

DESCRIPTION OF GFS AND NAM BUFR MESSAGES

The National Weather Service is currently disseminating GFS and NAM-based (MAV, MEX, and MET) MOS guidance in BUFR (Binary Universal Form for the Representation of meteorological data) format (as of January 2005 for the MAV and MET, and Summer 2005 for the MEX). The BUFR message is a computer independent binary stream consisting of several different sections. The first section (Section 0) indicates the beginning of the BUFR message, and Section 1 describes the general contents and origin of the message. Section 2 is optional and is reserved for local use. In the MOS BUFR message, this section contains station call letters for the sites within the bulletin and a description message. Section 3 explicitly describes the data stored in packed form in Section 4. Section 5 indicates the end of the BUFR message.

The NWS is using BUFR Edition 2 as described in WMO's Manual on Codes, Volume 1, FM 94-IX Ext. BUFR. The data in Section 4 are packed in compressed format. This means that data in the BUFR message are packed by ELEMENT so that if 10 stations and 19 projections are included, then the element data for one station and all 19 projections are strung together followed by the next station and all projections, etc. When all the stations are exhausted, the data for the next element follows. This scheme allows for maximum compression of the data because for EACH element, a global min (for all stations and projections) is obtained and subtracted from each value.

A subset represents a data value for a particular station and projection. The number of subsets for a given element depends on the number of stations contained in the message and the number of valid projections needed to represent the forecast data. Specifically, the number of subsets is the number of stations multiplied by the number of projections. The number of data subsets for a given message is located in section 3.

Section 3 also contains a list of element descriptors which are fully described in BUFR Table B, and correspond on a one-to-one basis with the data in Section 4. Attachments 1, 2, and 3 contain the lists of descriptors (elements) that are available in the short-range GFS (MAV), short-range NAM (MET), and extended-range GFS (MRF) MOS BUFR messages. Also, the attachments contain each of the descriptor's corresponding Table B entries. Each list begins with the station's call letters, latitude, longitude, initial forecast time, the model on which the forecasts are based, the objective technique used to generate the forecasts, and the forecast projection. Afterwards, all the MOS forecasts available in the message are listed. Each forecast element is completely described by a single descriptor with a few exceptions. Categorical forecasts covering periods, such as precipitation amount, and MEX sky cover and precipitation type, require two descriptors to identify the forecast. The first descriptor indicates the forecast period, and the second is the forecast associated with that period. For example, if the second descriptor indicates a precipitation amount forecast, the preceding descriptor indicates whether it is a 6-h, 12-h, or 24-h forecast.

The short-range (6 – 84h) GFS BUFR messages are transmitted under the following WMO headers:

- JSML30 KWNO YYHHMM - Pacific Region
- JSML31 KWNO YYHHMM - Northeast Region
- JSML32 KWNO YYHHMM - Southeast Region
- JSML33 KWNO YYHHMM - North Central Region
- JSML34 KWNO YYHHMM - South Central Region
- JSML35 KWNO YYHHMM - Rocky Mountains Region
- JSML36 KWNO YYHHMM - West Coast Region
- JSML37 KWNO YYHHMM - Alaska Region

The extended-range (90 – 192h) GFS BUFR messages are transmitted under the following WMO headers:

- JSMT30 KWNO YYHHMM - Pacific Region
- JSMT31 KWNO YYHHMM - Northeast Region
- JSMT32 KWNO YYHHMM - Southeast Region
- JSMT33 KWNO YYHHMM - North Central Region
- JSMT34 KWNO YYHHMM - South Central Region
- JSMT35 KWNO YYHHMM - Rocky Mountains Region
- JSMT36 KWNO YYHHMM - West Coast Region
- JSMT37 KWNO YYHHMM - Alaska Region

The NAM BUFR messages are transmitted under the following WMO headers:

- JSML10 KWNO YYHHMM - Pacific Region
- JSML11 KWNO YYHHMM - Northeast Region
- JSML12 KWNO YYHHMM - Southeast Region
- JSML13 KWNO YYHHMM - North Central Region
- JSML14 KWNO YYHHMM - South Central Region
- JSML15 KWNO YYHHMM - Rocky Mountains Region
- JSML16 KWNO YYHHMM - West Coast Region
- JSML17 KWNO YYHHMM - Alaska Region

Where YY is the day of the month, HHMM is the hour and minute the product is created.