

Graphical Forecasts for Aviation



User's Guide September 2018

Developed
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The Federal Aviation Administration (FAA) and National Weather Service (NWS) have stated:

“There probably is no better investment in personal safety, for the pilot as well as the safety of others, than the effort spent to increase knowledge of basic weather principles and to learn to interpret and use the products of the weather service.”

Each forecast is based on its scope and purpose in accordance with specific criteria, and has limitations. An understanding of format, scope, purpose, limitations, and amendment criteria are required to adequately apply a forecast, particularly when using a self-briefing media.

Graphical Forecasts for Aviation

In 2018 the Graphical Forecasts for Aviation (GFA) replaced the legacy text Area Forecast (FA) in the contiguous United States. The GFA can provide more localized areal coverage and a temporal resolution of one hour—surface to FL480.

SCOPE: A mostly synoptic scale product, the GFA describes conditions produced by weather systems such as high and low pressure areas, air masses, and fronts. The GFA typically predicts conditions that may affect flight operations over relatively large areas.

PURPOSE: The GFA provides a forecast for the enroute phase of flight and for locations without a Terminal Aerodrome Forecast.

LIMITATIONS: The GFA is not intended to cover every phenomena. Events predicted in other products might not appear. The Graphical Forecasts for Aviation suite includes most weather advisories, requires users to view several pages to obtain pertinent data, and can suffer from clutter.



The National Weather Association's Aviation Meteorology Committee has developed Weather Theory for Pilots; an interactive program designed to help General Aviation pilots better understand and apply weather theory and technologies to their flying activities. Although, specifically intended for new or low-time pilots, blocks and modules provide those without formal recurrent programs with refresher training in fundamental weather principles and their application to flight operations. The program is available at:

nwas.org/weather-theory-pilots-line-course/

Send comments, suggestions, and questions to:

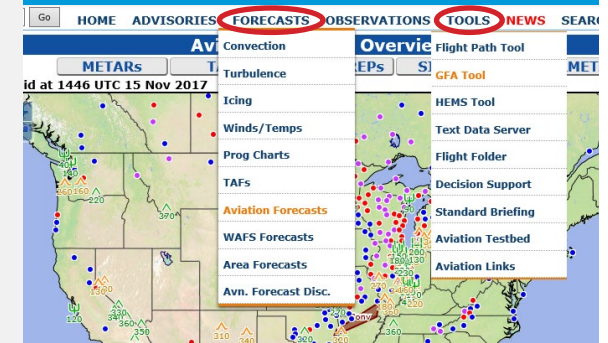
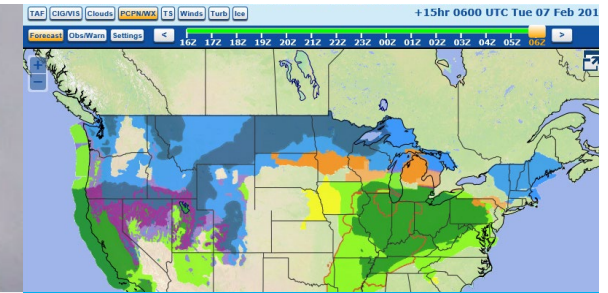
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Graphical Forecasts for Aviation

The Aviation Weather Center (AWC) has been developing a graphical replacement for the text Area Forecast (FA)—at least conceptually—for over a decade. In June 2014 the Federal Aviation Administration (FAA) and National Weather Service (NWS) announced a request for comments to transition to digital and graphical products. “The experimental Graphical Forecasts for Aviation is intended to provide the necessary aviation weather information to give users a complete picture of the weather that may impact flight in the continental United States.” The Graphical Forecasts for Aviation (GFA) is a digital product for commercial and general aviation pilots, operators, briefers, and dispatchers. In the spring of 2016 the experimental GFA became available on the AWC’s web site (www.aviationweather.gov). Since then the product has gone through several incarnations. The Graphical Forecasts for Aviation became operational in April 2017. Text Area Forecasts for the contiguous (CONUS) United States were discontinued in October 2017.

The Graphical Forecasts for Aviation suite provides the most complete set of graphical weather reports and forecasts. The AWC produces Aviation Surface and Aviation Clouds Forecast graphics as a low-bandwidth alternative to the GFA. These static images provide graphical forecasts for Flight Service (Leidos) and other users/vendors with limited Internet. Access these products from the AWC’s web site—see callout.

This Guide provides a condensed description of the GFA. Its purpose: Provide users with methods to obtain forecast data previously available from the text Area Forecast. Appendix 1: *Application* provides operational use and limitations of the product. Appendix 2: *Explanation/Definitions* contains additional clarification and descriptions of terms and symbols. (For further details refer to the AWC’s web site; “click” the information (INFO) tab on the “GFA Tool” page.



Products are available on the AWC’s “Home Page.” For Aviation Surface and Clouds use the top menu under “FORECASTS” select “AVIATION FORECASTS;” for the GFA Suite use the top menu under “TOOLS,” select “GFA Tool.”

Display

The GFA page, shown in Fig. GFA-1, contains a MENU BAR, PRODUCT VIEW AREA, and LEGEND. The MENU BAR incorporates Weather Product and Function Buttons, and Date/Time Display.

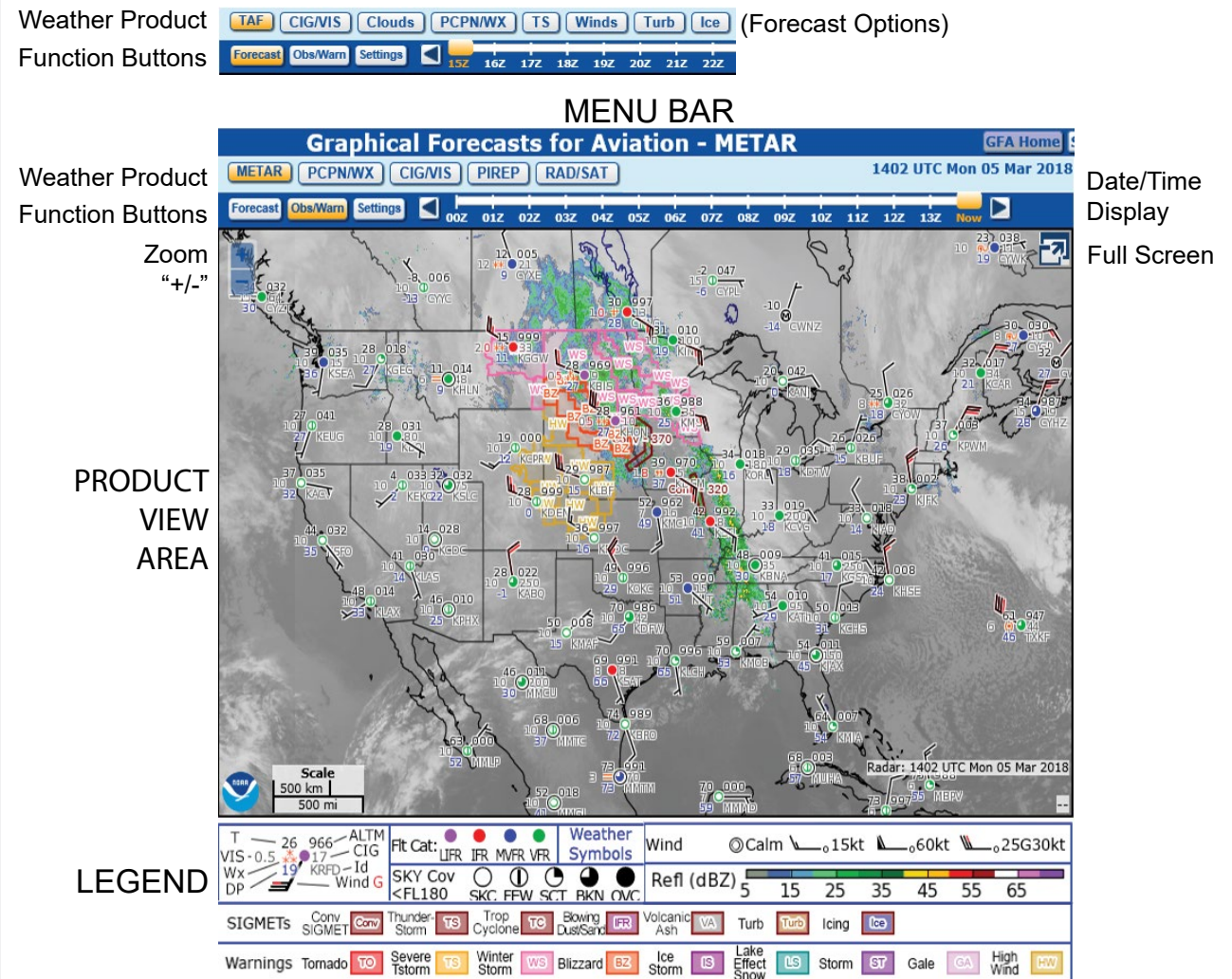


Fig. GFA-1. The GFA page consists of a Menu Bar—Weather Product and Function Buttons, Product View Area, and Legend.

Menu Bar

The MENU BAR (Fig. GFA-1) consists of a series of Weather Product and Function Buttons. Weather Product Buttons and Date/Time Display differ for the “Obs/Warn” Functions (Fig. GFA-1) and “Forecast” (top inset). The LEGEND changes to reflect the Weather Product displayed.

The Date/Time Display, right side of MENU BAR (Fig. GFA-1), provides the date and time of the product. The Slider Bar allows selection of a specific hour (UTC). “Click” the back/forward arrows or “drag” the box on the top of the Slider Bar. “Obs/Warn” products are available to 14 hours in the past; “Forecast” products are available up to 15 hours with a temporal resolution of one hour.

Warning

Like the G-AIRMET, the GFA provides a “snap shot” of expected conditions at specific times. Similar to the TAF BECMG change group, phenomena will change at either a regular or irregular rate at an unspecified time within the period. Avoid interpolating between time frames.

Product View Area

The PRODUCT VIEW AREA incorporates zoom, full screen mode, drag, and cursor and NAVAID position functions.

“Zoom” PRODUCT VIEW AREA using the “+/-” buttons in the upper left corner (Fig. GFA-1) or mouse scroll wheel. (On a tablet, “pinch” zoom.) Hold the shift key while pressing the left mouse button to select a zoom region—enclosed by a “red” box (call-out). The higher the zoom level, the more stations plot. Product density increases with “Zoom.” “Click” CONUS on “Settings” (Fig GFA-2 under MAP; Map Domain) to return coverage to the continental U.S.

Select full screen mode with the “full screen” button in the upper right part of the display (Fig. GFA-1). The menu bar remains at the top. (A “show legend” button appears

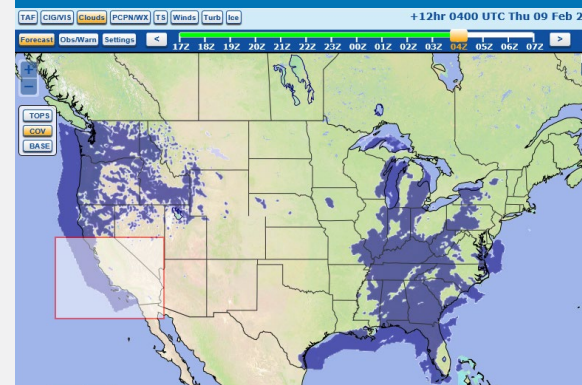
Significant material is *highlighted* as a “Caution” or “Warning” in the text.

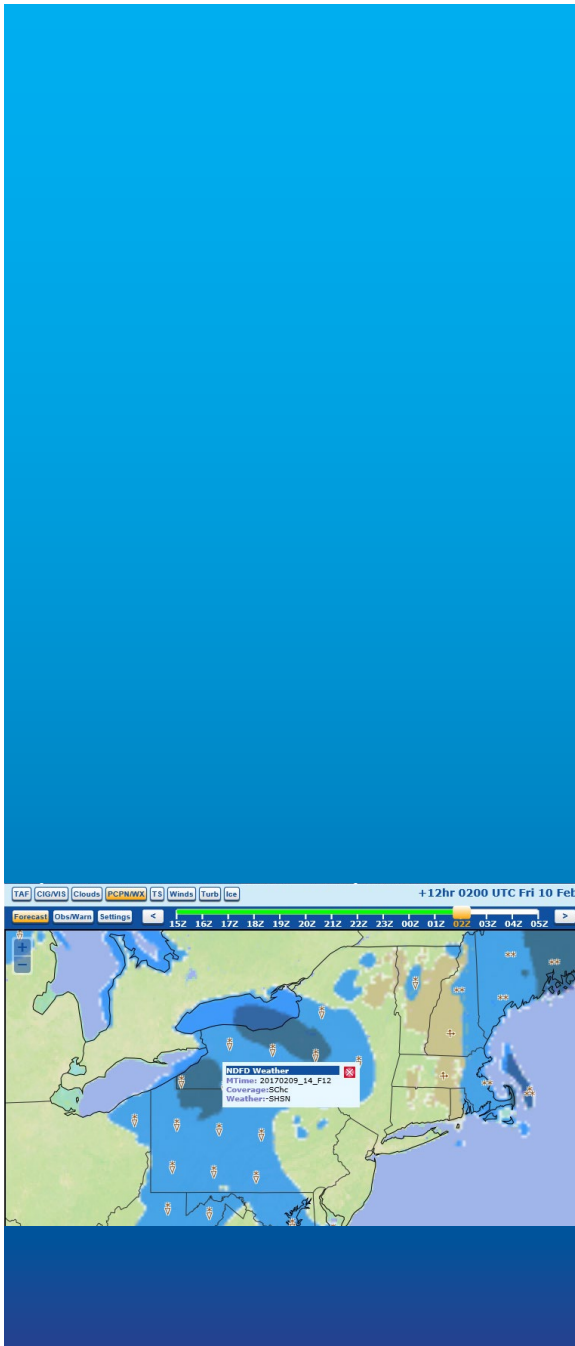
Caution

“Potential hazard” *should* know information.

