

Private Pilot (ASEL) Ground School Course

Lesson 19 | Weather Products

Chester County
Aviation



Lesson Overview

Lesson Objectives:

- Develop knowledge to read available weather products.
- Develop an understanding of how to find, read, interpret, and make safe decision based on various weather products.

Lesson Completion Standards:

- Student demonstrates satisfactory knowledge of weather products by answering questions and actively participating in classroom discussions.

Weather Data Sources

Weather Products

Weather Sources

- Service outlets are government, government contract, or private facilities that provide aviation weather services.
- Several different government agencies, including the FAA, National Oceanic and Atmospheric Administration (NOAA), and the NWS work in conjunction with private aviation companies to provide different means of accessing weather information.
- Flight Service Stations (FSS)
 - Telephone Briefing
- Transcribed Weather Broadcast (Alaska Only)

Transcribed Weather Briefings (AK Only)

- A continuous automated broadcast of meteorological and aeronautical data over selected low or medium frequency (L/MF) and very high frequency (VHF) omnidirectional range (VOR) NAVAID facilities.
- The broadcasts are automatically updated as changes occur. The broadcast contains adverse conditions, surface weather observations, PIREPS, and a density altitude statement (if applicable).

Flight Service Stations (FSS)

- The FSS is the primary source for preflight weather information.
- A preflight weather briefing from an FSS can be obtained 24 hours a day by calling 1-800-WX BRIEF from anywhere in the United States and Puerto Rico.
- Telephone numbers for FSS can be found in the Chart Supplement U.S. (formerly Airport/Facility Directory) or in the United States Government section of the telephone book.
- Prior to every flight, pilots should gather all information vital to the nature of the flight. This includes an appropriate weather briefing obtained from a specialist at a FSS.

FSS Weather Briefings

- A FSS can provide three types of weather briefing that all serve their own purpose:
 - Standard
 - Abbreviated
 - Outlook
- On initial call you should also provide whether the flight is visual flight rules (VFR) or IFR, aircraft identification and type, departure point, estimated time of departure (ETD), flight altitude, route of flight, destination, and estimated time en route (ETE).

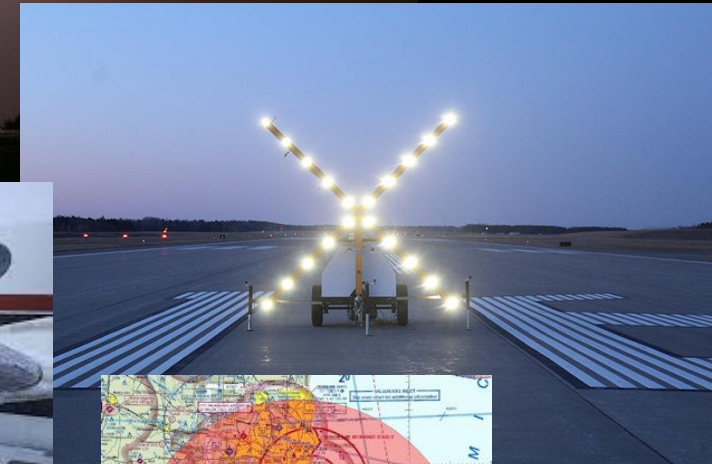
FSS Standard Weather Briefing

- A standard briefing provides the most complete information and a more complete weather picture.
- This type of briefing should be obtained prior to the departure of any flight and should be used during flight planning.
- A standard briefing provides the following information in sequential order if it is applicable to the route of flight.

FSS Standard Weather Briefing

(1) Adverse conditions

- This includes information about adverse conditions that may influence a decision to cancel or alter the route of flight. Adverse conditions include significant weather, such as thunderstorms or aircraft icing, or other important items such as airport closings.



FSS Standard Weather Briefing

(2) VFR Not Recommended

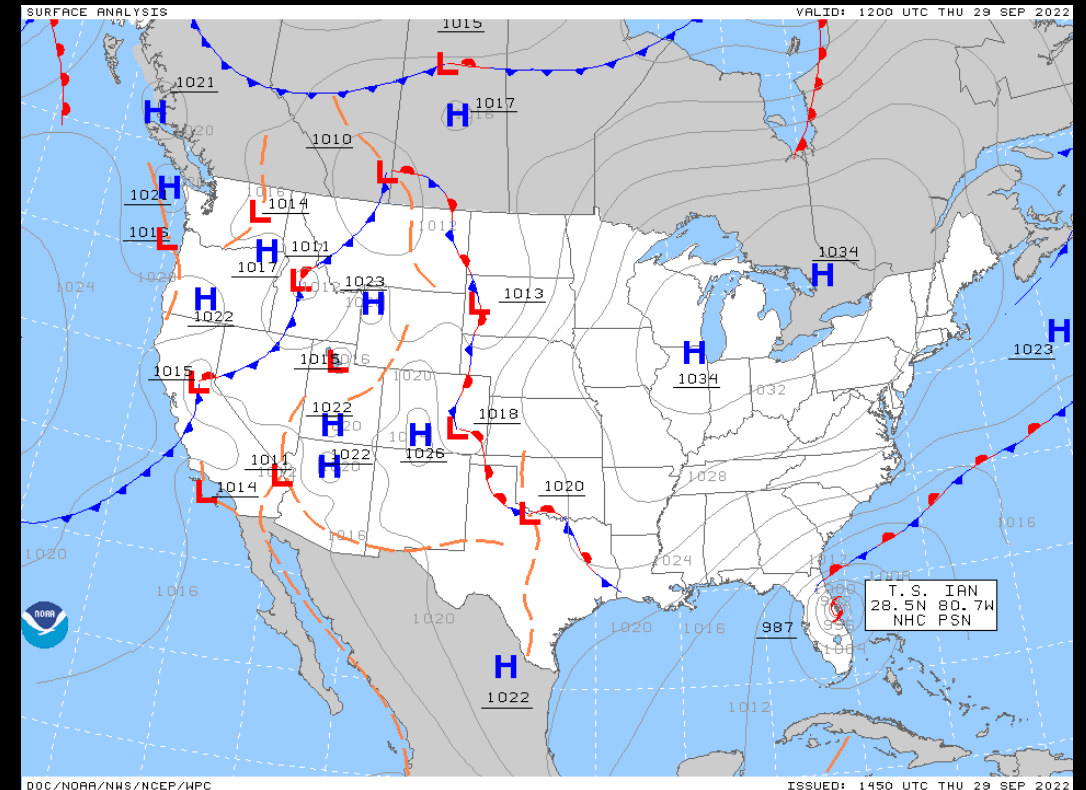
- If the weather for the route of flight is below VFR minimums, or if it is doubtful the flight could be made under VFR conditions due to the forecast weather, the briefer may state "VFR flight not recommended."
- It is the pilot's decision whether or not to continue the flight under VFR, but this advisory should be weighed carefully.



FSS Standard Weather Briefing

(3) Synopsis

- An overview of the larger weather picture. Fronts and major weather systems that affect the general area are provided



FSS Standard Weather Briefing

(4) Current Conditions

- The current ceilings, visibility, winds, and temperatures. If the departure time is more than 2 hours away, current conditions are not included in the briefing.

