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SUMMER HEIGHT ERRORS FROM THE RAFS AND GLOBAL MODELS

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[Editor's Note: The attached information illustrates the cold temperature bias that exists in the troposphere in the NGM. This information should be useful to forecasters in interpreting NGM output. In addition, steps to correct this bias, which will be important to field forecasters if implemented, are presented.]



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE

National Meteorological Center
Washington, DC 20233

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W/NMC2x2:NAP

MEMORANDUM FOR: List

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NAP

SUBJECT: Summer Height Errors from the RAFS and Global Models

I enclose the following figures.

Figure 1. Mean 500-mb height and mean 700-250-mb thickness for July 1987.

Figure 2. Mean 48-hour error in $z(500)$ for the NGM forecasts and the Aviation run forecasts.

Figure 3. The average standard deviation of the 48-hour forecast error in $z(500)$ for the two models.

Figure 4. Mean 48-hour error in thickness $z(250) - z(700)$ for the two models.

Figure 5. The average standard deviation of the 48-hour forecast error in thickness $z(250) - z(700)$ for the two models.

The following remarks can be said about these maps.

1. Both models have similar error patterns, for $z(500)$ and for $z(250)-z(700)$.
2. The magnitude of the standard deviation of the errors (Figures 3 and 5) are very similar for both models, in addition to the pattern.
3. The NGM mean forecast errors (Figures 2 and 4) differ from the Aviation Run mean errors mostly by the addition of a negative amount, almost uniformly over the entire field. For the thickness field (Fig. 4) the NGM error is more negative by about 20 meters on the average. This agrees with the known result that the NGM radiation model tends to overestimate radiational cooling slightly more than does the radiation model used in the global system.

The Development Division has tested a simple way to ameliorate the cooling bias in the NGM forecasts, by periodically correcting the hemispherically-averaged potential temperature for each sigma surface back to the value that existed for this quantity at $t = 0$. These tests have been very positive, with little or no deterioration in precipitation forecasts, in the diurnal cycle of temperature, or in forecasts of lifted index. They have shown significant reduction of the model's cold bias at all levels. This will probably be implemented therefore in early fall.

