Western Region Technical Attachment
No. 88-31
November 8, 1988

MOS AND PERFECT PROG GUIDANCE UPDATE

Editor's Note: The following information on LFM/NGM, MOS, and Perfect Prog Guidance was excerpted from Gary Carter's portion of TDL's Quarterly Progress Report.

New LFM MOS POP Equations

We're deriving new sets of MOS equations to predict the probability of .01 inch or more of precipitation in a 12-hour period ending 24, 36, 48, and 60 hours after either 0000 or 1200 UTC. In addition, POP equations are being developed for 6-hour periods ending 12, 18, ... and 60 hours after 0000 and 1200 UTC. This effort was initiated because the current operational MOS POP equations were developed in 1980; the Limited-area Fine-mesh Model (LFM) data used were from the period October 1972 through September 1980. In fact, only four years of LFM data were available for the 36-48 and 48-60 h cool season (October-March) equations. We now have a much larger data sample and we expect to improve the LFM-based MOS POP equations by using more of the recent model data. The new cool season equations should be developed and implemented by the end of 1988.

New Approach to LFM MOS Surface Winds

We've completed the initial series of tests to evaluate a new approach for predicting surface wind. The current surface wind guidance (both MOS and perfect prog) is for 1-min average winds valid at specific times throughout each day (i.e., 0000, 0060, 1200, and 1800 UTC). We devised a new surface wind predictand. This predictand is the highest wind speed and the associated direction obtained by examining observations both at the specific valid time and within $\pm$ 1 hour thereof. Based on this approach, forecasts for projections of 12, 15, 18, 21, 24, and 27 hours from both 0000 and 1200 UTC were verified for 94 stations throughout the contiguous United States. For purposes of comparison, we also evaluated analogous sets of forecasts produced by equations derived with the traditional predictand valid at the specific verifying hour. The test results indicate that both approaches have strengths and weaknesses in regard to the accurate prediction of operationally significant surface winds. Hence, further tests will be conducted to determine which predictand we should use in the development of NGM-based MOS forecast equations.

NGM MOS for 1989 Warm Season

Now that the Nested Grid Model (NGM) appears to have reached a stage where the changes being made are relatively infrequent, we have begun to rerun the current version of the model on a subset of historical data. In this way, we expect to obtain data necessary for the development of stable MOS equations. A key aspect of this plan is the assumption that the initial analysis system and the NGM will not undergo any major changes. Thus far, we've completed reruns for April and May of 1987. After these retrospective runs of the NGM for October 1986 through September 1987 are completed, we will derive sets of MOS equations to predict max/min temperature, POP, surface wind, and cloud amount. For example, we plan to use NGM data from the 1987 and 1988 warm seasons (April through September) to develop the initial sets of forecast equations. These equations will become operational during the 1989 warm season; equations for other weather elements and seasons will be developed and implemented as soon as possible thereafter.

Revised NGM Perfect Prog Max/Min Equations

We've begun development of a new set of perfect prog specification equations that will be applied to the NGM to predict the max/min temperature for approximately 200 sites in the contiguous United States. Although we are currently generating perfect prog max/min temperature forecasts from the NGM, these predictions are significantly less accurate than the LFM-based MOS max/min guidance. While part of the difference in the accuracy of the two sets of guidance is due to the inherent limitations of the perfect prog approach, the current perfect prog equations use no low-level thermal fields as predictors (i.e., 1000-850 mb thickness, 1000 mb temperature). These predictors had been omitted from the original equation development because of the strong cold bias in the lower levels of the NGM. Since this particular bias has now been eliminated, we will redevelop the perfect prog equations by adding appropriate low-level thermal variables to the list of potential predictors. In addition, we are stratifying the developmental data into 3-month seasons (spring, summer, fall, and winter), unlike the current 6-month perfect prog seasons. If testing on the winter season (December-February) is encouraging, we expect to implement the new perfect prog equations in early 1989.