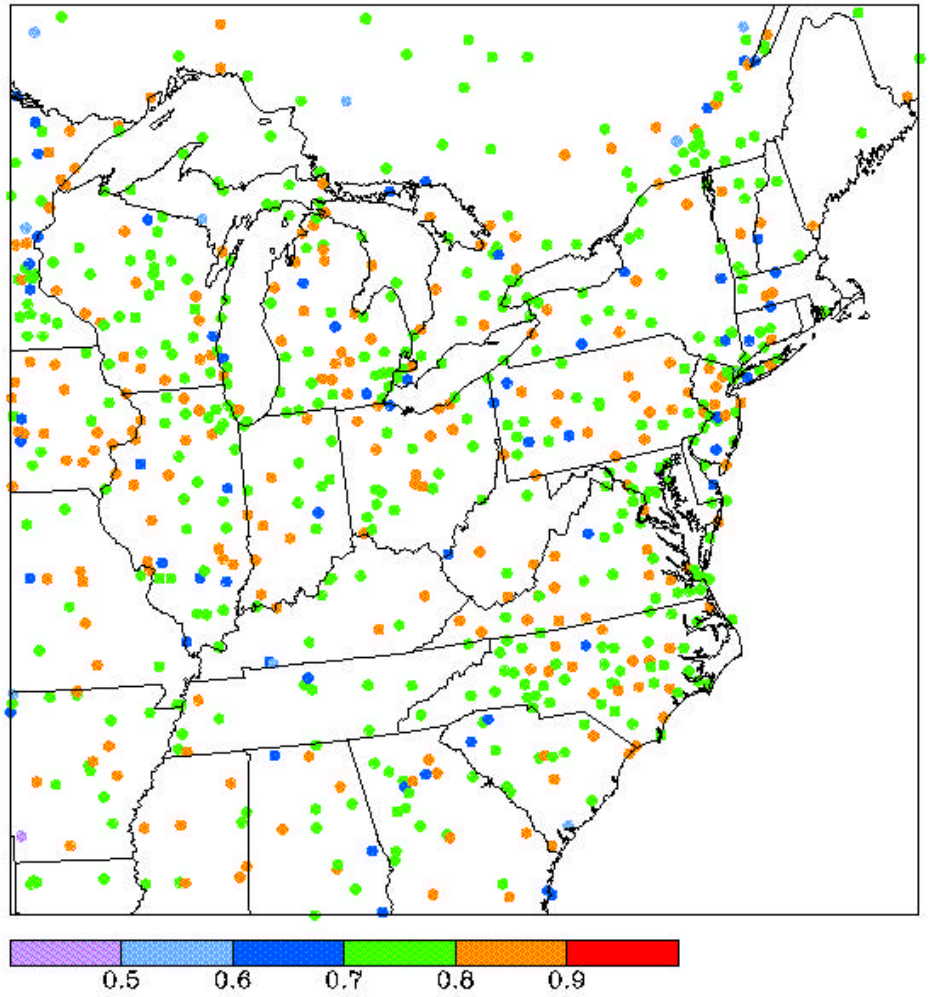
- Correlation coefficients were calculated for surface wind speed, temperature and humidity

Wind speed correlation with TDL are ranging from 0.7 to 0.8

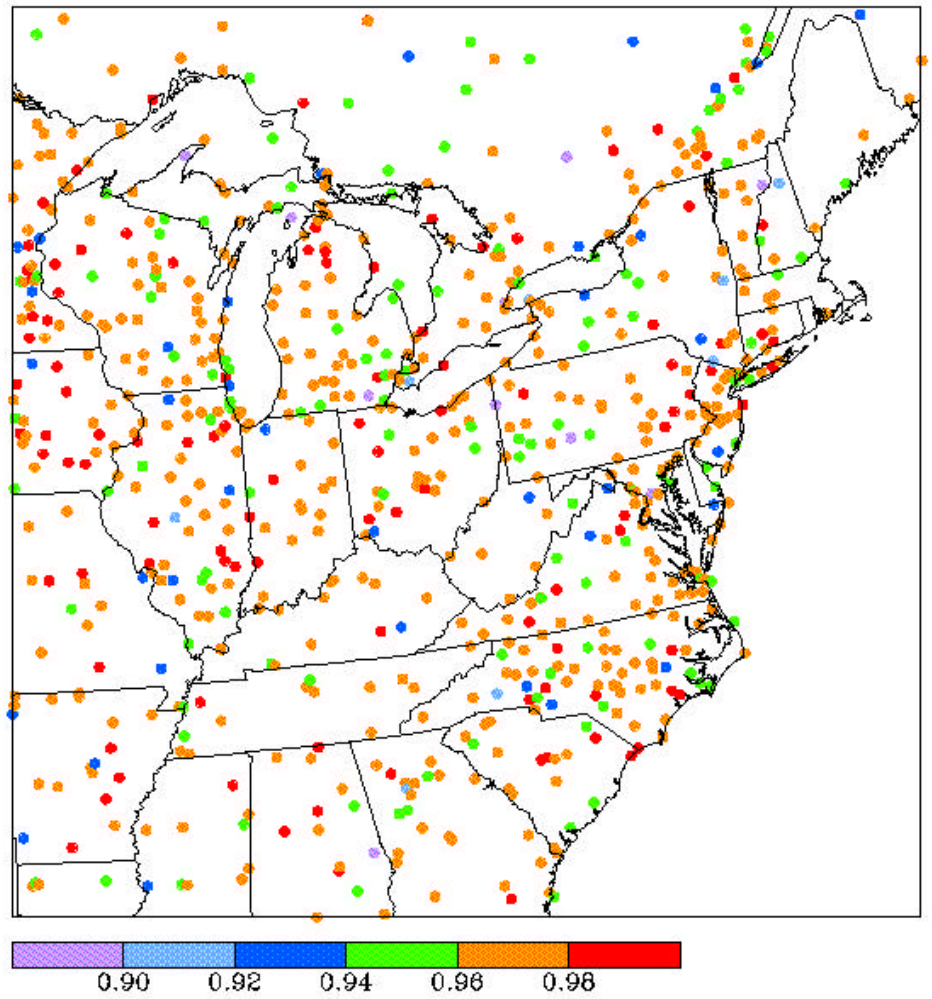
Temperature correlation with TDL are .96 and better