Warning

“Significant hazard/regulatory” *must* know information.





to display appropriate legends.) Press “full screen” again to return to normal view. “Click” the left mouse button in the PRODUCT DISPLAY AREA and drag to “Pan” the map. (On a tablet, touch and drag the display area.)

Legend

The LEGEND, at the bottom of the page decodes displayed products. Appendix 2 provides additional details on WARNINGS contractions, symbols, and definitions.

Note

All heights are Mean Sea Level (MSL), except TAFs, METARs and the CIG/VIS Weather Product—CIG grid.

Settings

The “Settings” Function Button provides DISPLAY VIEW AREA product customization. “Settings,” shown in Fig. GFA-2, is divided into four areas: WARNINGS, FORECASTS, OBSERVATIONS, and MAP. Within each area “check” boxes enable/disable products, and control opacity, density, scale, and other functions. The “Hover” check box—top, center of “Settings,” activates/deactivates the “Hover” function. In the PRODUCT VIEW AREA “Click” or “Hover” an observation, forecast, grid point, weather symbol, or polygon to display “pop-up” text—see callout.

WARNINGS controls the display of NWS Warnings, Domestic and International SIGMETs, and AIRMETs. (Appendix 2: Explanation/Definitions, Table GFA A2-1 provides expanded WARNINGS type, contractions, symbols, and definitions.)

Warning

At present, Center Weather Advisories (CWA) are NOT displayed. SIGMETs/Convective SIGMETs only display during the valid time of the product. When SIGMETs continue beyond (CONTG BYD) their valid time (four hours) or Convective SIGMETs continue (beyond two hours) into their OUTLOOK period the SIGMET is NOT displayed.

WARNINGS

☒ SIGMET

☒ Warnings

FORECASTS

☒ G-AIRMET

☒ Weather Grid

☒ Weather Overlay

TAF OBSERVATIONS

METAR

PIREP

☒ Satellite

☒ Radar

Opacity

10%

10%

10%

75%

Density

Normal

Normal

Normal

Medium

Medium

Medium

Min Intensity

90 min

75%

75%

Options

☒ Show Heights

☐ Metric

☐ Metric

☒ TAF

☒ Decode

☐ Loop

MAP

Basemap

Simple

Map Domain

CONUS

Location format

Degrees

Map Overlay

Airports

☐ Public

☐ Private

☐ Military

☐ Heliport

☐ Seaplane

☐ Show IDs

☐ Runways

Other

☐ Highways

☐ Roads

Navigation

☐ Fixes-Hi

☐ Fixes-Lo

☐ NAVAIDS

☐ Show IDs

☐ Jetroutes

☐ Airways

☐ Airspace

☐ ARTCC/FIR

☐ Counties

☐ Rivers

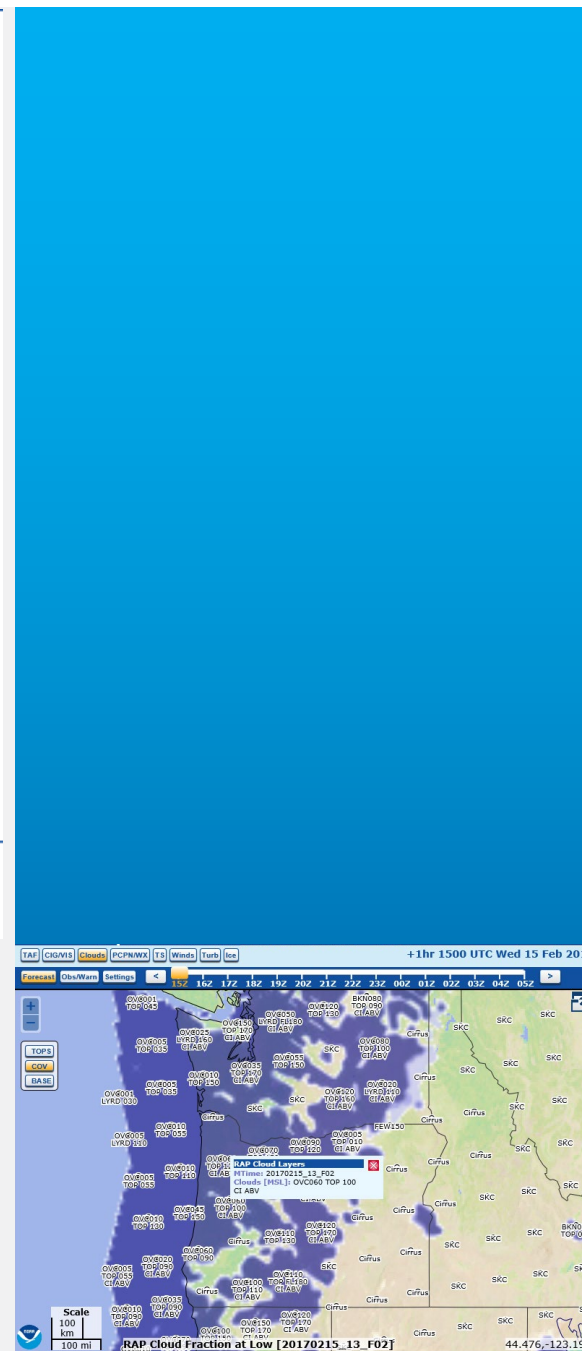
Reset Defaults

Fig. GFA-2. The “Settings” Function Button allows user customization of the Weather Products in the PRODUCT VIEW AREA.

FORECASTS controls the display of G-AIRMETs, Weather Grid and Weather Overlay products. The Weather Grid consists of “computer model” generated depictions of graphical coverage of ceilings/visibilities, and coverage and probability of precipitation, cloud—coverage, bases, tops, and turbulence, icing, and winds. The Weather Overlay depicts weather symbology, Winds barbs, and Clouds point forecasts (callout).

Caution

Weather Overlay symbology, Winds barbs, and Clouds point forecasts may NOT represent adjacent conditions. Weather between points may be substantially different, especially in mountainous areas.



For additional detail see Forecast page depictions in Appendix 1: *Using the GFA*.

TAF depiction is similar to the Obs/Warn METAR page in Fig. GFA-1.

OBSERVATIONS tailor METAR, PIREP, Satellite, and Radar displays.

Customize TAF and METAR display density and scale using Density setting—least to most; Scale data icons—Tiny to Huge. Display text in raw format, decode, or metric.

MAP modifies Basemap, Map Domain, and Map Overlay. A “Reset Defaults” button appears in the lower, right of “Settings.”

Forecast

“Forecast” Weather Products consist of:

- TAF—Terminal Aerodrome Forecasts
- CIG/VIS—Ceilings/Visibilities
- Clouds
- PCPN/WX—Precipitation/Weather
- TS—Thunderstorms
- Winds
- Turb—Turbulence
- Ice

TAF—Terminal Aerodrome Forecasts

Station plots display TAFs valid for the selected time using standard station models. (Appendix 2 provides further explanation of station models.)

CIG/VIS—Ceilings/Visibilities

Select FLT CAT (Flight Category), CIG, and VIS grids using the tabs in the upper left corner of the display. Flight Categories (LIFR, IFR, MVFR) are color coded.

Clouds

Select Cloud TOPS, COV (Coverage), and BASE grids using the tabs in the upper

left corner of the display. The LEGEND decodes coverage, bases (3000 ft increments through 18,000 ft), and tops (3000 ft increments through 18,000 ft/6000 ft increments through FL480). CI indicates cirrus type clouds above FL180.

Note

The Rapid Refresh Model (RAP) Low Cloud Tops overlay grid displays clouds below FL180. For convective tops see Convective SIGMETs (WST), convective Center Weather Advisories (CWA), Aviation Watch Notification Messages (AWW), Severe Thunderstorm/Tornado Watch Notification Messages (WW), and the Convective Outlook (AC).

PCPN/WX—(Precipitation/Weather)

The Weather Grid depicts precipitation and weather type, and probability. The Weather Overlay provides precipitation and weather symbols—coverage and probability. Appendix 2 provides additional details on weather type, coverage, and probability.

TS—Thunderstorms

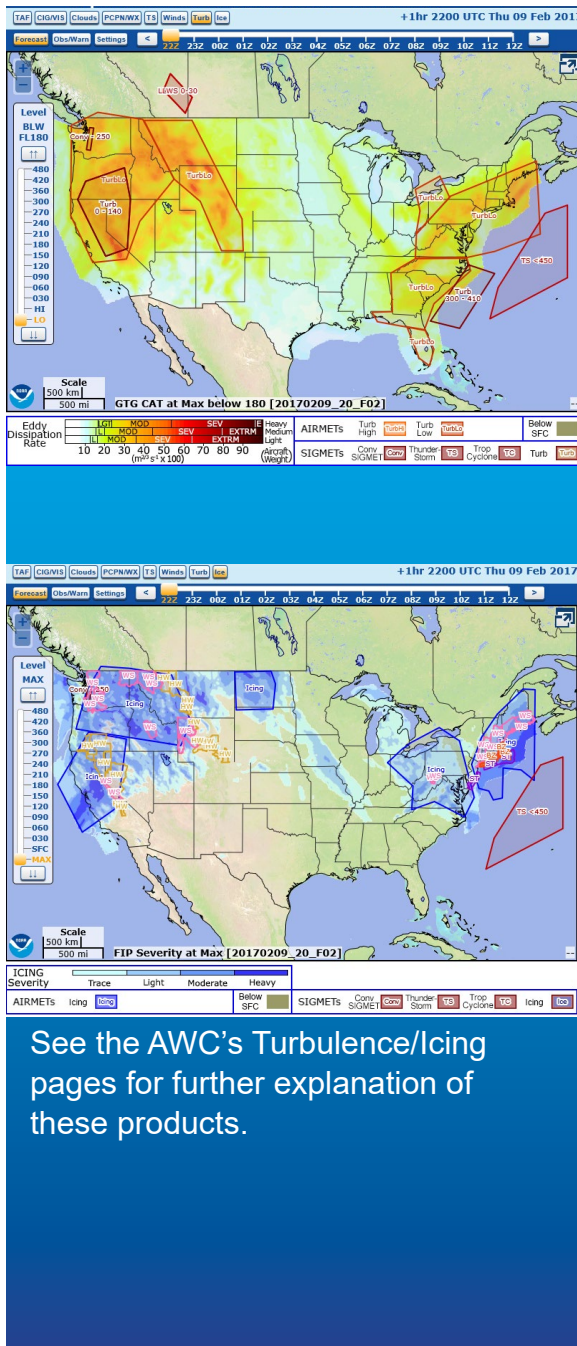
The Weather Grid depicts thunderstorm coverage. The Weather Overlay provides precipitation and weather symbols—coverage and probability.

Note

Winds, Turb (Turbulence), and Ice pages provide height data from the surface to FL480—3000 ft increments through FL300 and 6000 ft increments through FL480. Brown shading indicates levels below the surface.

Winds

The Level Selection Bar provides wind speed and direction for specific levels, “MAX” (maximum), and “SFC.” G-AIRMET Tango displays “surface winds” and “low-level wind shear” advisories.



Warning

The Graphical Turbulence Guidance product has limitations and must be used along with turbulence forecasts provided in AIRMETs, SIGMETs, and Center Weather Advisories. The Forecast Icing Product is NOT a substitute for icing information contained in AIRMETs, SIGMETs, and Center Weather Advisories.

Turb—Turbulence

Weather Grid turbulence intensities are based on Eddy Dissipation Rate (EDR) from the Graphical Turbulence Guidance (GTG) product. Select desired altitude from the Level Selection Bar, or “LO” (below FL180) or “HI” (at and above FL180)—callout.

