



The Front



FB Winds: New Name, Old Product

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Winds and temperatures aloft forecasts (FB Winds) have been part of a pilot's preflight routine for some time now. They are the "official" forecast of upper level winds and temperatures in the FAA view.

The FB Winds are provided as part of a standard briefing when you call an automated flight service station (AFSS). Similarly, the FB Winds are used when you plan a flight

with DUATs. How are the FB Winds generated and why do pilots feel they are often wrong?

Pilots have been using these forecasts for years and complaining about their inaccuracy for almost as long. You must appreciate the limitations of this particular forecast product to understand why some pilots are unhappy with it. First, let's discuss a little recent history. If you dust

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When's the Next Front?

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NCEP Winds Aloft Forecasts - SE US FYI

07:39 UTC Lo Lvl Hi Lvl 07:39 UTC MAP 06 hr 12 hr 24 hr

Note *: Change in FBWinds "For Use" times. See FYI/Help.
(Extracted from FBUS31 KWN0 240737)

FDIUS1
DATA BASED ON 240600Z
VALID 241200Z FOR USE 0800-1500Z. TEMPS NEG ABV 24000

| FT | 3000 | 6000 | 9000 | 12000 | 18000 | 24000 | 30000 | 34000 | 39000 |
|-----|------|---------|---------|---------|---------|---------|--------|--------|--------|
| EYW | 2869 | 2772+16 | 2773+12 | 2770+08 | 2664-03 | 2661-12 | 255527 | 244937 | 274149 |
| JAX | 0509 | 1806+13 | 2507+09 | 2016+04 | 2033-06 | 2135-16 | 194930 | 195140 | 206151 |
| MIA | 1974 | 2067+16 | 2067+12 | 2070+08 | 2175-03 | 2176-13 | 217325 | 226935 | 225847 |
| MLB | 1134 | 1440+16 | 1541+11 | 1641+06 | 1643-06 | 1652-15 | 175028 | 175538 | 195449 |
| PFN | 3529 | 3218+10 | 3020+07 | 2823+04 | 2437-08 | 2451-19 | 226729 | 237737 | 237949 |
| PIE | 0333 | 0421+15 | 0720+10 | 0720+05 | 0314-05 | 9900-14 | 160728 | 190938 | 211750 |
| TLH | 3625 | 3316+11 | 2918+07 | 2423+05 | 2334-08 | 2449-20 | 217328 | 227737 | 227650 |
| ATL | 3538 | 2621+05 | 2531+01 | 2546-02 | 2370-10 | 2382-22 | 239834 | 731038 | 721848 |
| CSG | 3538 | 2821+07 | 2630+03 | 2543+00 | 2360-10 | 2373-22 | 229033 | 730137 | 730849 |
| SAV | 3507 | 1709+12 | 2315+07 | 2427+03 | 2147-08 | 2257-18 | 217730 | 218240 | 219151 |
| HAT | 1417 | 2414+11 | 2437+08 | 2343+01 | 2348-10 | 2364-20 | 228733 | 730841 | 741251 |
| ILM | 1318 | 1912+11 | 2025+06 | 2234+01 | 2348-09 | 2374-19 | 218832 | 720441 | 731151 |
| RDU | 0808 | 1916+08 | 2126+02 | 2239-02 | 2372-11 | 2394-21 | 721833 | 722940 | 733251 |
| CAE | 0208 | 2414+07 | 2328+05 | 2340+01 | 2269-09 | 2278-21 | 710631 | 721340 | 721651 |
| CHS | 0816 | 1614+12 | 2216+07 | 2523+02 | 2249-08 | 2262-18 | 218331 | 218841 | 219852 |
| FLO | 9900 | 2321+09 | 2233+05 | 2241+00 | 2367-09 | 2280-20 | 710432 | 721040 | 721551 |
| GSP | 3615 | 2109+03 | 2232+01 | 2348-04 | 2383-10 | 2292-23 | 721233 | 722338 | 723049 |
| 2XG | 1725 | 2022+15 | 1921+10 | 1929+05 | 2053-06 | 1956-16 | 205330 | 214639 | 225551 |

Figure 1: The resolution for network of FB Winds locations is course.

The Front

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Mission Statement

To enhance aviation safety by increasing the pilot's knowledge of weather systems and processes and National Weather Service products and services.

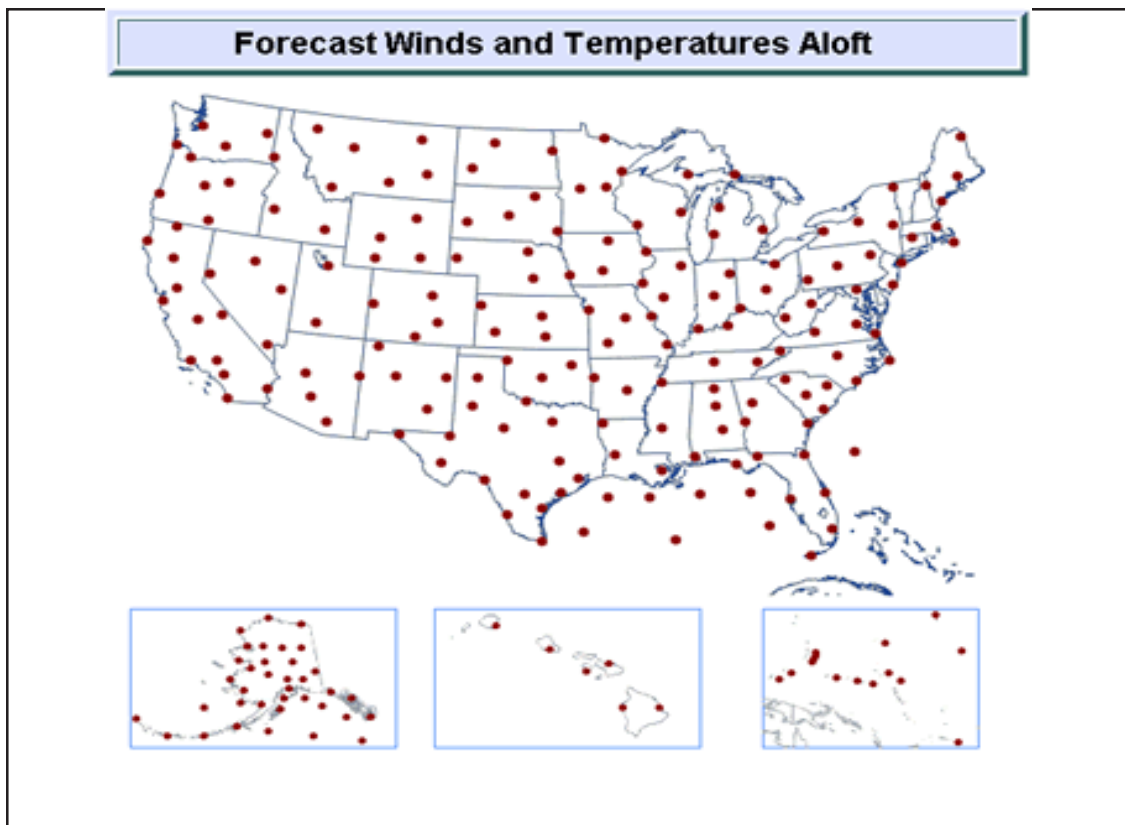


Figure 2: Forecast winds and temperatures essentially are derived from the closest model grid point to the actual FB Winds locations and altitudes.

