

UNDERSTANDING THE WINDS AND TEMPERATURES ALOFT FORECAST PRODUCT (FB)

Stanley E. Prevost, CFI/CFII

Planning for a cross-country flight includes an examination of the winds aloft, for three reasons: as part of choosing a cruise altitude; to assess the impact of wind on ground speed and thus fuel requirements for the flight; and to calculate the required heading and time for any dead reckoning legs of the flight.

Where does winds aloft data come from, and how does a pilot get it? To answer this, we have to briefly negotiate a bureaucratic maze. At the top (sort of) is the National Oceanic and Atmospheric Administration (NOAA) (<http://www.noaa.gov/>), one component of which is the National Weather Service (NWS) (<http://www.nws.noaa.gov/>). The NWS has several specialized National Centers for Environmental Prediction (NCEP), one of which is the NCEP Central Operations (<http://www.ncep.noaa.gov/>), which apparently is the group that actually runs the models and generates the forecast data. It appears that the NWS's Aviation Weather Center (<http://aviationweather.gov/>) distributes the NCEP model output data to the aviation community.

Pilots can access the forecast winds and temperatures aloft in many places on the internet. One official outlet is the Aviation Digital Data Service (ADDS), operated by the Aviation Weather Center (<http://adds.aviationweather.gov/winds/>). A graphical depiction of the data is provided there, as well as the official textual data. How to read the data product is described in the document linked as "FYI/Help" on the textual product, so that will not be repeated here.

The data product is called "Forecast Winds and Temps Aloft", "FBWinds" or just "FB", and is generated by NCEP from runs of the North American Model (NAM). The predecessor product was called FD and resulted from use of the Nested Grid Model (NGM). Always keep in mind that the product is a *forecast*, not a representation of actual current conditions. When a Flight Service briefer gives you winds aloft information, s/he is getting it from the FB product, and it is a *forecast*. Nobody can give you the actual conditions except another pilot who has the ability to measure the wind at his flight altitude.

The FB product is available four times a day based on the synoptic times of 00Z, 06Z, 12Z, and 18Z. Those are the nominal times at which new model runs are made. The results are made available from one and one-half hours to two hours after the synoptic times. Each run generates three forecasts for three different time periods over the next 24 hours. Each model run is made for three specific times, and the results are strictly valid only for those times. These valid times are six, twelve, and twenty-four hours after the model run synoptic time. However, the data are declared to be useful for a certain time period about the specific valid times. So each forecast period has a valid time and a "for use" time period. These are described in the following table (from <http://aviationweather.gov/products/nws/winds/info.php>) :

Data available	Model Run	6 hour 'FOR USE' times	12 hour 'FOR USE' times	24 hour 'FOR USE' times
~0200 UTC	0000 UTC	0200-0900 UTC *	0900-1800 UTC *	1800-0600 UTC
~0800 UTC	0600 UTC	0800-1500 UTC *	1500-0000 UTC *	0000-1200 UTC
~1400 UTC	1200 UTC	1400-2100 UTC *	2100-0600 UTC *	0600-1800 UTC
~2000 UTC	1800 UTC	2000-0300 UTC *	0300-1200 UTC *	1200-0000 UTC

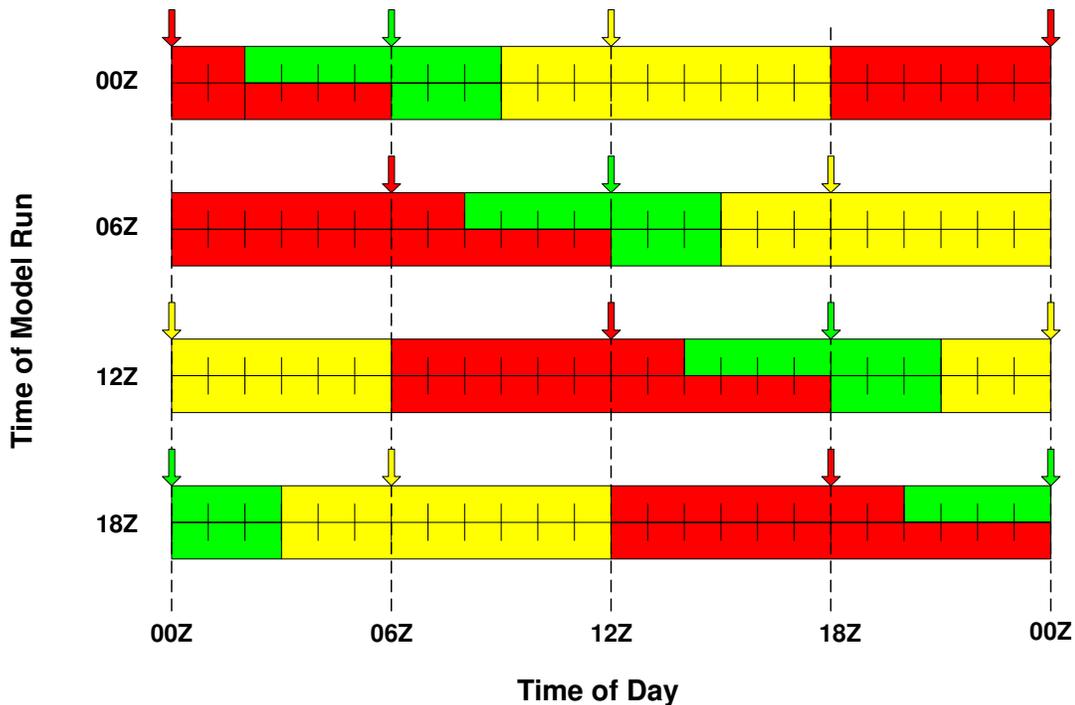
Note that the “Data Available” time is approximately two hours after the nominal model run time, as previously described. What this table does not explicit state is the Valid Time. The Valid Times are six, twelve, and 24 hours after the Model Run time, and are the valid times of the six hour, twelve hour and 24 hour forecasts, respectively.