Attachments

Distribution

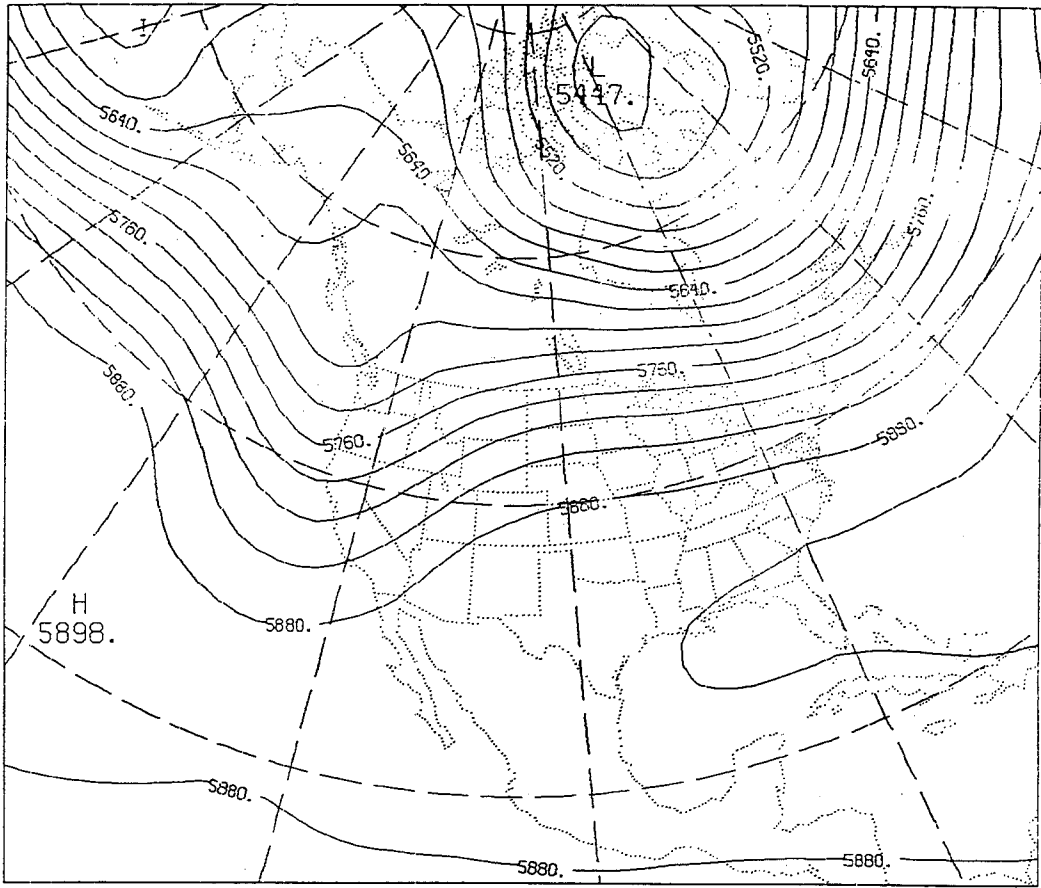
1. Regional Scientific Directors

Internal copy 1. Gerrity, Kalnay, Saylor, Bonner.

Internal copy 2. Hoke, Tuccillo, DiMego, Collins, Petersen.

Internal copy 3. F. Hughes, D. Olson.





