# P5.10 A TEAM-BASED FORECAST PROCESS USING MEDIUM-RANGE MODEL CONSISTENCY LOOPS

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## 1. INTRODUCTION

The 26th Operational Weather Squadron executes weather operations for military bases and posts in its Area of Responsibility (AOR), consisting of seven states in the south central United States, divided into four zones (Fig. 1). Operations include writing 24-hour terminal aerodrome forecasts and issuing watches, warnings, and advisories for 22 major and numerous smaller installations. Additionally, the squadron provides weather information to certain commanders involved in planning military missions anywhere in the world.

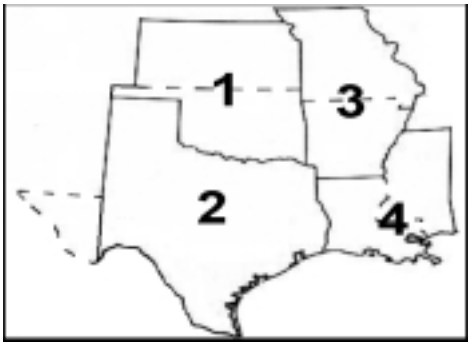


**Figure 1.** Squadron Area of Responsibility, divided into four forecasting zones.

Anticipating weather events such as thunderstorms and freezing precipitation one week in advance provides situational awareness to commanders, supervisors, and forecasters. They can better plan airlift and combat missions as well as routine training missions; and they can plan the use of stand-by augmentees. Medium-range forecasts also increase the confidence and accuracy of short-range forecasting, to include larger lead times for watches, warnings, and advisories. To better anticipate weather events, the squadron is developing a team-based prediction process based on medium-range model consistency loops.

## 2. PROCESS

The process considers individual valid days, starting two weeks out with staff members and forecasters familiarizing themselves with the AOR's climatology of weather events as well as discussions and maps issued by the Climate Prediction Center (CPC). Seven days before a target valid time, a Shaper forecaster compares a medium range forecast (MRF) model's 180 hour run with the previous one and two day's 204 and 228 hour runs, respectively. Since each run of this consistency loop of images is for the same target valid time, the Shaper assesses the model trend, then expected features and sensible weather, to include events by zone, followed by confidence. The Shaper also assesses trend, features, weather, and confidence for a valid time six days out using a consistency loop with the MRF's 156 hour run.

Five and four days before a target valid time, a Planner forecaster uses consistency loops of the MRF as well as other models as they become available to assess model trend, features, weather, and confidence. The Planner adjusts features drawn by the Shaper during previous days' runs. During the execution portion of the process, within three days before a target valid time, a Lead Forecaster works with a Graphics Manager and Zone Forecasters to continue the process, reconciling trends in the consistency loops with model initializations.

| PORTION | DAY | MEMBERS | INPUT | OUTPUT |
|---|---|---|---|---|
| LONG-RANGE | 8-14 | All | Climatology of weather events<br>CPC maps, discussion | None |
| SHAPING | 7-6 | Shaper | MRF consistency loops<br>Planner's maps for days prior to VT | Discussion<br>Surface map w/ precip<br>Significant weather table by zone |
| PLANNING | 5-4 | Planner | Available consistency loops<br>Ensemble of available models' 500 heights<br>Shaper's map for same valid time<br>Lead & Graphics' maps for days prior to VT | Discussion<br>Surface map w/ precip<br>Significant weather table by zone |
| EXECUTION | 3 | Lead Graphics | All consistency loops<br>Ensemble of all models' 500 heights<br>Planner's map for same valid time<br>Lead & Graphics' maps for days prior to VT | Discussion<br>Surface map w/ precip<br>Significant weather table by zone |
| | 2 | Lead Graphics Zone | All consistency loops<br>Ensemble of all models' 500 heights<br>Lead & Graphics' maps for same VT<br>Lead & Graphics' maps for day prior to VT<br>Forecast skew-T<br>Meteograms | Discussion<br>Surface map w/ precip<br>Significant weather table by station<br>Icing & Turbulence maps<br>Cloud maps |
| | 1 | Lead Graphics Zone | All consistency loops<br>Ensemble of all models' 500 heights<br>Lead & Graphics' maps for same VT<br>Forecast Skew-T<br>Meteograms<br>Observations (Sfc, UA)<br>Imagery (Satellite, Radar) | Discussion<br>Surface map w/ precip<br>Icing & Turbulence maps<br>Cloud maps<br>Watches, Warnings, Advisories<br>24 hr Terminal Aerodrome Forecast |

