

Surface Maps - Preflighting the atmosphere with National Weather Service Internet sites

Any pilot concerned about safety would naturally perform a preflight check of the aircraft before ever climbing into the cockpit and starting engines, no matter how short the flight might be. Likewise, preflighting the atmosphere with a National Weather Service (NWS) surface map, plotted data, satellite imagery and a radar mosaic should be as natural and effortless as an aircraft preflight inspection. Both are minimal investments in time that yield huge dividends in peace of mind during the flight.

Pilots know that a streak or drop of fluid on or near the landing gear may appear innocent, but could have serious consequences on safety when it comes time to extend the gear or apply the binders.

The National Weather Service (NWS) and its parent agency, NOAA (National Oceanic and Atmospheric Administration) offer surface maps that are simple to use and yet rich in the data you need to prepare for your flight.

Knowing how to use the surface

chart, what to look for, and what it means comes only from repeated practice and the discipline that says it is important despite the blue sky and cotton ball clouds above. This can be as important as the preflight on the plane.

Look at it this way, Your GPS will give you an ETA only if it knows your current position. Like a GPS, surface maps containing fronts, METARs, and such give you that initial meteorological reference so you can move on to study forecast charts. Weather trends are as important as current conditions.

The mere presence of a front on a surface map will tell you very little. It's the details found in plotted METAR reports that shed the real light on weather challenges that lie ahead. Temperatures, humidity, wind, and pressure gradients near the fronts give you the full picture.

The NWS's Hydrometeorological Prediction Center (HPC) surface analysis page is a great place to start. See Figure 1.

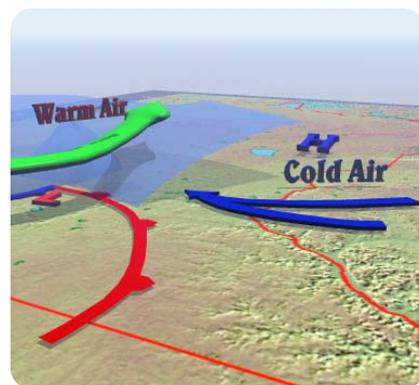
The left side of Figure 2 shows two



Weather causes or contributes to many aircraft accidents. The National Weather Service is determined to do its part in reducing weather-related accidents.

The Front will be a bimonthly newsletter offering explanations of both weather processes and National Weather Service products in a clear, straight-forward manner. The experience of those who read this newsletter is diverse. The greatest challenge will be to inform and educate in a way that enables all readers to draw usable information from each edition.

Weather is three dimensional and dynamic.. Whenever possible and appropriate, technical explanations will rely heavily on 3D



graphics that simulate a pilot's perspective.

This is your newsletter. We will work to make each issue better, and we need your questions and

Mission Statement

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



<p>Current Products</p> <ul style="list-style-type: none"> Short Range Medium Range QPF Exces_Rain/ Wint_Wx Tropical Selected_Cities/ Travelers Forecast Model_Diagnostics and Biases Surface Analysis 	<p>North American Surface Analysis</p> <p>The NWS is proposing modifications to some HPC products. Click here to compare current products with the proposed product suite.</p> <p>Current Surface Analyses</p> <p>North America / With Surface Observations</p> <p>Click on above map for full view.</p> <p>North America / Without Surface Observations</p> <p>Continental U.S. (CONUS) / Without Surface Observations</p>	<p>HPC HOME</p> <ul style="list-style-type: none"> What's New About the HPC HPC Accomplishments Product Information HPC Verification Research Office and Staff Photo Gallery
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Figure 1. Surface analysis maps are available on the Hydrometeorological Prediction Center's (HPC) homepage at www.hpc.ncep.noaa.gov/html/sfc2.html

