MDL TPB 05 - 04
May 11, 2005

GFS-BASED MOS GUIDANCE - THE SHORT-RANGE ALPHANUMERIC MESSAGES FROM THE 0600/1800 UTC FORECAST CYCLES

by
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1. INTRODUCTION

This Technical Procedures Bulletin (TPB) describes the format and contents of the MOS short-range alphanumeric messages generated during the 0600 and 1800 UTC forecast cycles of the Global Forecast System (GFS). These messages contain forecasts of the max/min temperature; time-specific surface temperature and dew point; total sky cover; surface wind direction and wind speed; probability of precipitation (PoP) for 6- and 12-h periods; categories of quantitative precipitation for 6- and 12-h periods; probability of thunderstorms and conditional probability of severe thunderstorms for 6- and 12-h periods; conditional probability of precipitation type (freezing, snow, or liquid) and a corresponding category; snowfall amount; and categories of ceiling height, visibility, and obstruction to vision. Guidance is provided for projections of 6 to 72 hours for most weather elements. Note that a particular element line (see Sections 3 - 20) is not included in the message when all of the forecasts in that line are unavailable.

The GFS-based MOS messages became operational during the 1800 UTC forecast cycle on October 16, 2001. This TPB has been revised to refer to GFS MOS guidance, in lieu of the AVN MOS designation which was originally used. The Aviation (AVN) model was a particular run of the Global Spectral Model; since September 2002, this model has been referred to as the Global Forecast System (GFS) model. In addition, this revised TPB describes new categorical definitions used for total sky cover, ceiling height, and visibility guidance. New definitions for these elements are scheduled for implementation on May 18, 2004. For reference, the categorical definitions used until May 2004 are included in Appendix A. Technical Procedures Bulletin No. 481 which described the original AVN-based MOS message is now obsolete. A different Technical Procedures Bulletin describes the 0000 and 1200 UTC bulletins.

2. MESSAGE HEADING

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
```

The message heading shown above (see Figs. 1 and 2 also) identifies the station for which the guidance is valid, the forecast cycle, and the day and hour for which the forecasts are valid. In this example, the message is valid for Albany, NY (KALB). All stations are identified by the ICAO four-character identifier.

The "GFS MOS GUIDANCE" appearing on the same line as the station call letters identifies the message contents. The date of the forecast cycle during which the message is issued follows this information. The form of mm/dd/yyyy where mm is the month (1 through 12), dd is the day (1 through 31), and yyyy is the four-digit year is used. The forecast cycle is identified by the standard 0600 or 1800 UTC. In this example, the MOS guidance for KALB was issued from the 0600 UTC forecast cycle of the GFS on February 2, 2004.

The DT and HR lines denote the date and hour at which the forecasts are valid. The DT line indicates the day of the month. Note that the month is denoted by the standard three or four letter abbreviation. Note, also, that the message for the 0600 UTC cycle does not contain the month indicator in the DT line for the last forecast period. For temperature, dew point, sky cover, wind direction and speed, precipitation type, ceiling height, visibility, and obstruction to vision, the date and hour denote the specific time that the forecasts are valid. These forecasts are valid every 3 hours until 60 hours after initial time and then every 6 hours until 72 hours after initial time. For PoP, quantitative precipitation, thunderstorms, severe weather, and snowfall amount, the time indicates the end of the period over which the forecasts are valid. For the max/min temperature, the date group gives only the approximate ending time of the daytime and nighttime periods for which the max and min temperature guidance, respectively, are valid.

3. X/N - MAXIMUM/MINIMUM TEMPERATURE

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
X/N              29          18          38          30       43
```

The max/min surface temperature forecasts are displayed for projections of 18, 30, 42, 54, and 66 hours after the initial data time (0600 or 1800 UTC). Although the forecasts are presented at consecutive 12-h intervals, each forecast is actually valid for a daytime or nighttime period. For the GFS-based MOS guidance, daytime is defined as 7 a.m. to 7 p.m. Local Standard Time (LST). Nighttime is defined as 7 p.m. to 8 a.m. LST. Thus, the valid date in the appropriate column of the DT and HR lines must be converted by the forecaster to his/her local date. This local date then denotes the appropriate daytime or nighttime for the max or min temperature forecast. For the 0600 UTC forecast cycle, the temperatures are shown in max/min (X/N) order and are valid for today's max, tonight's min, tomorrow's max, tomorrow night's min, and the day after tomorrow’s max. For the 1800 UTC cycle, the temperatures are shown in min/max (N/X) order and are valid for tonight's min, tomorrow's max, tomorrow night's min, the day after tomorrow's max, and the night after tomorrow night’s min. Each temperature forecast is presented to the nearest whole degree Fahrenheit, and three characters are allowed. A missing forecast is indicated by a 999.