**Table 1.** The squadron's Team-Based Forecast Process, beginning 14 days before a target valid time (VT)

Each day along the process, forecasters issue forecasts of significant weather, by zone (days 7-3) or by station (day 2), increasing temporal resolution from 12 hours (days 6 and 7) to 6 hours (days 4 and 5) to 3 hours (days 3 and 2). The process is summarized in Table 1.

## 3. DISCUSSION

The process design makes several assumptions about the skill of the model. First, the model has sufficient skill to merit evaluation as far out as 180+ hours. Second, the model is reasonably consistent model run to model run, despite differences in data input and cycle initialization (WMO, 2000). Third, the oscillation of features among different model runs will tend to reveal an expected median position which accurately resembles the future state of the atmosphere.

Preliminary results indicate the process is useful. Case studies in three months of prototype testing show favorable outcomes when model consistency is stable. One particular severe weather event in Zone 1 on 10 April 2001 was accurately anticipated seven days in advance (Figs. 2, 3). Stations in Zone1 experienced winds in excess of 85 knots and several tornadoes. Similar results of anticipating severe weather were achieved on four other occasions at least five days out. The process is also successful at recognizing other weather events as well as days with no significant weather.

Further research will involve detailed verification of surface charts as well as significant weather table entries to determine statistical skill levels. Research will also involve ensemble verification.

## 4. REFERENCE

WMO (World Meteorological Office), 2000: *Study of the Impact of the Loss of Russian Federation RAOBS on NWP Verification Statistics in the Northern Hemisphere, Final Report,* submitted Sep 30, 2000, posted at: www.wmo.ch/web/www/DPS/giraytys_final.html