Ice

Weather Grid icing intensities are based on the Forecast Icing Product (FIP). The Level Selection Bar displays “MAX” (maximum icing severity). “SFC” displays Weather Grid winter precipitation and Weather Overlay symbols—callout.

Note

On the FIP none, trace, light, moderate, and heavy refer to the severity of the *meteorological icing environment*—An atmospheric set of conditions where the rate of ice accumulation is objectively defined, as opposed to subjective observations (pilot) of the rate of ice accumulation and its effects on aircraft performance.

Obs/Warn

“Obs/Warn” (Observations and Warnings) consist of:

- METAR

- PCPN/WX—Precipitation and Weather
- CIG/VIS—Ceilings and Visibilities
- PIREP
- RAD/SAT—Radar and Satellite

METAR

METAR displays standard station model plots valid for the selected time. “Settings” customizes the display. “Click/Hover” a station to display METAR and TAF text. An example of the METAR page is shown in Fig. GFA-1.

PCPN/WX—Precipitation and Weather

PCPN/WX displays Weather Symbols. Other features are customizable in “Settings. “Click/Hover” a station to display associated METAR and TAF text.

CIG/VIS—Ceilings and Visibilities

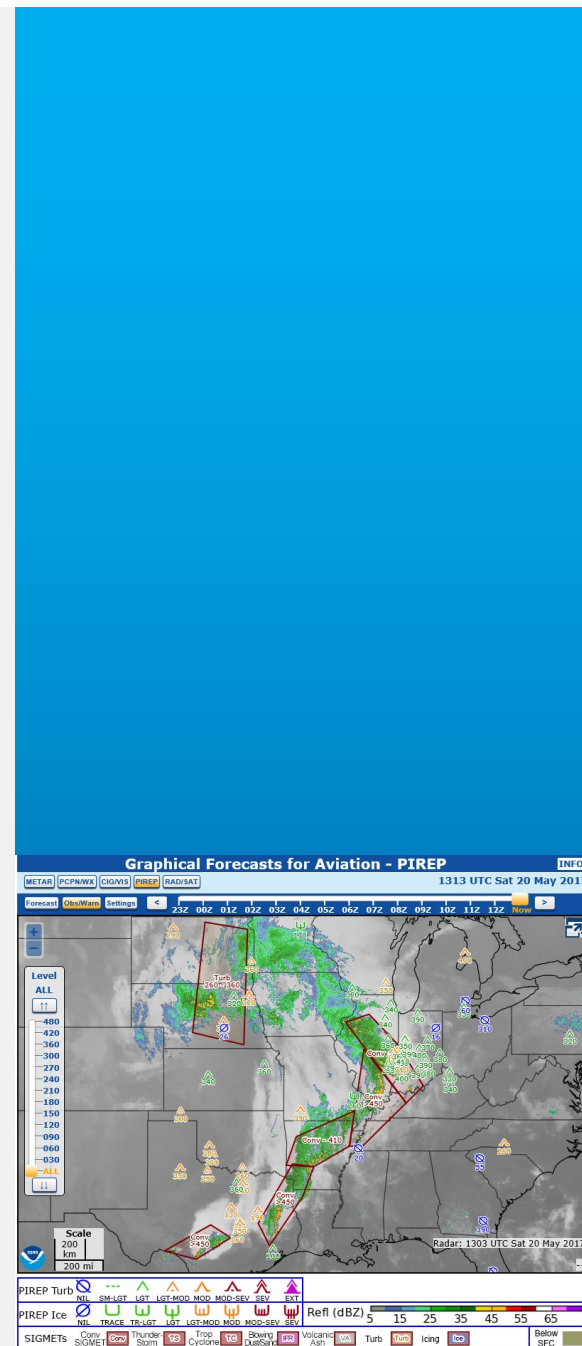
Using the menu at the top, left of the PRODUCT VIEW AREA, CIG/VIS displays color coded flight category, and ceiling or visibility numerical values. (NWS Dense Fog and Freezing Fog WARNINGS may be added in the future.)

PIREP

The Vertical Levels bar allows selection of PIREPs at and below specified altitude—callout. Customize PIREP Age, Min (Minimum) Intensity, and Scale in “Settings. The LEGEND decodes turbulence and icing intensities symbols.

RAD/SAT—Radar and Satellite

RAD displays a 40 minute loop of five images; intensity levels are shown in the LEGEND. Select SAT imagery type—5km visible, 10km infrared, or water vapor in “Settings.” (The callout illustrates the depiction of RAD/SAT imagery.)



Aviation Surface Forecast and Clouds Forecast Graphics

Available from the AWC, FSS, DUATS, and commercial providers, 3 hour static images contain forecasts out to 18 hours. Graphics cover the lower 48 states (CONUS) with 9 selectable regions. (See callout for western regional coverage.)

Fig. GFA 3 illustrates the CONUS Aviation Surface Forecast graphic. It contains a

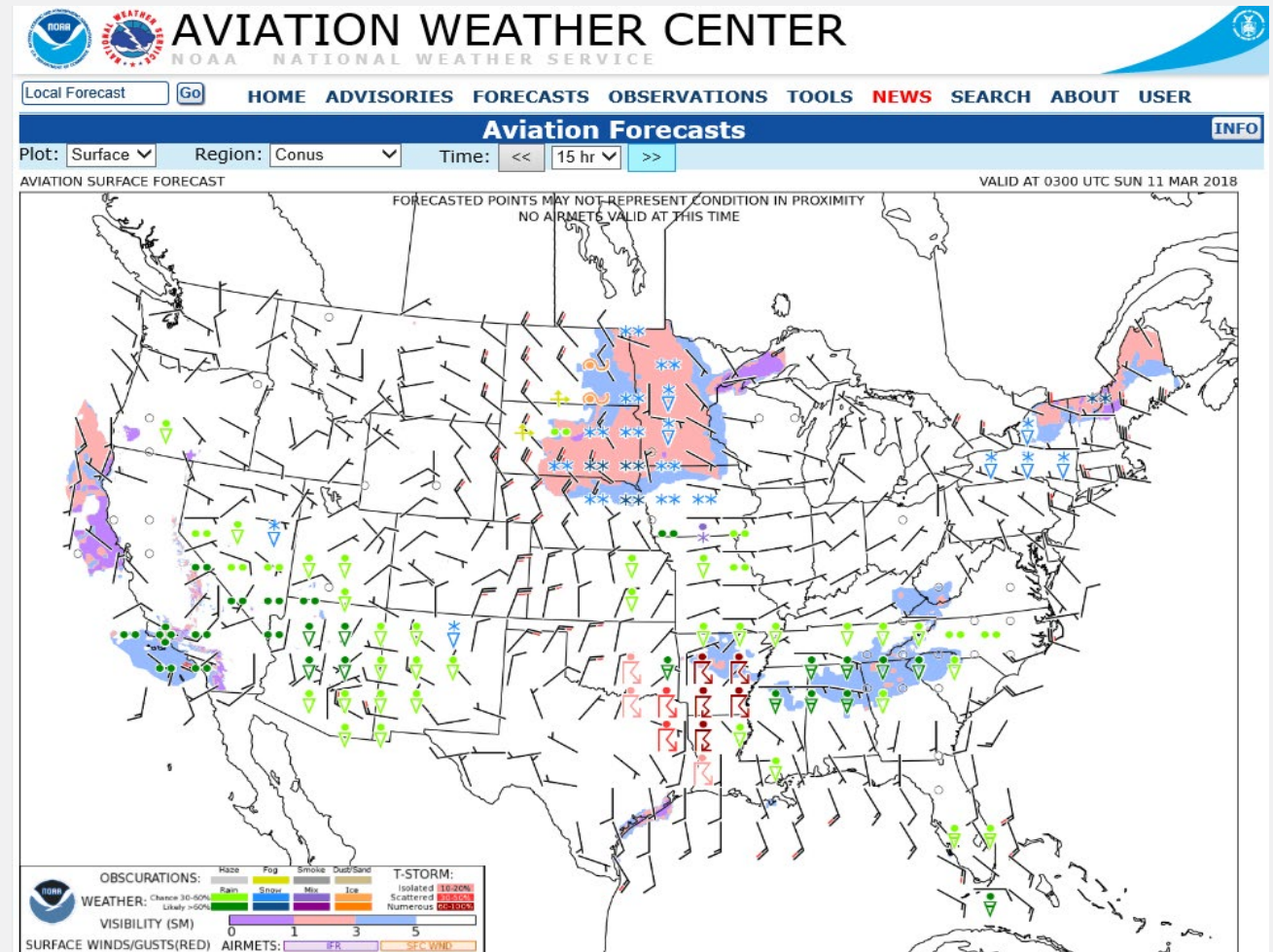
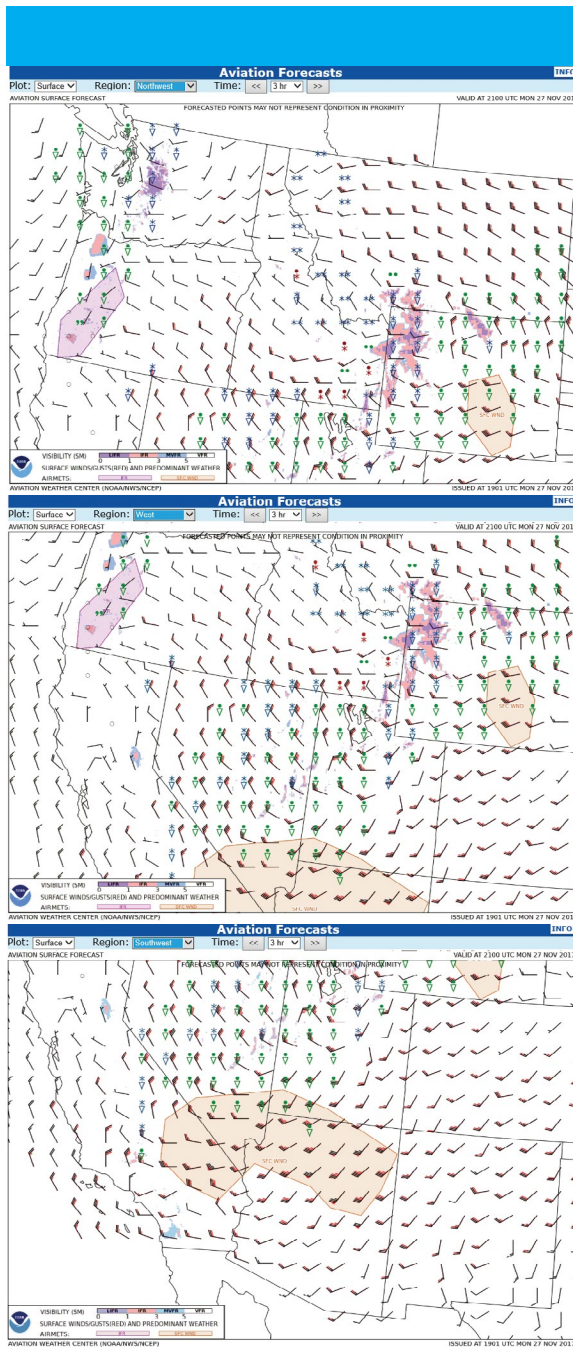


Fig. GFA 3. Three hour static images include overlaid AIRMETS SIERRA (IFR), and TANGO (Strong Surface Winds).

categorical grid of surface visibility (LIFR, IFR, MVFR, and VFR); surface wind and gusts, and predominant precipitation and weather type symbology. (Refer to Appendix 2 for *Flight Category* definitions; and, Fig. GFA A2-1 *Station Model Symbols* and Table GFA A2-3 *Weather Symbols*.) Graphical AIRMETS SIERRA (IFR), and TANGO (Strong Surface Winds) are overlaid on the product. (See callout for central region selectable coverage.)

