

**GFS-BASED MOS GUIDANCE FOR ISLAND SITES IN THE TROPICAL WESTERN PACIFIC OCEAN
- THE SHORT-RANGE ALPHANUMERIC MESSAGE FROM THE 0000/1200 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 message generated during the 0000 and 1200 UTC forecast cycles of the Global Forecast System (GFS) for island sites in the tropical western Pacific Ocean. This document contains descriptions of forecasts for time-specific surface temperature and dewpoint, total sky cover, surface wind direction and speed, probability of precipitation (PoP) for 6- and 12-h periods, and ceiling height. Guidance is provided for projections of 6 to 72 hours in advance for most weather elements. The most recent weather elements to be added to this message are total sky cover and ceiling height, effective Tuesday, November 5, 2013. No additional weather elements are planned for this message at this time. However, as changes are made to the bulletin format or as guidance for additional weather elements might become available, this document will be updated. Note that a particular element line (see Sections 3 - 9) is not included in the message when all of the forecasts in that line are unavailable.

2. MESSAGE HEADING

```
PGUA  GFS MOS GUIDANCE  10/24/2013  0000 UTC
DT /OCT 24                /OCT 25                /OCT 26                /
HR   06 09 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 18 00
```

The message heading shown above (see Figs. 1 and 2 also) identifies the call letters of 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 Andersen AFB (PGUA). All stations are identified by the ICAO four-character identifier (the call letters).

The "GFS MOS GUIDANCE" appearing on the same line as the station call letters identifies the message contents. The date and the forecast cycle during which the message is issued follow this information. The form of mm/dd/yyyy is used, 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 by the standard 0000 or 1200 UTC. In this example, the MOS guidance for PGUA was issued from the 0000 UTC forecast cycle of the GFS on October 24, 2013.

The DT and HR lines denote the dates and hours at which the forecasts are valid. The DT line indicates the days of the month. Note that the month is denoted by the standard three or four letter abbreviation. For temperature, dewpoint, sky cover, wind direction, wind speed, and ceiling height, 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 the time indicates the end of the period over which the forecasts are valid.

3. TMP - SURFACE TEMPERATURE

PGUA	GFS	MOS	GUIDANCE	10/24/2013 0000 UTC													
DT	/OCT 24			/OCT 25									/OCT 26			/	
HR	06	09	12 15 18 21	00 03 06 09 12 15 18 21	00 03 06 09 12 18 00												
TMP	83	80	79 79 78 79	84 84 82 79 78 78 77 77	83 83 82 79 78 77 81												

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 0000 and 1200 UTC. These forecasts are valid at 0600, 0900, ..., 2100, 0000 UTC, and so forth. Each temperature forecast is presented to the nearest whole degree Fahrenheit; a missing forecast is indicated by a 999. Note that only three characters are available for the temperature forecasts. Thus, two consecutive forecasts of 100 degrees or more appear with no spaces between them.

4. DPT - SURFACE DEWPOINT

PGUA	GFS	MOS	GUIDANCE	10/24/2013 0000 UTC													
DT	/OCT 24			/OCT 25									/OCT 26			/	
HR	06	09	12 15 18 21	00 03 06 09 12 15 18 21	00 03 06 09 12 18 00												
DPT	77	78	77 77 76 77	78 77 77 77 76 75 75 76 76 76 76 77 76 74 75													

Time-specific 2-m dewpoint forecasts are valid every 3 hours from 6 to 60 hours, and then every 6 hours to 72 hours after 0000 and 1200 UTC. These forecasts are valid at 0600, 0900, ..., 2100, 0000 UTC, and so forth. Each dewpoint forecast is presented to the nearest whole degree Fahrenheit; a missing forecast is indicated by a 999. Three characters are available for the dewpoint forecasts.

5. CLD - TOTAL SKY COVER CATEGORIES

PGUA	GFS	MOS	GUIDANCE	10/24/2013 0000 UTC													
DT	/OCT 24			/OCT 25									/OCT 26			/	
HR	06	09	12 15 18 21	00 03 06 09 12 15 18 21	00 03 06 09 12 18 00												
CLD	BK	BK	BK BK BK BK BK BK BK BK BK BK BK BK	SC SC BK BK BK BK BK BK													

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 (0000 and 1200 UTC). All forecasts are valid for specific times (i.e., 0600, 0900, 1200, 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 - 1 to 2 eighths of total sky cover;
- SC - 3 to 4 eighths of total sky cover;
- BK - 5 to 7 eighths of total sky cover;
- OV - 8 eighths of total sky cover or totally obscured sky.

The categorical guidance is prepared by using probability forecasts of the same categories. The categorical guidance displayed in the message is chosen

by a technique that produces as many forecasts of each of the five categories as occur in the observational data used for development of the guidance.