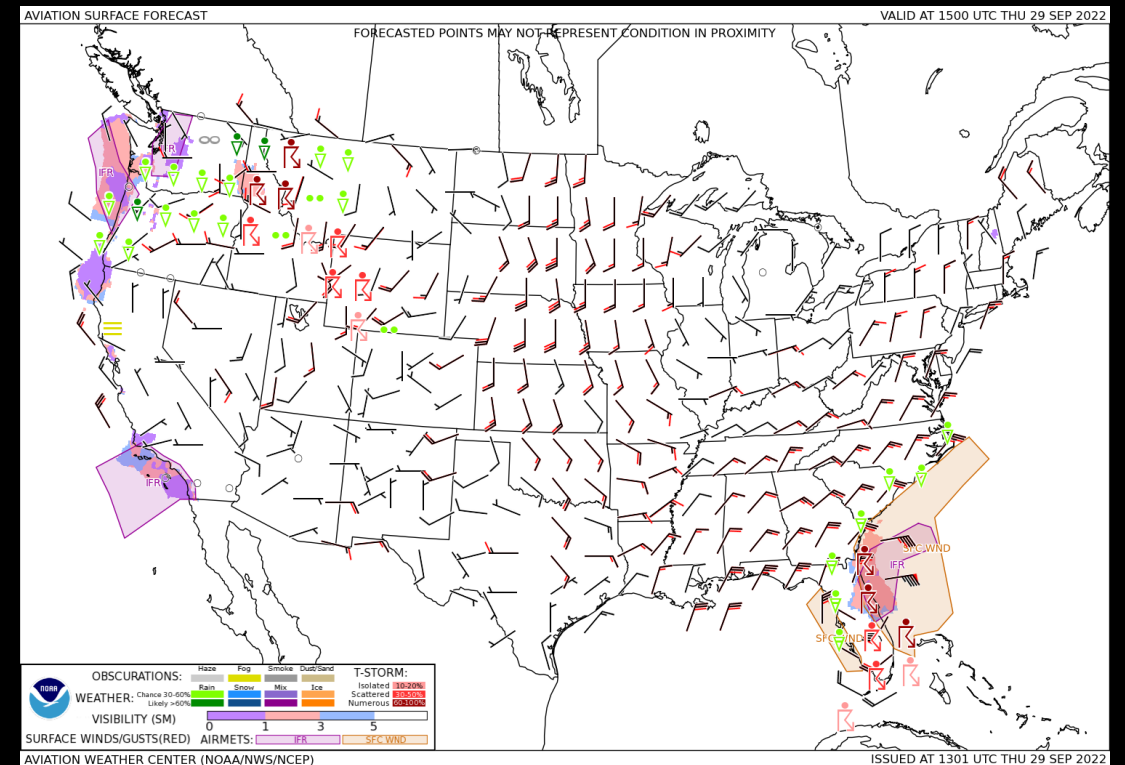


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KBOS 070054Z 12005KT 10SM FEW040 FEW250 10/04 A3013 RMK AO2 SLP201 T01000044
KBWI 070054Z 13003KT 10SM FEW065 FEW250 19/14 A3005 RMK AO2 SLP176 T01940139
KCLE 070051Z 22005KT 10SM BKN075 BKN200 21/09 A3005 RMK AO2 SLP174 T02110089
KCLT 070054Z 00000KT 10SM FEW050 FEW080 SCT250 21/13 A3006 RMK AO2 T02060133
KCVG 070052Z 18003KT 10SM FEW150 FEW250 19/09 A3006 RMK AO2 SLP174 T01940089
KDCA 070052Z 15007KT 10SM FEW060 21/16 A3005 RMK AO2 SLP176 T02060156
KDEN 070101Z 08019G26KT 10SM VCTS FEW065 SCT085CB BKN120 BKN220 14/08 A2995 RMK AO2 PK WND
07026/0054 LTG DSNT SE AND S AND NW OCNL LTGICCG VC W-NW TS VC W-NW MOV E T01440083
KDFW 070053Z 17006KT 10SM SCT180 OVC300 25/16 A2991 RMK AO2 SLP121 T02500161
KDTW 070053Z 07008KT 10SM FEW080 SCT100 BKN140 17/12 A3004 RMK AO2 SLP170 T01670122 PNO $
```


FSS Standard Weather Briefing

(5) En-Route Conditions

- The en route forecast is a summary of the weather forecast for the proposed route of flight.



FSS Standard Weather Briefing

(6) Destination Forecast

- The destination forecast is a summary of the expected weather for the destination airport at the estimated time of arrival (ETA).



```
TAF KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO  
1316 1 1/2SM BR  
FM1600 16010KT P6SM SKC BECMG 2224 20013G20KT  
4SM SHRA OVC020 PROB40 0006 2SM TSRA OVC008CB  
BECMG 0608 21015KT P6SM NSW SCT040
```

FSS Standard Weather Briefing

(7) Winds/Temp Aloft

- Forecast of the winds at specific altitudes for the route of flight. The forecast tempera

