GFS-BASED MOS GUIDANCE - THE EXTENDED-RANGE ALPHANUMERIC MESSAGES FROM THE 0000/1200 UTC FORECAST CYCLES

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1. INTRODUCTION

This Technical Procedures Bulletin (TPB) describes the format and contents of the Model Output Statistics (MOS) extended-range alphanumeric messages generated during the 0000 and 1200 UTC forecast cycles of the Global Forecast System (GFS). These messages contain forecasts of the daytime maximum/nighttime minimum temperature (max/min); time-specific 2-m temperature and dew point; mean total sky cover; maximum sustained surface wind speed; probability of precipitation (PoP) for 12- and 24-h periods; probability of thunderstorms for 12- and 24-h periods; conditional probabilities of freezing precipitation, snow, and rain mixed with snow; categorical precipitation type; quantitative precipitation for 12- and 24-h periods; and snowfall amount for a 24-h period. All elements except the temperature and dew point are valid over at least a 12-h period. Guidance is provided for projections of 24 to 192 hours for most weather elements.

The extended-range GFS-based MOS messages became operational during the 0000 UTC forecast cycle on May 31, 2000. This TPB has been revised to refer to GFSX MOS guidance, in lieu of the MRF MOS designation which was originally used. The Medium Range Forecast (MRF) 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. This TPB also describes both the 0000 and 1200 UTC messages; the latter which is planned for implementation in September 2005. At the initial implementation, the 1200 UTC messages will contain all of the forecast elements described below, except for mean total sky cover and precipitation type. These elements will be added as they become available. Technical Procedures Bulletin No. 460 which described the original MRF-based MOS message is now obsolete.

The NWS also produces short-range MOS text products based on the GFS model for projections of 6 to 84 hours after the 0000, 0600, 1200, and 1800 UTC forecast cycles. These messages are described in MDL TPBs 05-03 and 05-04, which are available at http://www.nws.noaa.gov/mdl/synop/mdltpb.htm .

2. MESSAGE HEADING

```
KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
```

The first line of the message heading shown above (see Figs. 1 and 2 also) identifies the station for which the guidance is valid, the contents of the message, and the date and forecast cycle during which the guidance was issued. In this example, the message is

valid for Albany, NY (KALB). All stations are identified by a four-character identifier. The contents of the message are identified as "GFSX MOS GUIDANCE." The forecast date is given in the form 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. The forecast cycle is identified in Universal Coordinated Time by the standard 0000 and 1200 UTC. In this example, the MOS guidance for KALB was issued from the 0000 UTC GFS run on January 1, 2005.

The second line of the message denotes the forecast hour or projection. For the temperature and dew point forecasts, this projection is the specific time the forecasts are valid. For the max/min temperature, the projection gives only the approximate ending time of the periods for which the max and min temperature guidance are valid. For all other elements, the time indicates the end of the 12- or 24-h period over which the forecasts are valid.

The third line of the message denotes the day and date on which the forecast projections end. Note that the days of the week are indicated by using standard three-letter abbreviations. The heading CLIMO is for the columns containing climatic normals for the 96-120 h period in the 0000 UTC issuance, or for the 84-108 h period in the 1200 UTC issuance. Currently, climatic normals are only available for the max/min and PoP elements. Note that no date separator (|) is placed between the last forecast date and the "CLIMO" heading.

3. X/N - MAXIMUM/MINIMUM TEMPERATURE

```
KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
X/N  47| 20  41| 35  45| 25  32| 23  30| 25  33| 24  36| 21  37 12 31
```