4. TMP - SURFACE TEMPERATURE

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                    ...
TMP  10 19 26 29 24 22 21 21 21 28 35 36 36 35 33 32 33 37 40 33 22
```

Time-specific 2-m temperature forecasts are valid every 3 hours from 6 to 60 hours, and then every 6 hours to 72 hours after 0600 and 1800 UTC. These forecasts are valid at 1200, 1500,..., 0300, 0600 UTC, and so forth. Each temperature forecast is presented to the nearest whole degree Fahrenheit; a missing forecast is indicated by a 999. Only three characters are available

for the temperature forecasts. Thus, two consecutive forecasts of 100 degrees or more or of -10 degrees or less appear with no spaces between them.

5. DPT - SURFACE DEW POINT

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3                /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                    ...
DPT   3  9 15 17 17 15 15 16 17 21 25 28 29 29 27 26 26 27 25 19 11
```

Time-specific 2-m dew point forecasts are valid every 3 hours from 6 to 60 hours, and then every 6 hours to 72 hours after 0600 and 1800 UTC. These forecasts are valid at 1200, 1500,..., 0300, 0600 UTC, and so forth. Each dew point forecast is presented to the nearest whole degree Fahrenheit; a missing forecast is indicated by a 999. Three characters are available for the dew point forecasts so that two consecutive forecasts of -10 degrees or less appear with no spaces between them.

6. CLD - TOTAL SKY COVER CATEGORIES

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3                /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                    ...
CLD  CL FW SC SC SC SC SC BK BK OV OV OV OV OV BK SC BK SC SC CL
```

Forecast categories of total sky cover (see the following table) are available in plain language for projections at 3-h intervals from 6 to 60 hours, and then every 6 hours to 72 hours after the initial data times (0600 and 1800 UTC). All forecasts are valid for specific times (i.e., 1200, 1500, 1800, and so forth). Two characters identify the category (CL - clear; FW - few; SC - scattered; BK - broken; OV - overcast); a missing forecast is denoted by XX.

Total Sky Cover Categories
CL - clear;
FW - > 0 to 2 octas of total sky cover;
SC - > 2 to 4 octas of total sky cover;
BK - > 4 to < 8 octas of total sky cover;
OV - 8 octas of total sky cover or totally obscured.

The categorical guidance is prepared by using probability forecasts of the same categories.

7. WDR - SURFACE WIND DIRECTION / WSP - SURFACE WIND SPEED

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3                /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                    ...
WDR  00 36 00 00 00 00 00 15 15 15 15 13 14 15 24 25 26 27 27 27 29
WSP  00 01 00 00 00 00 00 02 01 04 06 06 08 08 09 12 13 14 15 11 11
```

Surface wind direction (WDR) and speed (WSP) forecasts are given at 3-h intervals for projections of 6 to 60 hours, and then every 6 hours to 72 hours after the initial data times (0600 and 1800 UTC). These are forecasts of the 10-m winds (a 2-minute average) at specific times throughout each day (i.e., 1200, 1500, 1800 UTC, and so forth). The wind direction is given in tens of degrees and varies from 01 (10 degrees) to 36 (360 degrees). The normal meteorological convention for specifying wind direction is followed. The wind speed is given in knots; the maximum speed allowed in the message is 98 knots. For both direction and speed, missing forecasts are denoted by 99. A calm wind is indicated by a wind direction and speed of 00.