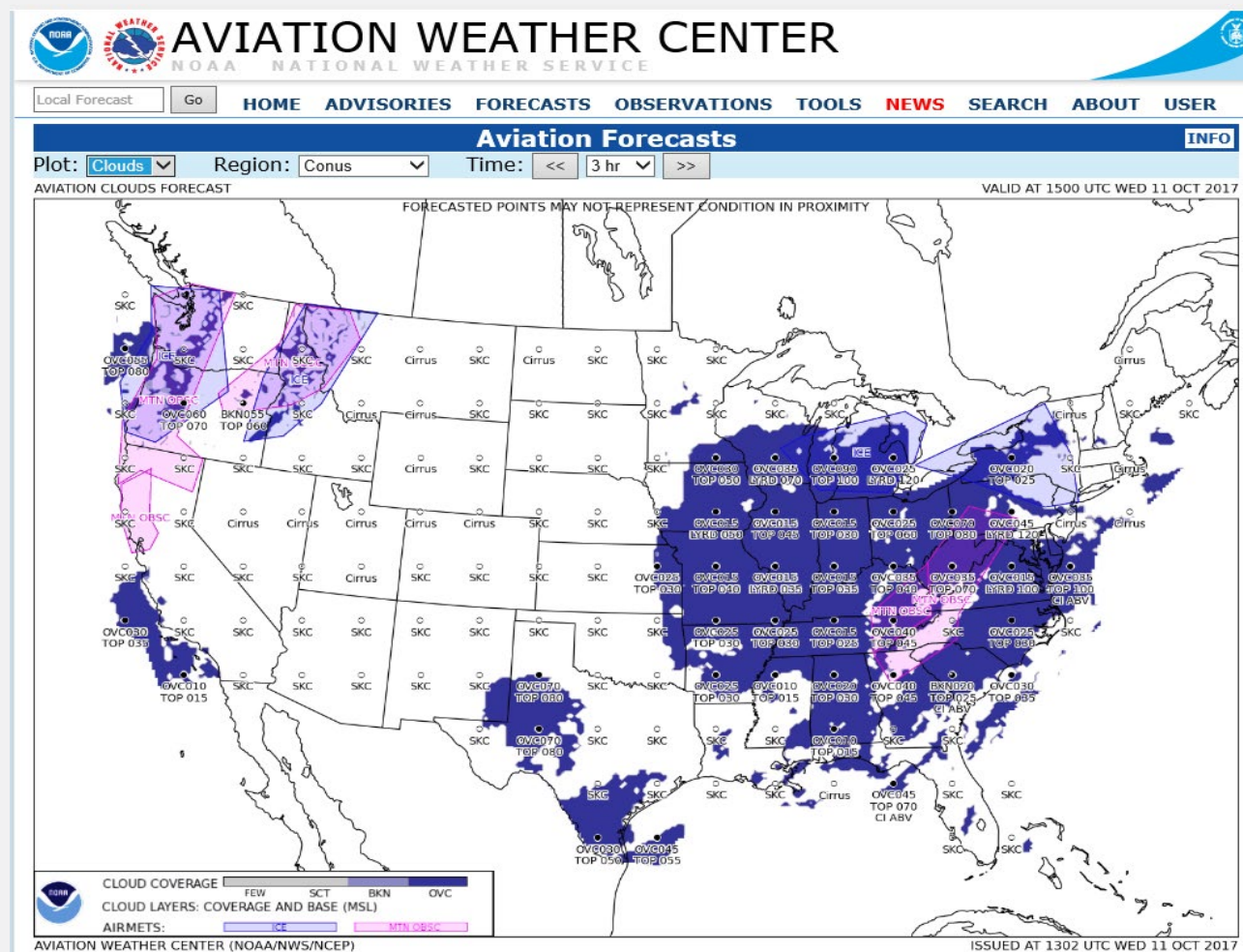
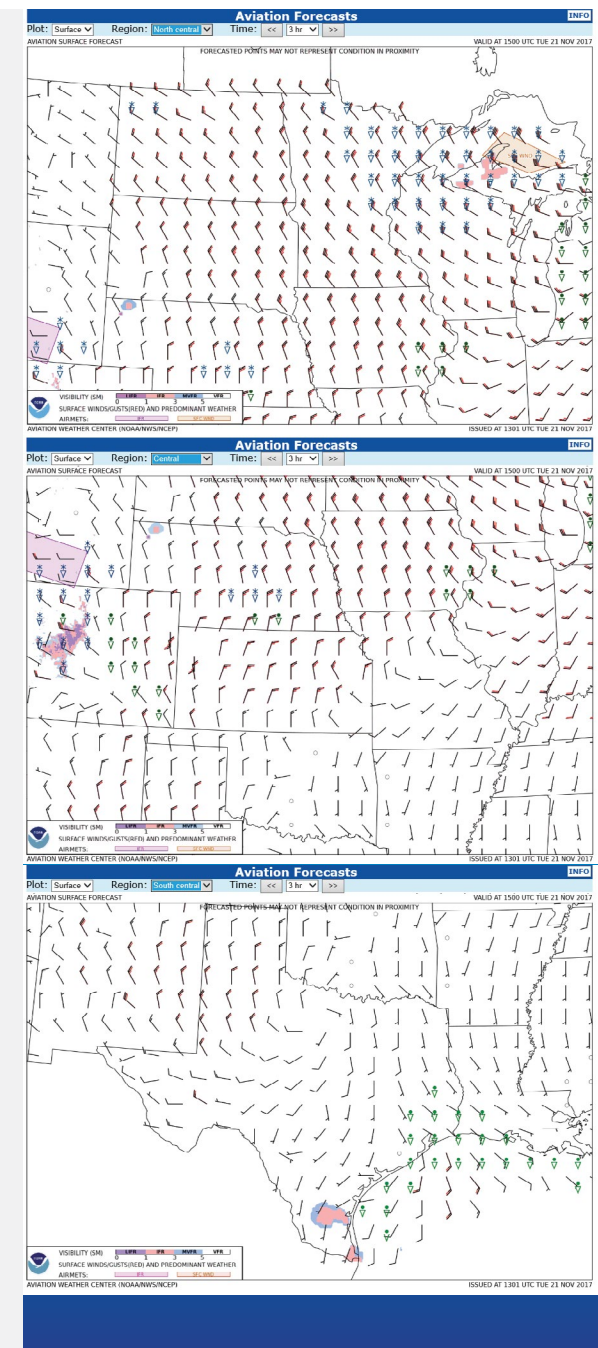


Fig. GFA 4. Three hour static images include overlaid AIRMETS ZULU (Icing), and SIERRA (Mountain Obsecuration).

Graphical Forecasts for Aviation



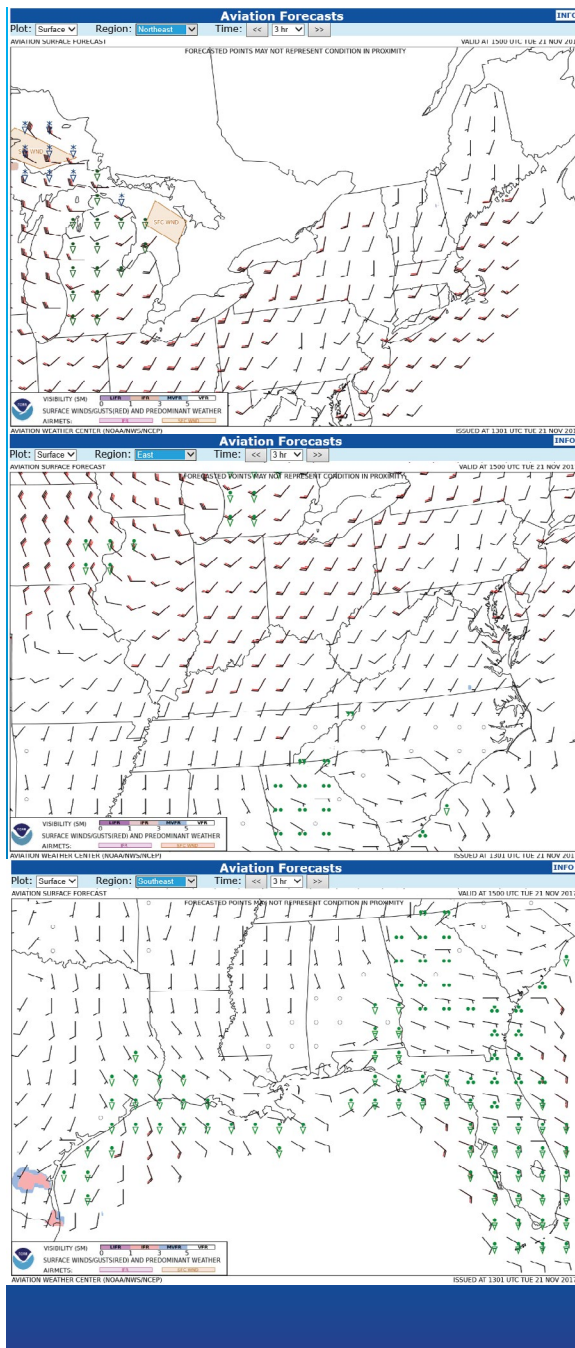


Fig. GFA 4 illustrates the CONUS Aviation Clouds Forecast graphic. The graphic contains Cloud Coverage (few/scattered, broken, overcast) grid, with Mean Sea Level (MSL) overlay of BKN or OVC cloud bases and tops below FL180. LYRD represents top of the highest multiple layers of BKN or OVC clouds; CI ABV indicates cirrus clouds above. Graphical AIRMETS SIERRA (Mountain Obscuration), and ZULU (Icing) are overlaid on the product. (See callout for eastern region selectable coverage.)

Advantages and Limitations

Advantages

- Displays for non-meteorologist users.
- A single source for multiple products.
- Temporal resolution 1 hour.
- Aerial resolution (overlay) 1.2 nm (2.2 km).
- Forecasts to 15 hours.
- Available continuously.
- Updated continuously.
- Display scalable and customizable.

Limitations

- Surface/Clouds forecasts temporal resolution 3 hours.
- Weather Grids are point forecasts.
- No amendments. (Weather Advisories automatically amend the forecast.)
- Primarily low altitude products (below FL180).
- Automated; may not be as accurate as forecast with human involvement.
- Displays may suffer from clutter.
- Users may disable certain overlays, eliminating areas of hazardous weather.

Appendix 1: Using the Graphical Forecasts for Aviation

For our purposes, the discussion only address weather—airspace classification is not considered. Pilots must take into account personal minimums, the limitations of their aircraft and its equipment, and their individual fitness for the planned flight (Risk Evaluation and Management).

Caution

Although GFA temporal coverage is one hour, pilots should review conditions at least two hours before and after proposed flight time—to determine trend. When using the GFA, the display of too much data (clutter) on a single page may obscure important information.

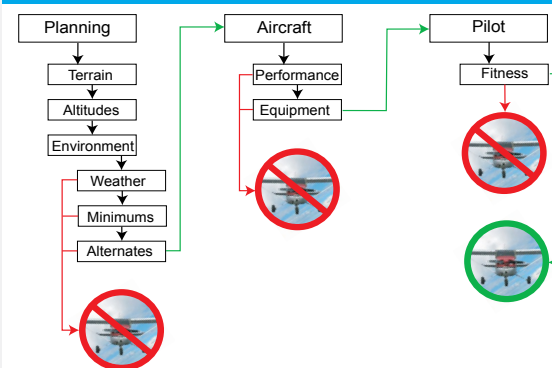
Refer to Fig. GFA A-1 and the callout—next page. With the exception of the coastal hills, terrain through California's Central Valley rises from sea level to about 500 ft. Peaks through the Sierra Nevada mountains climb to about 11,500 ft, with passes in the 8000 to 9000 foot range. The Great Basin of Nevada and Utah consist of valley floors from 4000 to 6000 ft and maintain peaks between 9000 and 11,000 ft.



Segment	CSTL/VLY	SIERNEV	NV	UT
Terrain (100 ft)	SL-005	Peaks 115; Passes 080-090	VLYs 040-060; Peaks 090-110	VLYs 040-050; Peaks 090-110

Fig. GFA A1-1. Consider a flight from Oakland, California to Salt Lake City, Utah.

Whether you use the "Risk" decision tree (below) or the FAA's "PAVE" checklist, perform a systematic evaluation for each flight—no matter how simple or complex.



The PAVE Checklist

Pilot	Experience, recency, currency, physical, and emotional condition
Aircraft	Fuel reserves, experience in type, aircraft performance, aircraft equipment.
enVironment	Airport conditions, weather, runways, lighting, terrain.
External Pressures	Allowance for delays and diversions; alternative plans, personal equipment.