```
FDIUS1
DATA BASED ON 261200Z
VALID 261800Z   FOR USE 1400-2100Z. TEMPS NEG ABV 24000

FT 3000    6000    9000    12000    18000    24000    30000    34000    39000
BIH          9900    2812+04  2835+00  2967-07  2773-19  287836  277647  277459
BLH 2806  2521+18  2526+14  2630+08  2744-07  2846-20  284737  283748  303859
FAT 3212  9900+06  2920+02  2935+00  2968-07  2769-19  286836  286947  286760
FOT 1919  2417+01  2730-03  2831-09  2869-15  2893-24  782238  782847  781657
ONT 9900  3017+11  3031+11  2840+09  2846-06  2750-19  274737  273648  303759
RBL 1610  2407+00  2819-04  2931-08  2871-14  2891-23  781737  781847  781258
SAC 2805  2713+02  2822+00  2935-03  2970-10  2881-21  289337  289347  288458
SAN 2713  3022+16  2930+12  2834+09  2734-06  2731-20  273237  282648  292558
SBA 3405  3325+11  3037+10  2942+07  2847-06  2750-20  284437  283947  293959
SFO 3112  2919+04  2928+02  2943+00  2968-08  2873-20  288136  288447  287959
SIY          2114+01  2420-06  2831-10  2858-19  2888-28  793639  783447  289754
WJF          3019+10  3032+08  2940+07  2851-06  2754-19  274637  284247  294159
AST 2018  2219-03  2224-09  2322-14  2630-25  2636-35  273345  263346  253447
IMB          2518-08  2522-15  2636-24  2744-35  274944  274945  264747
LKV          2422-07  2624-12  2742-22  2764-31  289141  780246  278651
OTH 2134  2133-02  2224-07  2626-11  2545-23  2870-31  781141  781346  287851
PDX 2014  2322-02  2326-08  2330-15  2630-25  2736-35  273745  263545  263847
RDM          2316+00  2426-07  2523-13  2733-24  2750-35  286744  276345  275548
GEG          2626-03  2536-08  2627-13  1405-23  1234-32  115745  142949  211648
SEA 2216  2318-03  2421-09  2518-15  2017-26  1336-33  132445  181546  221947
YKM 2617  2622-02  2624-09  2419-14  2328-27  1619-34  230945  231745  242147
```

FB Winds Map

FSS Standard Weather Briefing

(8) NOTAM's

- Information pertinent to the route of flight that has not been published in the NOTAM publication. Published NOTAM information is provided during the briefing only when requested.

**!MSN 01/006 MSN TWY B1, B2, J, AND
TWY B NORTH OF RWY 14/32 CLOSED
TO ACFT WINGSPAN MORE THAN 150
FT 1801021800-PERM**

FSS Standard Weather Briefing

(9) ATC Delay's

- ATC delays—an advisory of any known ATC delays that may affect the flight.

FSS Standard Weather Briefing

(10) Other Information

- Info the FSS specialist provides the radio frequencies needed to open a flight plan and to contact EFAS. Any additional information requested is also provided at this time.

FSS Abbreviated Weather Briefing

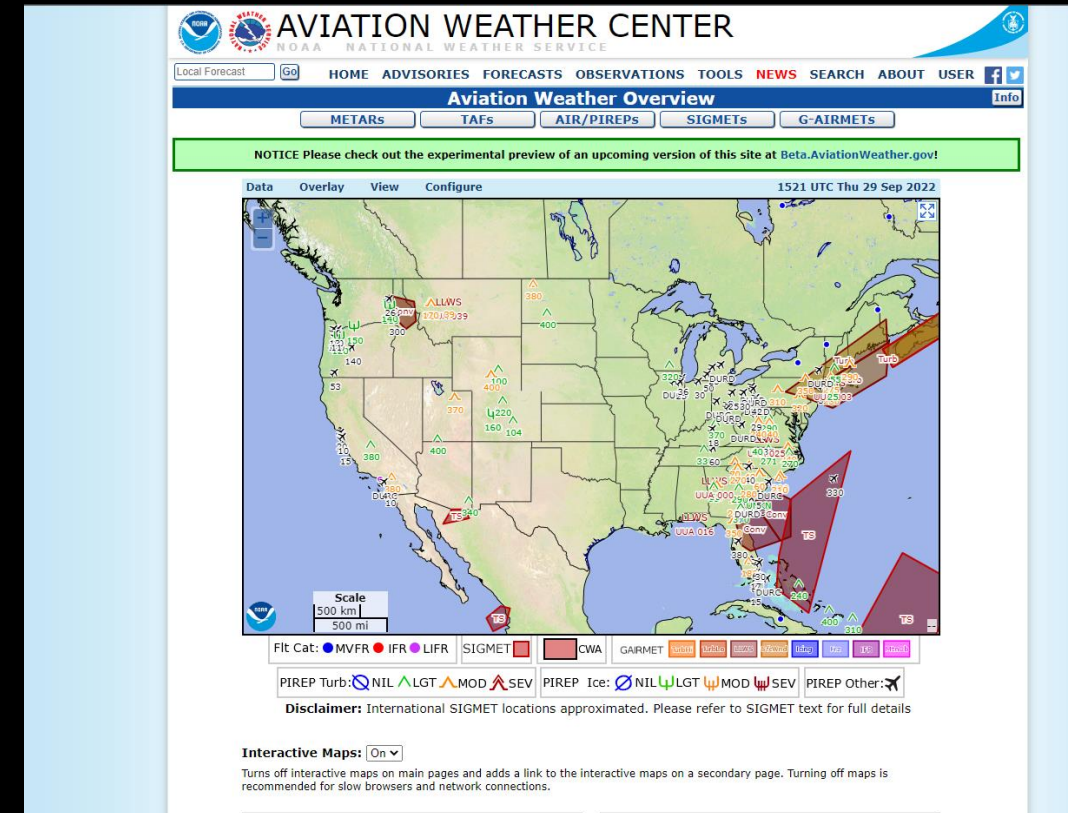
- An abbreviated briefing is a shortened version of the standard briefing.
- It should be requested when a departure has been delayed or when weather information is needed to update the previous briefing.
- When this is the case, the weather specialist needs to know the time and source of the previous briefing, so the necessary weather information is not omitted inadvertently.
- It is always a good idea for the pilot to update the weather information whenever he/she has additional time

FSS Outlook Weather Briefing

- An outlook briefing should be requested when a planned departure is 6 hours or more away.
- It provides initial forecast information that is limited in scope due to the time frame of the planned flight.
- This type of briefing is a good source of flight planning information that can influence decisions regarding route of flight, altitude, and ultimately the go/no-go decision.

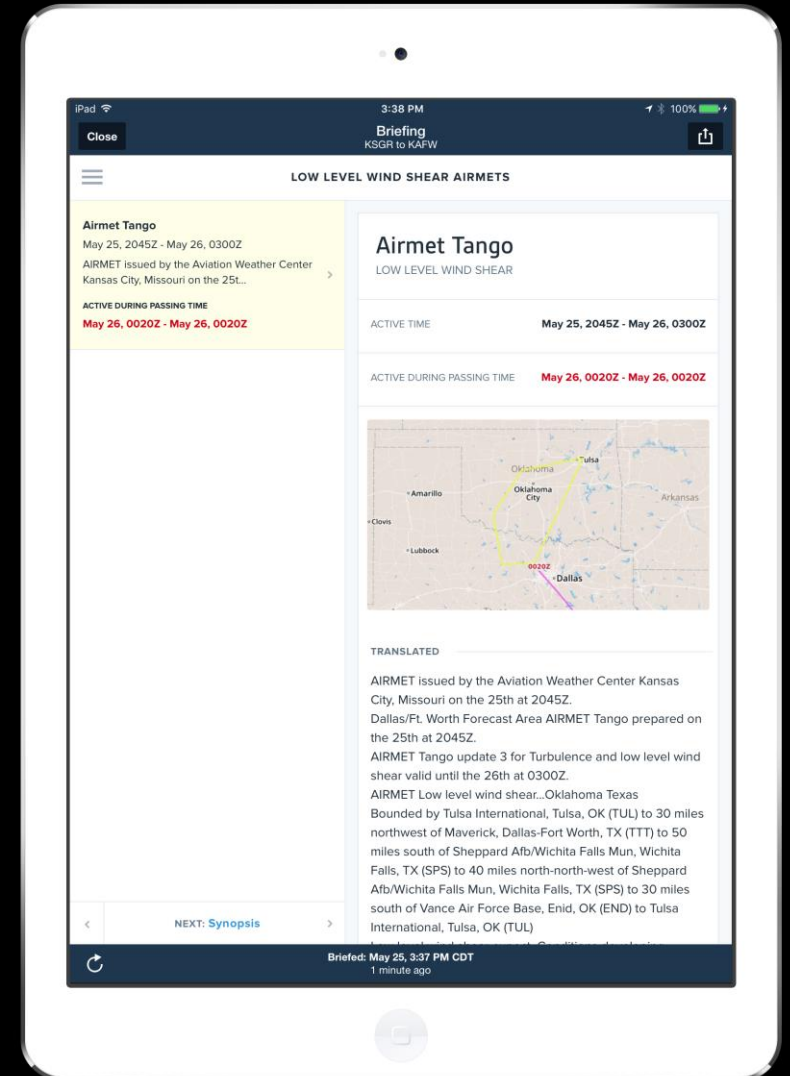
Aviation Weather Center

- Another approved weather source is <https://aviationweather.gov/>
- AWC provides many different weather products to supplement a weather briefing.
- AWC should be your source of weather beyond a telephone briefing.



ForeFlight/Garmin Pilot/iPad Applications

- While all the information is excellent to know, none of it can be tracked.
- This means there will be no evidence that you obtained a briefing or aware of information.



Observations

Weather Products

Aviation Weather Reports

- Aviation weather reports are designed to give accurate depictions of current weather conditions.
- Each report provides current information that is updated at different times.