July Mean Z500

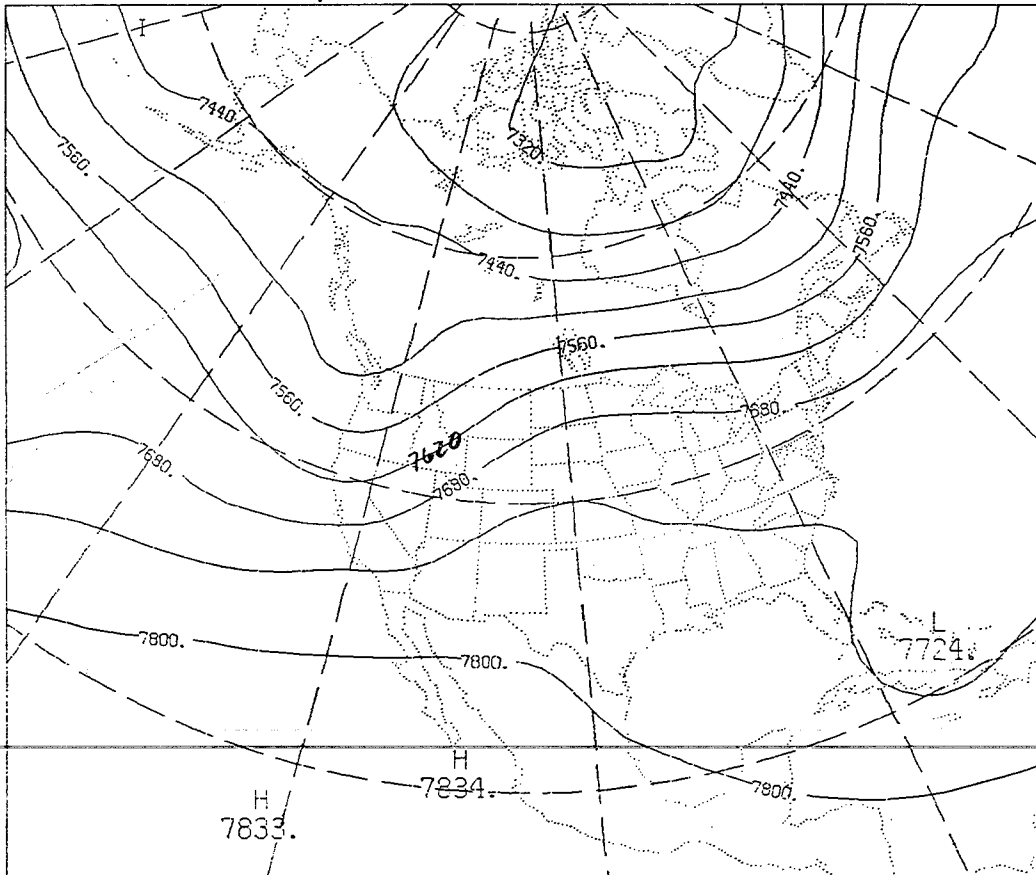
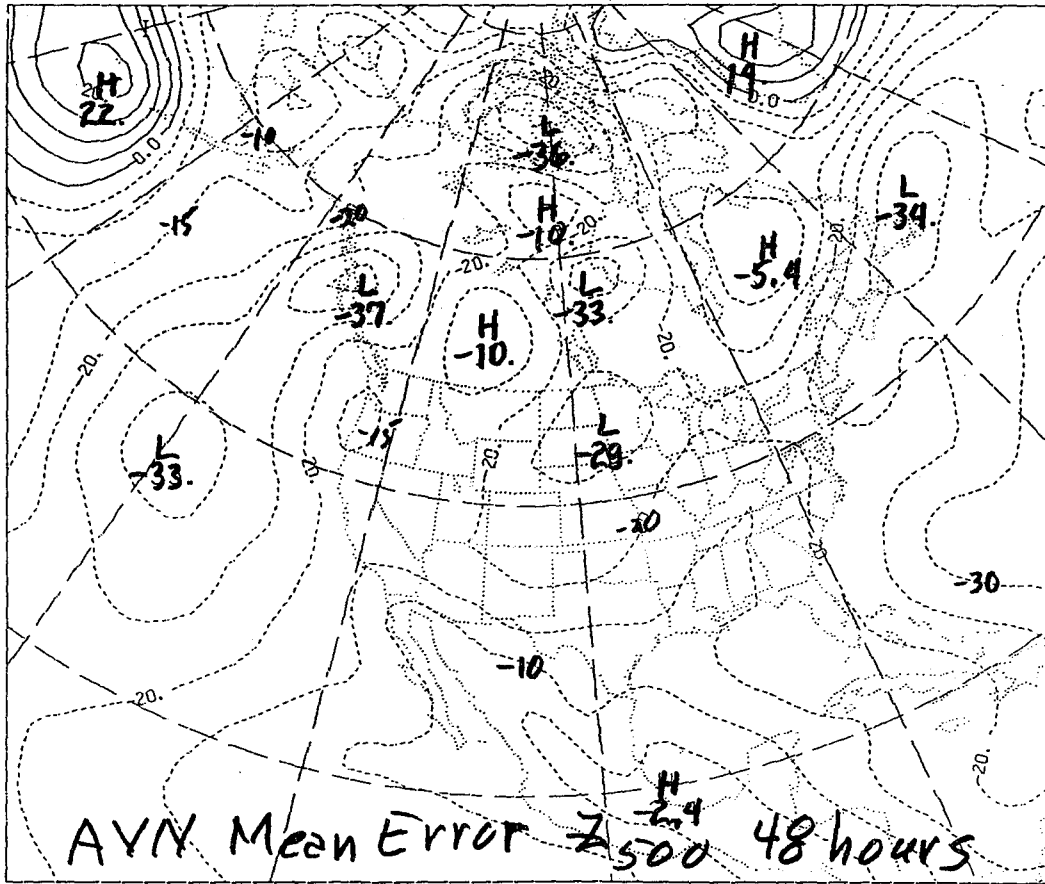


