



The Maintenance Decision Support System (MDSS) Project: NSSL Contributions

John Cortinas

cortinas@nssl.noaa.gov

Mike Baldwin

baldwin@spc.noaa.gov

*NOAA/OAR/National Severe Storms
Laboratory (NSSL)*

1313 Halley Circle

Norman, OK 73069

405-366-0482

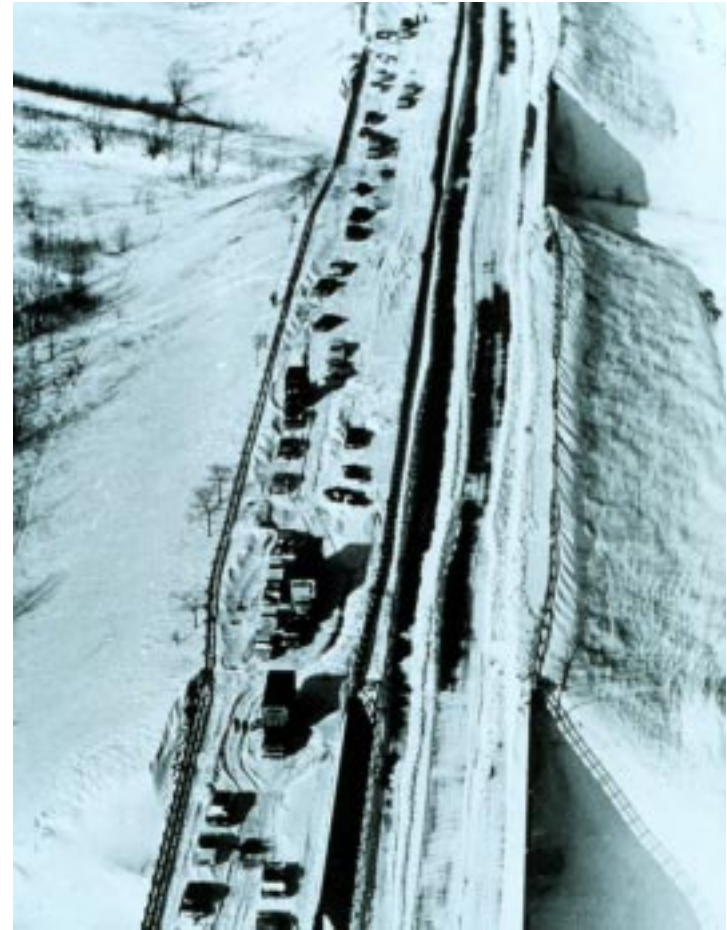


MDSS FHwy Headquarters Review April 11, 2002



NSSL Contributions

- **Precipitation-type Algorithms**
 - Provided computer programs (algorithms) which determine the most likely type of precipitation using forecasts of temperature and moisture.
 - Delivered three algorithms to NCAR to be incorporated into the Road Weather Forecast System.
 - Evaluated algorithm performance with independent NWS model data.
- **Modified Eta Mesoscale Model**
 - Provided daily output from modified NWS Eta model from 1 Dec. - current.
- **Scientific Expertise**
 - Attended review meetings and provided scientific expertise regarding system development and integration.



Super snowstorm (1967) paralyzed Chicago. Calumet Expressway near 138th.