- Some typical reports are METARs and PIREPs.

Aviation Routine Weather Report (METAR)

- A METAR is an observation of current surface weather reported in a standard international format.
- METARs are issued on a regularly scheduled basis unless significant weather changes have occurred (Hourly). A special METAR (SPECI) can be issued at any time between routine METAR reports.

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 RMK PRESFR

Type of Report

- There are two types of METAR reports. The first is the routine METAR report that is transmitted on a regular time interval. The second is the aviation selected SPECI. This is a special report that can be given at any time to update the METAR for rapidly changing weather conditions, aircraft mishaps or other critical information.

Aviation Routine Weather Report (METAR)

Example

METAR **KLNS** 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 RMK PRESFR

Station Identifier

- A four-letter code as established by the International Civil Aviation Organization (ICAO). In the 48 contiguous states, a unique three-letter identifier is preceded by the letter "K."

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 RMK PRESFR

Date and Time of Report

- Depicted in a six-digit group (161753Z). The first two digits are the date. The last four digits are the time of the METAR/SPECI, which is always given in coordinated universal time (UTC). A "Z" is appended to the end of the time to denote the time is given in Zulu time (UTC) as opposed to local time.

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z **AUTO** 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 RMK PRESFR

Modifier

- Denotes that the METAR/SPECI came from an automated source or that the report was corrected. If the notation "AUTO" is listed in the METAR/SPECI, the report came from an automated source. It also lists "AO1" (for no precipitation discriminator) or "AO2" (with precipitation discriminator) in the "Remarks" section to indicate the type of precipitation sensors employed at the automated station. "COR" is a corrected report.

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 RMK PRESFR

Wind

- Reported with five digits (14021KT) unless the speed is greater than 99 knots, in which case the wind is reported with six digits. The first three digits indicate the direction the true wind is blowing from in tens of degrees. If the wind is variable, it is reported as "VRB."

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 RMK PRESFR

Wind

- The last two digits indicate the speed of the wind in knots unless the wind is greater than 99 knots, in which case it is indicated by three digits. If the winds are gusting, the letter "G" follows the wind speed (G26KT). After the letter "G," the peak gust recorded is provided. If the wind direction varies more than 60° and the wind speed is greater than six knots, a separate group of numbers, separated by a "V," will indicate the extremes of the wind directions.

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 RMK PRESFR

Visibility

- The prevailing visibility ($\frac{3}{4}$ SM) is reported in statute miles as denoted by the letters "SM." It is reported in both miles and fractions of miles. At times, runway visual range (RVR) is reported following the prevailing visibility. RVR is the distance a pilot can see down the runway in a moving aircraft. When RVR is reported, it is shown with an R, then the runway number followed by a slant, then the visual range in feet. For example, when the RVR is reported as R17L/1400FT, it translates to a visual range of 1,400 feet on runway 17 left

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 RMK PRESFR

Weather

- Can be broken down into two different categories: qualifiers and weather phenomenon (+TSRA BR). First, the qualifiers of intensity, proximity, and the descriptor of the weather are given. The intensity may be light (-), moderate (), or heavy (+). Proximity only depicts weather phenomena that are in the airport vicinity. The notation "VC" indicates a specific weather phenomenon is in the vicinity of five to ten miles from the airport.

QUALIFIER		WEATHER PHENOMENA			
INTENSITY OR PROXIMITY	DESCRIPTOR	PRECIPITATION	OBSCURATION	OTHER	