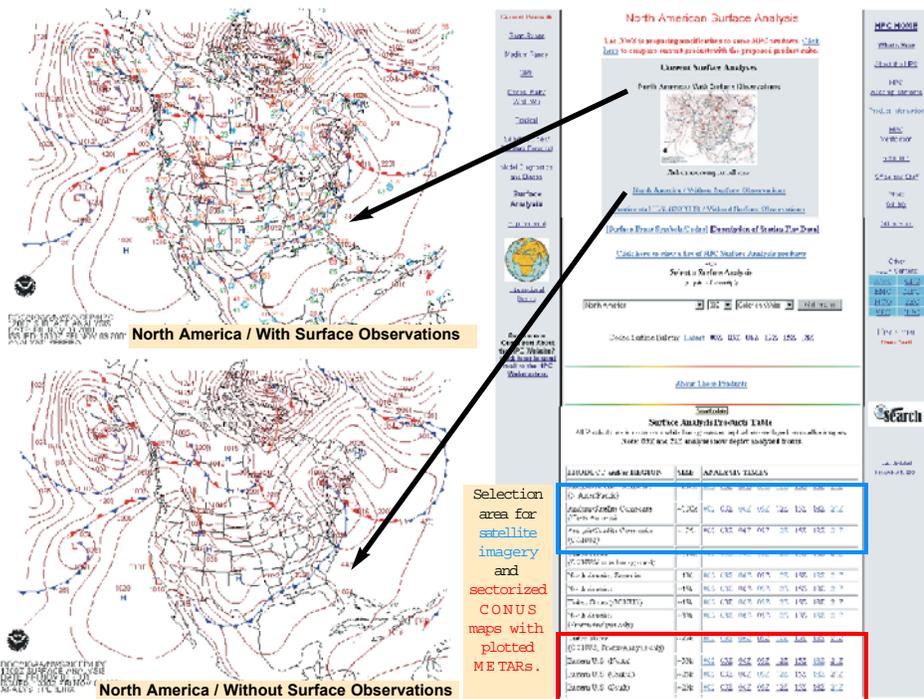


Figure 2. North American surface maps on the HPC surface analysis page are available with or without plotted METAR reports. The HPC surface analysis page at right has a section at the bottom for selecting maps at 3 hour intervals. In addition, you can select enhanced infrared satellite imagery to accompany the surface analysis.

examples of the maps that are available using the hotlinks above and below the map on the HPC surface analysis page.

This broad, North American view is similar to the first glance you give your aircraft as you walk toward it before a flight. It offers an initial assessment of potential weather problems or abnormalities. The advantage of a broad view is that it gives you a better understanding of how the weather systems in your area fit into the whole stream of weather features. Plus, you can see nearby weather systems that could pose problems on your flight..

Meteorologists often brief themselves by starting with a very broad scale view such as this North American surface analysis or even a hemispheric view. They progressively narrow their view down to their region of forecast responsibility. This “forecast funnel” approach works for pilots as well.

The broad scale inspection is now done. Next, focus on details that will affect your flight. Start by sliding down the HPC page to the list of surface maps at the bottom. See Figure 2. The top 3 options offer a composite of the latest color-enhanced satellite imagery laid underneath those surface pressure patterns and fronts you were just looking at. Figure 3 shows one of the choices and is

located in the list as:
 Analysis/Satellite Composite ~175k
 00Z 03Z 06Z 09Z 12Z 15Z 18Z 21Z
 (CONUS)

Click on the UTC time closest to the current time. When the image appears, be careful to check the legend of the image for the correct time and date. These images are valid at the UTC times shown, but normally are not posted until an hour and a half after that valid time. Images from 24 hours ago are available for each product in the table. So make sure, for example, that the 12Z image you select is today’s, and not yesterday’s .

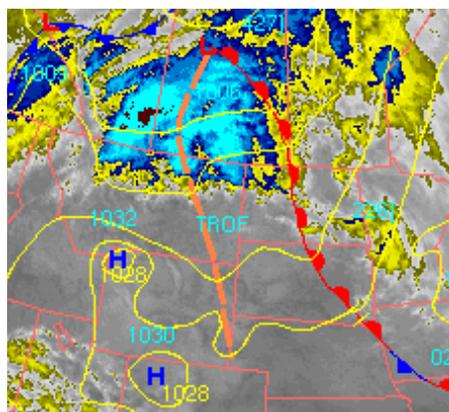


Figure 3. Color enhanced infrared satellite image with isobars and fronts overlaid. The contoured blue shades indicate the coldest or highest clouds.