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

```
PGUA   GFS MOS GUIDANCE   10/24/2013   0000 UTC
DT /OCT 24                /OCT 25                /OCT 26                /
HR   06 09 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 18 00
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WDR   27 27 24 25 24 24 21 20 21 20 19 21 20 18 12 10 07 07 06 04 06
WSP   12 09 08 06 05 05 07 07 07 04 03 02 01 02 06 06 06 03 04 05 09
```

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 (0000 and 1200 UTC). These are forecasts of the 10-m winds (a 2-minute average) at specific times throughout each day (i.e., 0600, 0900, 1200 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 00 for both wind direction and speed.

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

```
PGUA   GFS MOS GUIDANCE   10/24/2013   0000 UTC
DT /OCT 24                /OCT 25                /OCT 26                /
HR   06 09 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 18 00
---
P06           19    25    19    15    16    19    18    25    24 20 26
```

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 (0000 and 1200 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.

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

```
PGUA   GFS MOS GUIDANCE   10/24/2013   0000 UTC
DT /OCT 24                /OCT 25                /OCT 26                /
HR   06 09 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 18 00
---
P12           35           38           33           25           32
```

The P12 forecasts are for the probability of 0.01 inch or more of liquid-equivalent precipitation (PoP) occurring during a 12-h period. The 12-h PoP's are valid for intervals of 6-18, 18-30, 30-42, 42-54, and 54-66 hours after 0000 and 1200 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.

9. CIG - CEILING HEIGHT CATEGORIES

```
PGUA   GFS MOS GUIDANCE   10/24/2013  0000 UTC
DT /OCT 24                /OCT 25                /OCT 26                /
HR   06 09 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 18 00
---
CIG   8  8  8  6  8  8  8  7  8  8  8  8  8  8  8  8  8  8  8  8  7  7
```

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. The categorical guidance displayed in the message is chosen by a technique that produces as many forecasts of each of the eight categories as occur in the observational data used for development of the guidance.

10. AVAILABILITY

The GFS MOS guidance is available at approximately 0415 and 1615 UTC from the 0000 and 1200 UTC runs, respectively, of the GFS model. The guidance is disseminated in alphanumeric messages to Family of Services (FOS) and NWS AWIPS with the following two-line WMO headers:

For the Hawaii GFS MOS products:

```
FOPA20 KWNO - Pacific Region
MAVPA0
```

For the western Pacific GFS MOS products:

```
FOPA21 KWNO - Western Pacific islands
MAVPA1
```

11. STATION LIST

The GFS MOS guidance is available for 15 island sites in the tropical western Pacific Ocean. The user may check the following website for the station lists:

<http://www.nws.noaa.gov/mdl/synop/stadrg.php>

12. SAMPLE ALPHANUMERIC MESSAGES

Two sample alphanumeric messages of the GFS MOS guidance for Andersen AFB, Guam (PGUA) are listed below (Fig. 1 for 0000 UTC and Fig. 2 for 1200 UTC). These sample messages are extracted from the output of preliminary runs using the package to be implemented. Real-time GFS model output and observed data are used for predictors in these runs.

Figure 1. Sample 0000 UTC message.

PGUA	GFS MOS GUIDANCE																10/24/2013				0000 UTC			
DT	/OCT 24				/OCT 25				/OCT 26				/											
HR	06	09	12	15	18	21	00	03	06	09	12	15	18	21	00	03	06	09	12	18	00			
TMP	83	80	79	79	78	79	84	84	82	79	78	78	77	77	83	83	82	79	78	77	81			
DPT	77	78	77	77	76	77	78	77	77	77	76	75	75	76	76	76	76	77	76	74	75			
CLD	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK	SC	SC	BK	BK	BK	BK	BK	BK	BK	BK			
WDR	27	27	24	25	24	24	21	20	21	20	19	21	20	18	12	10	07	07	06	04	06			
WSP	12	09	08	06	05	05	07	07	07	04	03	02	01	02	06	06	06	03	04	05	09			
P06			19		25		19		15		16		19		18		25		24	20	26			
P12					35				38				33				25			32				
CIG	8	8	8	6	8	8	8	7	8	8	8	8	8	8	8	8	8	8	8	7	7			

Figure 2. Sample 1200 UTC message.

PGUA	GFS MOS GUIDANCE																10/24/2013				1200 UTC			
DT	/OCT 24				/OCT 25				/OCT 26				/OCT 27											
HR	18	21	00	03	06	09	12	15	18	21	00	03	06	09	12	15	18	21	00	06	12			
TMP	77	78	84	83	82	80	78	78	77	77	83	84	82	79	78	78	77	78	81	81	78			
DPT	76	77	78	77	77	77	77	75	75	77	77	77	77	76	76	75	75	76	77	76	76			
CLD	FW	SC	SC	BK	BK	BK	SC	BK	SC	SC	BK	BK	BK	SC	BK	BK	BK	BK	BK	BK	OV			
WDR	25	26	25	22	25	25	26	27	23	18	08	07	04	04	04	02	03	04	04	04	05			
WSP	05	06	07	07	07	03	01	01	01	02	05	05	06	05	05	05	07	07	10	10	08			
P06			18		16		14		17		20		24		25		24		30	36	29			
P12					34				28				25				35			51				
CIG	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	4	7	6	6	6			