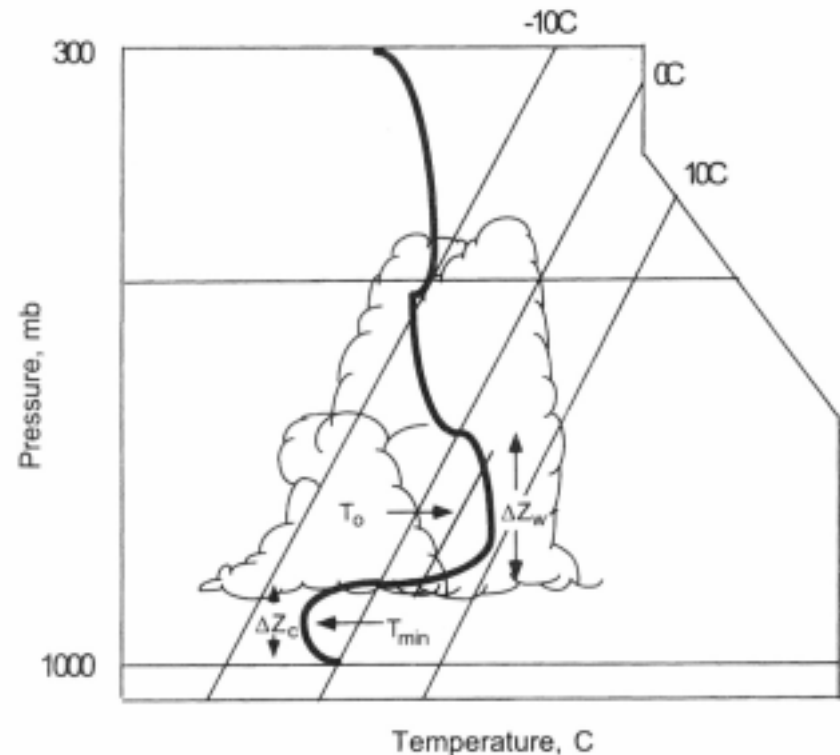


MDSS FHwy Headquarters Review April 11, 2002



Precipitation-Type Algorithms

- Algorithms analyze temperature and moisture data above a particular location to infer the most probable type of precipitation at the surface (rain, snow, freezing rain, or sleet).
- NSSL has contributed three different algorithms to the MDSS system (two currently being used). Each algorithm determines precipitation type differently.
- Algorithms use model output to determine most likely precipitation-type occurring *near* the ground.



MDSS FHwy Headquarters Review April 11, 2002



Precipitation-Type Algorithms

- Tests of algorithm forecast (out to 48h) performance during the winter of 2000-2001 (percentage of correct forecasts, given observed precipitation):
 - Snow: 87%-94%
 - Rain (2 m temperature \leq 5 deg. C): 86%-88%
 - Freezing Rain: 47%-61%
 - Sleet: 25%-36%
- All algorithms provide forecast information that is better than random forecasts.
- Multiple algorithms provided information about forecast uncertainty (i.e., higher probability of occurrence when more algorithms agree on precipitation type.)
- Results support using multiple algorithms within the MDSS.



MDSS FHwy Headquarters Review April 11, 2002



Eta Forecasting Model

- **Model provides forecasts at points separated by 22 km.**
- **Used extensively by National Weather Service.**
- **Vertical coordinate allows for realistic representation of steep orography.**
 - 50 vertical levels up to ~30 km
- **The MDSS version of the Eta model is a modified version of that used by the National Weather Service**
 - Different representation of convective precipitation
 - More accurate representation of diffusion processes



MDSS FHQY Headquarters Review April 11, 2002





Possible NSSL Modules for Future MDSS Implementation

- **Severe Weather and Precipitation Tracking**
 - NSSL is the leader in developing methods of identifying severe weather using radar data.
 - NSSL has developed a research tool, which includes a user-friendly GUI, for interrogating radar data and identifying trends in severe weather development and movement.
- **Precipitation Estimates and Flash Flooding Guidance**
 - Utilizing a multi-sensor approach, NSSL has developed a research/operational software package for estimating rainfall amount over large areas.
 - Software can be combined with NSSL-developed software to identify areas of flash flooding.
- **Modeling Improvements with Regard to Severe Weather**
 - Recent improvements to convective parameterization schemes and short-range ensemble forecasting techniques by NSSL scientists have improved the accuracy of similar NWS numerical forecasts.



MDSS FHwy Headquarters Review April 11, 2002