1	2	3	4	5	
-	Light	MI Shallow	DZ Drizzle	BR Mist	PO Dust/Sand whirls
	Moderate ²	PR Partial	RA Rain	FG Fog	SQ Squalls
+	Heavy	BC Patches	SN Snow	FU Smoke	FC Funnel Cloud, Tornado, or Waterspout ⁴
VC	In the Vicinity ³	DR Low Drifting	SG Snow Grains	VA Volcanic Ash	SS Sandstorm
		BL Blowing	IC Ice Crystals (Diamond Dust)	DU Widespread Dust	DS Duststorm
		SH Shower(s)	PL Ice Pellets	SA Sand	
		TS Thunderstorms	GR Hail	HZ Haze	
		FZ Freezing	GS Small Hail and/or Snow Pellets	PY Spray	
			UP Unknown Precipitation		

1. The weather groups are constructed by considering columns 1 to 5 in the table above in sequence, i.e., intensity followed by description, followed by weather phenomena, e.g., heavy rain shower(s) is coded as +SHRA.
2. To denote moderate intensity no entry or symbol is used.
3. See text for vicinity definitions.
4. Tornadoes and waterspouts are coded as +FC.

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 RMK PRESFR

Sky Conditions

- Always reported in the sequence of amount, height, and type or indefinite ceiling/height (vertical visibility) (BKN008 OVC012CB, VV003). The heights of the cloud bases are reported with a three-digit number in hundreds of feet AGL. Clouds above 12,000 feet are not detected or reported by an automated station.

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 RMK PRESFR

Sky Conditions

- The types of clouds, specifically towering cumulus (TCU) or cumulonimbus (CB) clouds, are reported with their height. Contractions are used to describe the amount of cloud coverage and obscuring phenomena. The amount of sky coverage is reported in eighths of the sky from horizon to horizon.

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 RMK PRESFR

Sky Conditions

Reportable Contraction	Meaning	Summation Amount of Layer
SKC / CLR	Sky Clear / Clear	0
FEW	Few	1/8 ~ 2/8
SCT	Scattered	3/8 ~ 4/8
BKN	Broken	5/8 ~7/8
OVC	Overcast	8/8
VV	Vertical Visibility	8/8

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 RMK PRESFR

Temperature and Dew Point

- The air temperature and dew point are always given in degrees Celsius (C) or (18/17). Temperatures below 0 °C are preceded by the letter "M" to indicate minus.

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 **A2970** RMK PRESFR

Altimeter Setting

- Reported as inches of mercury ("Hg) in a four-digit number group (A2970). It is always preceded by the letter "A." Rising or falling pressure may also be denoted in the "Remarks" sections as "PRESRR" or "PRESFR," respectively.

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 **RMK PRESFR**

Remarks

- The remarks section always begins with the letters "RMK." Comments may or may not appear in this section of the METAR. The information contained in this section may include wind data, variable visibility, beginning and ending times of particular phenomenon, pressure information, and various other information deemed necessary.

Aviation Routine Weather Report (METAR)

Example

METAR KLNS 161753Z AUTO 32021G26KT 3/4SM +TSRA BR
BKN008 OVC012CB 18/17 A2970 **RMK PRESFR**

Remarks

- An example of a remark regarding weather phenomenon that does not fit in any other category would be: OCNL LTGICCG. This translates as occasional lightning in the clouds and from cloud to ground. Automated stations also use the remarks section to indicate the equipment needs maintenance.

Pilot Report (PIREP)

- PIREPs provide valuable information regarding the conditions as they actually exist in the air, which cannot be gathered from any other source.
- PIREPs are reported to ATC or Flight Service.
- If the ceiling is below 5,000 feet, or visibility is at or below five miles, ATC facilities are required to solicit PIREPs from pilots in the area.
- When unexpected weather conditions are encountered, pilots are encouraged to make a report to a FSS or ATC. When a pilot weather report is filed, the ATC facility or FSS adds it to the distribution system to brief other pilots and provide inflight advisories.

Pilot Report (PIREP)

Example

UA/OV GGG 090025/TM 1450/FL 060/TP C182/SK 080 OVC/WX
FV04SM RA/TA 05/WW 270030KT/TB LGT/IC NONE/RM HVY RAIN

PIREP Type

- UA indicates routine PIREP; UUA indicates an urgent pirep.

Pilot Report (PIREP)

Example