The max/min surface temperature forecasts are displayed for projections of 24 to 192 hours every 12 hours after 0000 or 1200 UTC. Although the forecasts are presented at consecutive 12-h intervals, each forecast is actually valid for a daytime or nighttime period. Daytime is defined as 7 a.m. to 7 p.m. Local Standard Time (LST) and 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 0000 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, and so on. For the 1200 UTC cycle, the temperatures are show in min/max (N/X) order and are valid for tonight's min, tomorrow's max, tomorrow night's min, and so on. The normal min and max (for January 5th in this example) are given in the column labeled "CLIMO". Note that these normals are based on the 1961-1990 normals provided by the National Climatic Data Center, and are not available for all stations in the message. Also, since the message does not include a leading space before the normals, min normals of -10F or less, or max normals of 100F or more will appear with no spaces between them and the preceding max or min value. 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 - 2-M TEMPERATURE

```
 KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                    ...
 TMP  33| 22  38| 37  36| 27  28| 25  27| 27  29| 27  30| 24  32
```

Time-specific 2-m temperature forecasts are valid every 12 hours from 24 to 192 hours after 0000 and 1200 UTC. These forecasts are valid specifically at either 0000 or 1200 UTC in contrast to the max/min forecasts which are valid for a period. Each temperature forecast is presented to the nearest whole degree Fahrenheit; a missing forecast is indicated by a 999.

5. DPT - 2-M DEW POINT

```
 KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                  ...
 DPT  18| 12  25| 32  26| 24  25| 22  23| 24  24| 21  21| 19  25
```

Time-specific 2-m dew point forecasts are valid every 12 hours from 24 to 192 hours after 0000 and 1200 UTC. These forecasts are valid specifically at either 0000 or 1200 UTC in contrast to the max/min forecasts which are valid for a period. Each dew point forecast is presented to the nearest whole degree Fahrenheit; a missing forecast is indicated by a 999.

6. CLD - MEAN TOTAL SKY COVER CATEGORIES

```
KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                    ...
 CLD  CL| CL  OV| OV  PC| OV  OV| OV  OV| OV  OV| PC  PC| OV  OV
```

Categorical predictions of the mean total sky cover are available in plain language for 12-h periods ending 24 to 192 hours after 0000 and 1200 UTC. The forecasts are valid for the 1200-0000 and 0000-1200 UTC periods. The categorical forecasts are displayed as CL (mostly clear), PC (partly cloudy), or OV (mostly overcast); a missing forecast is denoted by XX. The categorical forecast is determined from the 3-category probability distribution of the mean total sky cover. The categories are defined by applying the breakpoints listed below to the mean cloudiness in each 12-h period.

Total Sky Cover Categories
CL - mostly clear (mean cloudiness < 31%);
PC - mixed clouds and clear skies, (31% ≤ mean cloudiness ≥ 68%);
OV - mostly overcast, (mean cloudiness > 68%).

Future changes will convert this to a 5 category system. More details will be forthcoming at that time.

7. WND - MAXIMUM SUSTAINED SURFACE WIND SPEED

```
 KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                   ...
 WND  19|  8  14| 15  12|  7   6|  7  11|  9  12| 13  13| 10  13
```

Maximum sustained surface wind speed forecasts (WND) are given for 12-h periods ending 24 to 192 hours after 0000 and 1200 UTC. The forecasts are valid for intervals ending at 0000 or 1200 UTC. Each forecast indicates the highest 10-m wind speed (2-minute average) expected to occur during the 12-h interval. Wind speed forecasts valid at specific hours (not shown in this message) are generated for projections of 6, 9, 12, 15, …, 189, and 192 hours after the initial model time of 0000 or 1200 UTC. The WND guidance value is obtained by taking the greatest of the five speed forecasts valid during the appropriate 12-h interval. Each wind speed is reported to the nearest knot; a missing forecast will be denoted by 999.

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

```
KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                   ...
 P12   2|  0  79| 62   7| 56  52| 48  63| 50  48| 31  16| 23  25 26 27
```

The P12 forecasts are the probability of 0.01 inches or more of liquid-equivalent precipitation (PoP) occurring during a 12-h period. The 12-h PoPs are valid for intervals from 0000-1200 or 1200-0000 UTC ending 24 to 192 hours after 0000 and 1200 UTC. In the message, the forecast values are displayed under the ending time of the period. The probability is given to the nearest percent. Values range from 0 to 100%. A missing forecast value is indicated by 999. The normal observed relative frequencies of 0.01 inches or more of precipitation for the 96-108 and 108-120 h periods for the 0000 UTC issuance (January 5th in this example), and 84-96 and 96-108 h periods for the 1200 UTC issuance are shown in the column labeled "CLIMO".