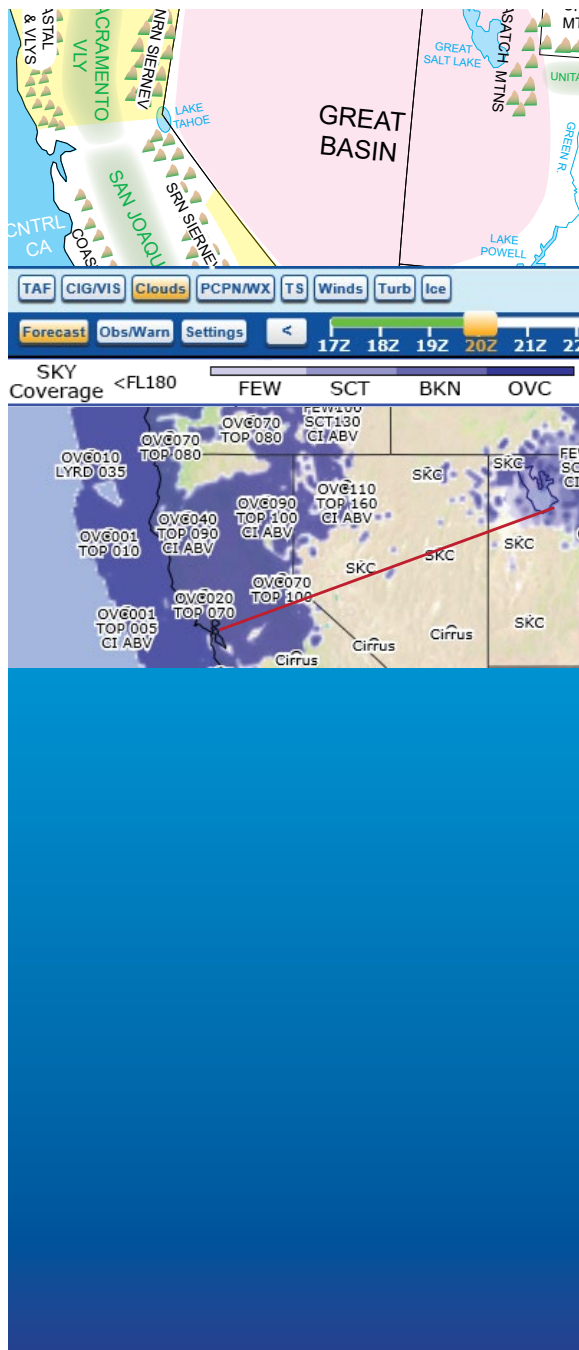


Fig. GFA A1-2. Heights on the Clouds page are Mean Sea Level (MSL).

Tops, for VFR as well as IFR operations, are important for aircraft/equipment—airplane ceiling, availability of oxygen, icing potential. Freezing and icing levels and intensities (AIRMET Zulu) are available on the Ice page. Based on the Weather Overlay Fig. GFA A1-3, through the Central Valley tops are forecast to 9000 ft; across the Sierra Nevada mountains 12,000 ft; and, into Utah 15,000 ft to FL180. Most of the higher tops in Utah lie to the east of our destination.

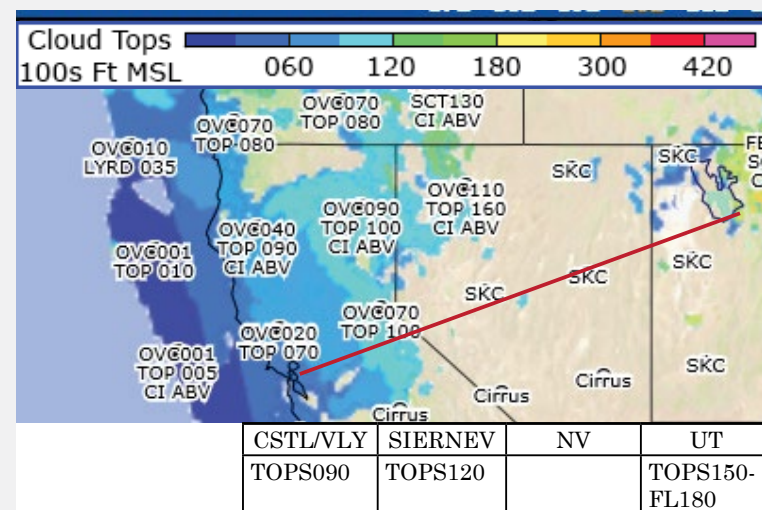


Fig. GFA A1-3. When determining cloud tops, always round up to the next highest value.

The following discussion is based on the Weather Overlays and Weather Grids (“Settings”). From Fig. GFA A1-2 and the callout, cloud cover and bases from the coast through the Central Valley: BKN-OVC030-060. The Sierra Nevada range is the most challenging/highest risk part of the flight. Mountain peaks and higher ridges are obscured in clouds and precipitation—MTN OBSCN AIRMET in effect which can be displayed in “Settings.” Through northern Nevada and Utah higher mountain peaks may be obscured; but, not enough areal coverage to warrant an AIRMET.

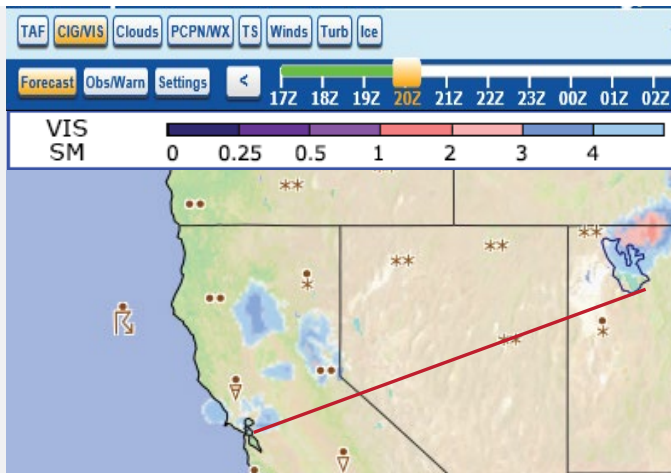


Fig. GFA A1-4. Like the text FA, only visibilities less than 6 SM are forecast.

Fig. GFA A1-5 describes precipitation and weather types. From the coast through the Central Valley rain showers (SHRA) are “Likely” (>50% probability). Over the SIERNEV rain and snow (RASN) probability remains “Likely.” East of the SIERNEV RASN probability decreases to “Chance” (for our purposes translated as scattered—≤ 50% probability). In NRN UT the GFA predicts a “Chance” of freezing precipitation—freezing drizzle or freezing rain (FZDZ/FZRA).

On the precipitation and weather types page thunderstorms are not expected to affect the route. (Scattered thunderstorms are forecast for the

From Fig. GFA A1-4 surface visibilities along most of the route are greater than 5 miles. The “FLT CAT” graphic (callout) shows a small area of IFR in the San Francisco Bay. This is NOT reflected in either the “CIG” or “VIS” graphics; nor in AIRMET SIERRA.

Note

GFA grid visibility and ceiling resolution exceeds AIRMET SIERRA requirements. Localized conditions may not be reflected in the product.

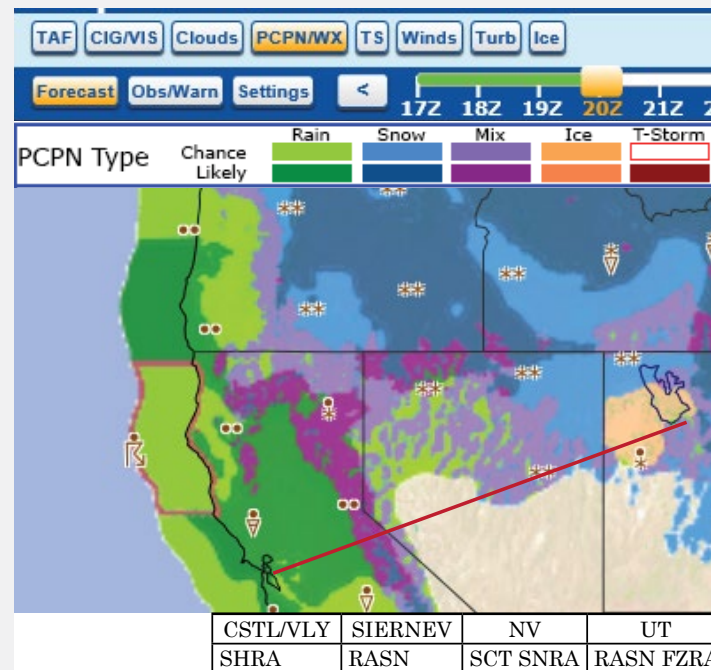
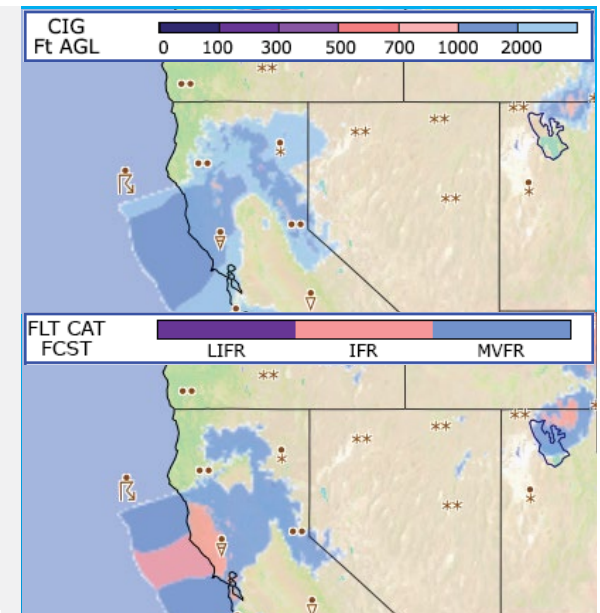


Fig. GFA A1-5. The Weather Grid depicts precipitation coverage and probability.

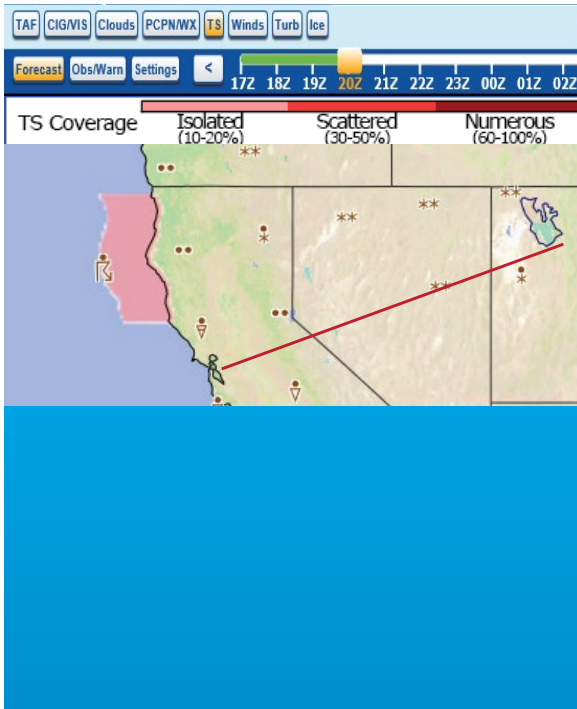


Forecast, CIG/VIS Weather Grid
Ceiling resolution:

100 ft – 0-100
200 ft – 100-700
1000 ft – 1000-3000

Visibility resolution (statute miles):

1/4 ml – 0-1/4
1/2 ml – 1/2-1
1 ml – 1-5



northern California coastal waters.) The TS—Thunderstorm page (callout) confirms the forecast and further defines coverage as “Isolated.”

Based on Fig. GFA A1-6: From the coast through the Central Valley winds are generally southerly, less than 20 knots. Winds across the crest of the SIERNV increase to 25 gusting to 35 knots. Through the Great Basin of Nevada winds back to southwest-erly 10 gusting to 15 knots, becoming light and variable in Utah.

Refer to Fig. GFA A1-7 and the callout. Terrain in western Tennessee rises from 300 ft to about 1000 ft in the eastern part of the state. In extreme eastern Tennessee into

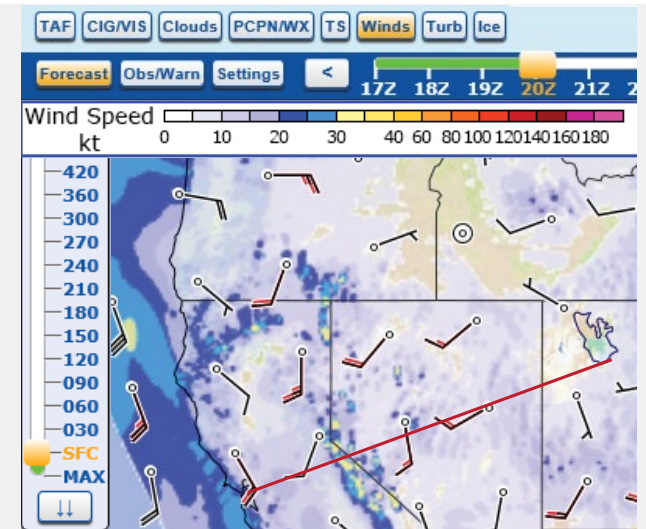


Fig. GFA A1-6. GFA Winds provides more detail than available with the Legacy text FA.