Humidity correlation with TDL are ranging from 0.8 to 0.9

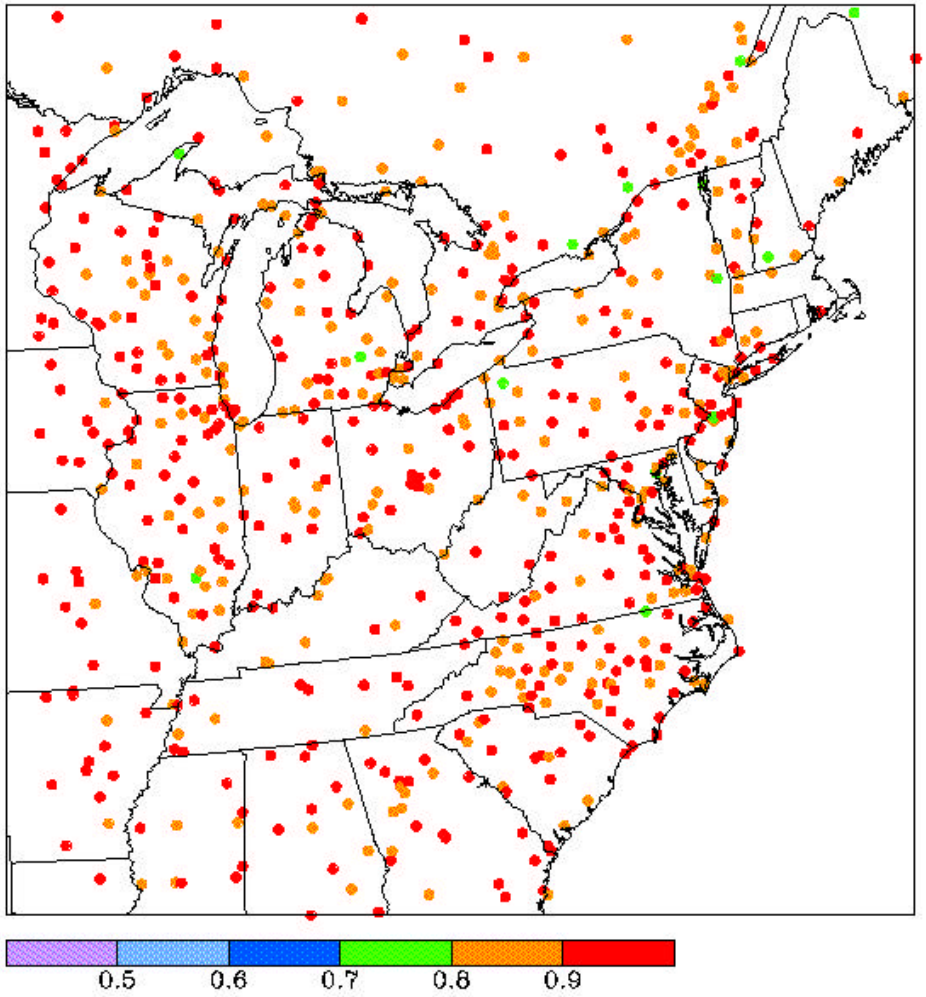
MM5 Sfc Wind Speed Correlation with TDL May to Sept 2002