off your handy-dandy aviation textbook, you will notice that Winds and Temperatures Aloft were once called FD Winds. Due to a recent change, NWS and FAA now refer to these as FB Winds.

The FB Winds are generated by the National Centers for Environmental Prediction (NCEP). Forecasts for 6, 12 and 24 hours are generated **every six hours** based on output from the North American Mesoscale (NAM) model.

The NAM model has a 12 km horizontal resolution. Forecast winds and temperatures are essentially derived from the closest model grid point to the actual FB Winds locations and altitudes (see **Figure 2**).

Several years ago, the NAM replaced the Nested Grid Model (NGM) as the choice for FB Winds

forecasts. The NGM was run only twice a day: 0000 UTC and 1200 UTC. The NAM offers four runs a day—a huge improvement. But regardless of the model used, several major limitations remain.

Issue 1: As seen in **Figure 2**, the resolution for the network of FB Winds locations is coarse. Even though the NAM model is capable of producing data at a 12 km resolution, users are not able to get a finer resolution with the current FB Winds product.

Issue 2: The FB Winds 3000 foot altitude resolution also is coarse, considering the NAM model could easily produce a forecast at 1000 foot intervals or less. With a 3000 foot resolution, you lose essential details. Surface-based temperature inversions, for example, play an important role in

U.S. weather but are rarely apparent in the FB Winds forecast.

Issue 3: FB Winds do not forecast the moisture content or the relative humidity of the air. Small dew point depressions (temperature-dew point spread) are indicative of clouds and precipitation. Crank down the temperature a bit; the combination of saturated conditions and temperatures below 0°C indicate the potential of structural icing.

Issue 4: Depending on the actual forecast product (6, 12 or 24 hours), the FB Winds are valid at 0000 UTC, 0600 UTC, 1200 UTC or 1800 UTC. What happens if you are planning a 2 hour flight beginning at 1600 UTC? Are you out of luck?

All FB Winds have a valid time and a “for use” period. For a 1430 UTC flight, for example, you would

still have to use the 6-hour FB forecast valid at 1200 UTC. This forecast is available **for use** between 0800 UTC and 1500 UTC. There is a huge potential problem here.

Figure 3 describes the valid times of the FB Winds products available for each run of the NAM model. The NAM model is run four times a day:

- ◆ Shortly after 0000 UTC
- ◆ Shortly after 0600 UTC
- ◆ Shortly after 1200 UTC
- ◆ Shortly after 1800 UTC

I say “shortly after” because the model is not started until the raw input data (observations) is completely collected. Finally, the FB Winds are posted a little more than 2 hours after these approximate start times.

Now back to the example. Let’s say you are planning a departure at 1430 UTC. The current FB Winds product is the 6-hour forecast from the 0600 UTC model run.

Here’s the important statement: The product is only **valid** at 1200 UTC; however, it is **for use** between 0800 UTC and 1500 UTC.

Let’s say a frontal system is forecast to pass through your planned route around 1300 UTC. Will the FB Winds and temperatures be accurate

for your route? This uncertainty is the main issue driving pilots to believe there is an error in the forecast.

Taking the example a bit further, let’s say the winds at 6,000 feet are forecast to be 180° at 17 knots with a temperature of 12°C. Remember, this forecast is valid at 1200 UTC.

Due to the frontal passage at 1300 UTC, the **observed** winds at 6,000 feet shift around to 275° at 33 knots, and the temperature drops to 6°C.

Is the original forecast a bad one? Not necessarily. Remember it was valid at 1200 UTC.

Will your flight plan be accurate? Not if you used the latest FB Winds forecast. This becomes more significant if you are making long trips. You could easily use up most of your fuel reserves.

Instrument pilots also may make poor decisions based on the temperature forecasts for icing potential if these limitations are not understood.

Will NCEP amend the FB in this case? There isn’t an amendment criterion; therefore, NCEP will not amend these forecasts.

What can you do to plan a more accurate flight? Here are four simple precautions:

- ◆ Understand the limitations described above.
- ◆ Examine any new observed data from pilot reports that may provide you with a more recent estimation of the winds and temperatures.
- ◆ Take note of changing weather conditions and factor those into your flight plan.
- ◆ Use a different forecast model.

The Rapid Update Cycle (RUC2) model is run hourly (not every 6-hours) and will provide an hourly analysis as well as 1, 2, 3, 6, 9 and 12 hour forecasts. As weather conditions change, the model will incorporate these weather changes into a new forecast every hour.

Moreover, you are not limited to just the FB Winds stations. You can choose any airport with a three-letter identifier and determine the winds and temperatures aloft.

Figure 4 is an example of a Skew-T log P diagram from the Forecast Systems Laboratory. The diagram represents RUC model forecast data: temperature, winds and dew point.

Note the wind barbs on the right side. As you move the cursor up and down in the center of this Java-based

| 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 |

Figure 3. Valid times of each of the FB Winds products available for each run of the NAM model.