Figure 3 is a zoomed-in portion of a larger satellite image that actually covers the CONUS. The image with the surface pressure pattern and fronts allow you to associate weather systems with the cloud patterns. This can be very useful for your in-flight awareness and discussion with Flight Watch.

Although not listed on this HPC page, three-hourly national radar composites are available with these same surface maps overlaid. The main directory is at: www.hpc.ncep.noaa.gov/sfc/

That site contains the following list of radar images and weather features.:

- radsfcus.gif 10-Nov-2001 13:49 27k
- radsfcus00.gif 10-Nov-2001 01:29 27k
- radsfcus03.gif 10-Nov-2001 04:19 27k
- radsfcus06.gif 10-Nov-2001 07:32 27k
- radsfcus09.gif 10-Nov-2001 09:54 27k
- radsfcus12.gif 10-Nov-2001 13:49 27k
- radsfcus15.gif 09-Nov-2001 16:30 28k
- radsfcus18.gif 09-Nov-2001 19:28 27k
- radsfcus21.gif 09-Nov-2001 22:08 27k

Notice that 24 hours worth of images are available. Check the date to make sure the data is not 24 hours old.

Figure 4 is a zoomed-in portion of one of these larger CONUS mosaic radar maps. With the radar imagery you can get an idea whether the clouds shown on the satellite image are indeed producing precipitation. Figures 3 and 4 together show that a satellite image may imply more weather than is actually being detected on weather radar. Sometimes what appears to be threatening cloud cover is merely a shield of high, thin, cold clouds that are not producing much in the way of precipitation. Such is the case shown here.

Continue the “forecast funnel” process and select local NWS radar imagery

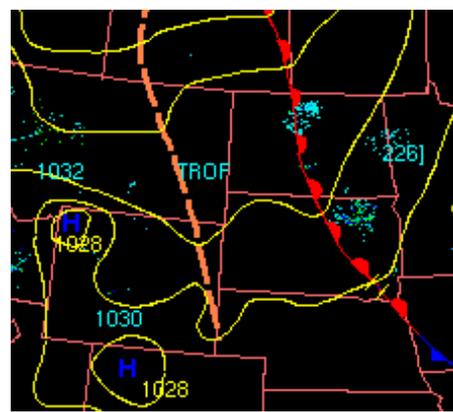


Figure 4. Composite radar image from individual NWS radars. Isobars and fronts overlaid are the same ones shown on the surface maps from HPC.



Figure 5. WSR-88D doppler radar locator map from the Aviation Weather Center.

that cover your intended flight. Figure 5. is the ADDS radar page found at:

<http://adds.aviationweather.noaa.gov/projects/adds/radar/>

Click on the station ID to get the latest image. Short term animated image loops are also available. Plus, you can navigate easily to adjoining radar sites.

The final step in preflighting the surface map is to focus on plotted METAR data. This detail is like setting the kollsman and checking circuit breakers before startup. It's hands-on and very necessary.

In this phase, you'll use the large North American map by sliding down the HPC page to the list of surface maps, specifically to "North America (Zoomed In)". That map is shown in Figure 6 and is available at the URL:

www.hpc.ncep.noaa.gov/sfc/lrgnamsfc09wbg.gif

The map contains most of the available METARs as well as the fronts, highs, and lows over-printed. Some states have a great number of METARs. Plotting all of these would clutter the map to the point that it would be unreadable. So a select number of reports is plotted to retain readability. You can pan around freely.

This map is too large to print, so HPC



Figure 6. North American map with plotted METAR data. Zooming in and panning around the map will give you an excellent overall view of the latest surface data from Mexico to Canada and Alaska.