UA/OV GGG 090025/TM 1450/FL 060/TP C182/SK 080 OVC/WX
FV04SM RA/TA 05/WV 270030KT /TB LGT/IC NONE/RM HVY RAIN

Location

- Use 3-letter NAVAID idents only. a. Fix: /OV ABC, /OV ABC 090025. b. Fix: /OV ABC 045020-DEF, /OV ABC-DEF-GHI.

Pilot Report (PIREP)

Example

UA/OV GGG 090025/TM 1450/FL 060/TP C182/SK 080 OVC/WX
FV04SM RA/TA 05/WW 270030KT /TB LGT/IC NONE/RM HVY RAIN

Time

- Time of report in Zulu (UTC). 1452Z in this example.

Pilot Report (PIREP)

Example

UA/OV GGG 090025/TM 1450/FL 060/TP C182/SK 080 OVC/WX
FV04SM RA/TA 05/WV 270030KT /TB LGT/IC NONE/RM HVY RAIN

Altitude/Flight Level

- 3 digits for hundreds of feet. If not known, use UNKN: /FL095, /FL310, /FLUNKN.

Pilot Report (PIREP)

Example

UA/OV GGG 090025/TM 1450/FL 060/TP C182/SK 080 OVC/WX
FV04SM RA/TA 05/WV 270030KT /TB LGT/IC NONE/RM HVY RAIN

Aircraft Type

- 4 digits maximum. If not known, use UNKN: /TP P28A, /TP E170, /TP UNKN.

Pilot Report (PIREP)

Example

UA/OV GGG 090025/TM 1450/FL 060/TP C182/SK 080 OVC/WX
FV04SM RA/TA 05/WW 270030KT /TB LGT/IC NONE/RM HVY RAIN

Sky Conditions/Cloud Layers

- Height of cloud base in hundreds of feet.
- If unknown, use UNKN.
- Height of cloud tops in hundreds of feet.

Pilot Report (PIREP)

Example

UA/OV GGG 090025/TM 1450/FL 060/TP C182/SK 080 OVC/WX
FV04SM RA/TA 05/WW 270030KT /TB LGT/IC NONE/RM HVY RAIN

Weather

- Standard from a METAR

Pilot Report (PIREP)

Example

UA/OV GGG 090025/TM 1450/FL 060/TP C182/SK 080 OVC/WX
FV04SM RA/TA 05/WW 270030KT /TB LGT/IC NONE/RM HVY RAIN

Air Temperature

- If below zero, prefix with a hyphen: /TA 15, /TA M06

Pilot Report (PIREP)

Example

UA/OV GGG 090025/TM 1450/FL 060/TP C182/SK 080 OVC/WX
FV04SM RA/TA 05/**WV 270030KT** /TB LGT/IC NONE/RM HVY RAIN

Wind

- Standard from a METAR

Pilot Report (PIREP)

Example

UA/OV GGG 090025/TM 1450/FL 060/TP C182/SK 080 OVC/WX
FV04SM RA/TA 05/WW 270030KT/TB LGT/IC NONE/RM HVY RAIN

Turbulence

- Use standard contractions for intensity and type (use CAT or CHOP when appropriate). Include altitude only if different from /FL, /TB EXTRM, /TB LGT-MOD BLO 090.

Pilot Report (PIREP)

Example

UA/OV GGG 090025/TM 1450/FL 060/TP C182/SK 080 OVC/WX
FV04SM RA/TA 05/WV 270030KT/TB LGT/IC NONE/RM HVY RAIN

Icing

- Describe using standard intensity and type contractions. Include altitude only if different than /FL: /IC LGT-MOD RIME, /IC SEV CLR 028-045.

Pilot Report (PIREP)

Example

UA/OV GGG 090025/TM 1450/FL 060/TP C182/SK 080 OVC/WX
FV04SM RA/TA 05/WV 270030KT /TB LGT/IC NONE/**RM HVY RAIN**

Remarks

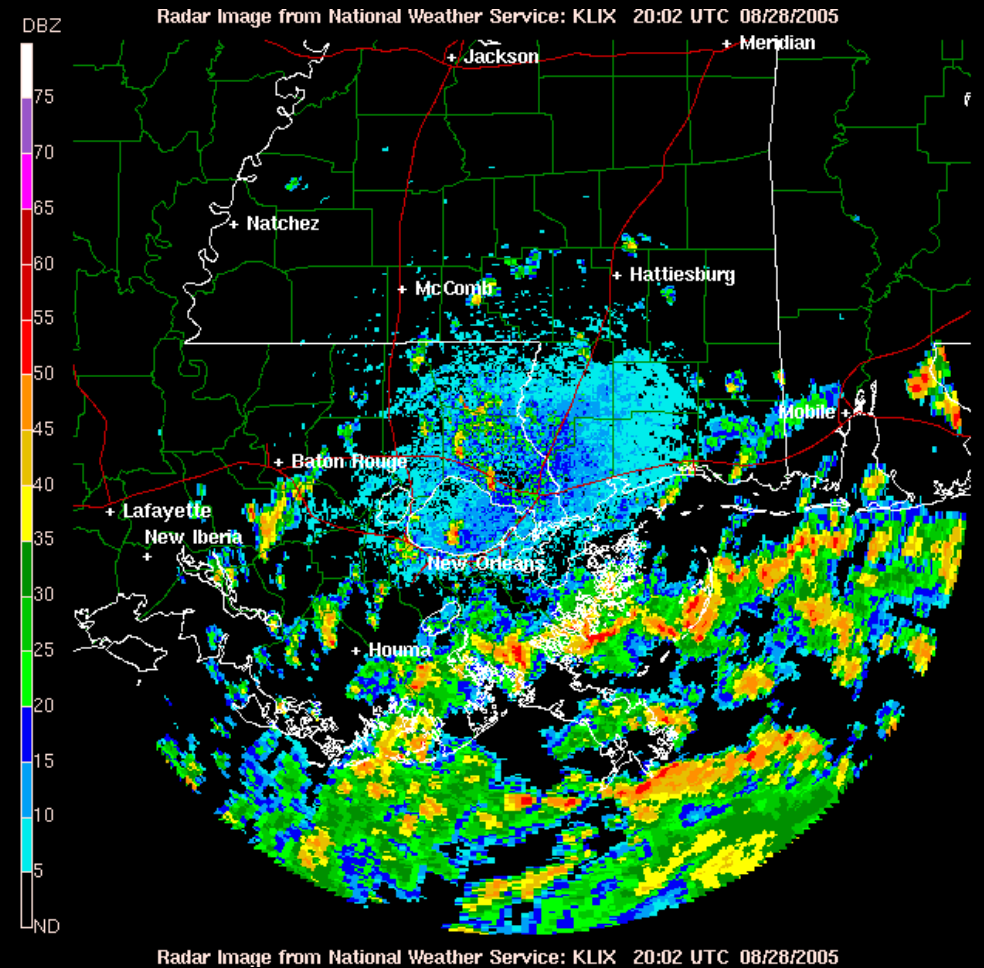
- Use free form to clarify the report and type hazardous elements first: /RM LLWS -15KT SFC-030 DURC RY22 JFK.

ARTCC Upper Air Observations

- Upper air observations are a mix of reporting methods that give the current conditions of the atmosphere. Most common method is a balloon.
- A radiosonde is a small cubic instrumentation package that is suspended below a six foot hydrogen- or helium-filled balloon. Once released, the balloon rises at a rate of approximately 1,000 feet per minute (fpm). As it ascends, the instrumentation gathers various pieces of data, such as air temperature, moisture, and pressure, as well as wind speed and direction. Once the information is gathered, it is relayed to ground stations via a 300 milliwatt radio transmitter.

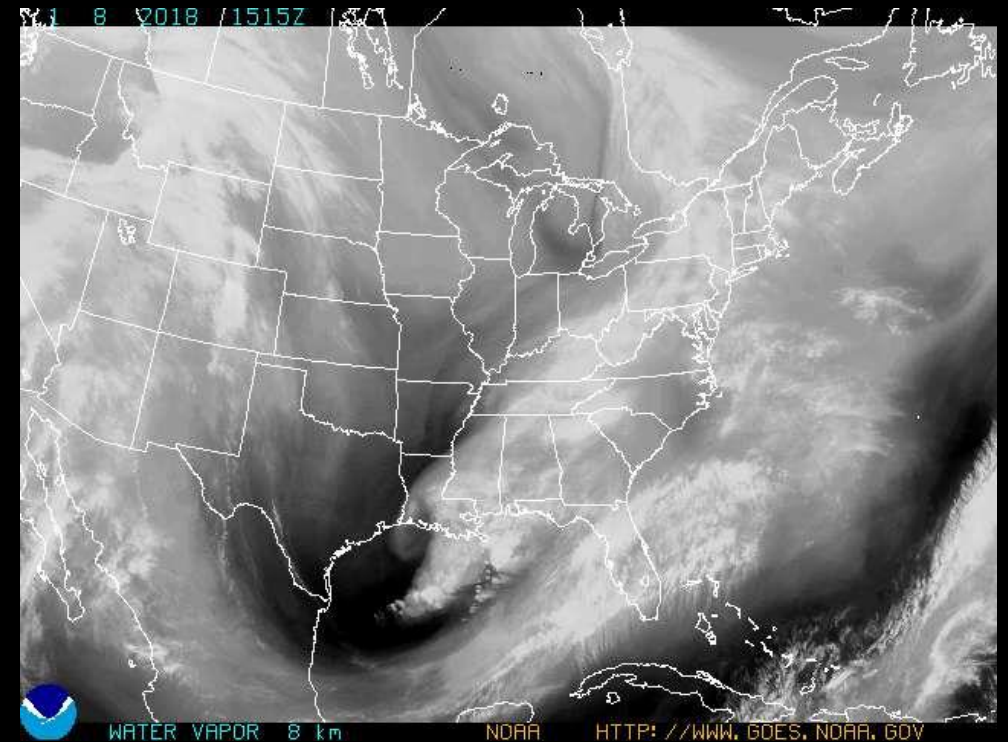
RADAR

- Radar has 4 types
 - NEXRAD Radar
 - FAA Terminal Doppler Radar
 - FAA Airport Surveillance radar
 - Airborne



Satellite

- Advancement in satellite technologies has recently allowed for commercial use to include weather uplinks. Through the use of satellite subscription services, individuals are now able to receive satellite transmitted signals that provide near realtime weather information for the North American continent.



Forecasts

Weather Products

Terminal Aerodrome Forecast (TAF)

- A TAF is a report established for the five-statute mile radius around an airport.
- TAF reports are usually given for larger airports. Each TAF is valid for a 24 or 30-hour time period and is updated four times a day at 0000Z, 0600Z, 1200Z, and 1800Z. The TAF utilizes the same descriptors and abbreviations as used in the METAR report.

Terminal Aerodrome Forecast (TAF)

Example