MM5 Sfc Temperature Correlation with TDL May to Sept 2002



MM5 Sfc Humidity Correlation with TDL May to Sept 2002

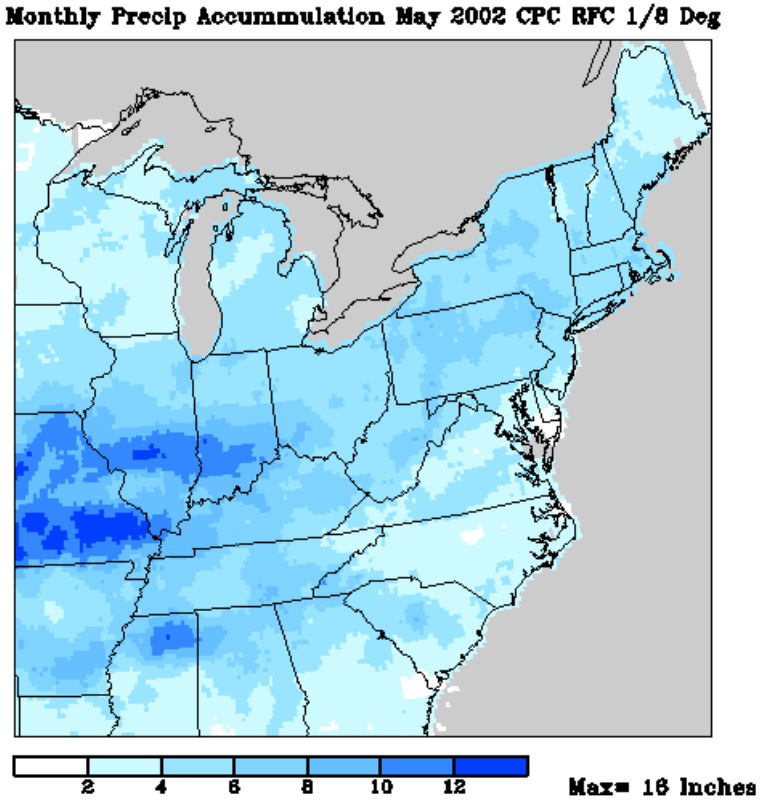


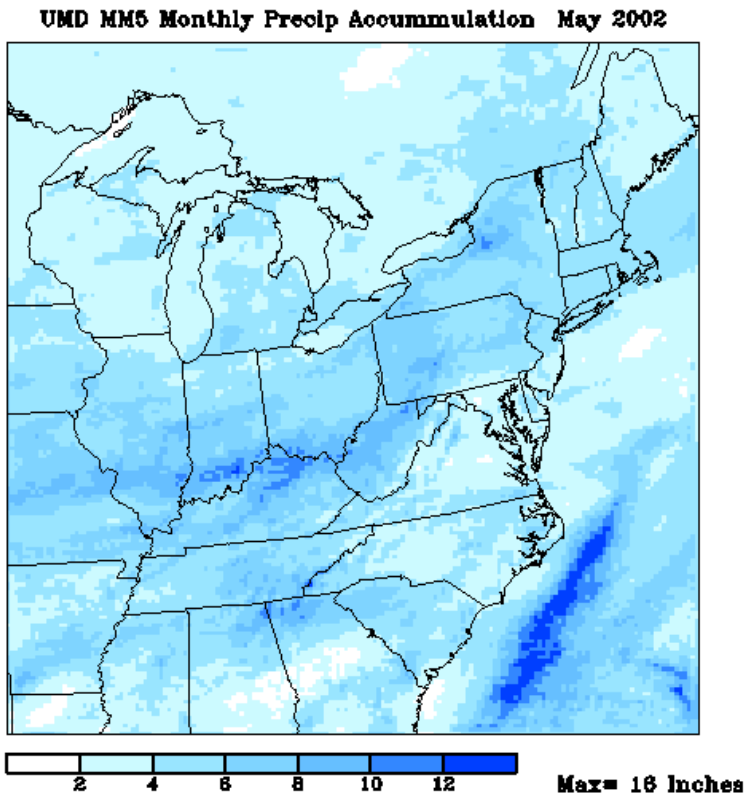
Monthly total of MM5 predicted precipitation was compared with 1/8-degree CPC rain gauge analysis

For months of May and September 2002, MM5 is doing a fair job capturing the rainfall patterns

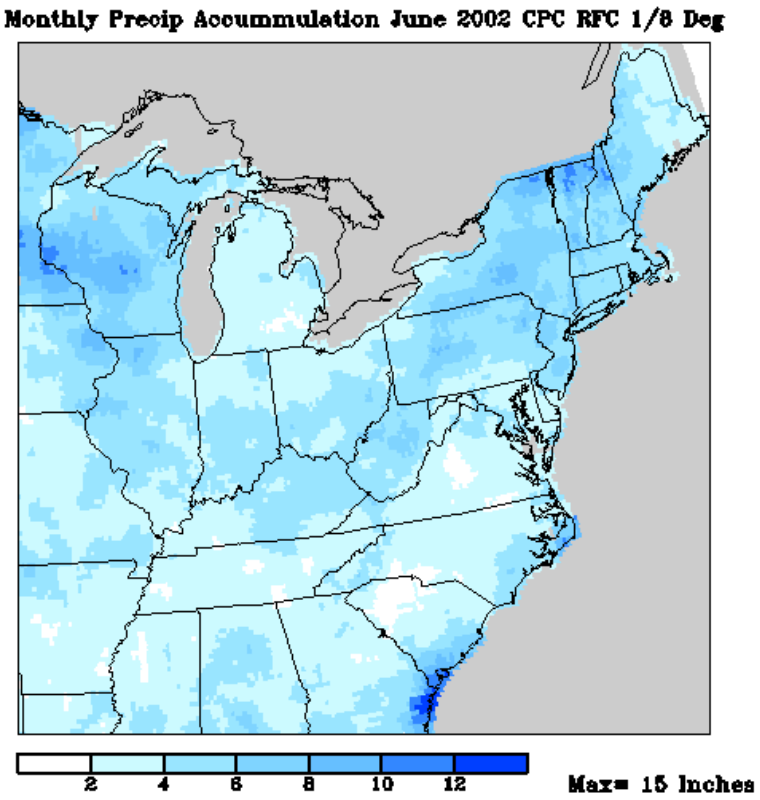
For months of June, July and August, the model is not doing well in terms of pattern and amount, probably is related to summertime convective activities