FIG.1 July Mean Z250-Z700



JULY 1987

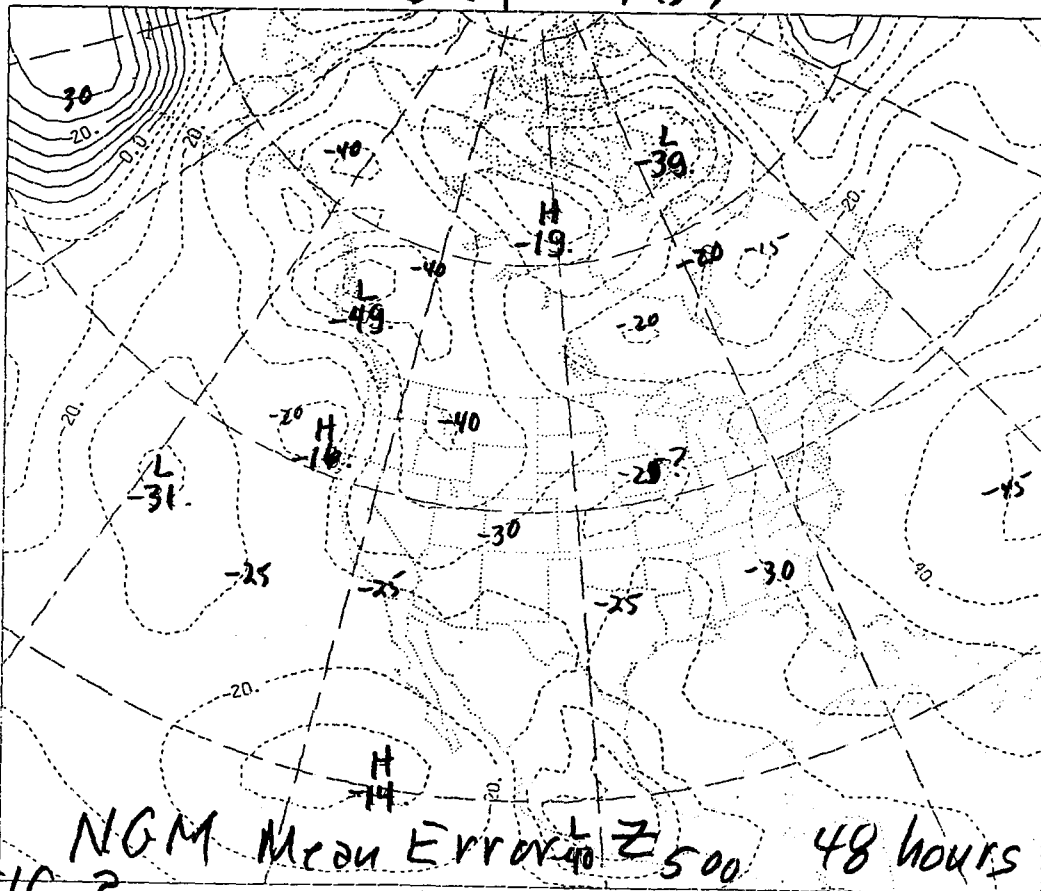