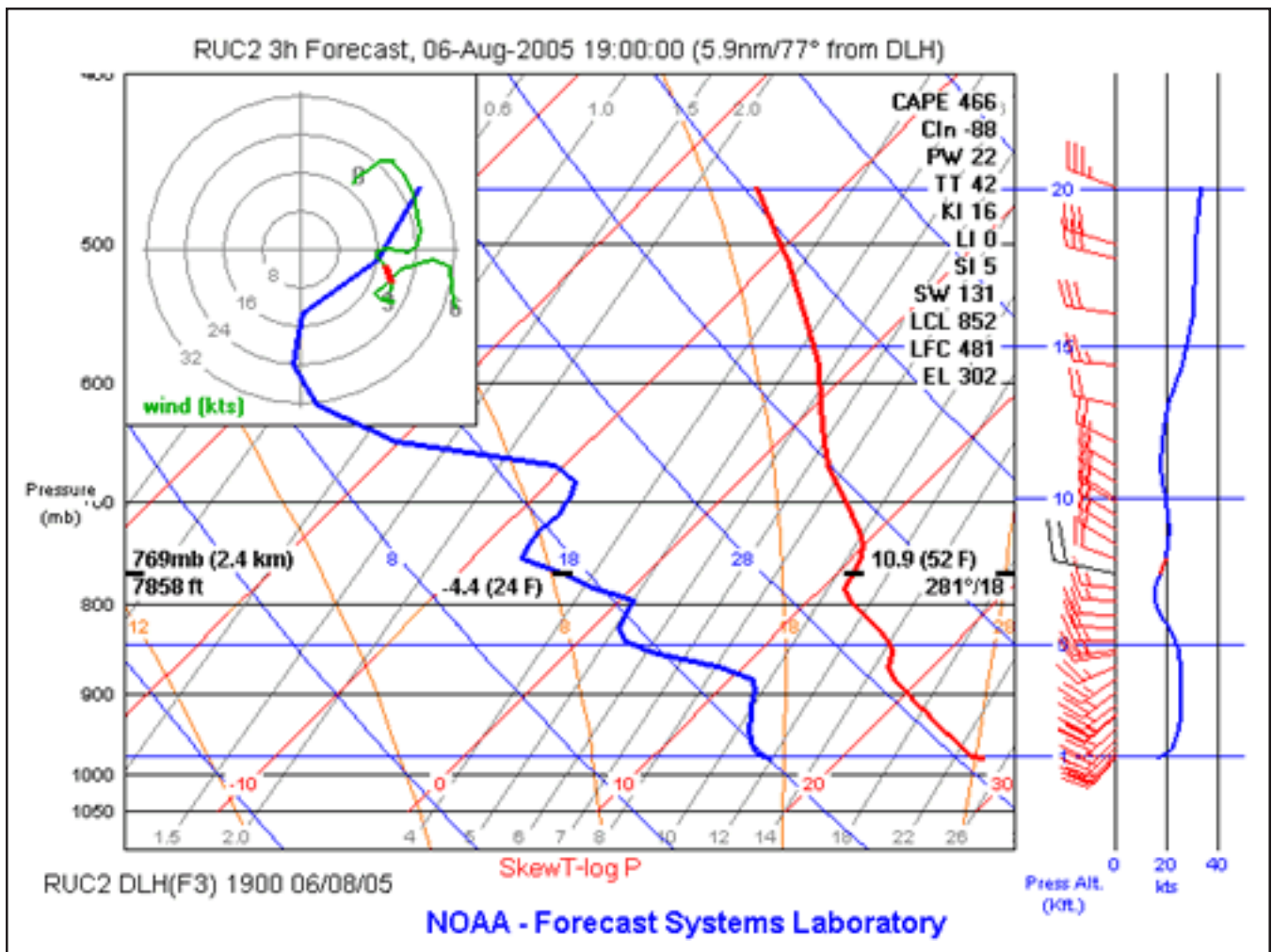


Figure 4: is an example of a Skew-T log P diagram from the Forecast Systems Laboratory (FSL).

interactive diagram each wind barb to the right is highlighted in black, representing the wind speed and direction at that pressure altitude.

In this sample, a 3-hour forecast valid at 1900 UTC for Duluth (KDLH), the cursor was placed at 7,858 feet (769 mb) of pressure altitude. The winds are forecast to be 281° (true) at 18 knots. The temperature at this altitude is forecast to be 10.9°C.

The graphical wind speed diagram to the far right allows you to choose the altitude with the least head wind or the greatest tail wind. For example, for a westerly route through KDLH, the winds are about 5 knots less at 6,500 ft than at 4,500 feet.

I am not suggesting that you punt the FB Winds forecast; however, with the RUC forecast you can get a much more current forecast with a finer resolution in the horizontal and the vertical.

Go to <http://www-frd.fsl.noaa.gov/mab/soundings/java> and give it a try. If it isn't clear, send me an email and I'll try to clarify it further.

Biography

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Tips for Recognizing Reliable Weather Sources

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The sun is shining, the air is warm, and the skies are clear. It looks like another perfect day to fly. The smell of jet fuel and Avgas move across the airfield as pilots are out and about completing their walk-a-rounds and first-flight-of-the-day checks. The weather looks good and the first plane is off and rolling down the runway.

Back in the FBO, a pilot walks into the weather room for one last look before he too departs. He walks past the television, glancing at the local weather, past the commercial weather product computers and stops at the telephone.

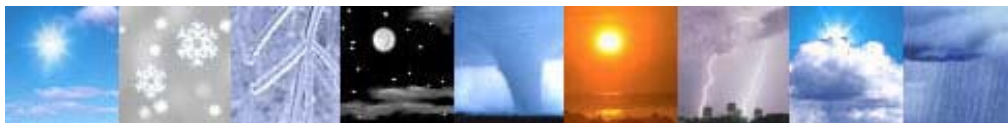
He looks around for pen and paper while he picks up the phone and dials **1-800-WXBRIEF**. Listening to the menu he presses "1," then hears "All briefers are currently busy. Please stay on the line for the next available briefer."

A few pilots walk in while he waits, some watch the television broadcast, some surf the Internet, others consult the weather products computer before walking back out. The telephone begins to ring. The briefer picks up, and the pilot asks for a standard weather briefing along his route of flight.

Federal Aviation Regulations require that each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight, including flights under IFR or not in the vicinity of an airport, weather reports and forecasts FAR 91.103:

<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=84473f22382403150c7526f0bc4df21c&rgn=div8&view=text&node=14:2.0.1.3.10.2.4.2&idno=14>

In a 2003 NWS survey, 250 pilots and aircraft dispatchers were asked a



series of questions pertaining to aviation weather services. Respondents were questioned on what types of weather products or information they typically use, which weather products they rely on the most, and how they typically obtain their aviation weather information.

The survey results showed that few pilots were alike in how they obtain weather information before a flight. Answers included:

- ◆ Flight service stations (FSS)
- ◆ Internet access to METARs, TAFs, radar and satellite images
- ◆ TV predictions and forecasts.

The development of enhanced communications capabilities offers the general aviation pilot access to a variety of government and commercial weather resources. New sensor systems, algorithms and forecast models make it essential pilots evaluate the reliability and accuracy of a weather product or service before use in preflight planning.