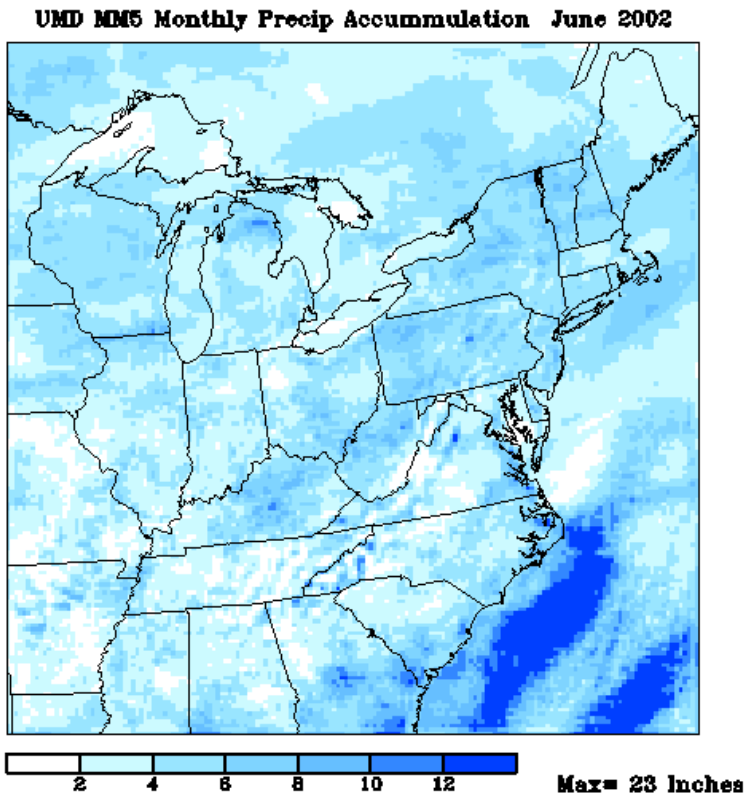
Obs May 2002 MM5



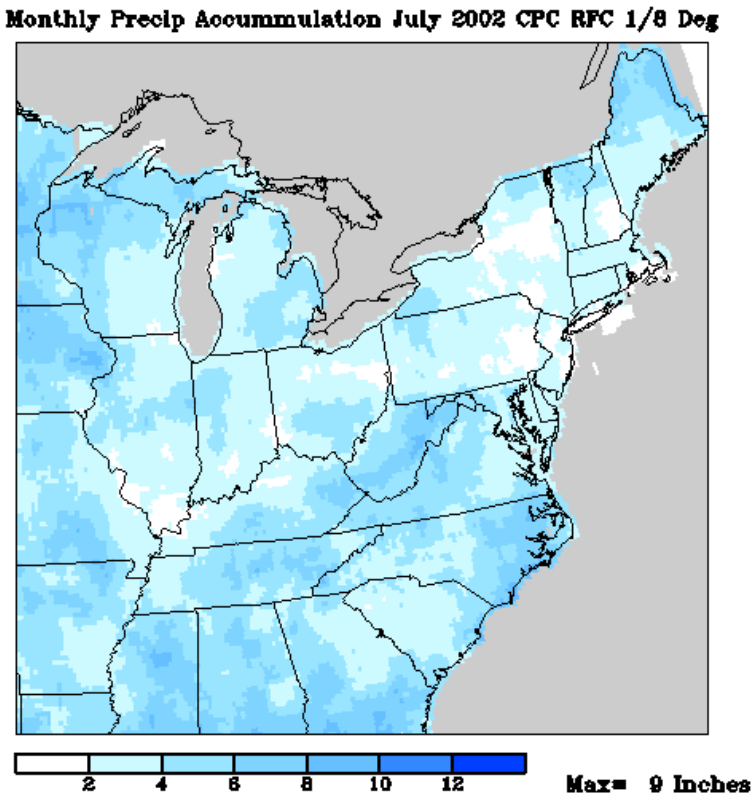


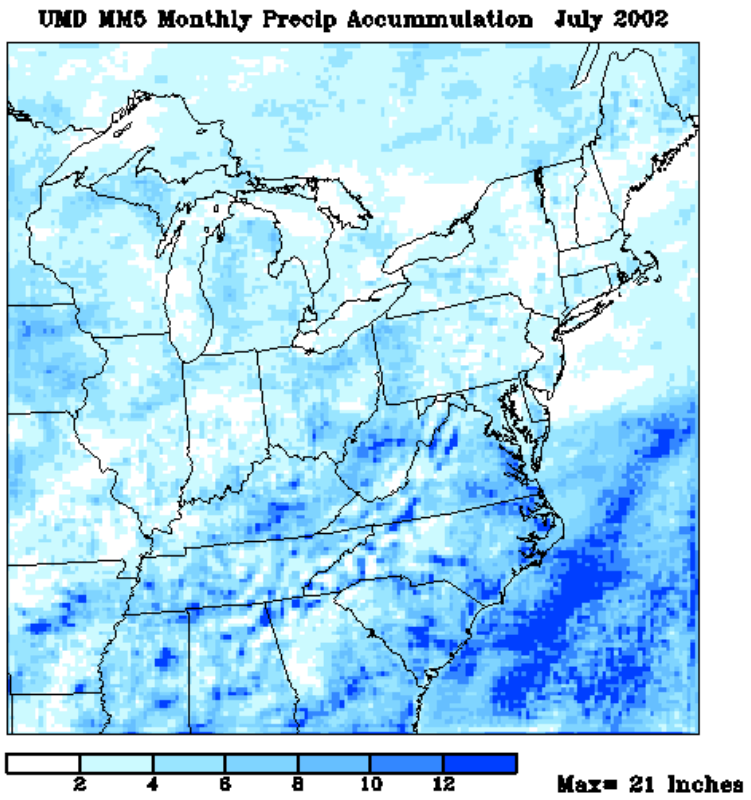
Obs June 2002 MM5



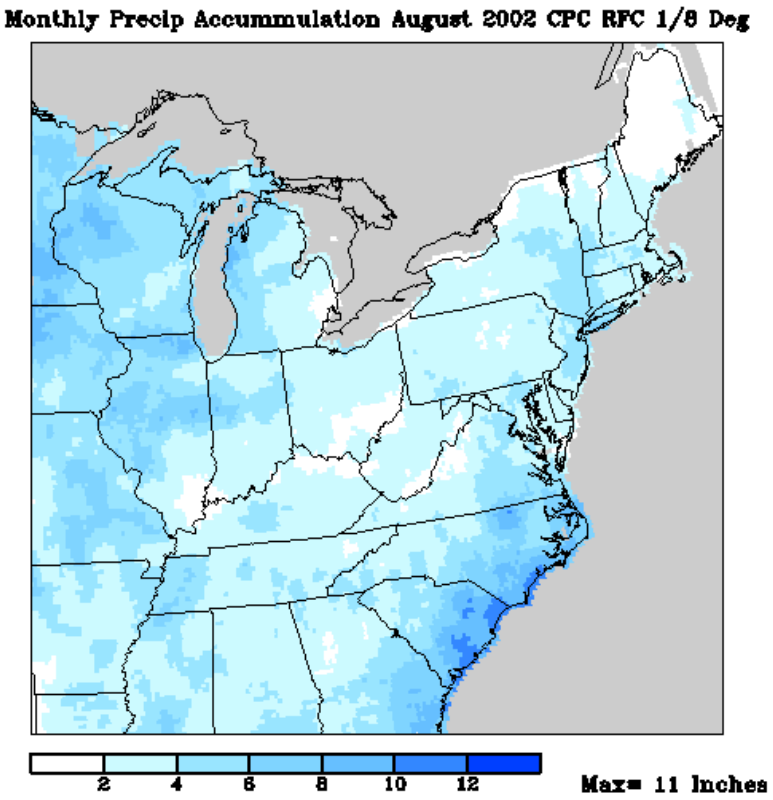


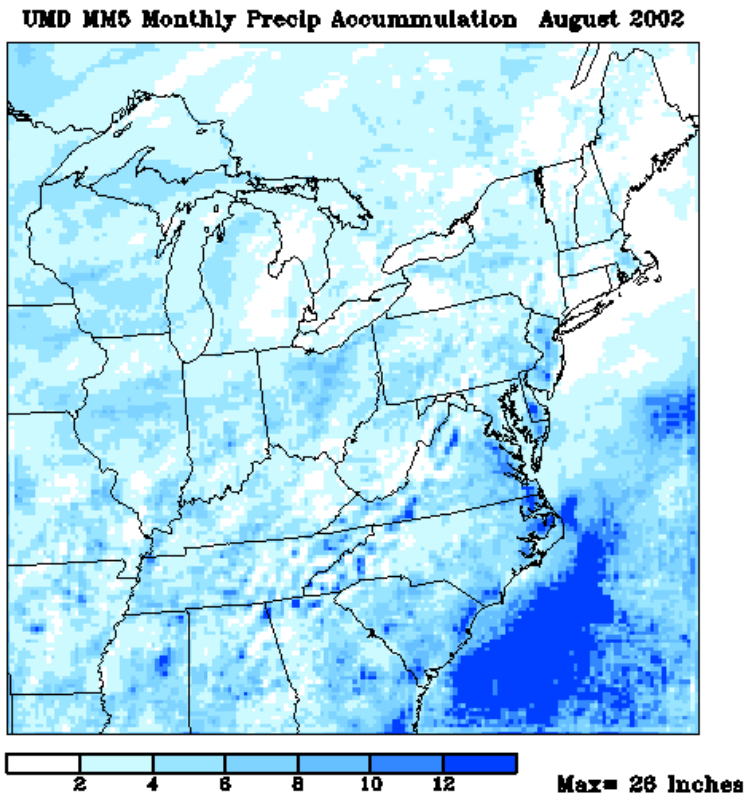