KGSO 301505Z 3015/3112 05007KT P6SM OVC025
FM301700 05006KT P6SM OVC040
FM310200 02005KT P6SM BKN020
FM310900 04005KT 3SM -DZ BKN008

Station ID

- The station identifier is the same as that used in a METAR

Terminal Aerodrome Forecast (TAF)

Example

KGSO 301505Z 3015/3112 05007KT P6SM OVC025
FM301700 05006KT P6SM OVC040
FM310200 02005KT P6SM BKN020
FM310900 04005KT 3SM -DZ BKN008

Time and Date of Origin

- Time and date (301505Z) of TAF origination is given in the six-number code with the first two being the date, the last four being the time. Time is always given in UTC as denoted by the Z following the time block

Terminal Aerodrome Forecast (TAF)

Example

KGSO 301505Z 3015/3112 05007KT P6SM OVC025
FM301700 05006KT P6SM OVC040
FM310200 02005KT P6SM BKN020
FM310900 04005KT 3SM -DZ BKN008

Forecast Valid Time

- The TAF valid period (0812/0912) follows the date/time of forecast origin group. Scheduled 24 and 30 hour TAFs are issued four times per day, at 0000, 0600, 1200, and 1800Z. The first two digits (08) are the day of the month for the start of the TAF. The next two digits (12) are the starting hour (UTC).

Terminal Aerodrome Forecast (TAF)

Example

KGSO 301505Z 3015/3112 05007KT P6SM OVC025
FM301700 05006KT P6SM OVC040
FM310200 02005KT P6SM BKN020
FM310900 04005KT 3SM -DZ BKN008

Forecast Valid Time

- 09 is the day of the month for the end of the TAF, and the last two digits (12) are the ending hour (UTC) of the valid period. A forecast period that begins at midnight UTC is annotated as 00. If the end time of a valid period is at midnight UTC, it is annotated as 24. For example, a 00Z TAF issued on the 9th of the month and valid for 24 hours would have a valid period of 0900/0924

Terminal Aerodrome Forecast (TAF)

Example

KGSO 301505Z 3015/3112 05007KT P6SM OVC025
FM301700 05006KT P6SM OVC040
FM310200 02005KT P6SM BKN020
FM310900 04005KT 3SM -DZ BKN008

Forecast Wind

- The wind direction and speed forecast are coded in a five-digit number group. An example would be 05007KT. The first three digits indicate the direction of the wind in reference to true north. The last two digits state the windspeed in knots appended with "KT."

Terminal Aerodrome Forecast (TAF)

Example

KGSO 301505Z 3015/3112 05007KT P6SM OVC025
FM301700 05006KT P6SM OVC040
FM310200 02005KT P6SM BKN020
FM310900 04005KT 3SM -DZ BKN008

Forecast Visibility

- Given in statute miles and may be in whole numbers or fractions. If the forecast is greater than six miles, it is coded as "P6SM."

Terminal Aerodrome Forecast (TAF)

Example

KGSO 301505Z 3015/3112 05007KT P6SM **OVC025**

FM301700 05006KT P6SM **OVC040**

FM310200 02005KT P6SM **BKN020**

FM310900 04005KT 3SM -DZ **BKN008**

Forecast Sky Condition

- Given in the same format as the METAR. Only cumulonimbus (CB) clouds are forecast in this portion of the TAF report as opposed to CBs and towering cumulus in the METAR.

Terminal Aerodrome Forecast (TAF)

Example

KGSO 301505Z 3015/3112 05007KT P6SM OVC025
FM301700 05006KT P6SM OVC040
FM310200 02005KT P6SM BKN020
FM310900 04005KT 3SM -DZ BKN008

Forecast Significant Weather

- Weather phenomena are coded in the TAF reports in the same format as the METAR.

Terminal Aerodrome Forecast (TAF)

Example

KGSO 301505Z 3015/3112 05007KT P6SM OVC025

FM301700 05006KT P6SM OVC040

FM310200 02005KT P6SM BKN020

FM310900 04005KT 3SM -DZ BKN008

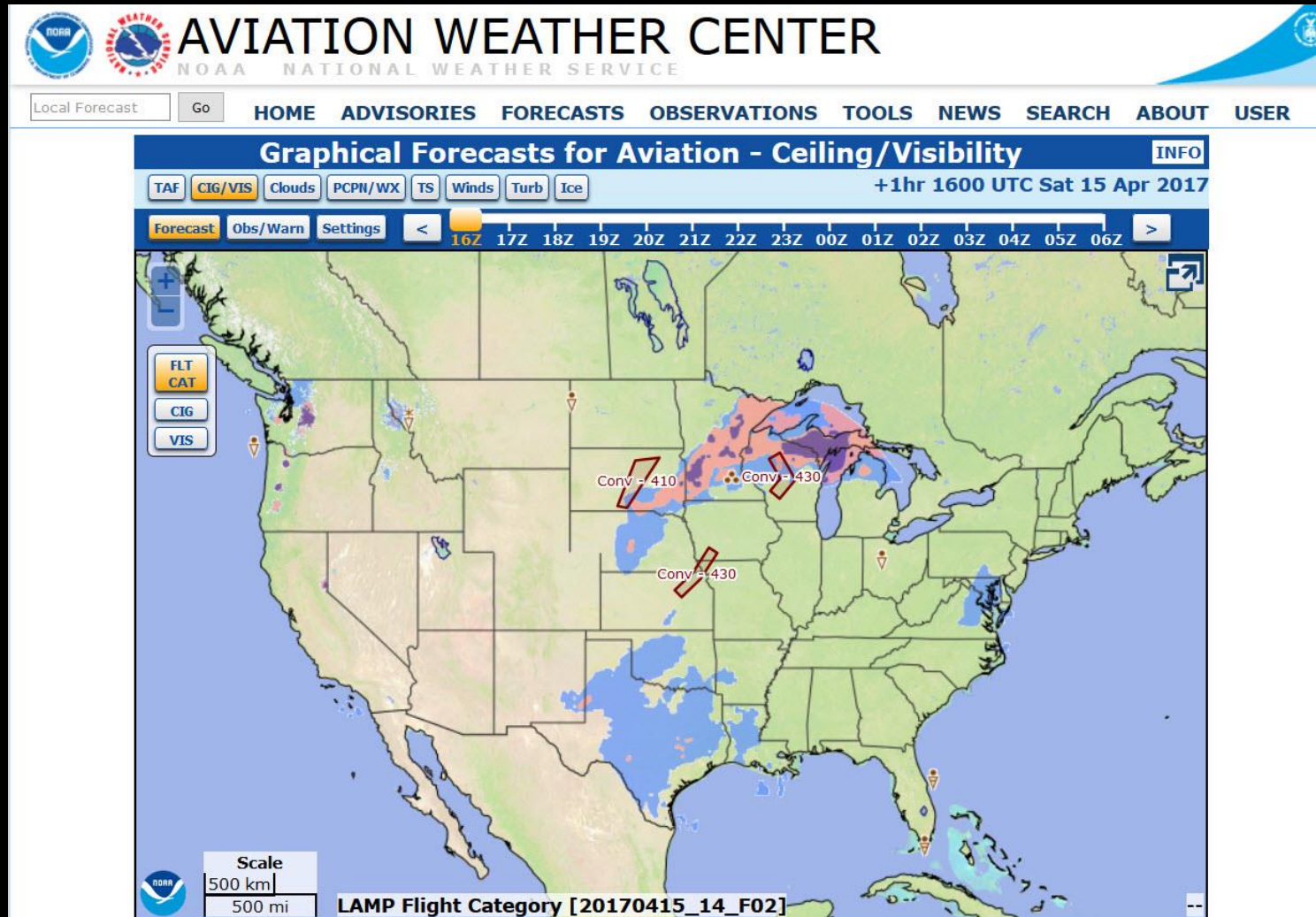
Forecast Change Group

- for any significant weather change forecast to occur during the TAF time period, the expected conditions and time period are included in this group. This information may be shown as from (FM), and temporary (TEMPO). "FM" is used when a rapid and significant change, usually within an hour, is expected. "TEMPO" is used for temporary fluctuations of weather, expected to last less than 1 hour.

Graphical Forecasts for Aviation (GFA)

- GFA was developed to replaced textual “Area Forecasts” to give pilot easier to comprehend pictural forecast data.
- Most of the GFA tool is Model Output Statistics based forecasting (MOS). This is a computer taking in data from across the county and comparing historic trends and environment to predict weather.
- <https://www.aviationweather.gov/gfa>