9. P24 - PROBABILITY OF PRECIPITATION IN A 24-H PERIOD

```
 KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                   ...
 P24    |     79|     72|     74|     67|     62|     48|     38    39
```

The P24 forecasts are the probability of 0.01 inches or more of liquid-equivalent precipitation (PoP) occurring during a 24-h period. The 24-h PoPs are valid for intervals from 0000-0000 UTC ending 48 to 192 hours after 0000 UTC and 36 to 180 hours after 1200 UTC. In the message, the forecast values are displayed under the ending time of the period. The probability is given to the nearest percent. Values range from 0 to 100%. A missing forecast value is indicated by 999. Note that the normal observed relative frequency of 0.01 or more inches of precipitation for the 96-120 h period for the 0000 UTC issuance (January 5th in this example), and the 84-108 h period for the 1200 UTC issuance is given under the "CLIMO" column.

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

```
 KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                    ...
 Q12   0|  0   2|  1   0|  1   1|  1   4|  2   2|  1    |
```

Guidance for liquid-equivalent precipitation amount (QPF) accumulated during a 12-h period is presented in categorical form. These forecasts are available for intervals from 0000-1200 and 1200-0000 UTC ending 24 to 156 hours after 0000 and 1200 UTC. In the message, the forecasts are displayed beneath the ending projection of the 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.

11. Q24 - QUANTITATIVE PRECIPITATION AMOUNT IN A 24-H PERIOD

```
KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO

 Q24    |     2|     1|     2|     4|     3|      |
```

Guidance for liquid-equivalent precipitation amount (QPF) accumulated during a 24-h period is presented in categorical form. These forecasts are available for intervals from 0000-0000 UTC ending 48 to 144 hours after 0000 UTC and 36 to 156 hours after 1200 UTC. In the message, the forecasts are displayed beneath the ending projection of the period. The QPF guidance is a categorical forecast of liquid-equivalent precipitation equaling or exceeding certain specified amounts in the 24-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. T12 - PROBABILITY OF THUNDERSTORMS IN A 12-H PERIOD

```
 KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                  ...
 T12   1|  2   0|  1   0|  2   2|  3   3|  5   5|  3   0|  0   1
```

The T12 forecasts are the probability of thunderstorms occurring during a 12-h period. The 12-h probability forecasts are valid for intervals from 0000-1200 or 1200-0000 UTC ending 24 to 192 hours after 0000 or 1200 UTC. The forecasts are displayed in the message beneath the ending projection of the 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. Probabilities are available year-round for stations in the contiguous U.S. Forecasts are unavailable for stations in Alaska, Hawaii, and Puerto Rico because reports from the National Lightning Detection Network used to define the thunderstorm predictand were unavailable in those areas.

13. T24 - PROBABILITY OF THUNDERSTORMS IN A 24-H PERIOD

```
KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                  ...
 T24    |  2    |  1    |  5    |  3    |  5    |  5    |  2
```

The T24 forecasts are the probability of thunderstorms occurring during a 24-h period. The 24-h probability forecasts are valid for intervals from 1200-1200 UTC ending 36 to

180 hours after 0000 UTC and 48 to 192 hours after 1200 UTC. The forecast values are displayed under the ending projection of the 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. Probabilities are available year-round for stations in the contiguous U.S. Forecasts are unavailable for stations in Alaska, Hawaii, and Puerto Rico because reports from the National Lightning Detection Network used to define the thunderstorm predictand were unavailable in those areas.

