AVN-Based MOS Precipitation Type Forecasts

Rebecca L. Allen

Techniques Development Laboratory
Office of Systems Development
NWS

AVN Precipitation Type Guidance

The probability that a specific precipitation type will occur given that precipitation occurs at that station.

- Forecasts valid every 3 hours from 6 to 72 hours
- Available for 1000+ sites in the CONUS and Alaska

Precipitation Types

Frozen

Pure Snow
Snow Grains

Liquid

Rain
Drizzle
Rain/Snow Mixed
Thunderstorms

Freezing

Freezing Rain
Freezing Drizzle
Ice Pellets
Anything Mixed with Freezing Rain/Drizzle, or Ice Pellets

MOS Technique

Statistically relates observed weather elements to appropriate predictors.

Statistical Particulars

- Multiple Linear Regression
  - Forward selection
  - Enhanced non-linear predictors
- Regional Equations

Ptype Development Regions

4 Regional Equations

Predictors

AVN Model

Temperature
Wetbulb Temperature
Thicknesses
U & V Winds
Temperature Advection
Relative Humidity

ZR Predictor
SSR Predictors

Geoclimatic

Latitude
Longitude
Elevation
Relative Frequencies
Sin/Cos DOY

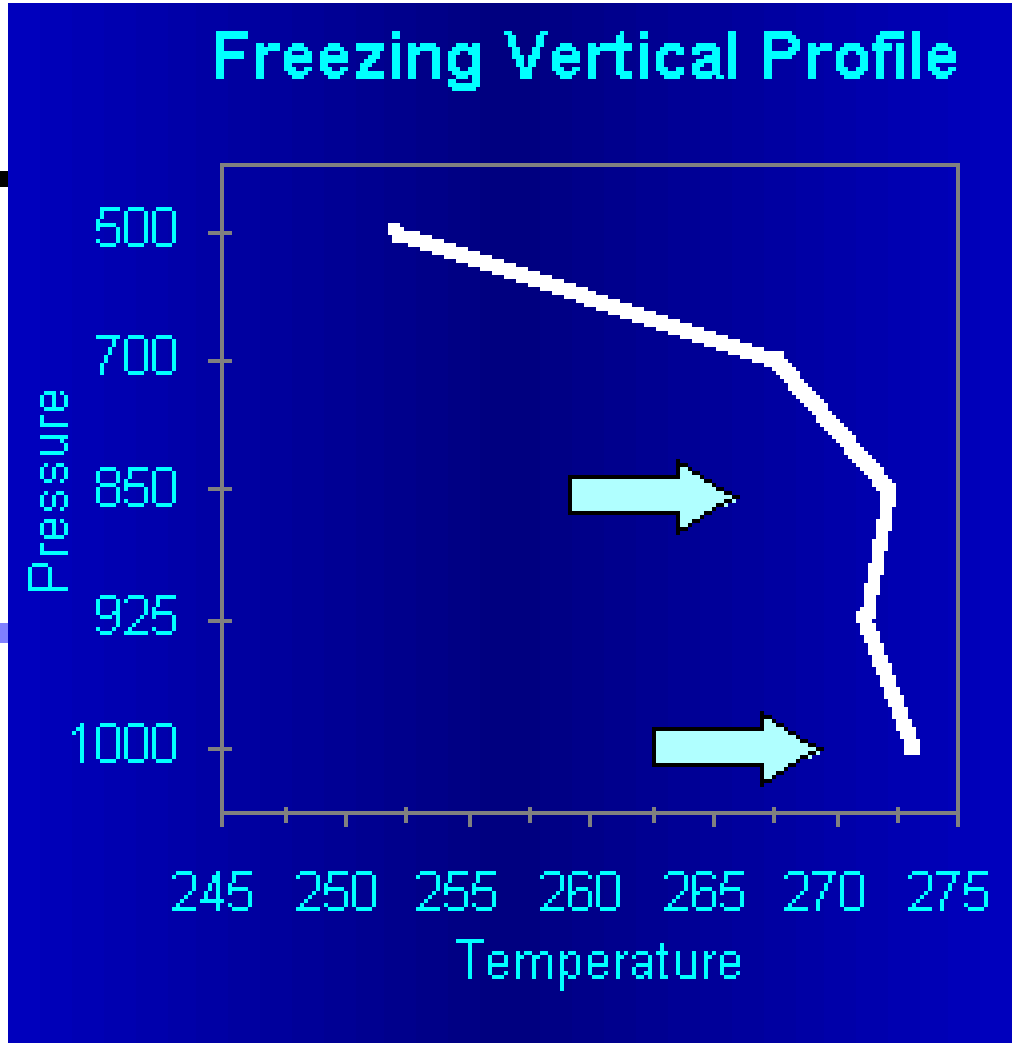
Observed

Temperature
Avg of Temp and Dew Point
snow/no snow
rain/no rain
freezing/no freezing

Blue text idicates predictor was often selected by regression routine

ZR Predictor

- Cold temperature at surface
- Inversion aloft within temperature bounds
- Model predicts precipitation