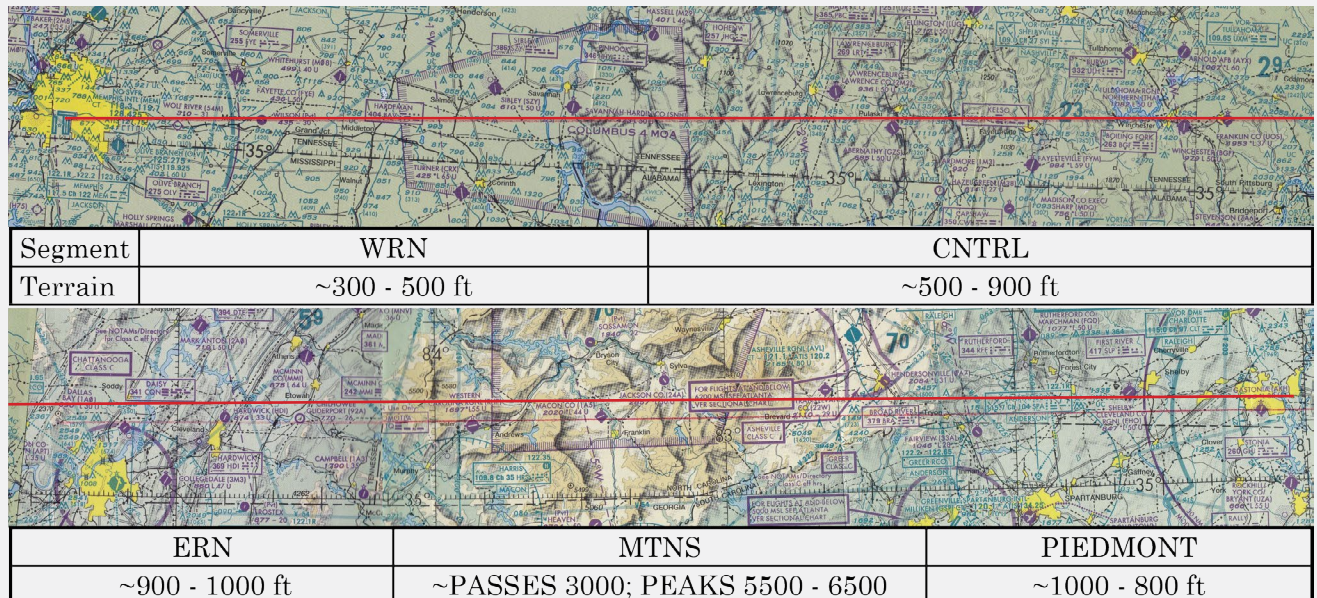
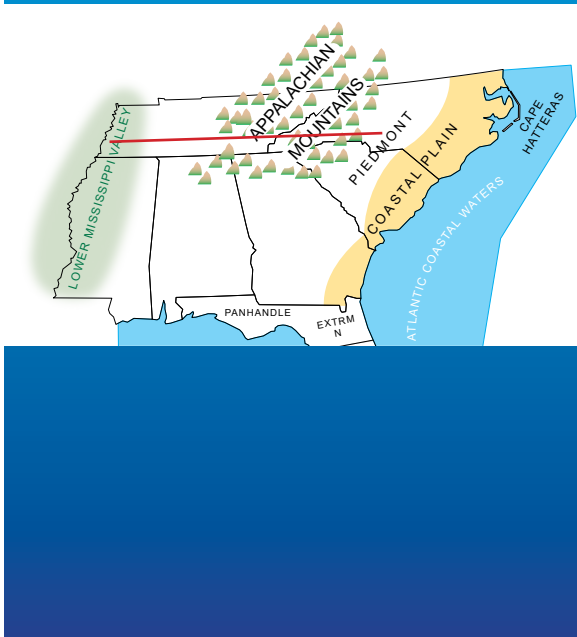


Fig. GFA A1-7. Consider a flight from Memphis, TN to Charlotte, NC.

western North Carolina mountain passes are about 3000 ft, with peaks in the 5500 to 6500 foot range. Into the Piedmont portion of the route terrain lowers from 1000 to 800 ft.

The following discussion is based on the Weather Overlays and Weather Grids (“Settings”). From Fig. GFA A1-8, cloud cover and bases through Tennessee: BKN-OVC120-150 becoming SKC in the central and eastern portions. Over the mountains of North Carolina: FEW030-060; obscuring the peaks and possibly closing some of the passes. Into the Piedmont: BKN030-060; with most of the coverage to the south and east of our destination.

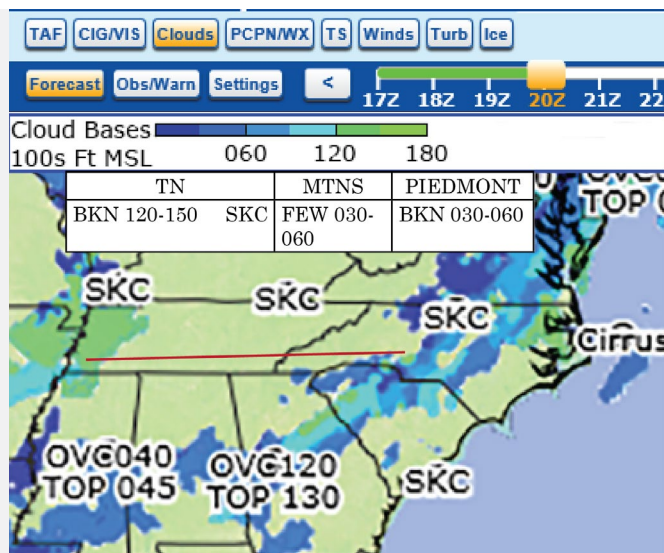


Fig. GFA A1-8. Heights on the Clouds page are Mean Sea Level (MSL).

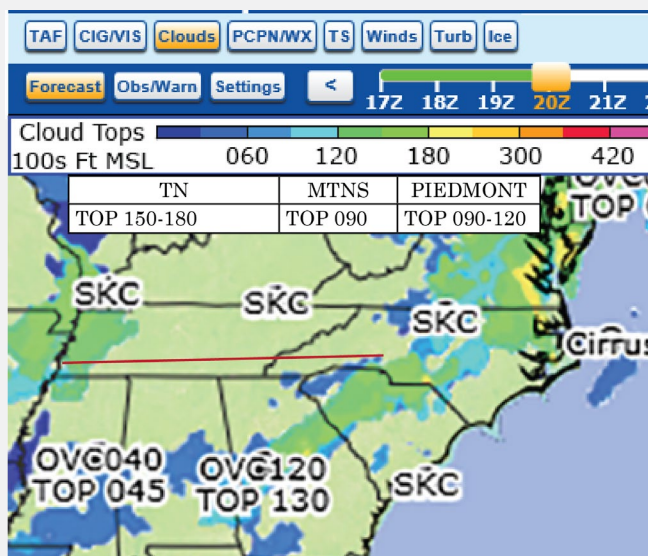


Fig. GFA A1-9. When determining cloud tops, always round up.

Recall the “Caution” in the previous section: Weather Overlay symbology, Winds barbs, and Clouds point forecasts may NOT represent adjacent conditions. Weather between points may be substantially different, especially in mountainous areas.

Based on the Weather Overlay Fig. GFA A1-9, tops in western Tennessee are forecast between 15,000 and 18,000 ft; across the mountains 9000 ft; and, into the Piedmont 9000 to 12,000 ft.

From Fig. GFA A1-10 surface visibilities along most of the route are forecast

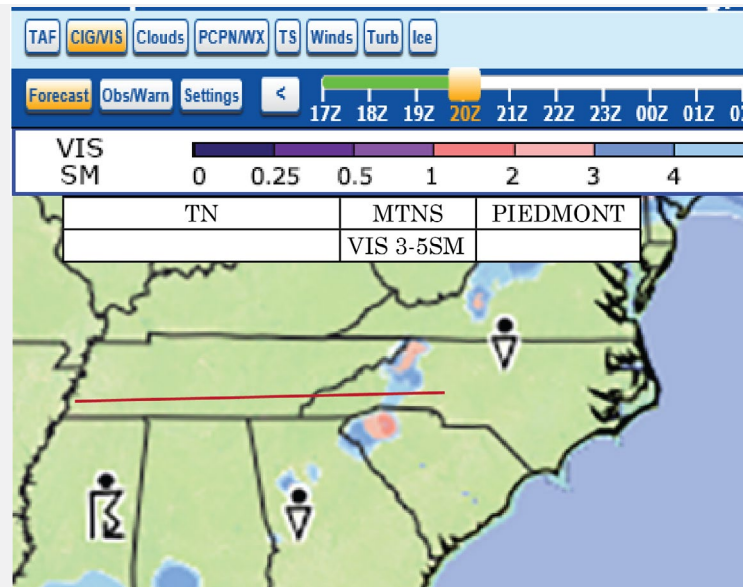


Fig. GFA A1-10. Like the Legacy text FA, only visibilities less than 6 SM are forecast.

greater than 5 miles. Visibilities through the mountains and passes 3-5SM—an additional hazard to VFR flight through the mountains.

Fig. GFA A1-11 describes precipitation and weather types. No significant precipitation or weather is expected for the Tennessee portion of the route. Over the mountains and into the Piedmont a “Chance” (for our purposes translated as scattered—≤ 50% probability) of rain showers (SCT SHRA); possibly “Likely” (>50% probability) in the vicinity of any thunderstorm activity that develops. Into the Piedmont SHRA are “Likely.”

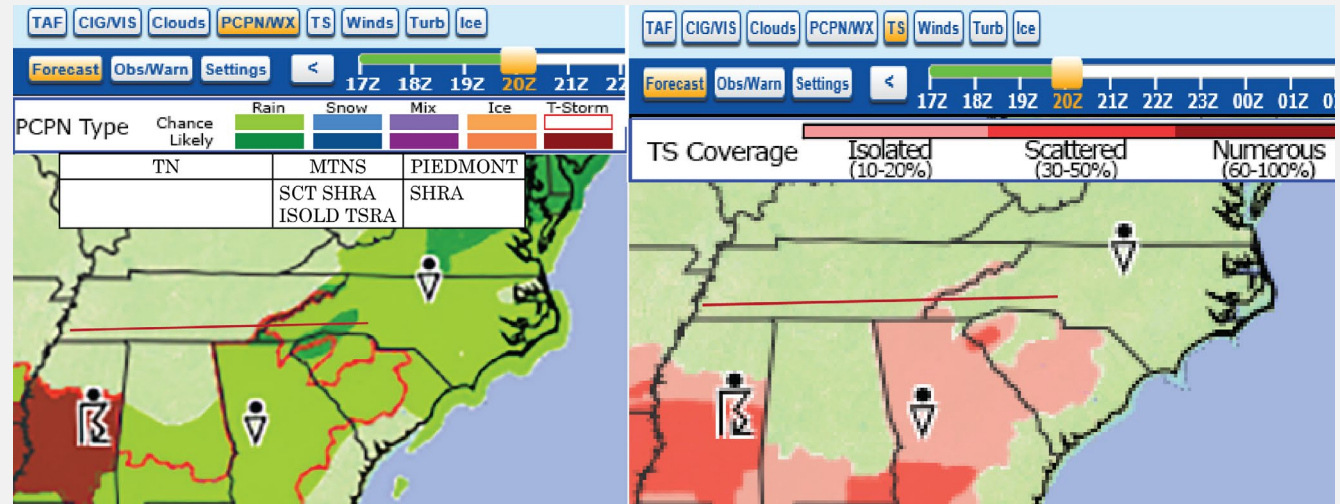


Fig. GFA A1-11. The Weather Grid (left) depicts precipitation coverage and probability; the Thunderstorm page (right) adds arial coverage .

On the precipitation and weather types page thunderstorms are expected to be scattered within a narrow line. From the TS—Thunderstorm page thunderstorm coverage is “Isolated.”

Based on Fig. GFA A1-12: Surface winds throughout Tennessee are forecast southerly between 10 and 15 knots; over the mountains winds increase to 25 knots —this analysis is based on the Weather Grid (Legend Fig. A1-12); and remain gusty in the Piedmont at around 20 knots.

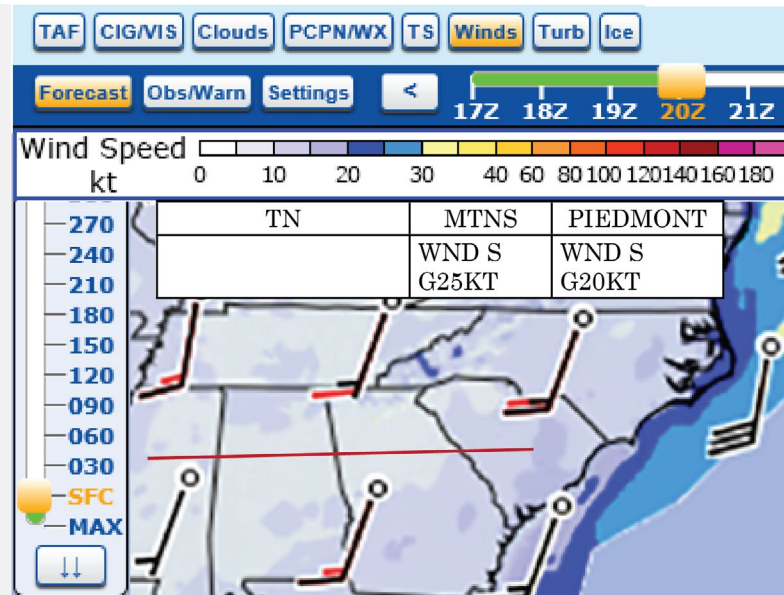


Fig. GFA A1-12. GFA wind page provides more detail than was available with the Legacy text FA.