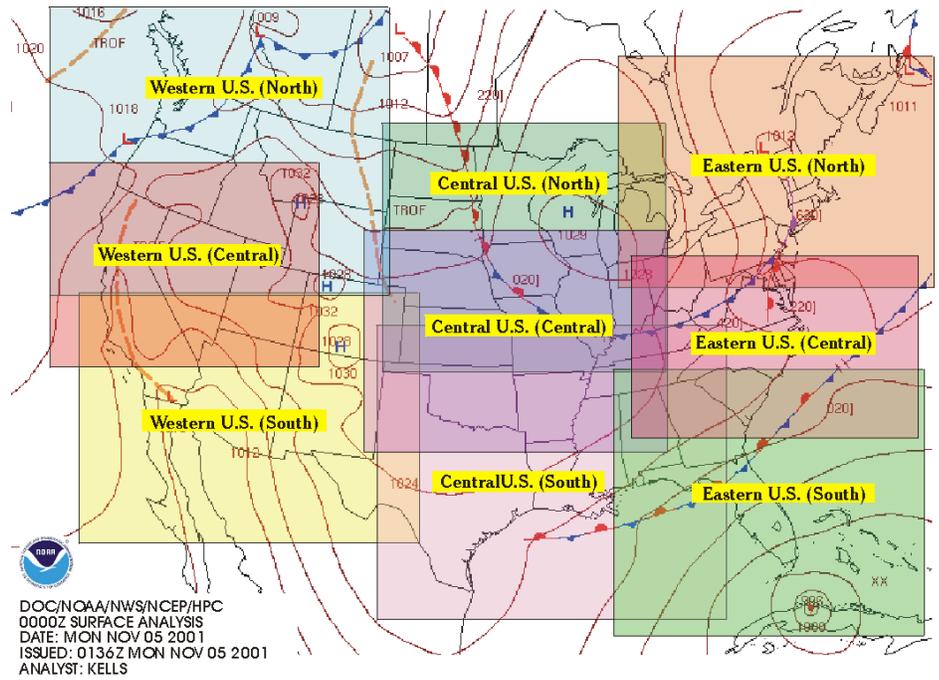


Figure 7. The North American surface chart is subdivided into 9 overlapping maps covering the U.S. Each region is available from the list at the bottom of the HPC surface analysis page. Plotted METARs accompany the fronts, highs, lows and isobars making it easy to associate wind shifts, and temperature and dewpoint differences with fronts.