Obs July 2002 MM5



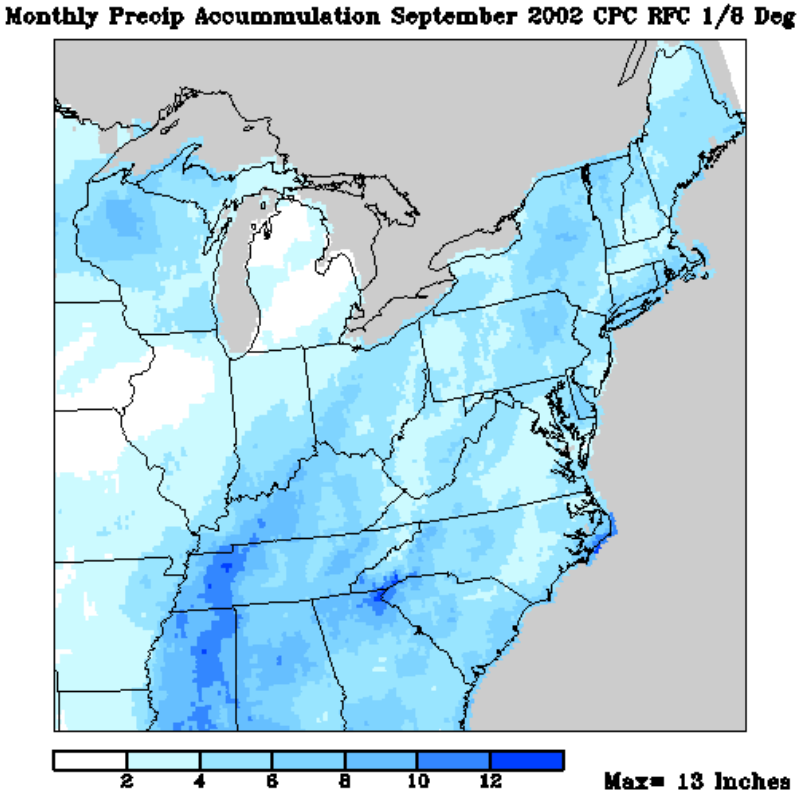


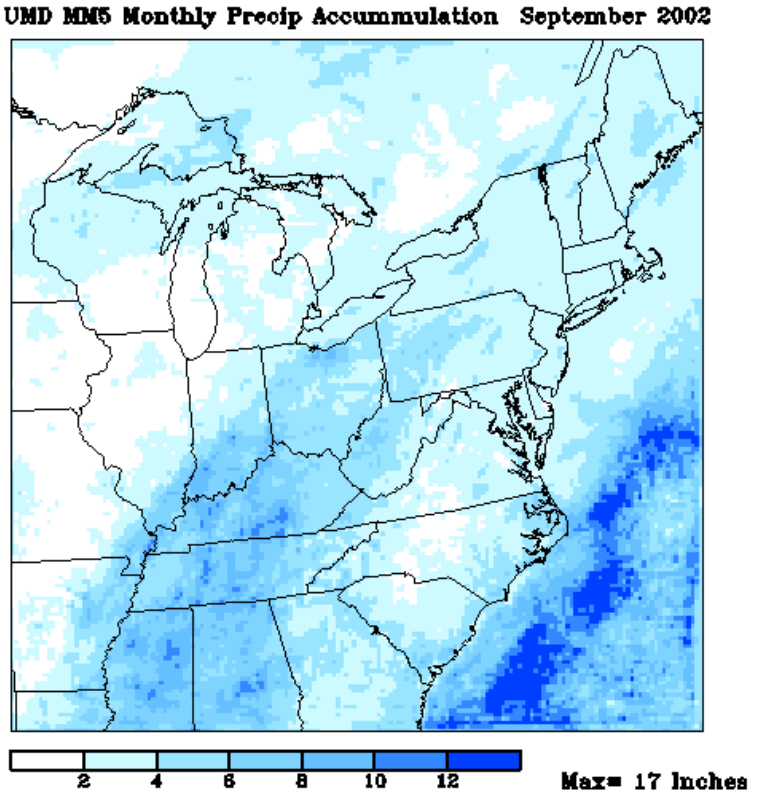
Obs August 2002 MM5





Obs September 2002 MM5





MM5 cloud cover was compared qualitatively with UMD Surface Radiation Budget Groups' products