Government agencies such as the FAA and NWS, with the support of the National Center for Atmospheric Research and the Forecast Systems Laboratory, have developed a process known as Aviation Weather Technology Transfer (AWTT). This process ensures user needs and

technical and operational readiness requirements are met before new weather products are released for pilots and operators use.

Commercial agencies, such as local television stations, private weather vendors and other Web sources offering aviation weather do not usually partake in the AWTT comprehensive process and may not meet the FAA/NWS quality control standards. These vendors may provide seemingly good weather information from radar, satellite and ground facilities, but their products reliability and accuracy are not monitored or regulated.

The FAA cautions pilots against using unfamiliar products and offers a series of simple questions to help evaluate the reliability and accuracy of unfamiliar weather services and products.

The Aeronautical Information Manual, Section 7-1-3, *Use of Aviation Weather Products*, suggests asking the following questions to evaluate the reliability and accuracy of a weather source:

◆ Is the service or product applicable for aviation use?

- Does the product or service provide data usable in aeronautical weather decision-making?
- Does the product or service fail to provide data necessary to make critical aeronautical weather decisions?

◆ Does the service provide data or products produced by approved aviation weather information sources?

- Is the data or product modified?
- If so, is the modification process described and is the final product in a configuration that supports aeronautical weather decision-making?

◆ Are the weather products professionally developed and produced or quality-controlled by a qualified aviation meteorologist?

◆ Does the provider's quality assurance plan include the capability to monitor generated products and contain a procedure to correct deficiencies as they are discovered?

◆ Is the product output consistent with original data sources?

◆ Is the product compliant with applicable RTCA, Inc., Society of Automotive Engineers (SAE) and International Civil Aviation organization (ICAO) standards?

◆ Are education and training materials sufficient to enable users to use the new product effectively?

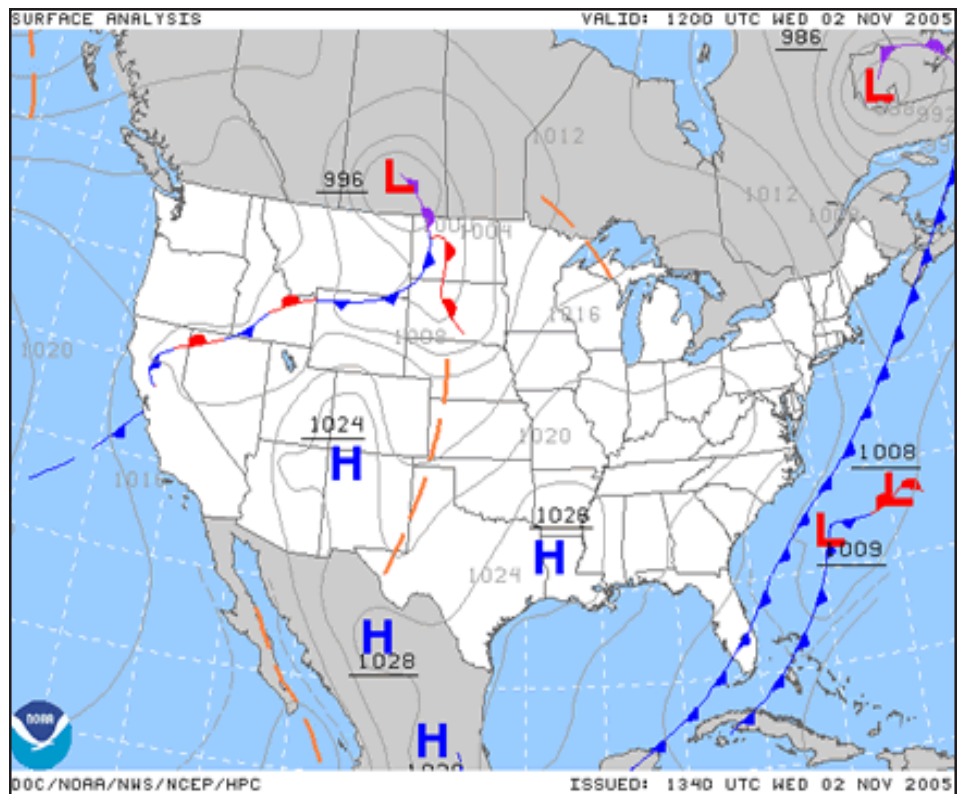


Figure 1. NOAA CONUS Weather Map

◆ Are the following key elements of the product intuitive and easy for the user to interpret?

- Type of data or product
- Currency or age of data or product
- Method for displaying and decoding the data or product
- Location or mapping of data

◆ Is the product suitable for use, considering potential pilot misunderstandings due to:

- Complexity of the product
- Nonstandard display
- Incorrect mapping or display of data
- Incorrect overlay of weather data with other data
- Inappropriate display of missing data
- Missing, inaccurate time/date stamp on product

By answering these questions before using unfamiliar weather products or services, you will be able to make an informed decision on whether a product meets the requirements of FAR 91.103.

The increasing availability of weather services and products to the GA pilot make it essential that you evaluate the reliability and accuracy of each product or service. The FAA and NWS, with the support of National Center for Atmospheric Research and the Forecast Systems Laboratory, continue to develop and implement reliable and accurate weather products using the AWTT process.

Some familiar products are available at **1-800-WXBRIEF** or **www.aviationweather.gov** and other Web sources. It is not the FAA's intent, by providing these guidelines within the AIM, to limit the use of other sources, but to urge caution before using unfamiliar products. →

Start with the big picture by clicking on the satellite icon, then on the area of interest on the U.S. map. This screen provides a regional satellite clip to view. Remember to click on the Infra-Red (IR) option at night.

In **Figure 1**, the satellite depicts clear skies and no weather around Pennsylvania. Now look at a surface forecast chart for tomorrow morning. Click on “Prog Charts” (Figure 2.) You expect to see the northeast under high pressure. And sure enough, it is. There is a system to the west but too far away to be a concern. So the current satellite and forecast data agree with

the forecast; however, you’re still concerned about that morning fog which is highly terrain dependent. You need more information.

One aid is to look at METARs, or observations, from the past 24 hours at several sites. This will help you determine the development and timing of fog in the area and whether it is likely to reform the next day.

The rule of thumb supporting this thinking is that many places tend towards similar fog conditions each morning if the weather pattern remains consistent, like the case here with high pressure. Also it’s good to

know which airports tend to fog in solidly and which don’t. Local terrain is such a big player in fog forecasting that it’s worth a few seconds to see which surrounding airports were relatively fog free and which were not. This quick routine helps develop a good backup plan.