14. PZP - PROBABILITY OF FREEZING PRECIPITATION IN A 12-H PERIOD (CONDITIONAL)

```
 KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                    ...
 PZP  17| 38  42| 28  13| 30  34| 43  37| 38  27| 30  21| 24  26
```

Conditional probability of freezing precipitation (given that precipitation is occurring) forecasts are available for 12-h intervals ending 24 to 192 hours after 0000 and 1200 UTC. The 12-h forecast periods are from either 1200-0000 UTC or 0000-1200 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 during the 12-h period. 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 17. The PZP guidance is transmitted only during the period of September 1 - May 31. Because of the rarity of the freezing rain or sleet events, some stations do not have forecast equations for the PZP category. Forecasts are not available for stations in southern Florida, Hawaii, the Caribbean Islands, and parts of California, where freezing rain and snow rarely occur. In these cases, the PZP line will not appear in the message at any time of the year.

15. PSN - PROBABILITY OF SNOW IN A 12-H PERIOD (CONDITIONAL)

```
KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                    ...
 PSN  34| 52  19|  0  10| 25  28| 28  35| 30  33| 27  55| 49  40
```

Conditional probability of snow (given that precipitation is occurring) forecasts are available for 12-h intervals ending 24 to 192 hours after 0000 and 1200 UTC. The 12-h forecast intervals are from either 1200-0000 UTC or 0000-1200 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. 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 17. The PSN guidance is transmitted only during the period of September 1 -

May 31. Forecasts are not available for stations in southern Florida, Hawaii, the Caribbean Islands, and parts of California, where freezing rain and snow rarely occur. In these cases, the PSN line will not appear in the message at any time of the year.

16. PRS - PROBABILITY OF RAIN MIXED WITH SNOW IN A 12-H PERIOD (CONDITIONAL)

```
KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
 FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
 SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                    ...
 PRS  20|  9   5| 10  17| 12  11|  8   6|  3   8| 18   7| 11  12
```

Conditional probability of rain mixed with snow (given that precipitation is occurring) forecasts are available for 12-h intervals ending 24 to 192 hours after 0000 and 1200 UTC. The 12-h forecast intervals are from either 1200-0000 UTC or 0000-1200 UTC. Rain mixed with snow is defined as the occurrence of both rain (or drizzle) and snow (see definition in Section 15) in the 12-h period. The probabilities are given to the nearest whole percent, and values range from 0 to 100%. Missing values are indicated by 999. Although the conditional probability of rain is not included in the message, it can be inferred since the sum of the probabilities of freezing precipitation (Section 14), snow (Section 15), rain and snow mixed, and rain is 100%. These probabilities are used in producing the categorical TYP forecast described in Section 17. The PRS guidance is transmitted only during the period of September 1 - May 31. Forecasts are not available for stations in southern Florida, Hawaii, the Caribbean Islands, and parts of California, where freezing rain and snow rarely occur. In these cases, the PRS line will not appear in the message at any time of the year.

17. TYP - PRECIPITATION TYPE FORECASTS (CONDITIONAL)

```
KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
...
TYP   S|  Z   Z|  Z   R|  Z   Z|  Z   Z|  Z   Z|  Z   Z|  Z   Z
```

The TYP guidance in the message gives the conditional forecast precipitation type (if precipitation occurs) for 12-h periods ending 24 to 192 hours after the initial hour of 0000 and 1200 UTC. The 12-h forecast intervals are from either 1200-0000 UTC or 0000-1200 UTC. These categorical forecasts are obtained from the probability forecasts described in sections 14 – 16. The forecast is indicated by one or two characters 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), "RS" represents rain and snow mixed, and "R" represents liquid precipitation (rain or drizzle). 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 Caribbean Islands, and parts of California, where freezing rain and snow rarely occur. In these cases, the TYP line will not appear in the message at any time of the year.

18. SNW - SNOWFALL AMOUNT CATEGORICAL FORECAST

```
KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
                                    ...
SNW    |      0|      0|      1|      1|       |       |
```

Guidance for snowfall amount accumulated during a 24-h period is presented in categorical form. These forecasts are available for intervals from 0000-0000 UTC ending 48 to 120 hours after 0000 UTC and 36 to 132 hours after 1200 UTC. Since observations from the cooperative observer network are used to define the event, the valid times are only approximations. The categories are denoted as follows:

Snow Amount Categories

0 = no snow or a trace expected;
1 = > a trace to < 2 inches expected;
2 = 2 to < 4 inches;
4 = 4 to < 6 inches;
6 = 6 to < 8 inches;
8 = ≥ 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 Caribbean Islands, and parts of California, where snow rarely occurs. In these cases, the SNW line will not appear in the message at any time of the year.