8. P06 - PROBABILITY OF PRECIPITATION IN A 6-H PERIOD

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                  ...
P06         0     0     0     0    25    86    80    23     4  0  0
```

The P06 forecasts are for the probability of 0.01 inches or more of liquid-equivalent precipitation (PoP), occurring during a 6-h period. The 6-h PoP's are valid for intervals of 6-12, 12-18, 18-24, 24-30, 30-36, 36-42, 42-48, 48-54, 54-60, 60-66, and 66-72 hours after the initial data times (0600 and 1800 UTC). In the message, the forecast values are displayed under the ending time of the 6-h period. The probability is given to the nearest percent. Values range from 0 to 100%. A missing forecast value is indicated by 999.

9. P12 - PROBABILITY OF PRECIPITATION IN A 12-H PERIOD

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                  ...
P12               0           3          89          80        4
```

The P12 forecasts are for the probability of 0.01 inches or more of liquid-equivalent precipitation (PoP) occurring during a 12-h period. For nearly all stations, the 12-h PoP's are valid for intervals of 6-18, 18-30, 30-42, 42-54, and 54-66 hours after the initial data times (0600 and 1800 UTC). For stations in Hawaii, however, the 12-h PoP’s are valid for intervals of 12-24, 24-36, 36-48, 48-60, and 60-72 hours after 0600 and 1800 UTC. In the message, the forecast values are displayed under the ending time of the 12-h period. The probability is given to the nearest percent. Values range from 0 to 100%. A missing forecast value is indicated by 999.

10. Q06 - QUANTITATIVE PRECIPITATION AMOUNT IN A 6-H PERIOD

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                  ...
Q06         0     0     0     0     1     4     4     1     0  0  0
```

Guidance for liquid-equivalent precipitation amount (QPF) accumulated during a 6-h period is presented in categorical form. These forecasts are available for projections of 6-12, 12-18, 18-24, 24-30, 30-36, 36-42, 42-48, 48-54, 54-60, 60-66, and 66-72 hours after the initial data time (0600 and 1800 UTC). The forecasts are displayed beneath the hour indicating the end of the 6-h period. The QPF guidance is a categorical forecast of liquid-equivalent precipitation equaling or exceeding certain specified amounts in the 6-h periods. The categories are as follows:

QPF Categories
0 = no precipitation expected;
1 = 0.01 - 0.09 inches;
2 = 0.10 - 0.24 inches;
3 = 0.25 - 0.49 inches;
4 = 0.50 - 0.99 inches;
5 = ≥ 1.00 inches.

Missing forecasts are denoted by 9. The categorical guidance is prepared by using probability forecasts of the same categories.

11. Q12 - QUANTITATIVE PRECIPITATION AMOUNT IN A 12-H PERIOD

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                  ...
Q12               0           0           3           2        0
```

Guidance for liquid-equivalent precipitation amount (QPF) accumulated during a 12-h period is presented in categorical form. These forecasts are available for projections of 6-18, 18-30, 30-42, 42-54, and 54-66 hours after the initial data time (0600 and 1800 UTC). For stations in Hawaii, however, the 12-h QPF's are valid for intervals of 12-24, 24-36, 36-48, 48-60, and 60-72 hours after 0600 and 1800 UTC. The forecasts are displayed beneath the hour indicating the end of the 12-h period. The QPF guidance is a categorical forecast of liquid-equivalent precipitation equaling or exceeding certain specified amounts in the 12-h periods. The categories are as follows:

QPF Categories
0 = no precipitation expected;
1 = 0.01 - 0.09 inches;
2 = 0.10 - 0.24 inches;
3 = 0.25 - 0.49 inches;
4 = 0.50 - 0.99 inches;
5 = 1.00 - 1.99 inches;
6 = ≥ 2.00 inches.

Missing forecasts are denoted by 9. The categorical guidance is prepared by using probability forecasts of the same categories.

