



# *The Maintenance Decision Support System (MDSS) Project: NSSL Accomplishments*

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# *NSSL Accomplishments*

- **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.
- **Eta Mesoscale Model**
  - Transferred current National Weather Service weather forecasting model to Forecast Systems Laboratory high performance computing system.
  - Completed initial testing.
- **Attended review meetings and provided expertise regarding system development and integration.**



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

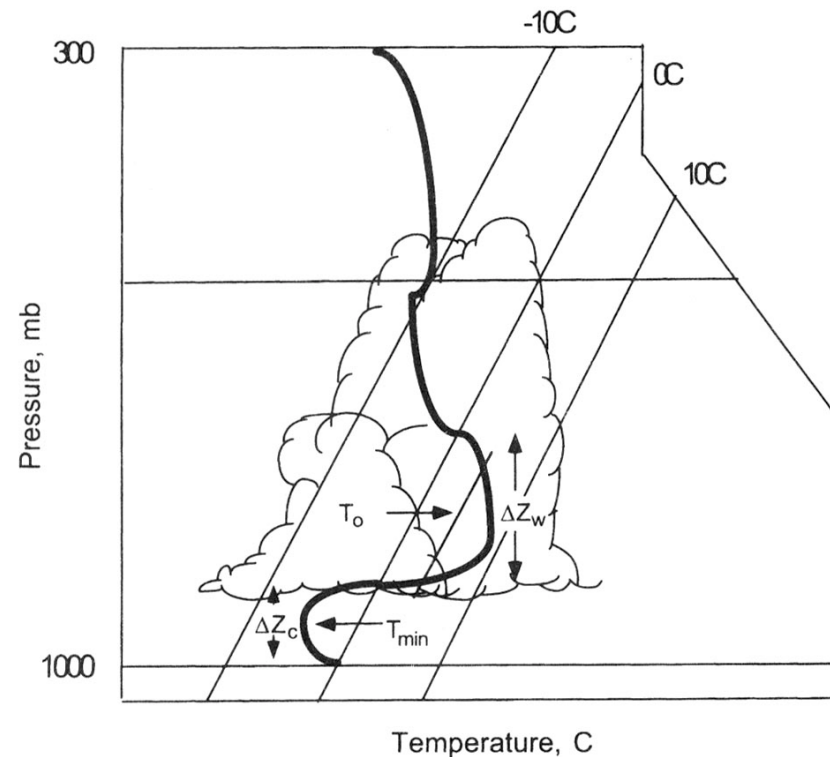


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# *Precipitation-Type Algorithms*

- 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. Each algorithm determines precipitation type differently
- Algorithm suite provides probabilistic information about precipitation-type forecast



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# *Precipitation-Type Algorithms*

- **Tests of algorithm forecast (out to 48h) performance during the winter of 2000-2001 (percentage of correct forecasts, given observed precipitation):**
  - **Rain (2 m temperature  $\leq$  5 deg. C): 84%-86%**
  - **Freezing Rain: 56%-60%**
  - **Sleet: 26%-46%**
  - **Snow: 92%-94%**
- **Statistical analysis of data shows that all algorithms provide forecast information that is better than random forecasts.**
- **Study also showed that using multiple algorithms provided more information about forecast certainty than using one algorithm (i.e., higher probability of occurrence when more algorithms agree on precipitation type.)**
- **These results support using multiple algorithms within the MDSS.**



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# *Eta Forecasting Model*

- Model provides forecasts at points separated by 10 km.
- Used extensively by National Weather Service
- Vertical coordinate allows for realistic representation of steep orography.
  - 60 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 storms
  - More accurate representation of horizontal diffusion processes



FSL High Performance Computer



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## *FY 2002 Development*

- **Continue to work with NCAR to evaluate the accuracy of the precipitation-type algorithms within the MDSS.**
- **Work with NCAR to configure Eta model to create input that is compatible with the RWFS.**
- **Evaluate Eta performance within MDSS to insure that model is producing relatively accurate results.**
- **Provide expertise to system development, configuration, and evaluation.**



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## References

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- **Ramer, J., 1993: An empirical technique for diagnosing precipitation type from model output. Preprints, *5th International Conf. on Aviation Weather Systems*, Vienna, VA, AMS, 227-230.**



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