19. AVAILABILITY

The extended-range GFS-based alphanumeric message is produced twice each day (at approximately 0500 and 1700 UTC) and is distributed in 10 alphanumeric messages transmitted to NWS NOAAPORT and Family of Services (FOS) circuits. Six messages contain guidance for stations in the contiguous U.S., Puerto Rico, and the Caribbean Islands, three contain guidance for Alaskan sites, and one contains guidance for stations in Hawaii. The following WMO Headers and AWIPS ids are used:

REGION	WMO HEADING	AWIPS ID
Pacific	FEPA20 KWNO	MEXPA0
Northeast	FEUS21 KWNO	MEXNE1
Southeast	FEUS22 KWNO	MEXSE1
North Central	FEUS23 KWNO	MEXNC1
South Central	FEUS24 KWNO	MEXSC1

Rocky Mountain	FEUS25 KWNO	MEXRM1
West Coast	FEUS26 KWNO	MEXWC0
Southeast Alaska	FEAK37 KWNO	MEXAJK
Central Alaska	FEAK38 KWNO	MEXAFC
Northern Alaska	FEAK39 KWNO	MEXAFG

Separate WMO Headings and AWIPS ids are used to distribute extended-range GFS-based MOS guidance for a subset of stations to the Air Force Weather Agency (AFWA). These messages are only distributed over military communication lines. Twenty-seven messages contain guidance for stations in the contiguous U.S., three contain guidance for Alaskan sites, one contains guidance for stations in Hawaii, and one contains guidance for Puerto Rico. The following two-line headers are used:

REGION	**WMO HEADING**	**AWIPS ID**
Contiguous U.S.	FEUS30 KWNO	MEXFxx, where xx=01 through 27
Alaska	FEAK30 KWNO	MEXFxx, where xx=50 through 52
Pacific	FEPA30 KWNO	MEXF70
Caribbean	FECA40 KWNO	MEXF80

20. STATION LIST

As of August 2001, the extended-range MOS guidance was available for 1060 stations in the United States. Guidance for additional sites was added in 2001 and 2003. At the time of this writing, guidance is available for 1524 stations. The reader may check the following web page for the complete station list by WMO Heading:

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

As of September 2001, the Air Force messages are available for 273 stations in the United States. The complete station list, organized by WMO Heading, can be found on the following web page:

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

Figure 1. Sample 1200 UTC message.

```
KALB   GFSX MOS GUIDANCE  12/31/2004  1200 UTC
FHR  24  36| 48  60| 72  84| 96 108|120 132|144 156|168 180|192
     SAT 01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07|SAT CLIMO
N/X  40  47| 20  41| 35  45| 25  32| 23  30| 25  33| 24  36| 21 12 31
TMP  43  33| 22  38| 37  36| 27  28| 25  27| 27  29| 27  30| 24
DPT  34  18| 12  25| 32  26| 24  25| 22  23| 24  24| 21  21| 19
CLD  CL  CL| CL  OV| OV  PC| OV  OV| OV  OV| OV  OV| PC  PC| OV
WND  12  19|  8  14| 15  12|  7   6|  7  11|  9  12| 13  13| 10
P12   2   2|  0  79| 62   7| 56  52| 48  63| 50  48| 31  16| 23 26 27
P24      21|     79|     72|     74|     67|     62|     48|       39
Q12   0   0|  0   2|  1   0|  1   1|  1   4|  2   2|       |
Q24       0|      2|      1|      2|      4|      3|       |
T12   1   1|  2   0|  1   0|  2   2|  3   3|  5   5|  3   0|  0
T24       |  2    |  1    |  5    |  3    |  5    |  5    |  2
PZP   4  17| 38  42| 28  13| 30  34| 43  37| 38  27| 30  21| 15
PSN  27  34| 52  19|  0  10| 25  28| 28  35| 30  33| 27  55| 55
PRS  20  20|  9   5| 10  17| 12  11|  8   6|  3   8| 18   7| 10
TYP   R   S|  Z   Z|  Z   R|  Z   Z|  Z   Z|  Z   Z|  Z   Z|  S
SNW       0|      0|      1|      1|      1|       |       |
```