12. T06 - PROBABILITY OF THUNDERSTORMS/CONDITIONAL PROBABILITY OF SEVERE THUNDERSTORMS IN A 6-H PERIOD

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3                /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                    ...
T06      0/ 0  1/ 9  1/ 0  0/ 0  1/ 1  0/14  2/ 0  0/ 0  0/ 1  0/ 2
```

The T06 line represents forecasts for the probability of thunderstorms (to the left of the diagonal) and the conditional probability of severe thunderstorms (to the right of the diagonal) occurring during a 6-h period. The 6-h probability forecasts are valid for intervals of 6-12, 12-18, 18-24, 24-30, 30-36, 36-42, 42-48, 48-54, 54-60, and 66-72 hours after the initial data times (0600 and 1800 UTC). Because of the line width, the 60-66 h forecast is not available. In the message, the pair of forecast values are displayed under the ending time of the 6-h period. The thunderstorm probability is given to the nearest whole percent. Values range from 0 to 100%. A missing forecast value is indicated by 999. The conditional severe thunderstorm probability is given to the nearest whole percent. Values range from 0 to 98%. A missing forecast value is given by 99. Both the thunderstorm and conditional severe storm probabilities are available year-round for stations in the contiguous U.S. Note that these probabilities represent the likelihood of the event within a box approximately 47 km on a side and containing the station specified. Forecasts are unavailable for stations in Alaska, Hawaii, or Puerto Rico because reports from the National Lightning Detection Network used to define the thunderstorm predictand were unavailable for locations in those areas.

13. T12 - PROBABILITY OF THUNDERSTORMS/CONDITIONAL PROBABILITY OF SEVERE THUNDERSTORMS IN A 12-H PERIOD

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3                /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                    ...
T12                 1/ 9        1/ 1        2/14        0/ 1  0/21
```

The T12 line represents forecasts for the probability of thunderstorms (to the left of the diagonal) and the conditional probability of severe thunderstorms (to the right of the diagonal) occurring during a 12-h period. The 12-h probability forecasts are valid for intervals of 12-24, 24-36, 36-48, 48-60, and 60-72 hours after the initial data times (0600 and 1800 UTC). In the message, the pair of forecast values are displayed under the ending time of the 12-h period. The thunderstorm probability is given to the nearest whole percent. Values range from 0 to 100%. A missing forecast value is indicated by 999. The conditional severe thunderstorm probability is given to the nearest whole percent. Values range from 0 to 98%. A missing forecast value is given by 99. Both the thunderstorm and conditional severe storm probabilities are available year-round for stations in the contiguous U.S. Note that these probabilities represent the likelihood of the event within a box approximately 47 km on a side and containing the station specified. Forecasts are unavailable for stations in Alaska, Hawaii, or Puerto Rico because reports from the National Lightning Detection Network used to define the thunderstorm predictand were unavailable for locations in those areas.

14. POZ - PROBABILITY OF FREEZING PRECIPITATION (CONDITIONAL)

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                    ...
POZ   7  3  4  5  5  6 11 12  4 12  7 22 20 16  7  5  5  5  4 10 11
```

Conditional probability of freezing precipitation (given that precipitation is occurring) forecasts are available for specific times every 3 hours from 6 to 60 hours and then every 6 hours to 72 hours after 0600 and 1800 UTC. Freezing precipitation is defined as the occurrence of freezing rain or drizzle, ice pellets (sleet), or any mixture of freezing rain, drizzle, or ice pellets with other precipitation types. The probabilities are given to the nearest whole percent, and values range from 0 to 100%. Missing values are indicated by 999. These probabilities are used in producing the categorical TYP forecast described in Section 16. The POZ guidance is transmitted during the period of September 1 - May 31. Because of the rarity of the freezing rain event, some stations do not have forecast equations for the POZ category for some projections, and the forecast will be missing. Forecasts are not available for stations in southern Florida, Hawaii, the Carribean Islands, and most of California, where freezing rain and snow rarely occur. For these sites, the POZ line is not in the message at any time of the year.

15. POS - PROBABILITY OF SNOW (CONDITIONAL)

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                    ...
POS  93 97 96 95 95 94 89 85 96 88 76 43 37 34 27 45 59 85 83 75 89
```

Conditional probability of snow (given that precipitation is occurring) forecasts are available for specific times every 3 hours from 6 to 60 hours and then every 6 hours to 72 hours after 0600 and 1800 UTC. Snow is defined as the occurrence of a pure snow event, that is, snow, snow showers, snow grains, or snow pellets or any combination of those elements. Snow mixed with rain is considered a liquid precipitation event. The probabilities are given to the nearest whole percent, and values range from 0 to 100%. Missing values are indicated by 999. These probabilities are used in producing the categorical TYP forecast described in Section 16. The POS guidance is transmitted only during the period of September 1 - May 31. Although the conditional probability of liquid precipitation is not given in the message, the probability can be inferred since the sum of the probability of freezing precipitation, snow, and liquid precipitation is 100%. Forecasts are not available for stations in southern Florida, Hawaii, the Carribean Islands, and most of California, where freezing rain and snow rarely occur. For these sites, the POS line is not in the message at any time of the year.