Aviation Surface Forecast and Cloud Forecast Graphics

Refer to Fig. GFA A1-13 and the callout. The Portland, Oregon area, located at the north end of the Willamette Valley, has elevations less than 500 ft. Terrain rises abruptly with the Cascade Mountains. Peaks rise to about 11,500 ft, with passes as low

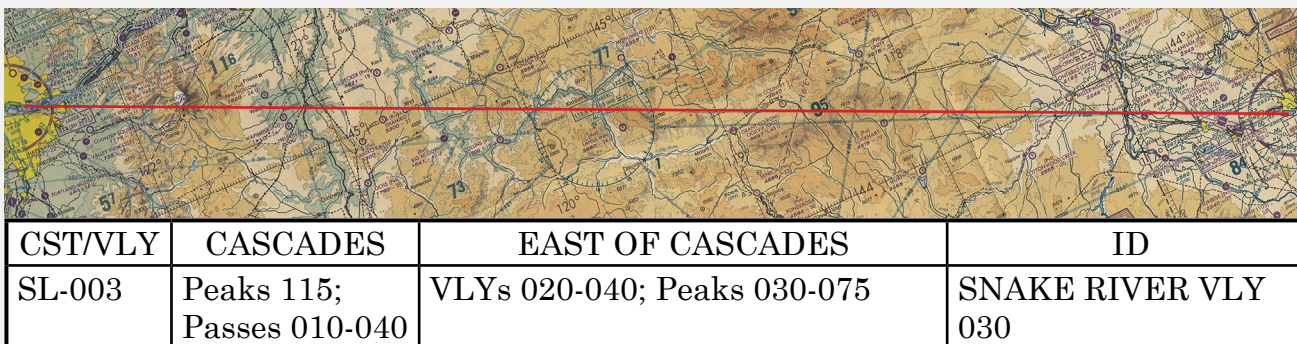
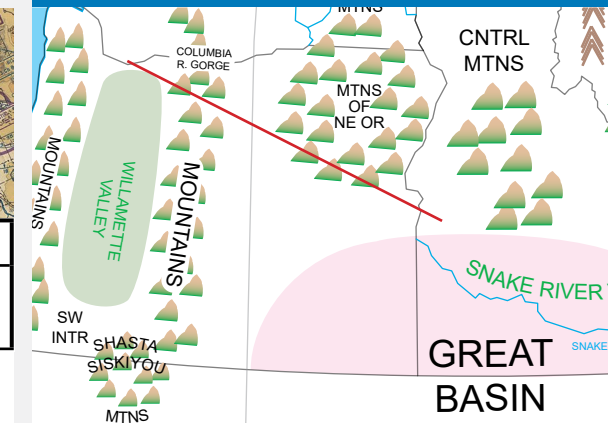


Fig. GFA A1-13. Consider a flight from Portland, OR to Boise, ID; terrain heights are (hundreds of feet) Mean Sea Level (MSL).



Operationally, mountain obscuration typically means VFR flight is possible in the valleys, but may not be possible through mountain passes and particularly across mountain ridges.

Refer to Table GFA A2-4 Conditional Terms for additional coverage/probability definitions.

as 1000 ft through the Columbia River Gorge, but generally in the 4000 foot range. East of the Cascades valleys have elevations from 2000 to 4000 ft and maintain peaks between 3000 and 7500 ft—rising in the eastern portion of Oregon. The Idaho part of the route consists of the Snake River Valley with elevations of about 3000 ft.

Fig. GFA A1-14 contains an example of the northwest region of the Aviation Clouds Forecast Graphic. Magenta shading represents AIRMET SIERRA (Mountain

Obscuration), which includes the Cascades, mountains of eastern Oregon, and mountains of Idaho. Fig. GFA A1-14 provides a “summary” of sky condition for the route, (All heights are Mean Sea Level—MSL.) Forecast: West and over the Cascades SCT-BKN 025-055 TOPS100; Oregon east of the Cascades SCT090 TOPS100; Idaho OVC060 TOPS070-100.

Fig. GFA A1-15 represents an example of the northwest region of the Aviation Surface Forecast Graphic. The magenta overlay designates AIRMET SIERRA (IFR). Aerial coverage includes Washington, and northeast Oregon and Idaho north of the planned route. “Summary” of visibilities and weather for the route: West and over the Cascades VIS ≥5SM -SHRASN; East of the Cascades VIS ≥5SM OCNL 1-3SM –SHRASN—sur-

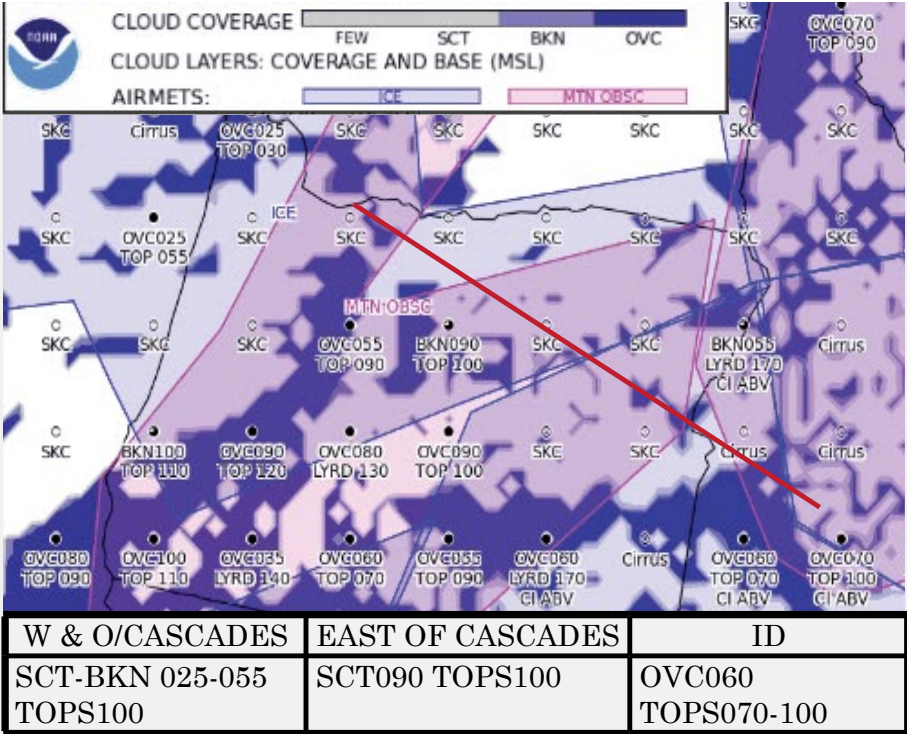


Fig. GFA A1-14. Sky condition, in the Table at the bottom of the illustration, is a “summary” for the route—similar to the Legacy text Area Forecast.

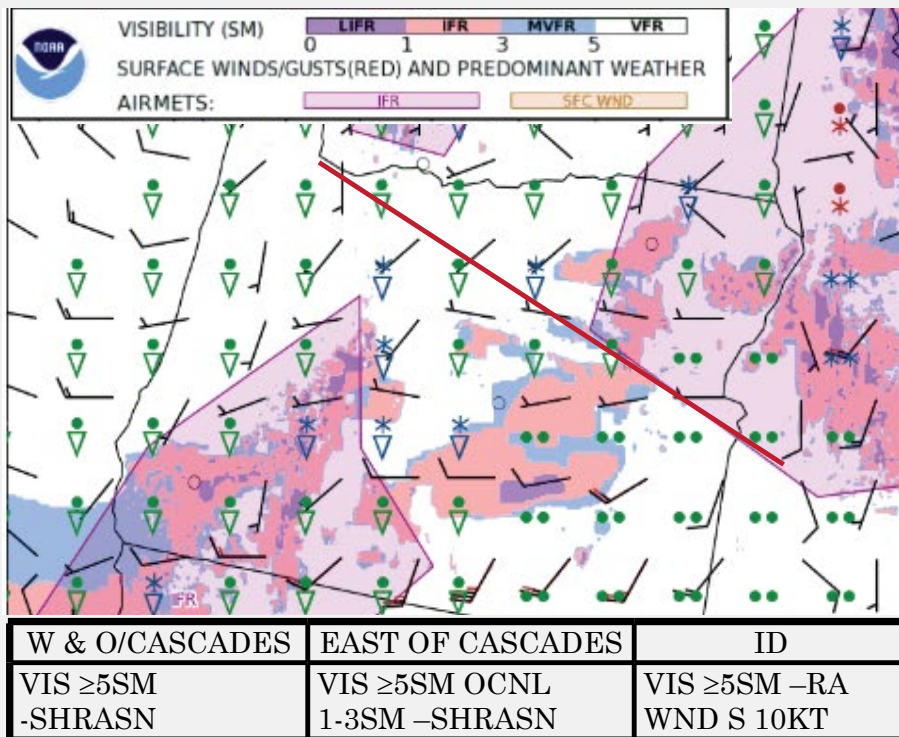


Fig. GFA A1-15. The Surface Graphic provides a composite forecasts graphic of visibility, precipitation, and wind.

tain peaks. However, the forecast indicates these areas should be circumnavigable.

Note

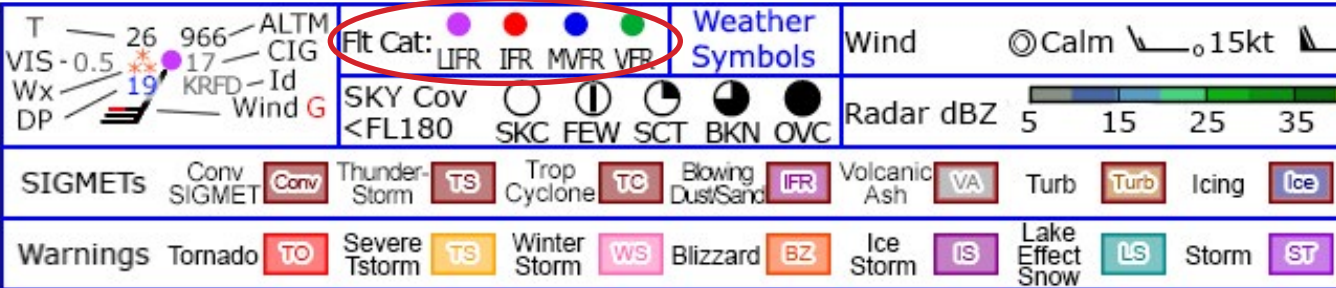
Operationally, expect AIRMET phenomena to affect over 50% of the area at any time. Therefore, a pilot might encounter areas within the delineated portion that are NOT affected by the hazard. This is not inconsistent, but reflects the dynamic and transitory nature of weather. From a forecast perspective phenomena usually lies well within the delineated area.

face winds variable less than 10 knots; Idaho VIS ≥5SM -RA WND S 10KT.

Based on the “Clouds” and “Surface” forecasts ONLY the weather does not preclude VFR flight. The most challenging part of the route are the mountains of eastern Oregon. Even though IFR AIRMET SIERRA does not pertain to the route, forecasts and terrain indicate at least local areas of IFR; most likely due to precipitation (RASN) possibly obscuring higher mountain peaks.

Weather-wise pilots determine alternates—strategic flight planning. A graphical product allows the visual determination of an “escape route” should the planned flight become unsafe.

Appendix 2: Explanation/ Definitions



Appendix 2: *Explanation/Definitions* contains additional clarification and descriptions of terms and symbols. (For further details refer to the information (INFO) pages of the Graphical Forecasts for Aviation.