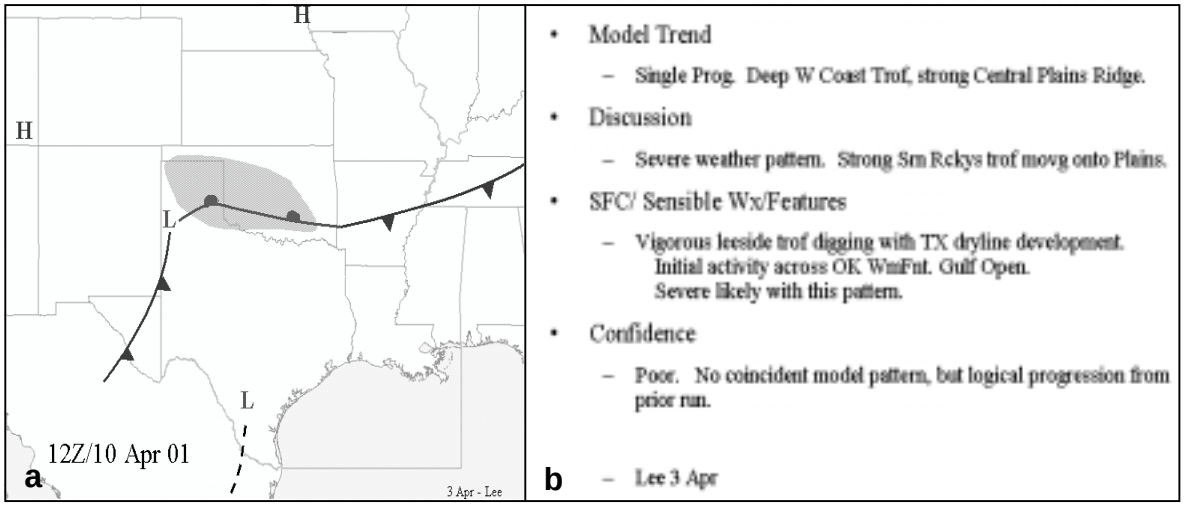


**Figure 2**. Forecast surface chart (**a**) and discussion (**b**) issued 3 Apr 01 for valid time 12Z, 10 Apr 01.

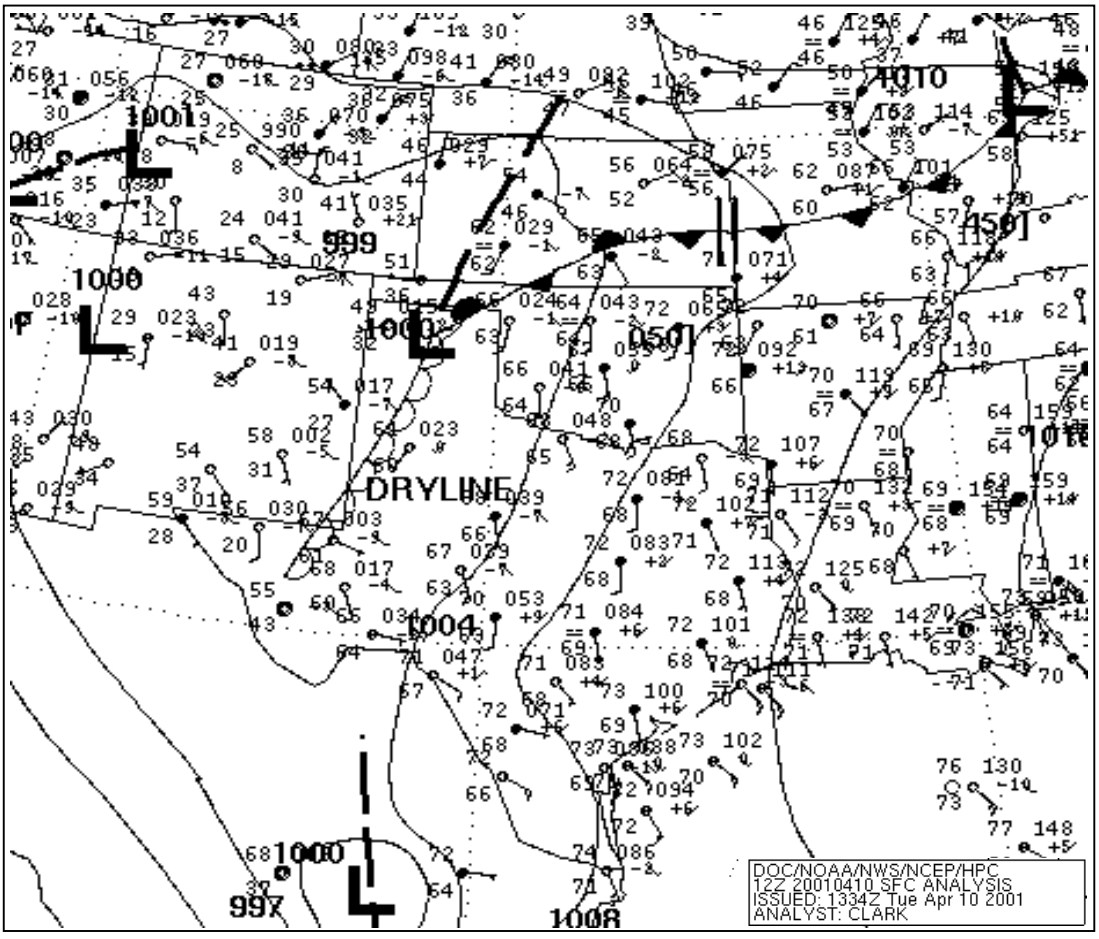


**Figure 3.** Surface chart analysis for 12Z, 10 Apr 01. The analyzed L in the Texas panhandle was accurately forecast seven days in advance (Fig 2a).