16. TYP - PRECIPITATION TYPE FORECASTS (CONDITIONAL)

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                  ...
TYP   S  S  S  S  S  S  S  S  S  S  S  Z  S  S  R  S  S  S  S  S  S
```

The TYP line represents forecasts of precipitation type (given that precipitation is occurring) for specific times every 3 hours from 6 to 60 hours, and then every 6 hours to 72 hours after the initial hour of 0000 or 1200 UTC. These categorical forecasts are obtained from the probability forecasts of the same categories. The categorical forecast is indicated by one character where "Z" represents freezing precipitation (freezing rain, freezing drizzle, ice pellets (sleet), or any report of these elements mixed with other precipitation types), "S" represents snow (snow, snow grains, snow pellets, or snow showers), and "R" represents liquid precipitation (rain, drizzle, or a mixture of rain or drizzle with snow). A missing forecast is denoted by "X". The precipitation type guidance is transmitted only during the period of September 1 - May 31. Forecasts are not available for stations in southern Florida, Hawaii, the Carribean Islands, and most of California, where freezing rain and snow rarely occur. For these sites, the TYP line is not in the message at any time of the year.

17. SNW - SNOWFALL AMOUNT CATEGORICAL FORECAST

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                  ...
SNW                            0                       6
```

Categorical forecasts of snowfall amount are available in the message for 24-h periods ending approximately 30 and 54 hours after 0600 UTC and approximately 42 and 66 hours after 1800 UTC. Since observations from the cooperative observer network are used to define the event, the valid times are approximations. The categories are denoted as follows:

Snowfall Amount Categories
0 = no snow or a trace expected;
1 = > a trace to < 2 inches expected;
2 = 2 to < 4 inches;
4 = $\geq$ 4 to < 6 inches;
6 = $\geq$ 6 to < 8 inches;
8 = $\geq$ 8 inches.

A missing forecast is denoted by 9; forecasts are disseminated only for the period of September 1 - May 31. Forecasts are not available for stations in southern Florida, Hawaii, the Carribean Islands, and most of California, where snow rarely occurs. For these sites, the SNW line is not in the message at any time of the year.

18. CIG - CEILING HEIGHT CATEGORICAL FORECASTS

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                    ...
CIG   8  8  8  8  8  8  8  7  7  7  4  3  3  3  5  6  8  7  8  8  8
```

Forecasts of eight categories of ceiling height (see the following table) are available for specific times valid every 3 hours from 6 to 60 hours and then every 6 hours to 72 hours after 0000 and 1200 UTC. The forecasts are displayed beneath the time of the day for which they are valid. Values of 1 through 8 are allowed for the categorical guidance; a value of 9 denotes a missing forecast. The categories are as follows:

Ceiling Height Categories
1 = ceiling height of < 200 feet;
2 = ceiling height of 200 - 400 feet;
3 = ceiling height of 500 - 900 feet;
4 = ceiling height of 1000 - 1900 feet;
5 = ceiling height of 2000 - 3000 feet;
6 = ceiling height of 3100 - 6500 feet;
7 = ceiling height of 6600 - 12,000 feet;
8 = ceiling height of > 12,000 feet or unlimited ceiling.

The categorical guidance is prepared by using probability forecasts of the same categories.

19. VIS - VISIBILITY CATEGORICAL FORECASTS

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3               /FEB   4             /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                    ...
VIS   7  7  7  7  7  7  7  7  7  7  7  4  4  4  5  7  7  7  7  7  7
```

Forecasts of seven categories of visibility (see the following table) are available for specific times valid every 3 hours from 6 to 60 hours and then every 6 hours to 72 hours after 0600 and 1800 UTC. The forecasts are displayed beneath the time of the day for which they are valid. Values of 1 through 7 are allowed for the categorical guidance; a value of 9 denotes a missing forecast. The categories are as follows:

Visibility Categories
1 = visibility of < 1/2 mi;
2 = visibility of 1/2 - < 1 mi;
3 = visibility of 1 to < 2 mi;
4 = visibility of 2 to < 3 mi;
5 = visibility of 3 to 5 mi;
6 = visibility of 6 mi;
7 = visibility of > 6 mi.

The categorical guidance is prepared by using probability forecasts of the same categories.