At the ADDS site, go to the METAR icon. Enter the identifier along with the identifiers of several surrounding sites and click on the past 24 hour’s option. Now let’s try and decipher fog prone areas and fine-tune your backup plan in case KIPT is fogged in tomorrow morning.

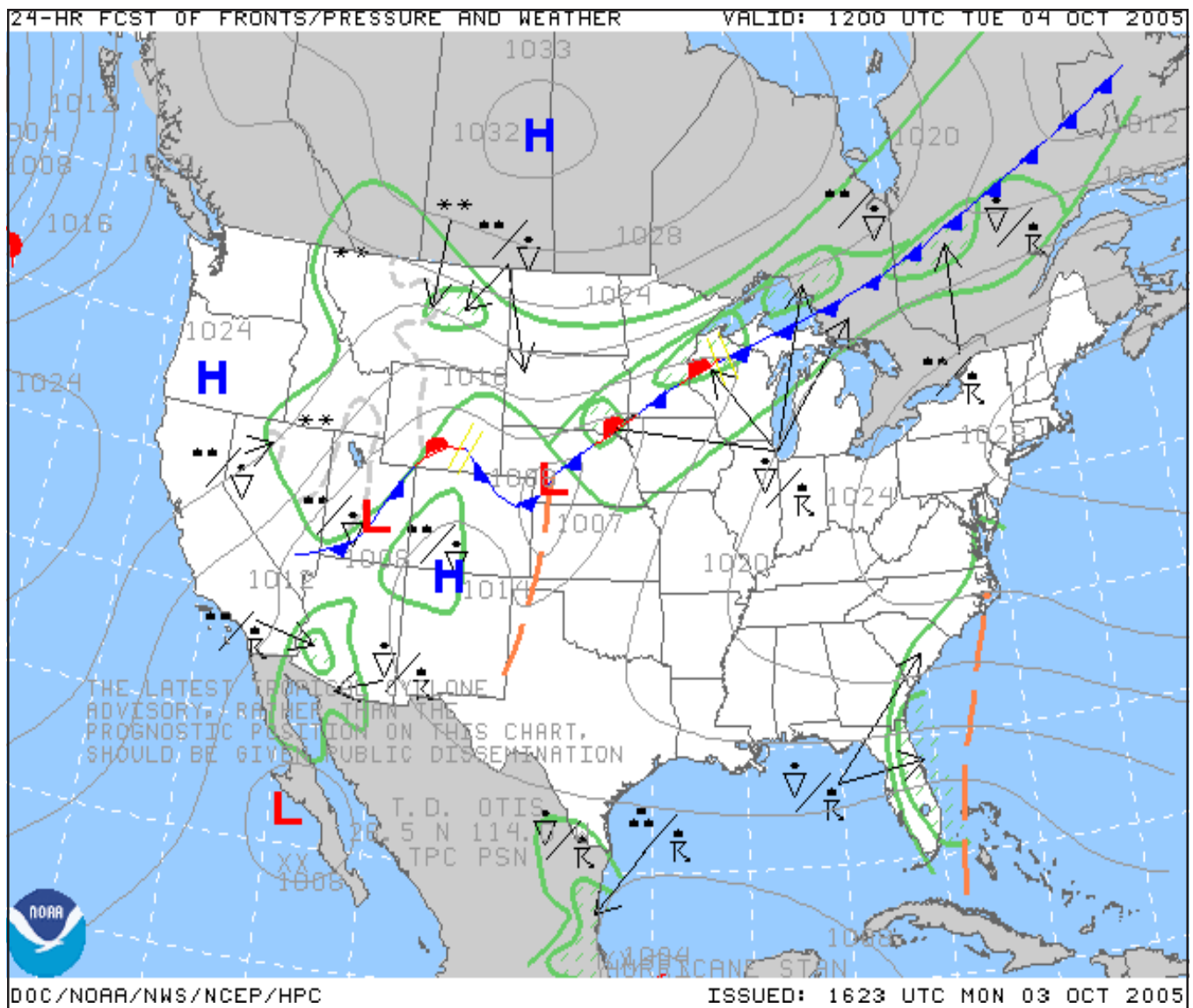


Figure 2. The prog chart valid for tomorrow morning confirms high pressure over the region.

KIPT indeed fogged in this morning and broke out late, rapidly going from IFR to VFR from about 11 a.m. to 11:30 a.m. Based on our rule of thumb about weather repeating itself under high pressure, an 8 a.m. arrival for tomorrow morning may be optimistic.

```
KIPT 031554Z 00000KT 7SM SCT003 17/14 A3039 RMK AO2 SLP293 T01720139
KIPT 031519Z 00000KT 3SM BR SCT003 14/13 A3040 RMK AO2
KIPT 031507Z 00000KT 2SM BR BKN003 14/13 A3041 RMK AO2
KIPT 031454Z 00000KT 1 1/4SM BR OVC001 13/13 A3042 RMK AO2 SLP300 T01280128 50007
KIPT 031438Z 00000KT 1SM BR OVC001 13/12 A3042 RMK AO2
KIPT 031354Z 00000KT 1/4SM FG VV001 13/12 A3042 RMK AO2 SLP301
KIPT 031054Z 00000KT 1/4SM FG VV001 12/12 A3039 RMK AO2 SLP291
KIPT 030954Z AUTO 00000KT 1/4SM FG VV001 12/12 A3038 RMK AO2 SLP288
```

Checking other sites from the morning, you see KABE (Allentown) was not as bad. The fog never really set up; it remained mainly shallow ground fog that cleared between 9 and 10 a.m. Assuming everything stays the same, KABE could provide a decent alternate for tomorrow.

```
KABE 031451Z 00000KT 10SM CLR 21/12 A3043 RMK AO2 SLP303 T02060117
KABE 031351Z 00000KT 6SM HZ CLR 17/11 A3043 RMK AO2 SLP305 T01720111
KABE 031251Z 05004KT 3SM HZ CLR 14/11 A3042 RMK AO2 SLP302 T01390111
KABE 031223Z 35003KT 3SM BR CLR 12/10 A3042 RMK AO2 TWR VIS 4
KABE 031151Z 00000KT 1 1/2SM BR CLR 10/08 A3042 RMK AO2 TWR VIS 4 KABE 031051Z 36003KT 1 1/2SM BR
CLR 09/08 A3040 RMK AO2 TWR VIS 4
KABE 030951Z AUTO 00000KT 3SM BR CLR 09/08 A3040 RMK AO2 SLP292
```