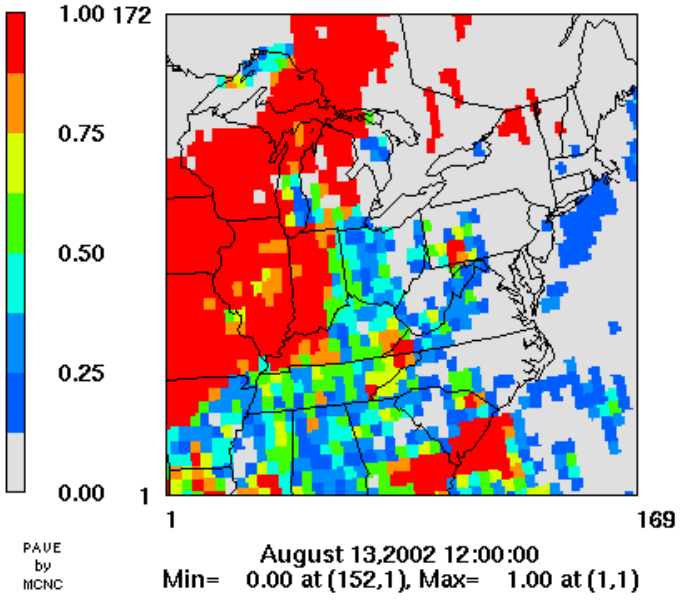
The observed cloud interpolated from satellite base data of 0.5^{o} by 0.5^{o} resolution

Total cloud fraction estimated by MCIP from MM5 low, middle and high cloud fraction

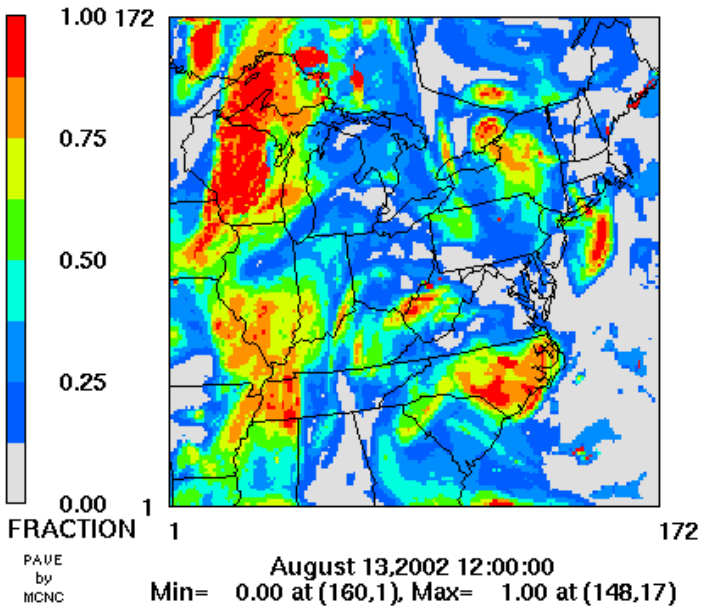
MM5 is doing a fair job to simulate cloud patterns for the time periods we examined