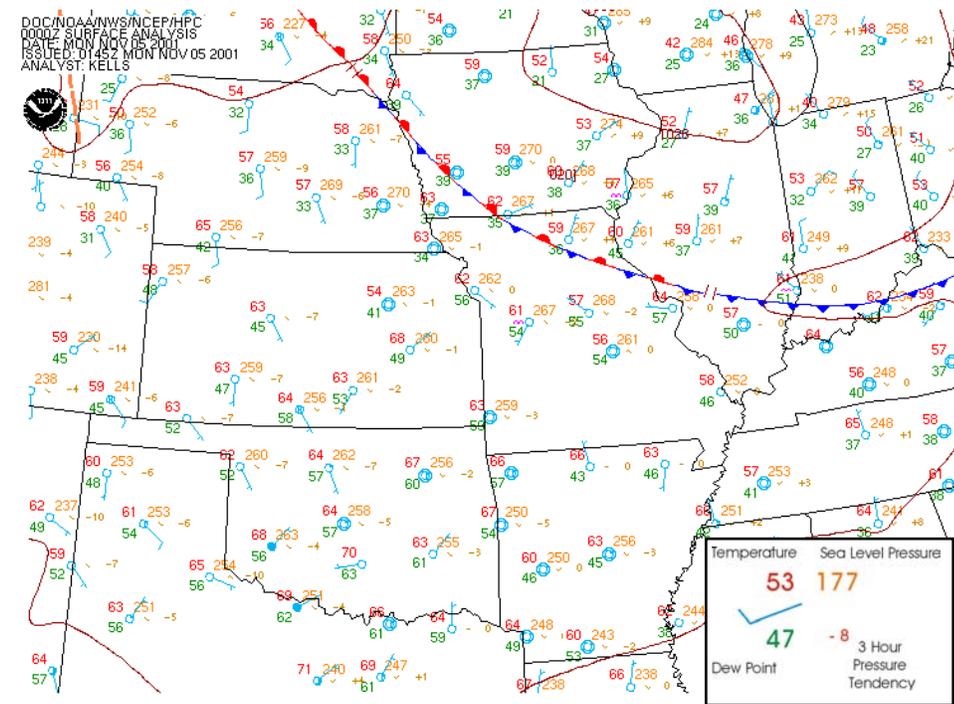


Figure 8. The central section of the large sea level pressure map of North America. Plotted METAR, fronts and isobars are clearly visible. Ceilings and visibilities are not shown on this map. (The data key shown is not part of the map when you select it.)

has subdivided it into 9 sections covering the CONUS. These smaller sectors are colored and labeled in Figure 7. The sector names correspond to those found in the list at the bottom of the HPC page. A full 24 hour collection of these maps is available by clicking the UTC times adja-

cent to the sector names. Comparing features on previous maps with those on the latest one enables you to determine movement of weather systems over that period of time. Figure 8 shows the central U.S. subsection. Watch the issuance times and dates as you did when selecting radar and

satellite images. You can print out these maps and jot down some notes during your AFSS briefing.

You now have your essential overview of surface weather systems. The final step is to get a picture of ceilings and visibilities. The HPC maps don't provide them, but the Aviation Digital Data Service (ADDS) feature on the Aviation Weather Center's page is an excellent interactive tool for that. The URL is:

<http://adds.aviationweather.noaa.gov>

See Figure 9. The interactive portion

is under the "Java Tools" tab in the upper right corner. Clicking there and then selecting "METARs Java Tool" brings you to the map shown in Figure 10. There's a lot of data to load here, and it does take time. A DSL or T1 connection will definitely ease the impatience. Also, this page seems to load faster with Internet Explorer rather than with Netscape.

Moving your cursor over each station, pops out the actual METAR report. This map does not have any fronts or isobars. Just the data you have chosen from

the options at the bottom of the page is displayed, but it gives a good visual assessment of ceiling and visibility categories (VFR, IFR, LIFR) through the use of colored station symbols.

The ADDS page offers its own version of a regionalized surface plot. Click the light blue "METARs" tab on the ADDS main page to display that map. No fronts are superimposed in these plots so it may be harder for you to associate weather with the systems producing it. Also, in states where AWOSs and ASOSs are plentiful, the stations are crammed together, making them hard to read.

You should now be aware of the major weather systems and the actual weather being produced. You are now ready to brief with Flight Service for more details.

In summary, gathering weather information is like doing a preflight check on your aircraft. You use the "forecast funnel" approach to locate fronts, highs, and lows and then to focus on the details of METARs, TAFs, and inflight advisories. Using the HPC and ADDS internet sites gives a detailed, uncluttered, interactive briefing routine with printable maps that won't drain your ink cartridge. Coming to Flight Service with a good mental picture and understanding of the surface weather features along with current weather will make your briefing with the specialist more efficient, focused, and productive.

Coming up...

The March, 2002 issue of "The Front", will examine convective sigmets, non-convective, and center weather advisories. Plus, you'll get three redesigned plotting maps that will fit into your book of approach plates for easier use in the cockpit.