KAVP (Wilkes-Barre/Scranton) has a nice local effect. The light, easterly winds in the early morning hours almost always ensure little or no fog. This provides a good, solid alternate for planning.

```
KAVP 031454Z 29003KT 6SM HZ CLR 21/12 A3042 RMK AO2 SLP291 T02060117 KAVP 031354Z 02003KT 7SM CLR
18/11 A3042 RMK AO2 SLP293 T01830111
KAVP 031254Z 00000KT 6SM HZ CLR 15/11 A3042 RMK AO2 SLP292 T01500106
KAVP 031154Z 11005KT 4SM HZ CLR 12/09 A3041 RMK AO2 SLP291 T01220094
KAVP 031054Z 10005KT 5SM BR CLR 12/09 A3040 RMK AO2 SLP287 T01170094 $
KAVP 030954Z AUTO 12006KT 5SM BR CLR 12/10 A3039 RMK AO2 SLP284
```

Look next at KCXY and KMDT (Harrisburg and Middletown). KCXY is close to the river and dense fog banks could encroach on to the field. But in this case, while shallow ground fog did limit visibility for a time, the fog was gone by 9 a.m.-10 a.m. This field could be a toss up for an alternate tomorrow. Not being familiar with the local effects, I'll probably look elsewhere for my back up plan.

```
KCXY 031556Z 10005KT 10SM CLR 22/12 A3040 RMK AO2 SLP295 T02220117
KCXY 031456Z VRB03KT 6SM HZ CLR 21/12 A3042 RMK AO2 SLP301 T02060117 50004
KCXY 031356Z 10004KT 6SM HZ CLR 18/11 A3043 RMK AO2 SLP305 T01780106
```

```
KCXY 031256Z 00000KT 2SM BR CLR 15/13 A3042 RMK AO2 SLP300 T01500128
KCXY 031204Z 00000KT 2SM BR CLR 12/11 A3041 RMK AO2
KCXY 031156Z 00000KT 2SM BR CLR 12/11 A3041 RMK AO2 SLP298 T01170106
KCXY 031108Z 00000KT 1 3/4SM BR CLR 11/10 A3040 RMK AO2
KCXY 031056Z AUTO 00000KT 3SM BR CLR 11/10 A3039 RMK AO2 SLP293
```

```
KMDT 031356Z 00000KT 5SM HZ CLR 17/12 A3042 RMK AO2 SLP300 T01720117
KMDT 031256Z 00000KT 3SM HZ CLR 15/12 A3041 RMK AO2 SLP297 T01500122
KMDT 031156Z 00000KT 2SM BR CLR 12/11 A3040 RMK AO2 SLP293 7////
KMDT 031141Z 00000KT 1 3/4SM BR CLR 12/11 A3039 RMK AO2
KMDT 031056Z 00000KT 2 1/2SM BR CLR 12/11 A3039 RMK AO2 SLP290
KMDT 030956Z 00000KT 3SM BR CLR 12/11 A3038 RMK AO2 SLP287 T01170106
```

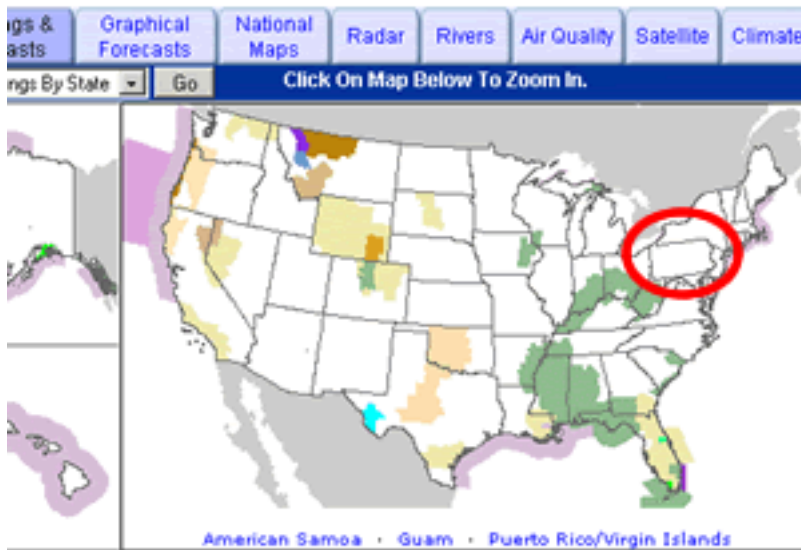
KLNS (Lancaster) Shallow ground fog with visibility limited, a rapid burn off towards 10 a.m. Possible alternate, so will evaluate further after viewing the TAF and AFD.

```

KLNS 031453Z VRB04KT 9SM CLR 21/11 A3042 RMK AO2 SLP300 T02060106 50005
KLNS 031224Z 13003KT 3SM BR CLR 12/10 A3041 RMK AO2
KLNS 031200Z 00000KT 1 1/4SM BR CLR 12/10 A3041 RMK AO2
KLNS 031121Z 00000KT 3SM BR CLR 10/09 A3040 RMK AO2
KLNS 031104Z 00000KT 1 1/4SM BR CLR 09/08 A3040 RMK AO2
KLNS 031053Z 00000KT 2SM BR CLR 10/09 A3040 RMK AO2 SLP292 T01000089
KLNS 030953Z 00000KT 1 3/4SM BR CLR 10/09 A3038 RMK AO2 SLP288
KLNS KLNS 030933Z AUTO 00000KT 3SM BR CLR 11/09 A3038 RMK AO2
KLNS 030924Z AUTO 00000KT 2 1/2SM BR CLR 11/09 A3038 RMK AO2

```

That's it for the observations. Some areas are less foggy than others. You can work that information into the backup plan. Now back to the ADDS page. Click on the TAF icon, type in KIPT, and the TAF from the example pops up.



```

KIPT 031724Z 031818 15005KT P6SM FEW250
FM0400 00000KT 4SM BR SCT250
FM0700 00000KT 1SM BR SCT003
TEMPO 0913 1/4SM FG VV001
FM1530 15005KT P6SM SCT150

```

No real surprises here. Fog is expected in the TAF. But could you understand the weather process and impacts, or the forecaster's thinking and confidence level a bit better? Yes. Often by

Figure 3. NWS Home page.

reading the new Aviation Forecast Discussion, it's possible to gain insight into the elements that went into making the forecast. For this example shift from the ADDS site to the NWS home page: <http://www.weather.gov>. (Figure 3)

- ◆ Click in central Pennsylvania. The home page for the local forecast office in State College, PA, will open. On the left, in the blue navigation bar, click on the first word or phrase you see under "Forecasts." For this example at State College, click on "7-Day Local" (Figure 4).
- ◆ Once on the new page, look for Area Forecast Discussion (Figure 5). The link may have a slightly different name or location at other local forecast offices. In this example, you see the Area Forecast Discussion. Click on "Our Office, State College." Scroll down until you see something like the Aviation Discussion in Figure 6.