Note that the durations of the For Use intervals for the three different forecasts are 7, 9, and 12 hours. Each For Use interval versus the respective Valid Time is described thusly:

Forecast	Valid Time after Model Run	Duration of For Use Period	For Use Period Begins Before Valid Time by	For Use Period Ends After Valid Time by
6 hour	6 hrs	7 hrs	4 hrs	3 hrs
12 hour	12 hrs	9 hrs	3 hrs	6 hrs
24 hour	24 hrs	12 hrs	6 hrs	6 hrs

This is better understood by reference to the figure on the following page.

Winds and Temperatures Aloft Forecast (FB)



"For Use" Times ■ 6-hr forecast ■ 12-hr forecast ■ 24-hr forecast

Valid Times ↓

One thing to observe is that the For Use period of the 6-Hour forecast begins 2 hours after nominal model run time, which is when the data should be available. Thus the forecast should be usable as soon as it is available. Another thing to observe is that one should never be outside a 6-Hour forecast For Use period, since they are released every six hours. This means that a pilot should always have valid 6-Hour forecast data available at the time of beginning the flight, or shortly before it, so that flight calculations can be updated with best data. Preliminary estimates can be performed the day or night before using 12- or 24-hour forecast data.

Even using the 6-Hour forecast, one can be up to nine hours after the model run, which was based on data older than that. Again, never forget that the FB product is a *forecast*. The further out one goes from the model run time, and the further away from the Valid Time, the more unreliable the forecast will be. Also, the more dynamic the weather situation, the poorer the model will be able to predict the future. Comparing the current 6-Hour product to the 24-hour product generated 24 hours earlier can help gauge how well the model is working in the current circumstances. If one needs more current predictions of winds aloft than are available with the FB product, one option is to use the output of the RUC model which is run hourly. See <http://rucsoundings.noaa.gov/> . This

takes a little study, and the data is initially presented on a Skew-T/Log P plot, but the textual data is available.

Note the following portion of an FB report. In the first line, the “FBUS31” identifies the report as an FB product. The “121406” is the UTC time the report was released, which is 2 hours and six minutes after the model run time of 1200. The “DATA BASED ON 121200Z” says it was a 1200Z model run. Since the Valid time is 1800Z, six hours after the model run time, we know it is a six-hour forecast. Note also that the For Use time indicates that the data was for use as soon as released.

```
(Extracted from FBUS31 KWNO 121406)
FD1US1
DATA BASED ON 121200Z
VALID 121800Z   FOR USE 1400-2100Z. TEMPS NEG ABV 24000

FT  3000      6000      9000      12000      18000      24000      30000      34000      39000
BRL 3310 3112+20 3311+16 3116+09 3221-07 2941-17 295132 296441 306152
DBQ 0113 3515+19 3115+13 3024+08 3133-07 2941-20 286834 298243 307950
DSM 0309 3607+21 3408+16 3211+10 2921-07 2843-18 284932 296442 306853
.....
PIR          1317+16 1620+12 2131+09 2541-10 2744-21 286834 289642 279352
RAP          1620+14 2231+17 2525+11 2734-09 2643-19 287232 278842 278852
GRB 3611 3218+15 3023+10 2926+05 3040-10 3156-21 307037 306545 296251
```

(Can you see the temperature inversion at RAP?)

At times, a given location may report that data is not available. They have to send up balloons with radiosonde packages to get the data that feeds the computer models, and not every launch gets made or is successful.