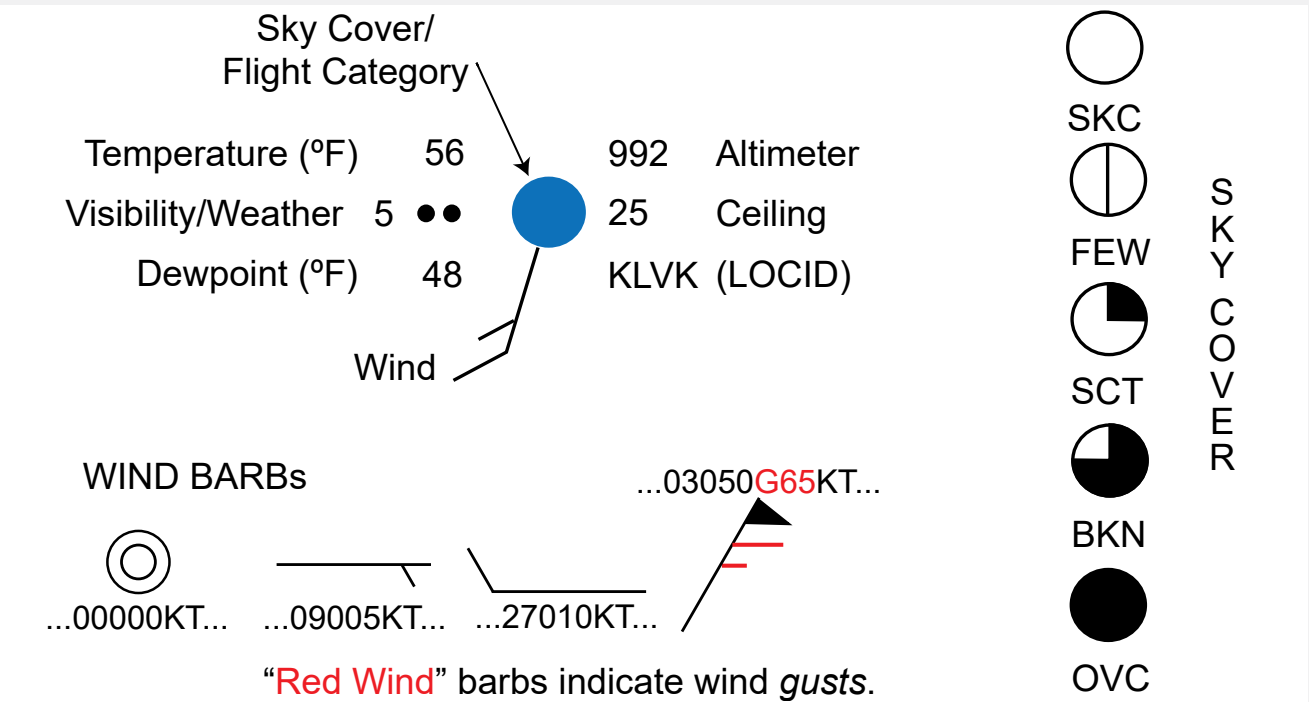















Fig. GFA A2-1. Station Model Plot symbology used in the *PRODUCT VIEW AREA*.

Fig. GFA-A2-1 displays “aviation interest” symbology used on GFA products. Flight category definitions are contained in the callout; color codes in the Legend—shown in the banner (red circle).

GFA Flight Categories			
Cat.	Ceiling (FT)		Vis. (SM)
VFR	> 3000	and	> 5
MVFR	1000 to 3000	and/or	3 to 5
IFR	≥600 to < 1000	and/or	≥ 2 to < 3
LIFR	≥ 200 to < 600	and/or	≥ 1/2 to < 2

Small Craft Advisories for wind may be added in the future.

Table GFA A2-1. GFA Warnings		
NWS Warnings		
Hazard	Symbol	Definition
Tornado		Conditions favorable for the development of tornadoes.
Severe Thunderstorms		Conditions favorable for the development of severe thunderstorms.
Winter Storm		An advisory for a significant combination of hazardous winter weather—snow, sleet, damaging ice accumulation.
Blizzard		Snow and/or blowing snow—visibility \leq 1/4 mile; winds/gusts \geq 30 knots.
Storm		An advisory issued for sustained winds or gusts of 48 to 63 knots within.
Gale		An advisory issued for sustained winds or gusts of 34 to 47 knots.
High Wind		An advisory issued when sustained winds \geq 34 knots or gusts \geq 50 knots.
Ice Storm		An ice storm event expected with an ice accumulation \geq 1/2 inch.
Lake Effect Snow		Widespread or localized lake-induced snow squalls or heavy showers.
International SIGMETs		
Thunderstorms		Widespread ¹ thunderstorms; or, potential to significant effect aircraft operations.
Tropical Cyclone		Organized convection over tropical or sub-tropical waters with wind speeds $>$ 34 knots.
IFR		Widespread ¹ sandstorms/duststorms; or, a potential to significant effect aircraft operations.
Volcanic Ash		A volcanic eruption that produces volcanic ash emissions, regardless of eruption magnitude.

¹Widespread—an area greater than 3000 sq. ml.

Table GFA A2-1. *GFA Warnings* provides contractions, symbols, and definitions used in the PRODUCT VIEW AREA and LEGEND portions of the GFA page.

Table GFA A2-2. Hazards/Warnings				
Forecasts—Function Button Products				
Product	AIRMET	AWC SIGMET ¹	Int'l SIGMET ²	NWS Warning ³
TAF		Conv, Turb, Ice, IFR ⁴ , VA	TS, TC, TB, IC, IFR ⁴ , VA	TO, TS, WS, BZ, IS, LS, ST, GA, HW
CIG/VIS	Sierra (Cig/Vis)	Conv, IFR ⁴ , VA	TS, TC, IFR ⁴ , VA	WS, BZ
Clouds	Sierra (MtnOb)	Conv, VA	TS, TC, VA	
PCPN/WX		Conv, IFR ⁴ , VA	TS, TC, IFR ⁴ , VA	TO, TS, WS, BZ, IS, LS, ST
TS		Conv	TS, TC	TO, TS
Winds	Tango (LLWS, SFC Wind)	Conv	TS, TC	WS, BZ, IS, ST, GA, HW
Turb	Tango (Hi/Lo)	Conv, Turb	TS, TC, TB	
Ice	Zulu	Conv, Ice	TC, TS, IC	@SFC WS, BZ, IS, LS
Obs-Warn (Observations and Warnings)—Function Button Products				
Product	AIRMET	AWC SIGMET ¹	Int'l SIGMET ²	NWS Warning ³
PCPN/WX		Conv, IFR ⁴ , VA	TS, TC, IFR ⁴ , VA	TO, TS, WS, BZ, IS, LS, ST, GA, HW
CIG/VIS		Conv, IFR ⁴ , VA	TS, TC, IFR ⁴ , VA	WS, BZ
PIREP		Conv, Turb, Ice, IFR ⁴ , VA	TS, TC, TB, IC, IFR ⁴ , VA	
RAD/SAT		Conv, Turb, Ice, IFR ⁴ , VA	TS, TC, TB, IC, IFR ⁴ , VA	TO, TS, WS, BZ, IS, LS, ST, GA, HW

¹AWC SIGMET: Conv, Turb, Ice, IFR⁴, VA.

²Int'l SIGMET: TS, TC, TB, IC, IFR⁴, VA.

³NWS Warning: TO, TS, WS, BZ, ST, GA, HW, IS, LS.

⁴IFR: Widespread DS/SS reducing VIS <3 ml.

Table GFA A2-2. *Hazards/Warnings* used on the GFA Product shows those weather advisories provided on individual Weather Products “Forecasts—Obs/Warn” Function Button screens in the GFA PRODUCT VIEW AREA.

On the GFA obstruction colors denote areal coverage.

Table GFA A2-3. Abridged GFA Weather Symbols			
Precipitation			
-DZ (Drizzle)	”	+SN (Snow)	* * *
RA (Rain)	●●●	(PL) Ice Pellets	▲
-SHRA (Rain Showers)	● ▽	+SHSN (Snow Showers)	* ▽
-FZDZ (Freezing Drizzle)	”	+FZRA (Freezing Rain)	●”●
TS (Thunderstorm)	TS	TSSN	+TSRA
	⌞	* ⌞	● ⌞
Obscurations			
BR (Mist)	==	BLDU/BLSA) Blowing Dust/ Sand)	\$
FG (Fog)	===	DS/SS (Dust- storm/Sandstorm)	\$→
FZFG (Freezing Fog)	≡ ▽	BLSN (Blowing Snow)	↑ +
FU (Smoke) VA (Volcanic Ash)	~	HZ (Haze)	∞

Table GFA A2-3. Abridged GFA Weather Symbols contains symbols most often used on the Graphical Forecasts for Aviation. GFA symbology depicts: precipitation type and intensity, probability, and coverage; thunderstorm precipitation type, probability and coverage; and, obstructions to visibility.

The number of symbols indicates intensities of drizzle, rain, and snow: two symbols light, three symbols moderate, four symbols heavy. Examples in Table GFA A2-2:

drizzle light (-), rain moderate, snow heavy (+). Ice pellet intensity is not graphically depicted. An elongated triangle depicts showers, with precipitation type. A horizontal

line through the triangle indicates moderate or heavy intensity (snow showers example). A “sign wave” symbol represents freezing precipitation, and type within the symbol; one symbol light intensity, two symbols moderate or heavy.

A “lightning bolt” indicates thunderstorms, and precipitation type when accompanying the thunderstorm. A double “lightning bolt” means heavy precipitation.

Note

For a complete list of symbols “Click” the Weather Symbols link in the Legend—shown in the banner on the first page of this Appendix.

As shown in Fig. GFA A2-2 Aviation Surface Forecast Graphic excerpt and legend, obstruction symbol colors depict HZ, FG, FU/VA, and DU/SA; precipitation colors chance/likely probability; and, thunderstorm symbol color coverage—ISO/SCT/NUM.

Since the early 1930s, pilots have objected to coded weather information. When the FAA took over most pilot weather briefing responsibilities in the 1960s, FSS read and explained reports. During DUATs initial implementation reports were, again, distributed in coded format. Subsequently, systems were modified to provide “plain language” translations. As part of the communications revolution weather data has become available through in-cockpit displays—using coded data. With the GFA, station models and weather symbols are back. We’ve come full circle.

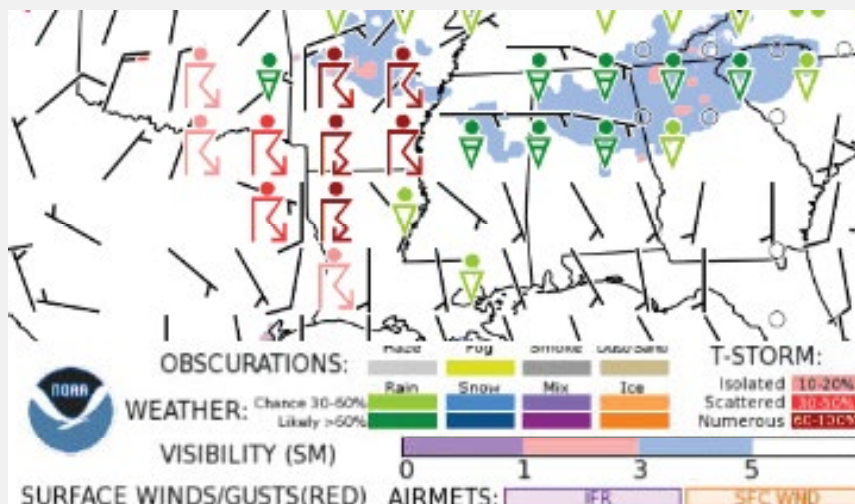


Fig. A2-2. Aviation Surface Forecast Graphic colors depict probability and coverage.

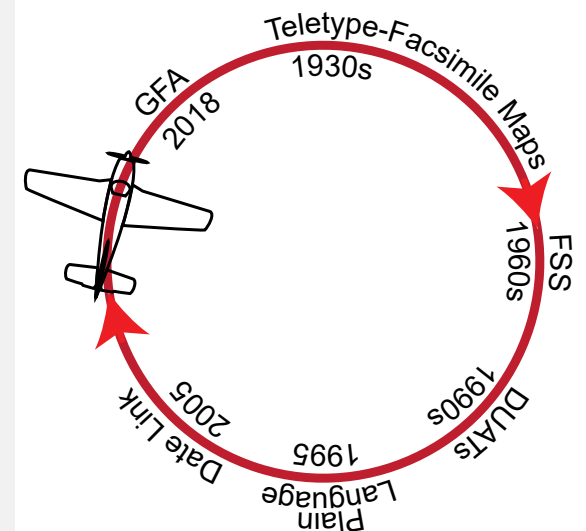


Table GFA A2-4. Conditional Terms		
Probability of Precipitation		
Term	Contraction	Probability
Likely	Lkly	≥ 55%
Definite	DEF	> 50%
Chance	CHC	25% - <55%
Slight Chance	SChc	≤ 20%
Coverage		
Term	Contraction	Coverage
Widespread	Wide	80% - 100%
Frequent	FRQ	75%
Numerous	Num	60% - 70%
Patchy ¹	Ptchy	> 50%
Scattered/Areas	SCT/AREAS	30% - 50%
Widely Scattered	WDLY SCT	≤ 20%
Isolated	Iso	10%

¹Phenomena, such as Ground Fog, covering a substantial area.

Table GFA A2-3. *Conditional Terms* provides areal coverage and probability of precipitation. Coverage/Probability percentages are a summary based on computer generated models.