"The Front" is a bimonthly initiative of the NWS Central Region Aviation Team. It is edited by Craig Sanders, NWS Duluth, MN and Sally Crean, NWS Indianapolis, IN. They invite your questions, comments, and suggestions for future articles that would help make your flight safer. Write to them at:

craig.sanders@noaa.gov
and
sally.crean@noaa.gov

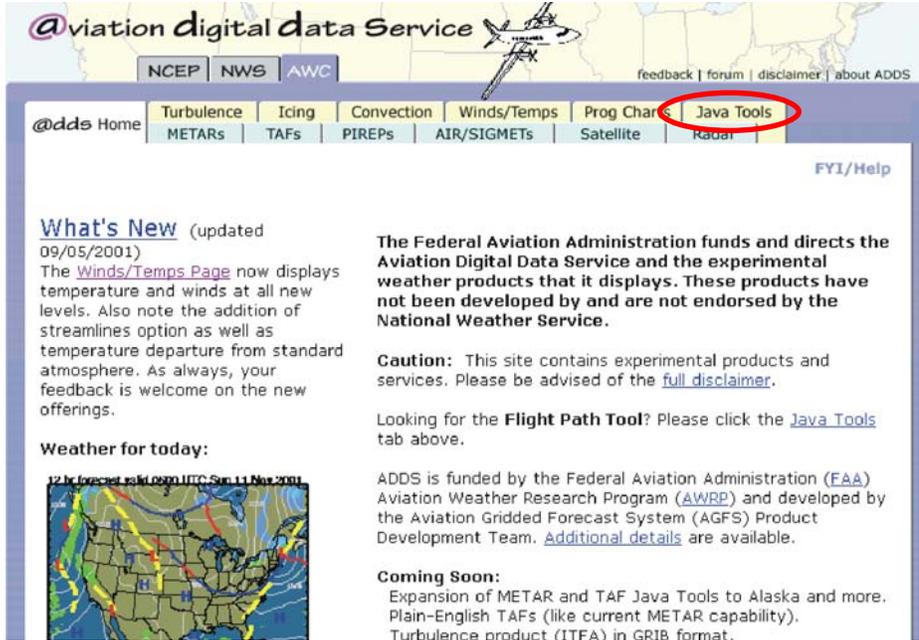


Figure 9. The Aviation Digital Data Service page at the Aviation Weather Center

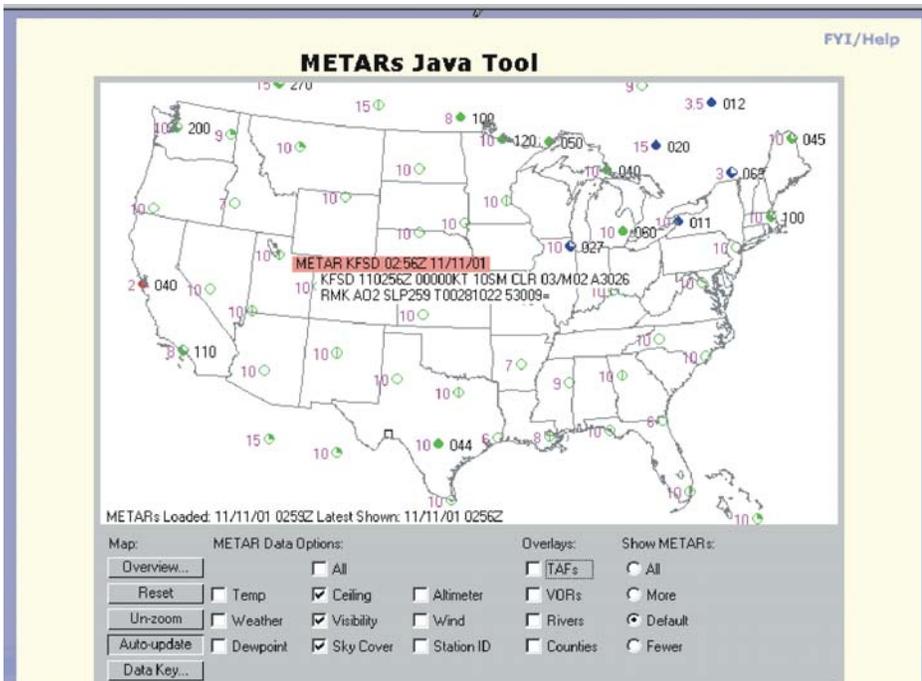


Figure 10. The Java Tool Page lets you to interactively select weather parameters to display. Holding the cursor over a station pops out the full METAR report as shown.