Figure 2. Sample 0000 UTC message.

```
KALB   GFSX MOS GUIDANCE   1/01/2005  0000 UTC
FHR  24| 36  48| 60  72| 84  96|108 120|132 144|156 168|180 192
SAT  01| SUN 02| MON 03| TUE 04| WED 05| THU 06| FRI 07| SAT 08 CLIMO
X/N  47| 20  41| 35  45| 25  32| 23  30| 25  33| 24  36| 21  37 12 31
TMP  33| 22  38| 37  36| 27  28| 25  27| 27  29| 27  30| 24  32
DPT  18| 12  25| 32  26| 24  25| 22  23| 24  24| 21  21| 19  25
CLD  CL| CL  OV| OV  PC| OV  OV| OV  OV| OV  OV| PC  PC| OV  OV
WND  19|  8  14| 15  12|  7   6|  7  11|  9  12| 13  13| 10  13
P12   2|  0  79| 62   7| 56  52| 48  63| 50  48| 31  16| 23  25 26 27
P24    |     79|     72|     74|     67|     62|     48|     38    39
Q12   0|  0   2|  1   0|  1   1|  1   4|  2   2|  1    |
Q24    |      2|      1|      2|      4|      3|       |
T12   1|  2   0|  1   0|  2   2|  3   3|  5   5|  3   0|  0   1
T24    |  2    |  1    |  5    |  3    |  5    |  5    |  2
PZP  17| 38  42| 28  13| 30  34| 43  37| 38  27| 30  21| 24  26
PSN  34| 52  19|  0  10| 25  28| 28  35| 30  33| 27  55| 49  40
PRS  20|  9   5| 10  17| 12  11|  8   6|  3   8| 18   7| 11  12
TYP   S|  Z   Z|  Z   R|  Z   Z|  Z   Z|  Z   Z|  Z   Z|  Z   Z
SNW    |      0|      0|      1|      1|       |       |
```

Appendix A. The following changes have been made to the extended-range GFS MOS text product since its initial implementation in May 2000. More details about changes to the MOS system can be found at http://www.weather.gov/mdl/synop/changes.htm .

May 31, 2000	First product issued containing 2-m temperature, dew point temperature, and maximum and minimum temperature based on the 0000 UTC model cycle.
July 19, 2000	Probability of precipitation (POP) and quantitative precipitation amount added to product.
October 4, 2000	Precipitation type and mean total sky cover guidance added to product.
May 9, 2001	Thunderstorm and severe thunderstorm guidance added to product.
Sept. 26, 2001	Separate products for military sites added.
January 22, 2002	323 stations added to guidance.
July 30, 2002	Climatological values of max/min temperature and POP added to product for select sites.
Sept. 17, 2002	Wind speed guidance added to product.
December 16, 2003	Snowfall amount guidance added to product. 145 stations added to guidance. "MRF MOS" heading changed to "GFSX MOS" to reflect consolidation of AVN and MRF runs of NCEP's Global model into one Global Forecast System (GFS) model.
Sept. 27, 2005	MEX product added for 1200 UTC cycle. 1200 product contains all elements except for wind, precipitation type and mean total sky cover.
April 25, 2006	Probability of thunderstorm guidance changed from representing the likelihood within a box approximately 47 km on a side to a box 40 km on a side.
July 11, 2006	Wind guidance changed from the maximum speed occurring at any of the hours in the 12-h period to the current definition. Wind guidance made available in 1200 UTC product.