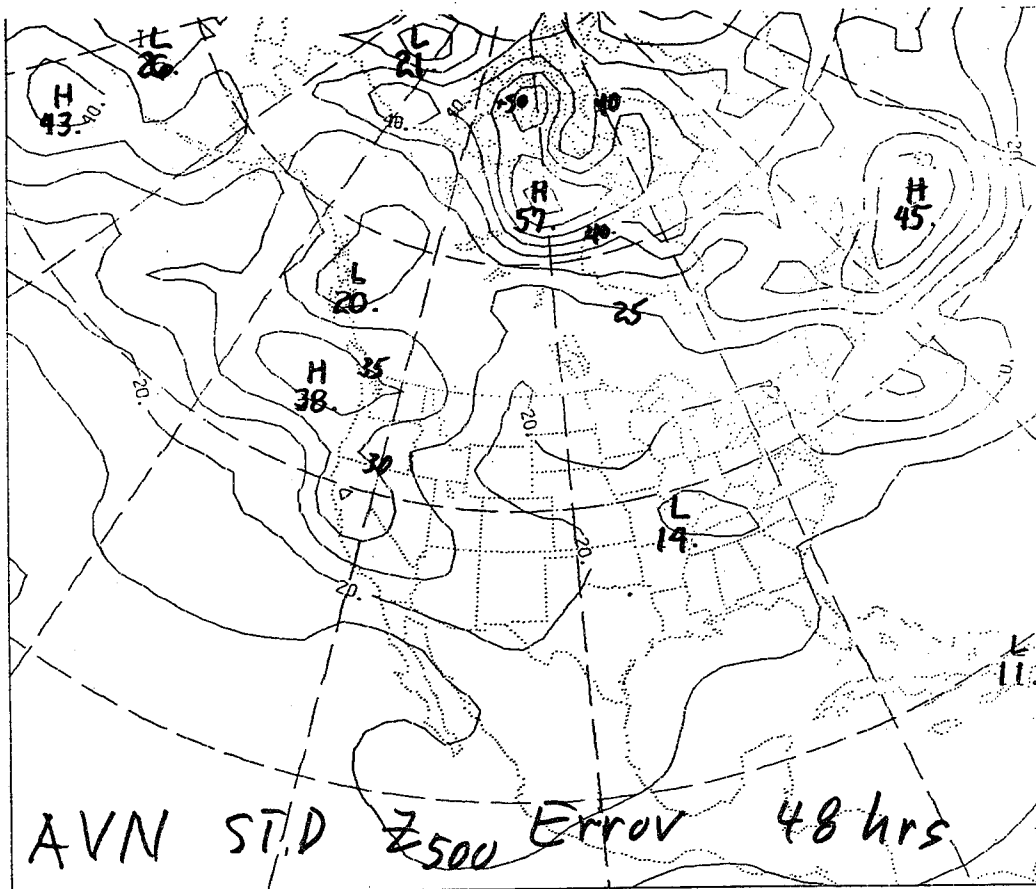