Observed and Simulated Cloud field on August 13, 2002

Observed Cloud

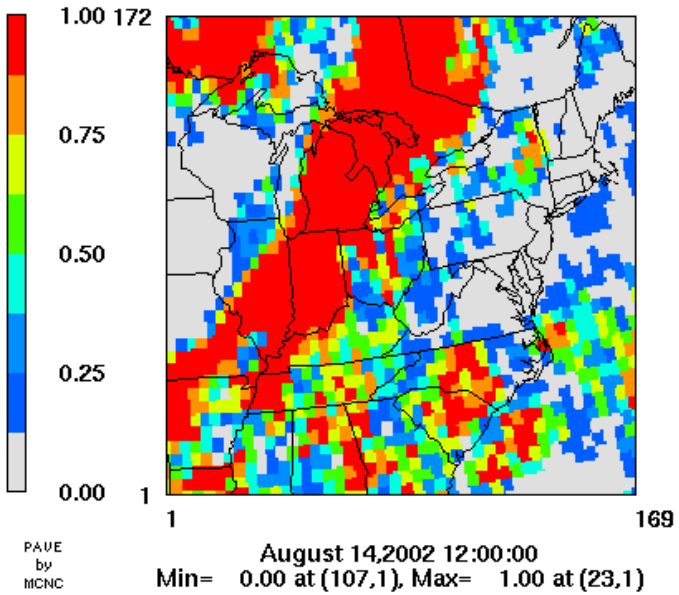


MM5 Cloud

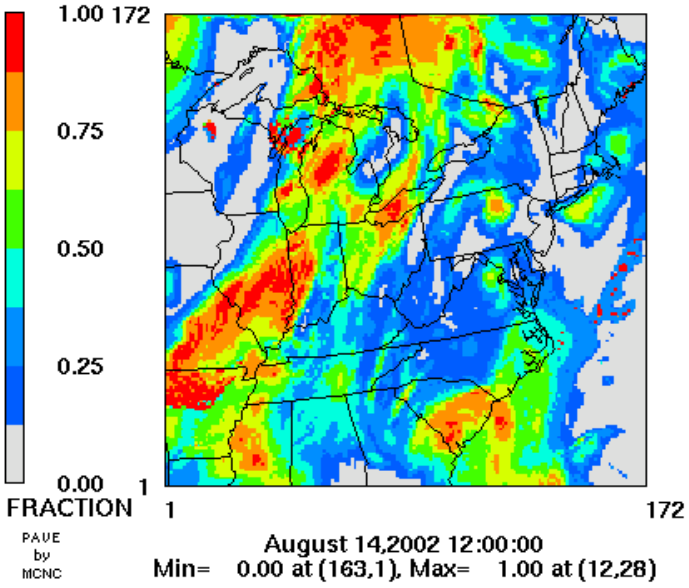


Observed and Simulated Cloud Field on August 14, 2002

Observed Cloud

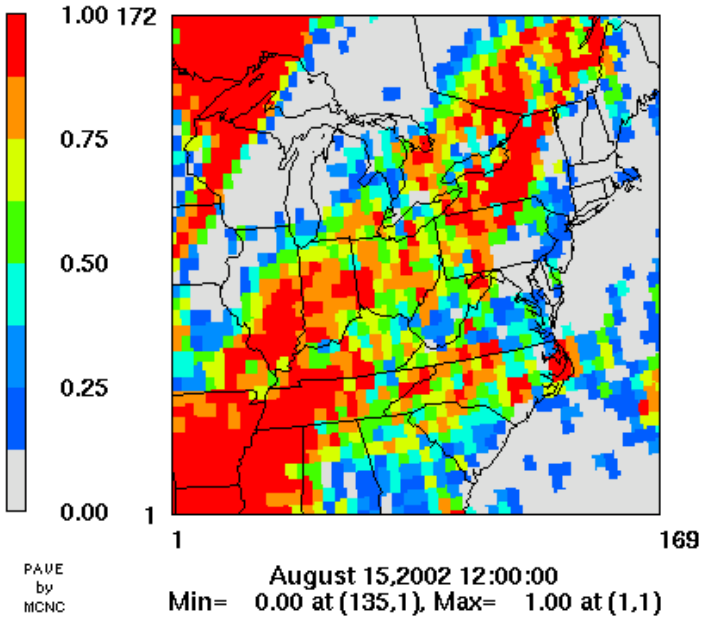


MM5 Cloud

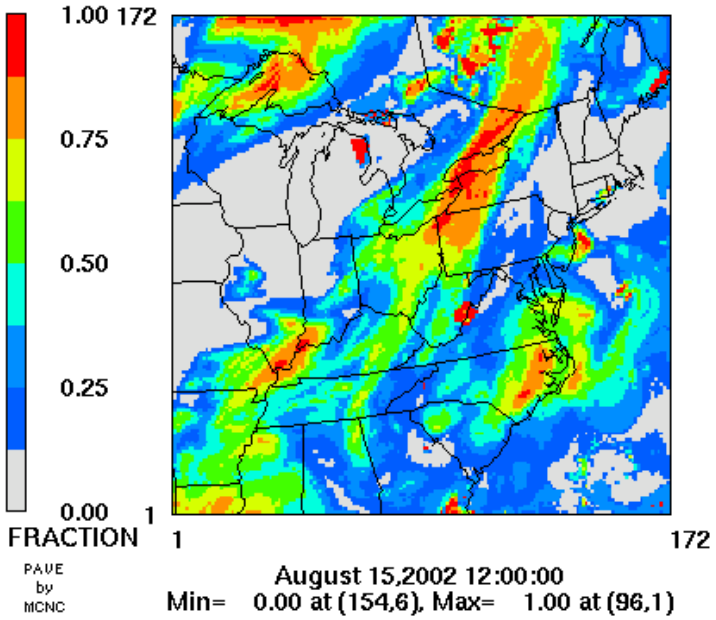


Observed and Simulated Cloud Field on August 15, 2002

Observed Cloud

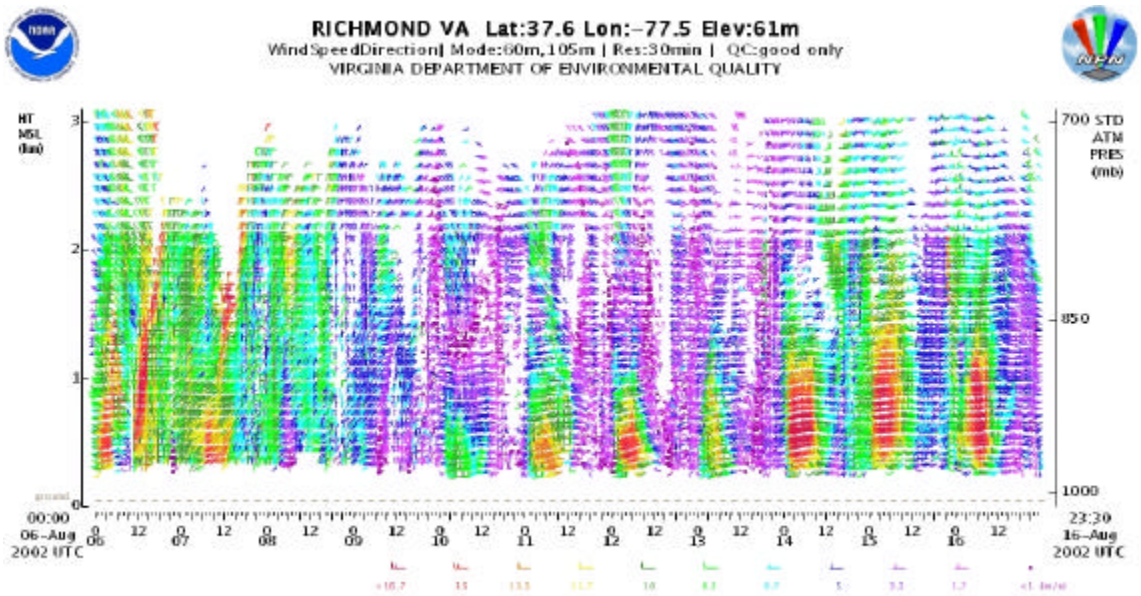


MM5 Cloud



MM5 vertical wind speed profiles were compared qualitatively with wind profilers observations, using low level jets (LLJ) as an indicator