Figure 4. State College, PA, Home page. Click on 7 Day Local under Forecasts.

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Weather Radio Be Prepared Wind Chill StormReady SkyWarn Spotters General Info Old News.Features FAQ's Office Info Tours.Education Local Geography Pictures Links</p> | <p>Area Forecast Discussions for PA prepared by:</p> <ul style="list-style-type: none"> • Our office (State College) • The Philadelphia NWS office • The Pittsburgh NWS office • The Binghamton, NY NWS office • The Cleveland, OH NWS office • The Sterling, VA (D.C.) NWS office <hr/> <p>Commonly used NWS Contractions, and General Forecast Terminology</p> <hr/> <p>Ever wonder what some of the more common Geographic Regions in PA are that we refer to in our products and discussions?</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Figure 5. State College, PA, Area Forecast Discussion

The aviation discussion is usually found after the short term section of the AFD. Breaking down this sample AFD, you see the text in **Figure 6**.

The rule of thumb mentioned earlier about fog tending to repeat itself in consistent or non-changing weather conditions appears fine here. (TONIGHT SIMILAR TO LAST FEW NIGHTS.)

That's your consistency check. The forecaster discusses the possibility of fog coming earlier. (FOG LIKELY TO FORM A LITTLE FASTER). This forecast alerts you to expect fog a bit sooner than observations indicated.

Overall the Aviation AFD in this example is providing a sense of the forecaster's confidence level, which seems high for this fog event.

Finally, in the last paragraph of the AFD, the forecaster mentions concern for stratocumulus clouds forming (MVFR) later in the day tomorrow. The wording, however, gives you confidence the clouds will hold off (. SOUTH TO SE FLOW MAY BRING SOME SC IN FROM THE SE AT SOME POINT...BUT MOST LIKELY NOT BEFORE TUE...IF THEN.)

So based on research and input from the forecaster's discussion, here

are some of the choices you have for your trip:

- 1 Take no action and leave tomorrow morning on time.
- 2 Leave later this afternoon and arrive at KIPT this evening.
- 3 Go to Plan B and arrive at KIPT after the fog has burned off, based off the TAF/AFD and your research.
- 4 Cancel the trip and wait for a less risky day.

So how did the forecast work out? Looking at **Figure 7**, the fog

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AFDCTP

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE STATE COLLEGE PA
1128 AM EDT MON OCT

.SHORT TERM (REST OF TODAY) ...
MINIMAL CHANGES NEEDED AS SURFACE HIGH CONTINUES TO BRING WARM TEMPERATURES TO CENTRAL PA. A BIT
MORE SUN OUT THERE THAN...ETC...ETC

AVIATION...

TONIGHT SIMILAR TO LAST FEW NIGHTS. MAIN DIFFERENCE IS SLIGHTLY
HIGHER DEWPOINTS...THUS FOG LIKELY TO FORM A LITTLE FASTER.
PERHAPS A BETTER CHC ON TUE MORNING FOR FOG...BUT WINDS WILL BE
SLIGHTLY STRONGER.

WINDS THIS MORNING WILL STILL BE FAIRLY LIGHT...BUT MIXING WILL BE SLIGHTLY FASTER THAN LAST FEW
DAYS...SO HARD TO SEE FOG LINGERING TOO LONG...EVEN WITH SHORTER DAYS NOW. SOME HIGH CLDS
TODAY...GIVEN SLIGHTLY UNSTABLE AIRMASS TO THE WEST AND CONVECTION.

SOUTH TO SE FLOW MAY BRING SOME SC IN FROM THE SE AT SOME
POINT...BUT MOST LIKELY NOT BEFORE TUE...IF THEN.

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Figure 6. Aviation Discussion.

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KIPT 041831Z 11007KT 7SM FEW019 21/16 A3034 RMK AO2
KIPT 041754Z 16008KT 8SM OVC019 20/15 A3035 RMK AO2 SLP277 T02000150
KIPT 041654Z 11005KT 8SM BKN017 20/15 A3037 RMK AO2 SLP284 T02000150
KIPT 041638Z VRB05KT 8SM SCT017 19/15 A3038 RMK AO2
KIPT 041554Z VRB04KT 5SM HZ OVC015 18/15 A3039 RMK AO2 SLP290
KIPT 041501Z VRB03KT 4SM HZ OVC015 16/13 A3040 RMK AO2
KIPT 041454Z 12003KT 2SM BR OVC015 15/13 A3040 RMK AO2 SLP296
KIPT 041254Z 00000KT 1 1/4SM BR FEW002 OVC015 11/11 A3041 RMK AO2
KIPT 041154Z 29003KT 1/4SM FG VV001 10/09 A3040 RMK AO2 SLP294
KIPT 040943Z AUTO 00000KT 1/4SM FG OVC001 11/11 A3037 RMK AO2
KIPT 040854Z AUTO 00000KT 1/2SM FG OVC001 11/10 A3036 RMK AO2 SLP280
KIPT 040754Z AUTO 00000KT 2 1/2SM BR CLR 11/10 A3036 RMK AO2 SLP277
KIPT 040707Z AUTO 00000KT 1 3/4SM BR BKN001 11/10 A3035 RMK AO2
KIPT 040702Z AUTO 00000KT 2 1/2SM BR SCT001 11/11 A3036 RMK AO2
KIPT 040654Z AUTO 00000KT 3SM BR BKN003 11/11 A3036 RMK AO2 SLP278
KIPT 040615Z AUTO 00000KT 2SM BR BKN003 11/11 A3036 RMK AO2
KIPT 040554Z AUTO 00000KT 1 3/4SM BR FEW003 11/11 A3036 RMK AO2
KIPT 040454Z AUTO 00000KT 3SM BR BKN002 12/11 A3036 RMK AO2 SLP279
KIPT 040439Z AUTO 00000KT 3SM BR SCT002 12/11 A3036 RMK AO2
KIPT 040410Z AUTO 00000KT 2 1/2SM BR CLR 12/12 A3036 RMK AO2
KIPT 040354Z AUTO 00000KT 4SM BR CLR 13/11 A3036 RMK AO2 SLP282

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Figure 7. MVFR Ceiling

developed earlier in the morning than it did yesterday, as the forecaster's aviation discussion mentioned. Rather than burning off quickly, however, the fog lifted and formed a MVFR ceiling. This ceiling didn't evaporate until 2:00 p.m.-2:30 p.m. EDT (**Figure 7**).