Developmental Sample

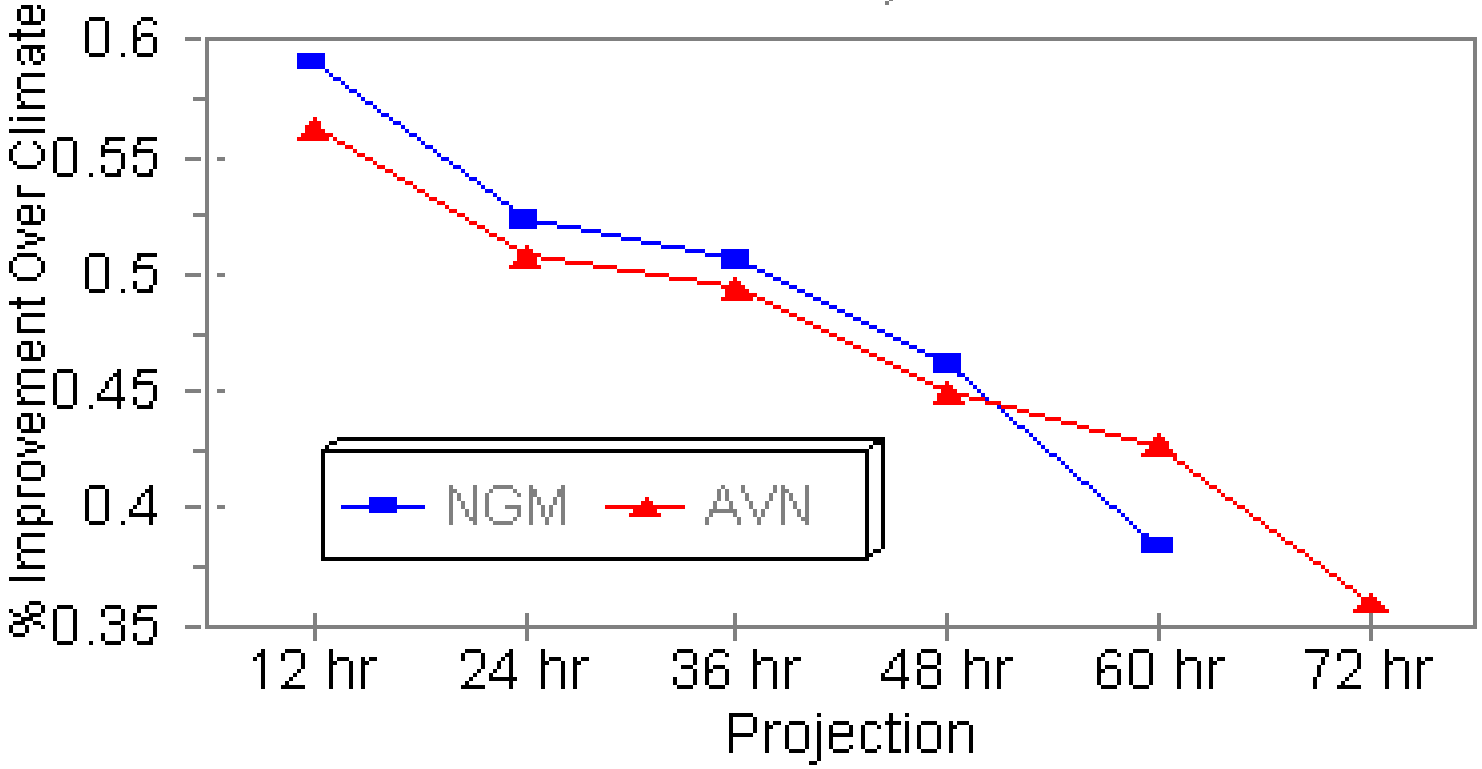
- 611 stations judged to **report reliably**
- 2 Years of Data:
  - Sep 16 - May 15 of 97/98, 98/99
  - Model data from 00z cycle
- Conditional - only cases where precip occurred

Verification

"Is it any good?"

- P-Score
  - Mean-squared error of probability forecasts
  - Compare with NGM MOS Ptype and climatology
- Independent Sample
  - ~ 400 stations
  - 88 days: Last 15 days Oct 98 - Mar 99

Overall Ptype P-scores



NGM Ptype	AVN Ptype
Temporary Challenges	
12 vertical levels	5 vertical levels
5 years of data	2 years of data
Logit predictors	SSR predictors
Long Term Advantages	
Data every 6 hours	Data every 3 hours
No model data beyond 48 hours	Model data out through 72 hours
190.5 km horiz. resolution	95.25 km horiz. resolution
2 cycles per day	4 cycles per day
565 sites	1000 + sites
SAO obs	METAR/ASOS obs

Conclusions & Future Work

- AVN Ptype skillfull; not as accurate as NGM yet
- Scheduled implementation February 2000

- Categorical forecasts
- Develop other cycles (06Z, 12Z, 18Z)
- Redevelop equations with larger sample
- MRF Ptype system - Oct 2000
- Eta Ptype system - Oct 2001

TDL Website

Http://nws.noaa.gov/tdl/synop