FIG. 2



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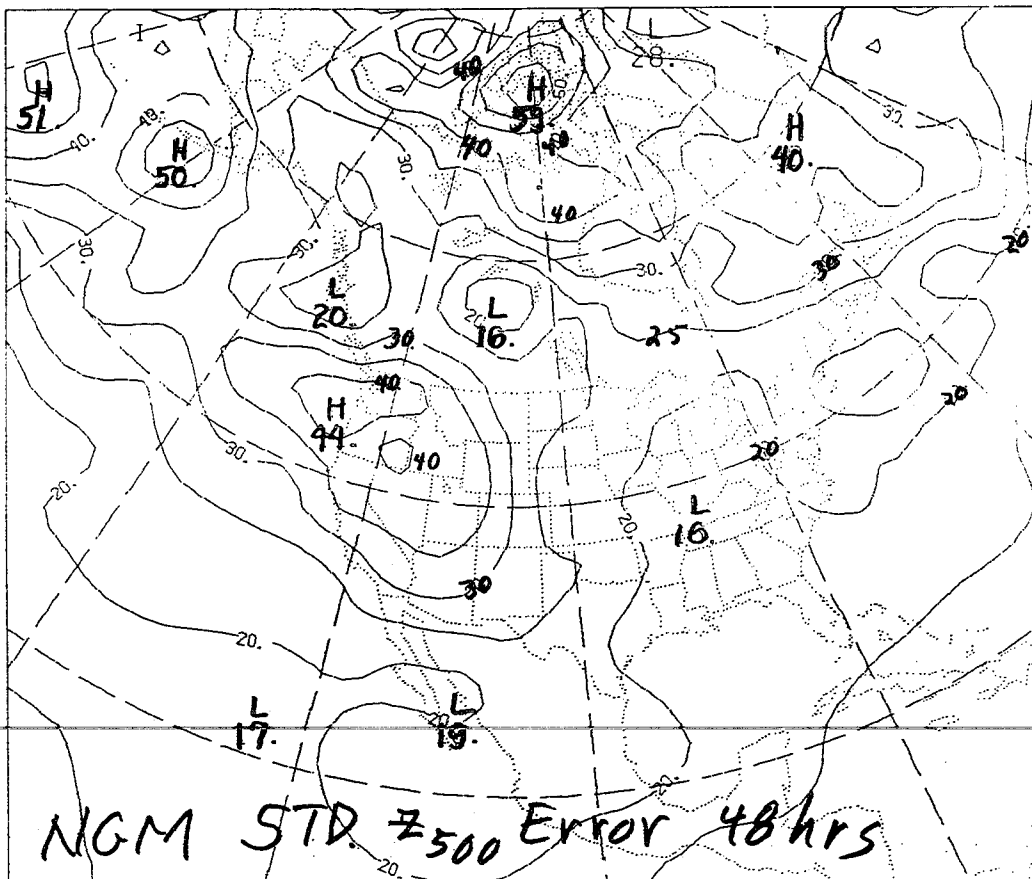
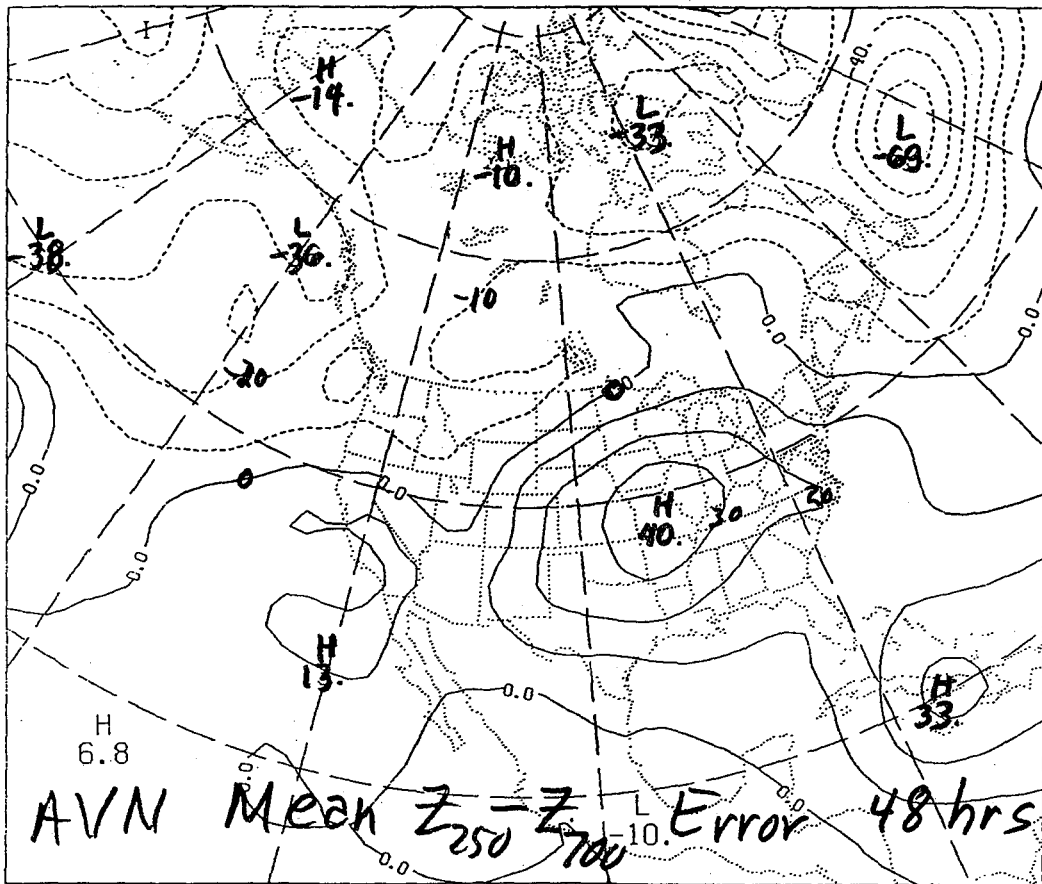