Knowing how the weather panned out, revisit your four choices:

1. Take no action and leave tomorrow morning on time. Poor decision. Forecasts are not perfect, but understanding the reasons the weather may occur puts you in a proactive stance. In this case, our research and the aviation discussion are clear indicators that fog is likely.

2. Leave later this afternoon and arrive at KIPT this evening. By building flexibility into your trips, weather can sometimes be factored out of the equation. Though leaving a day early could be an extreme solution, it's not unrealistic to route a trip a few hours earlier in the morning when the forecast indicates afternoon thunderstorms. Waiting few

hours until a cold front passes is another example of avoiding bad weather. This choice may be unrealistic in today's busy world, but building flexibility into a plan allows a pilot to sidestep weather hazards common to fog, afternoon thunderstorms and frontal weather.

3. By leaving later in the morning, you hope the fog will burn off by the time you arrive. It did not work out quite as planned but by

researching surrounding stations, you built in realistic alternates.

4. Cancel the trip and wait for another day with less risk. A hard choice, but safety and sound decision making based on our earlier reviews should never take a back seat when preparing your trips.

Figures 8-10 offer some more examples of the aviation AFD from across the country. **Figure 8** is an example from the Great Falls, MT,

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.AVIATION...
UPDATED 1820Z.
FOG/LOW CLOUDS HAVE MOSTLY DISSIPATED AND IFR CEILINGS SHOULD END AT
KHVR BY LATE AFTERNOON. OTHERWISE EXPECT CLOUDS GRADUALLY
DISSIPATING LATER THIS AFTERNOON/EARLY EVENING EXCEPT FOR PORTIONS
OF SW AND CNTRL MT. HIGH CLOUDS WILL BEGIN TO MOVE OVER THE AREA FROM
THE SW AFTER MIDNIGHT. SHOULD ALSO SEE SOME LIGHT DOWNSLOPE WINDS
OVER THE PLAINS AFTER MIDNIGHT. WITH THOSE TWO FACTORS IN MIND LEFT
FOG OUT OF TAFS FOR LATE TONIGHT/SAT MORNING. WOULD NOT RULE OUT
PATCHY LIFR CONDITIONS NEAR KHVR AND KLWT TWDS 12Z.

KGTF 281725Z 281818 VRB06KT P6SM SCT060 BKN250
FM2100 22010KT P6SM SCT060 BKN250
FM0100 22008KT P6SM SCT100
FM1200 22010KT P6SM BKN250

KHVR 281725Z 281818 VRB03KT P6SM OVC005
FM2000 VRB06KT P6SM BKN250
TEMPO 2021 OVC006
FM0200 22006KT P6SM SKC
FM1600 22010KT P6SM BKN250

```

Figure 8. Great Falls, MT

office. In this example, the forecaster details an improving scenario with TAFs through the day. Then overnight, the forecaster conveys some uncertainty with phrases such as:

WOULD NOT RULE OUT PATCHY LIFR CONDITIONS NEAR KHVR AND KLWT TWDS 12Z

These statements are almost like “buyer beware.” They can convey uncertainty. This is new to users. In the

past, the TAF was always black and white.

Now there is forecast reasoning or underlying local knowledge users can draw from. **Figure 9** is an example from the Salt Lake office.

```
.AVIATION...PRECIPITATION BAND WILL REMAIN OVER SLC THROUGH THIS MORNING. VISIBILITIES AT SLC DURING THIS TIME WILL REMAIN IN THE VFR RANGE. CEILINGS ARE EXPECTED TO BE VFR AS WELL...BUT BELOW 6000FT AGL. THE PRECIPITATION BAND IS EXPECTED TO MOVE EAST OF THE AREA BY NOON WITH RAIN TAPERING OFF EXCEPT FOR A FEW SHOWERS. CEILINGS WILL LIFT A BIT IN THE AFTERNOON BUT ARE EXPECTED TO REMAIN NEAR 6000 FT AGL. WINDS WILL LIKELY STAY SOUTHERLY IN THE AFTERNOON AS PRECIPITATION CONTINUES SOUTH OF SLC.

KSLC 281732Z 281818 16007KT P6SM VCSH SCT040 BKN070
TEMPO 1822 -SHRA SCT020 BKN040
FM0200 15008KT P6SM SCT060 BKN100
```

Figure 9.
Salt Lake City

The SLC discussion covers the weather in more detail. It provides information on the weather and the trend, which enhances the information of the TAF and local area. **Figure 10** is one more example from the Detroit office.

```
.AVIATION...

DIURNAL CUMULUS/STRATO-CU WILL BE A BIT THICK IN MOIST...NORTHEAST FLOW OFF LAKE HURON. THIS WILL BE ESPECIALLY TRUE IN DTW/DET AND WILL CARRY A TEMPO GROUP THIS AFTERNOON FOR A BROKEN CEILING AROUND 3500 FEET. THAT WILL FADE QUICKLY THIS EVENING...WITH CLEAR SKIES AND LIGHT WINDS EXPECTED INTO SATURDAY.

KDET 281720Z 281818 04006KT P6SM SCT035
TEMPO 1822 BKN035
FM0200 VRB03KT P6SM SKC
FM1400 24007KT P6SM SKC=
```

Figure 10.
Detroit

In this example discussion, you can see the reasoning for the clouds:

IN MOIST...NORTHEAST FLOW OFF LAKE HURON

It shows, in no uncertain terms, the weather improving:

THAT WILL FADE QUICKLY THIS EVENING...WITH CLEAR SKIES AND LIGHT WINDS EXPECTED INTO SATURDAY.

The aviation discussion is a powerful way for aviation users to understand the reasoning and confidence behind today's TAF. By making the aviation discussion part of the briefing routine, it is possible to gain more insight about weather patterns and resulting conditions that the TAF alone cannot define.

Most offices tend to keep the Area Forecast Discussions in about the same spot on their web sites as in the State

College example above. Or, use the following link and look for the closest weather forecast office in the area of interest: <http://www.weather.gov/view/validProds.php?prod=AFD>

To provide comments on the aviation AFD to a local forecast office, go to, or try the office's contact information at the bottom of their office page, or email me at Michael.Graf@noaa.gov. →