20. OBV - OBSTRUCTION TO VISION CATEGORICAL FORECASTS

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2      /FEB   3                /FEB   4              /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
                                    ...
OBV   N  N  N  N  N  N  N  N  N  N  N BR BR BR BR  N  N  N  N  N  N
```

Forecasts of five categories of obstruction to vision (see the following table) are available for specific times valid every 3 hours from 6 to 60 hours and then every 6 hours to 72 hours after 0600 and 1800 UTC. The forecasts are displayed in plain language beneath the time of the day for which they are valid. The categories are denoted by the letters “N”, “HZ”, “BR”, “FG”, and "BL"; a value of "X" denotes a missing forecast. The categories are as follows:

Obstruction to Vision Categories
N = none of the following;
HZ = haze, smoke, dust;
BR = mist (fog with visibility $\geq$ 5/8 mi);
FG = fog or ground fog (visibility < 5/8 mi);
BL = blowing dust, sand, snow.

The categorical guidance is prepared by using probability forecasts of the same categories. In the equation development, cases of fog or mist were not stratified by the occurrence of precipitation. Thus, a forecast of fog can be coincidental with a forecast of precipitation. Lower visibilities caused exclusively by precipitation occurrence are not indicated by the obstruction to vision guidance.

21. AVAILABILITY

The GFS MOS guidance is available at approximately 1015 and 2215 UTC from the 0600 and 1800 UTC runs, respectively, of the GFS model. The guidance is disseminated in 10 alphanumeric messages to NWS AWIPS and Family of Services (FOS) circuits: six containing guidance for stations in the contiguous U.S., Puerto Rico, and the Virgin Islands; three containing guidance for Alaskan sites; and one containing guidance for stations in Hawaii. The following two-line WMO headers are used:

WMO Header - Region
FOPA20 KWNO - Pacific Region
MAVPA0

FOUS21 KWNO - Northeast U.S.
MAVNE1

FOUS22 KWNO - Southeast U.S.
MAVSE1

FOUS23 KWNO - North Central U.S.
MAVNC1

FOUS24 KWNO - South Central U.S.
MAVSC1

FOUS25 KWNO - Rocky Mountain Region
MAVRM1

FOUS26 KWNO - West Coast Region
MAVWC0

FOAK37 KWNO - Southeast Alaska (Juneau)
MAVAJK

FOAK38 KWNO - Central Alaska (Anchorage)
MAVAFC

FOAK39 KWNO - Northern Alaska (Fairbanks)
MAVAFG

The messages for a subset of the stations in the above collectives are also sent to AFWA for dissemination on military communication circuits. Twenty-seven messages contain guidance for stations in the contiguous U.S., three messages contain guidance for Alaskan sites, one message contains guidance for Hawaiian sites, and one message contains guidance for stations in Puerto Rico. The following WMO headers are used:

WMO Header - Region
FOUS30 KWNO - Contiguous U.S.
MAVFxx, where xx=01 through 27

FOAK30 KWNO - Alaska
MAVFxx, where xx=50, 51, or 52

FOPA30 KWNO - Hawaii
MAVF70

FOCA30 KWNO - Puerto Rico
MAVF80

22. STATION LIST

As of January 2004, the GFS MOS guidance was available for 1524 stations in the ten bulletins transmitted to AWIPS and on the NWS FOS. The guidance is available for 272 stations in the messages transmitted to AFWA. The user may check the following home pages for the station lists and corresponding WMO headers:

http://www.nws.noaa.gov/mdl/synop/stadrg.html

http://www.nws.noaa.gov/mdl/synop/afstadrg.htm

The first address provides station lists for the AWIPS/FOS messages; the second address provides station lists for the military bulletins.

Figure 1. Sample 0600 UTC message.