FIG. 3



JULY 1987 30 meters = 1°

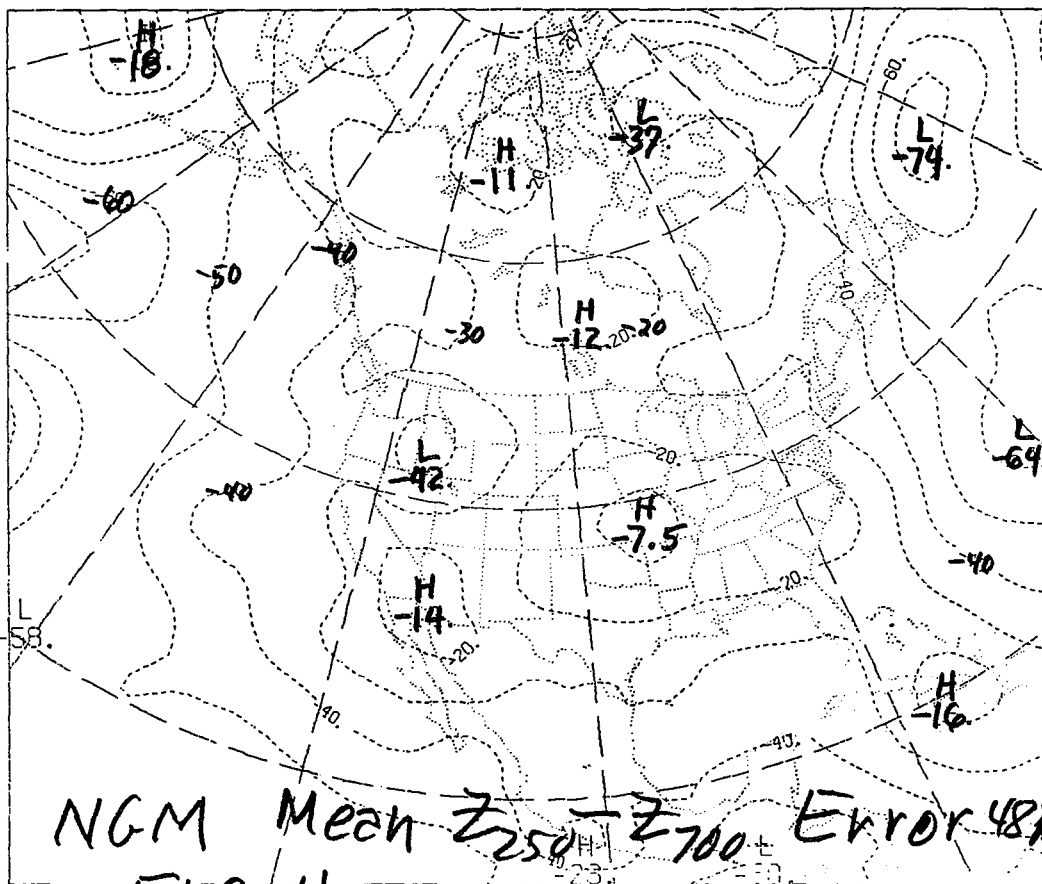
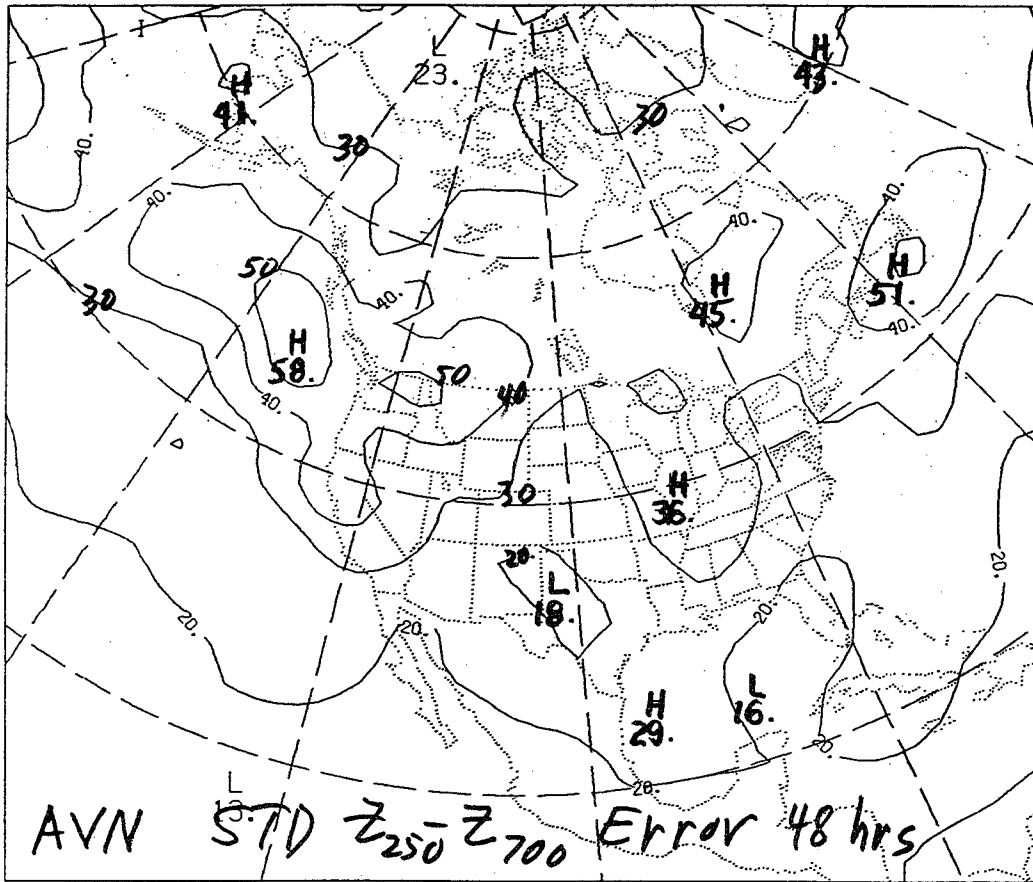