MM5 is doing a fair job capturing LLJ events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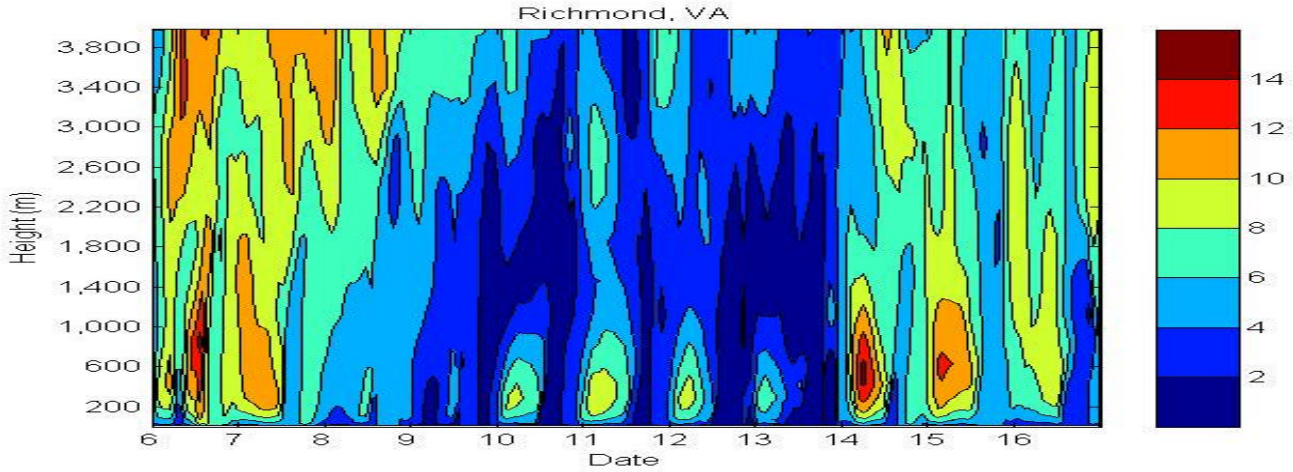
700 STD ATM PRES (mb)
850
1000
00:00 06-Aug 2002 UTC
23:30 16-Aug 2002 UTC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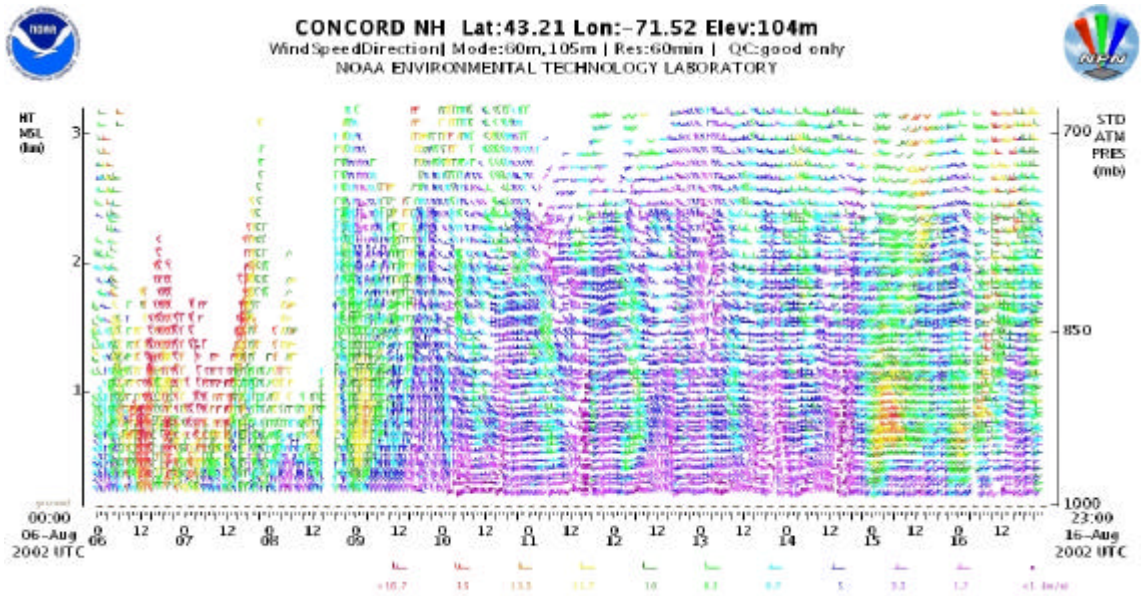
CONCORD NH Lat:43.21 Lon:-71.52 Elev:104m
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NOAA ENVIRONMENTAL TECHNOLOGY LABORATORY
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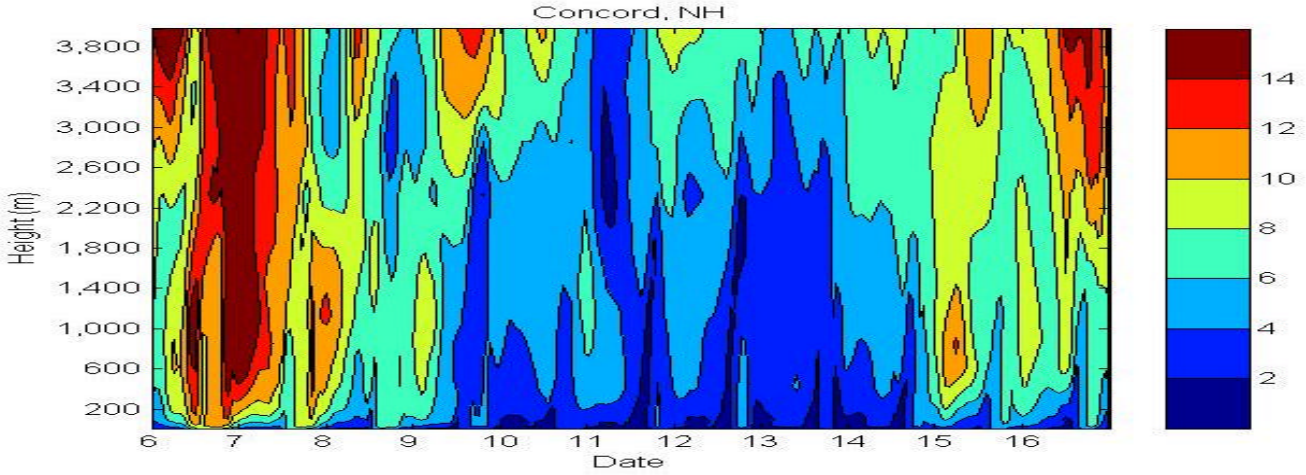
STD ATM PRES (mb)
700
850
1000
00:00 06-Aug 2002 UTC
23:00 16-Aug 2002 UTC


Concord, NH
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Date
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August 15, 2002