```
KALB   GFS MOS GUIDANCE    2/02/2004  0600 UTC
DT /FEB   2       /FEB   3                /FEB   4                /
HR   12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 00 06
X/N               29          18          38          30       43
TMP  10 19 26 29 24 22 21 21 21 28 35 36 36 35 33 32 33 37 40 33 22
DPT   3  9 15 17 17 15 15 16 17 21 25 28 29 29 27 26 26 27 25 19 11
CLD  CL FW SC SC SC SC SC BK BK OV OV OV OV OV OV BK SC BK SC SC CL
WDR  00 36 00 00 00 00 00 15 15 15 15 13 14 15 24 25 26 27 27 27 29
WSP  00 01 00 00 00 00 00 02 01 04 06 06 08 08 09 12 13 14 15 11 11
P06         0     0     0     0     25    86    80    23     4  0  0
P12               0           3          89          80       4
Q06         0     0     0     0      1     4     4     1     0  0  0
Q12               0           0          3           2        0
T06       0/ 0  1/ 9  1/ 0  0/ 0  1/ 1  0/14  2/ 0  0/ 0  0/ 1  0/ 2
T12                  1/ 9        1/ 1        2/14        0/ 1  0/21
POZ   7  3  4  5  5  6 11 12  4 12  7 22 20 16  7  5  5  5  4 10 11
POS  93 97 96 95 95 94 89 85 96 88 76 43 37 34 27 45 59 85 83 75 89
TYP   S  S  S  S  S  S  S  S  S  S  S  Z  S  S  R  S  S  S  S  S  S
SNW                           0                          6
CIG   8  8  8  8  8  8  8  7  7  7  4  3  3  3  5  6  8  7  8  8  8
VIS   7  7  7  7  7  7  7  7  7  7  7  4  4  4  5  7  7  7  7  7  7
OBV   N  N  N  N  N  N  N  N  N  N  N BR BR BR BR  N  N  N  N  N  N
```

Figure 2. Sample 1800 UTC message.

```
KALB   GFS MOS GUIDANCE    2/02/2004  1800 UTC
DT /FEB   3                /FEB   4                /FEB   5
HR   00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 12 18
N/X               17          38          26          40       14
TMP  26 23 21 20 20 28 34 36 35 33 32 31 28 34 38 35 30 25 21 16 23
DPT  16 16 16 16 17 21 23 25 26 28 27 26 23 25 24 21 17 13 10  6  4
CLD  BK BK BK SC BK OV OV OV OV OV OV SC BK SC FW CL CL CL CL CL CL
WDR  00 00 00 14 15 15 15 13 13 17 22 25 25 26 27 27 28 29 29 31 31
WSP  00 00 00 01 01 05 07 07 10 10 11 16 12 16 18 17 17 15 13 10 09
P06         0     0    18    80    85    25     0     0     0  0  0
P12               0           80          89          3        0
Q06         0     0     0     4     4     1     0     0     0  0  0
Q12               0           3           3           0        0
T06       2/ 6  0/ 0  3/ 0  2/16  2/ 0  0/ 2  0/ 2  0/23  1/ 1  0/ 2
T12                  3/ 0        2/16        0/ 2        1/23  0/ 2
POZ   7  7  6 10  5  8 13 10  9  9  7  6  3  5  5  5 10 10 11  2  5
POS  90 93 94 90 95 88 72 63 59 42 39 64 72 95 95 88 88 90 89 93 95
TYP   S  S  S  S  S  S  S  S  S  S  S  S  S  S  S  S  S  S  S  S  S
SNW                                    4                       0
CIG   7  7  7  8  7  7  7  4  4  3  5  8  6  8  8  8  8  8  8  8  8
VIS   7  7  7  7  7  7  7  4  4  4  5  7  7  7  7  7  7  7  7  7  7
OBV   N  N  N  N  N  N  N BR BR BR BR  N  N  N  N  N  N  N  N  N  N
```

Appendix A. The following categorical definitions became obsolete in May 2004.

Total Sky Cover Categories
CL - clear;
SC - > 0 to 4 octas of total sky cover;
BK - > 4 to < 8 octas of total sky cover;
OV - 8 octas of total sky cover or totally obscured.

Ceiling Height Categories
1 = ceiling height of < 200 feet;
2 = ceiling height of 200 - 400 feet;
3 = ceiling height of 500 - 900 feet;
4 = ceiling height of 1000 - 3000 feet;
5 = ceiling height of 3100 - 6500 feet;
6 = ceiling height of 6600 - 12,000 feet;
7 = ceiling height of > 12,000 feet or unlimited ceiling.

Visibility Categories
1 = visibility $\leq$ 1/4 mi;
2 = visibility of > 1/4 mi to $\leq$ 1/2 mi;
3 = visibility of > 1/2 mi to < 1 mi;
4 = visibility of 1 to < 3 mi;
5 = visibility of 3 to 5 mi;
6 = visibility of 6 mi;
7 = visibility of > 6 mi.