FIG 4



JULY 1987 ^{30 meters} = 10

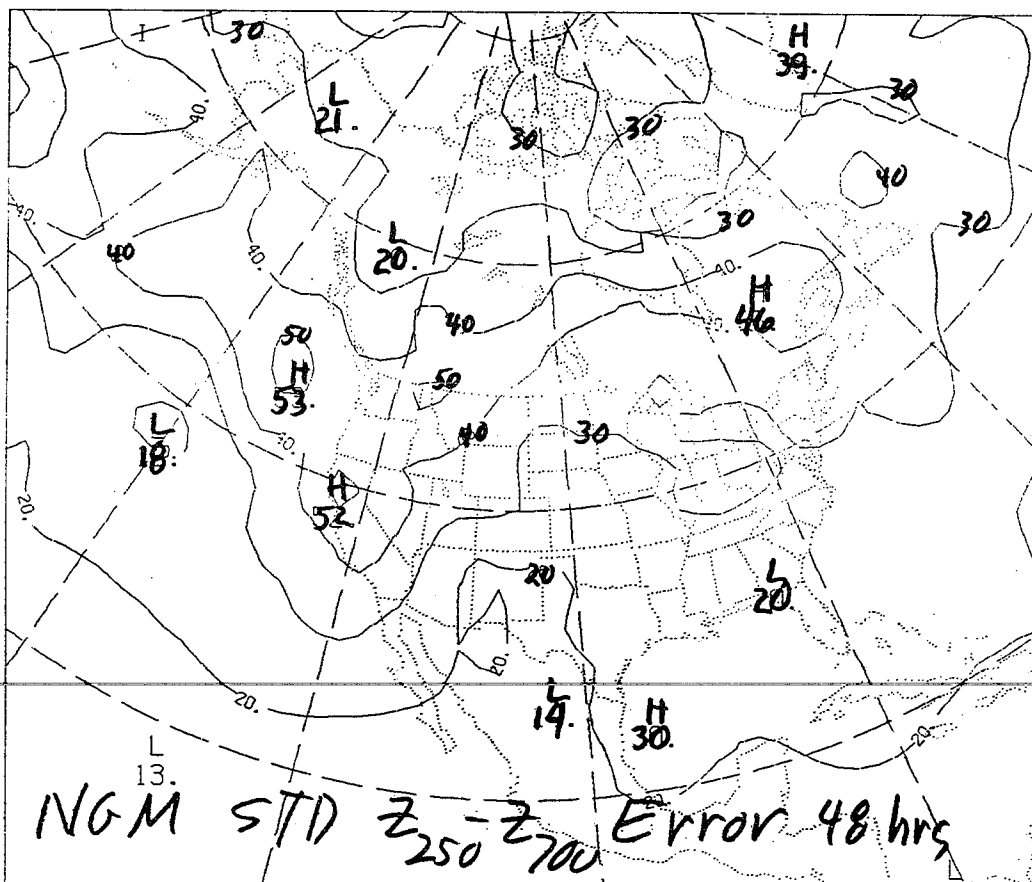


FIG 5