Graphical Forecasts for Aviation (GFA)



In-Flight Weather Advisories

Weather Products

Automatic Terminal Information Service (ATIS)

- ATIS is current weather, NOTAM, or any other pertinent information at an airport broadcasted over the radio.
- A new ATIS is typically broadcasted each hour.
 - If weather changes significantly, another one will be issued.
- ATIS is encoded with a letter of the phonetic alphabet so that you can advise ATC you have received all of the important information on ATIS.

Automatic Weather Observation System (AWOS)

- AWOS is an automated readout of current weather at an airport broadcasted over the radio.
- A new AWOS recording occurs every time the broadcast repeats.

AIRMET

- AIRMETs are examples of inflight weather advisories that are issued every 6 hours with intermediate updates issued as needed for a particular area forecast region.
- The information contained in an AIRMET is of operational interest to all aircraft.
- An AIRMET includes forecast of moderate icing, moderate turbulence, sustained surface winds of 30 knots or greater, widespread areas of ceilings less than 1,000 feet and/or visibilities less than three miles, and extensive mountain obscurement.

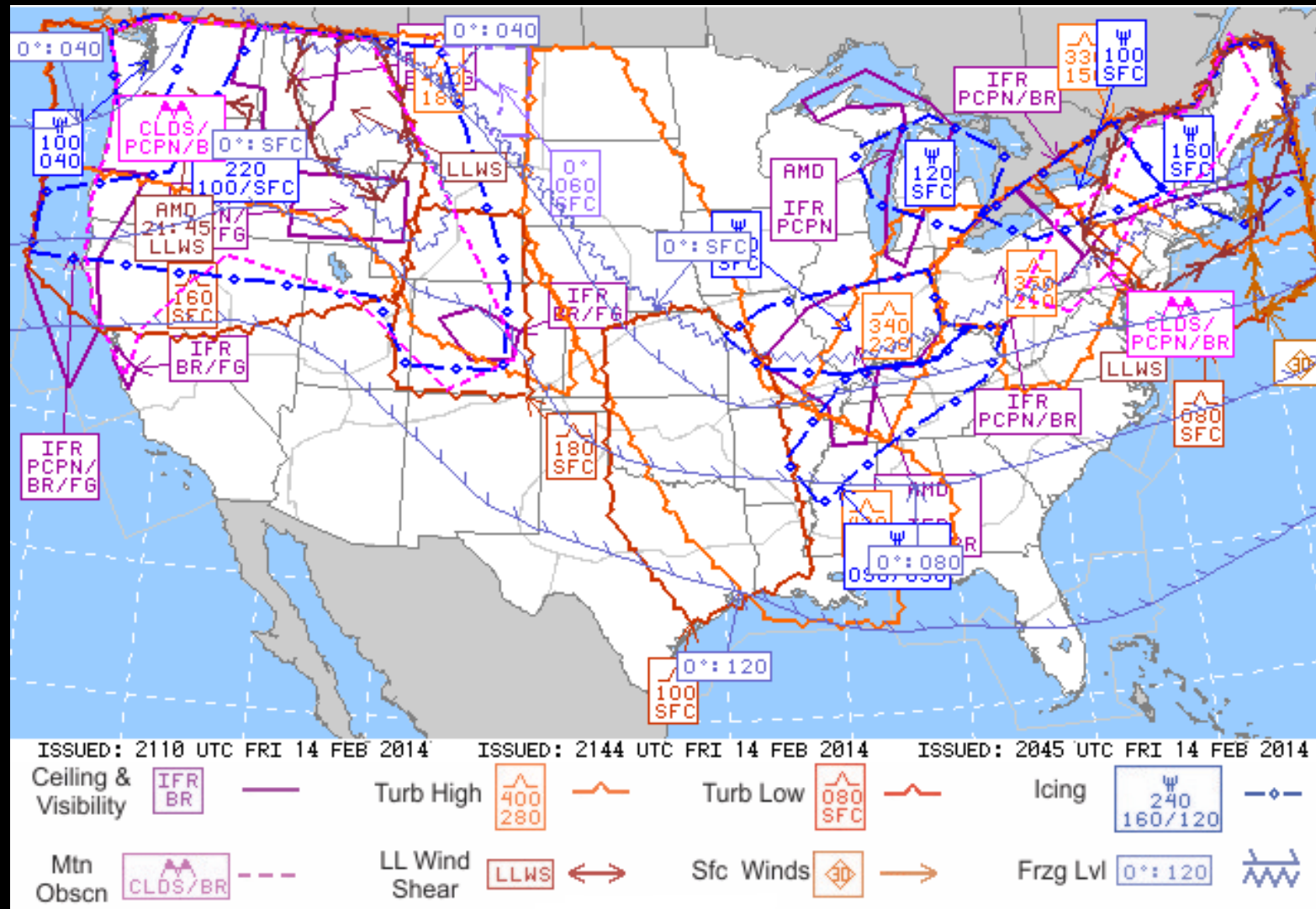
AIRMET

- **AIRMET Zulu (Z)** – Moderate or greater Icing
- **AIRME Tango (T)** – Moderate or greater Turbulence and/or sustained surface winds of 30 knots or greater
- **AIRMET Sierra (S)** - widespread areas of ceilings less than 1,000 feet and/or visibilities less than three miles, and extensive mountain obscurement.

AIRMET

- AIRMET MTN OBSCN...ME NH VT MA NY PA FROM CAR TO MLT TO CON TO SLT TO SYR TO CAR MTNS OCNLY OBSCD BY CLDS/PCPN/BR. CONDS CONT BYD 02Z THRU 08Z

AIRMET



SIGMET

- SIGMETs (WSs) are inflight advisories concerning nonconvective weather that is potentially hazardous to all aircraft.
- They report weather forecasts that include severe icing not associated with thunderstorms, severe or extreme turbulence or clear air turbulence (CAT) not associated with thunderstorms, dust storms or sandstorms that lower surface or inflight visibilities to below three miles, and volcanic ash.
- SIGMETs are unscheduled forecasts that are valid for 4 hours unless the SIGMET relates to a hurricane, in which case it is valid for 6 hours.

SIGMET

- A SIGMET is issued under an alphabetic identifier, from November through Yankee. The first issuance of a SIGMET is designated as an Urgent Weather SIGMET (UWS). Reissued SIGMETs for the same weather phenomenon are sequentially numbered until the weather phenomenon ends.

SIGMET

- SIGMET ROME02 VALID UNTIL 100530 OR WA FROM SEA TO PDT TO EUG TO SEA OCNL SEV CAT BTN FL280 AND FL350 EXPCD DUE TO JTSTR. CONDS BGNG AFT 0200Z CONTG BYD 0530Z .

Convective SIGMET (WST)

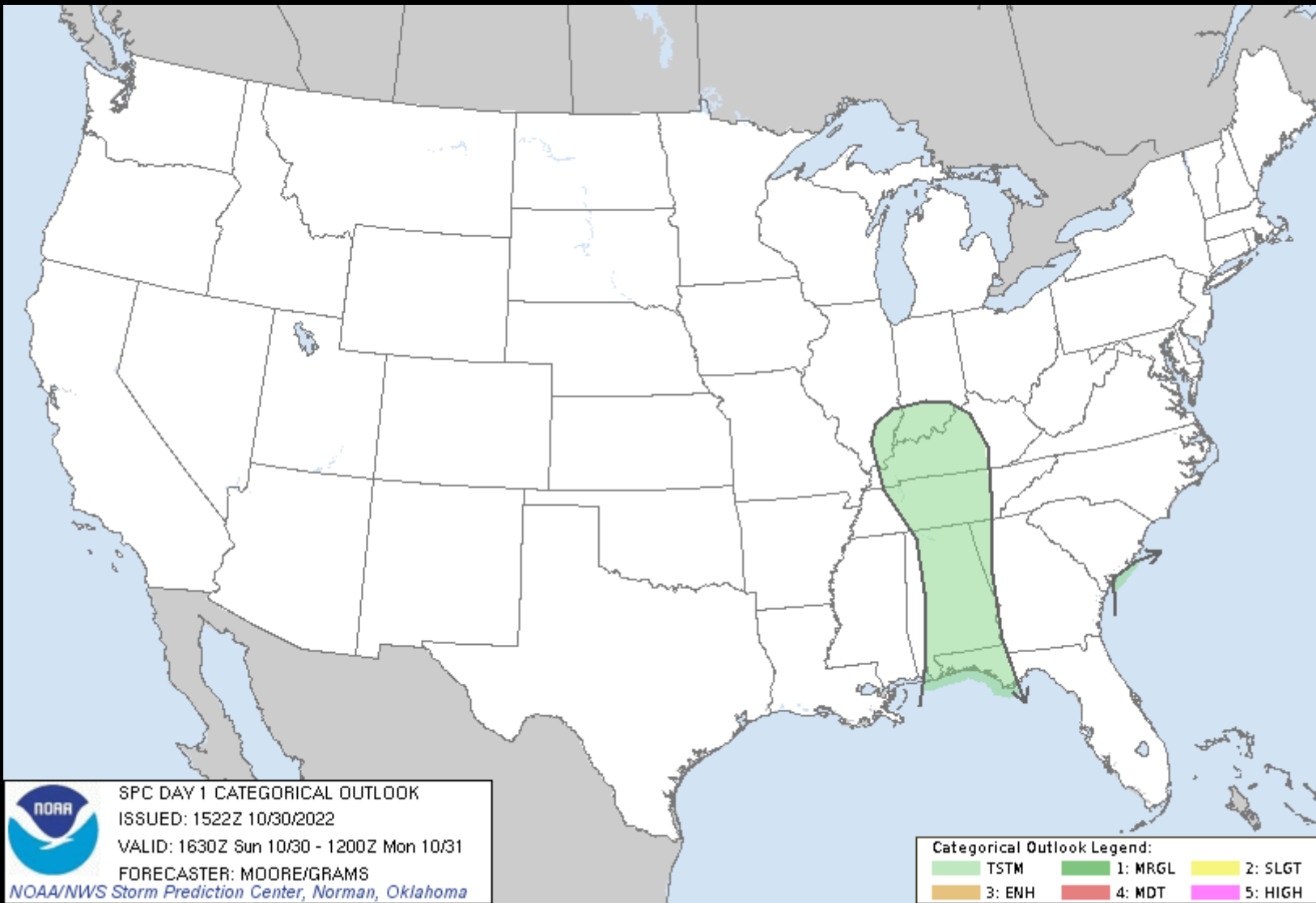
- A Convective SIGMET (WST) is an inflight weather advisory issued for hazardous convective weather that affects the safety of every flight.
- Convective SIGMETs are issued for severe thunderstorms with surface winds greater than 50 knots, hail at the surface greater than or equal to $\frac{3}{4}$ inch in diameter, or tornadoes. They are also issued to advise pilots of embedded thunderstorms, lines of thunderstorms, or thunderstorms with heavy or greater precipitation that affect 40 percent or more of a 3,000 square mile or greater region.

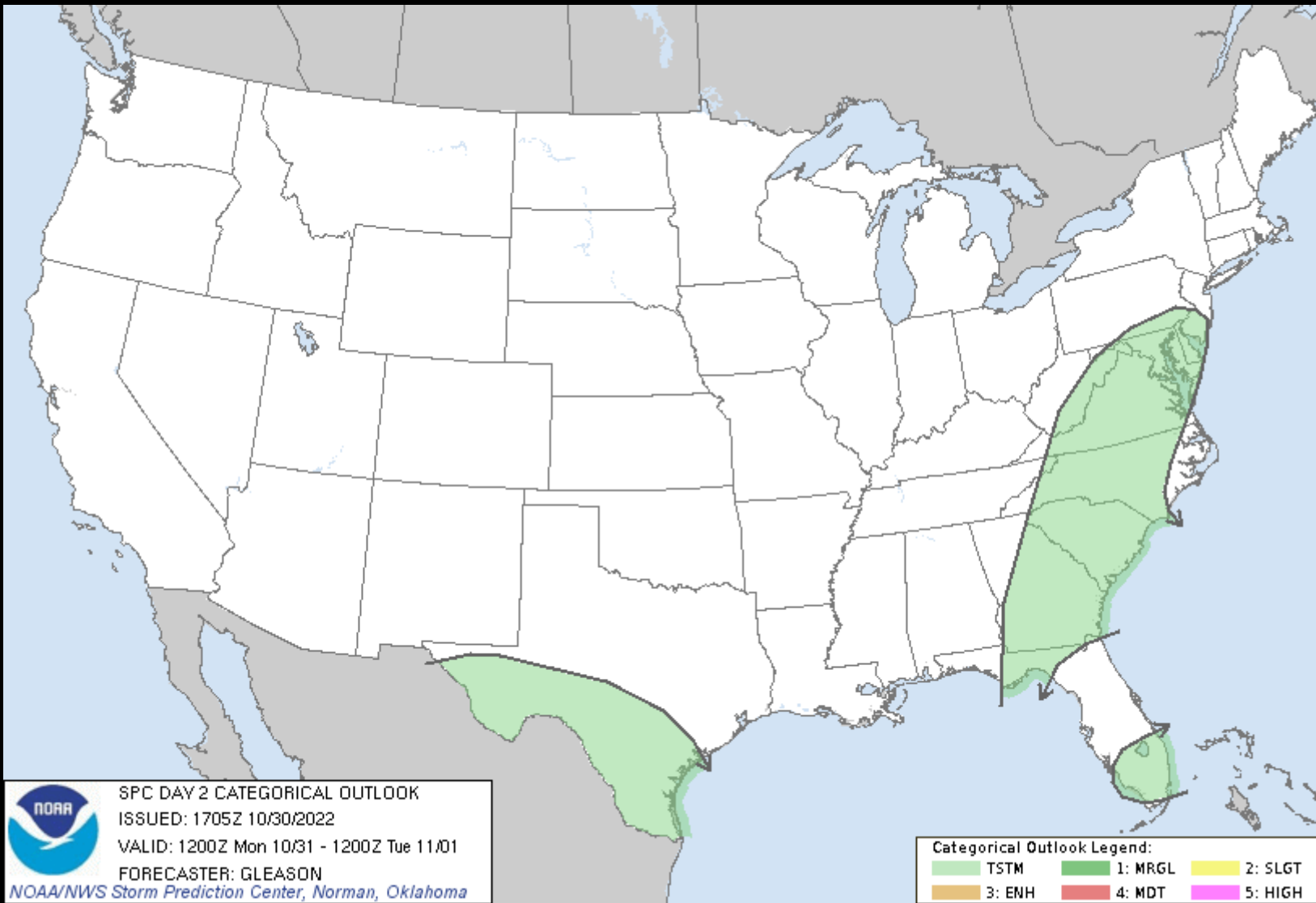
Convective SIGMET (WST)

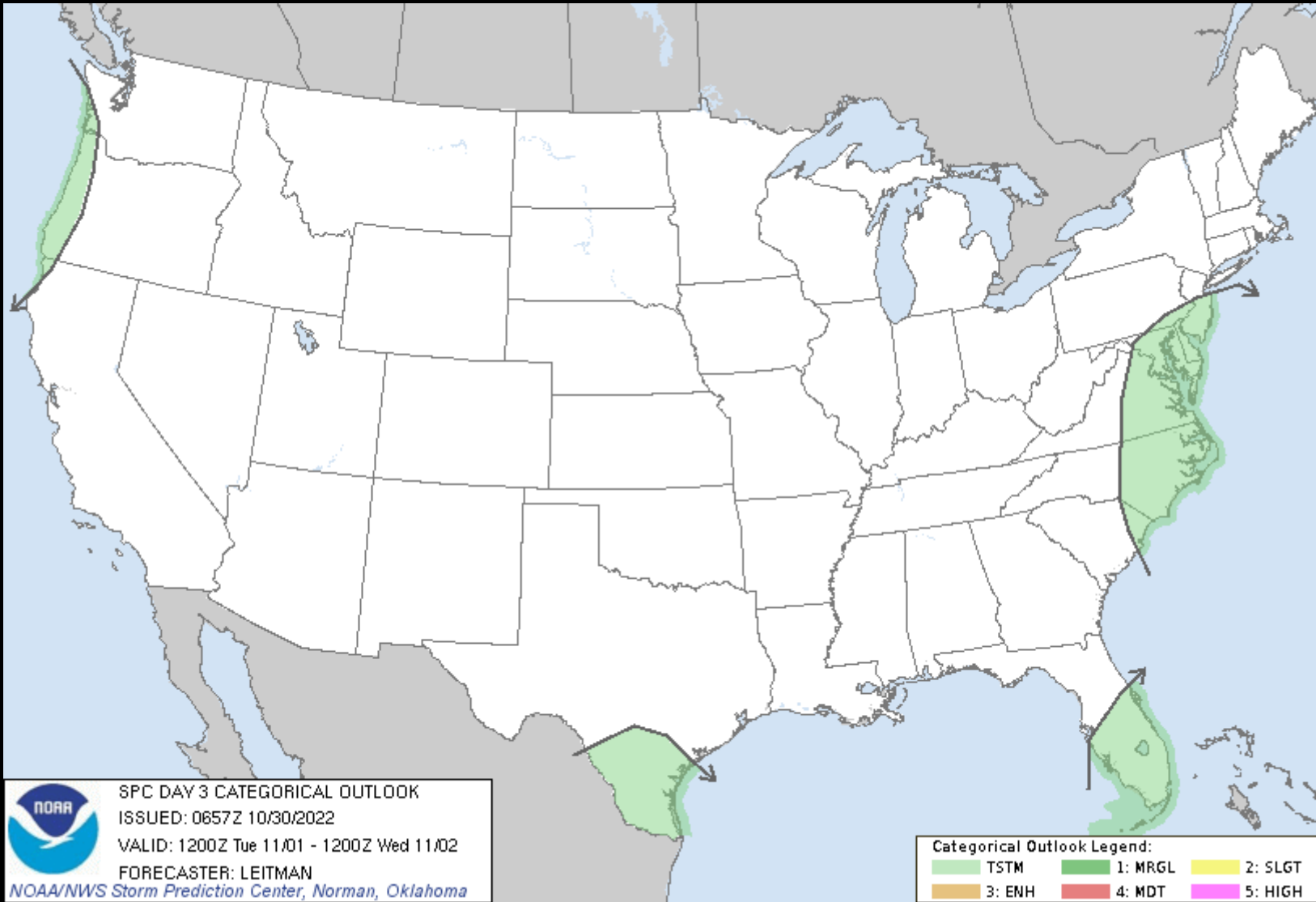
- CONVECTIVE SIGMET 20C VALID UNTIL 2055Z ND SD FROM 90W MOT-GFK-ABR-90W MOT INTSFYG AREA SEV TS MOVG FROM 24045KT. TOPS ABV FL450. WIND GUSTS TO 60KTS RPRTD. TORNADOES...HAIL TO 2 IN... WIND GUSTS TO 65KTS POSS ND PTN

Convective Outlook

- Forecast potential areas of severe thunderstorms
- Not a forecast of storm severity just potential of severe thunderstorms
- Forecasted from 1 to 8 days







Day 4

POTENTIAL TOO LOW

Day 4 - 8
Severe
Weather
Outlook
Legend

30 %

15 %



SPC DAY 4 SEVERE WEATHER OUTLOOK
ISSUED: 0819Z 10/30/2022
VALID: Wed 11/02 1200Z - Thu 11/03 1200Z
FORECASTER: LEITMAN

NOAA/NWS Storm Prediction Center, Norman, Oklahoma

Winds and Temperature Aloft (FB)

- Winds and temperatures aloft forecasts (FB) provide wind and temperature forecasts for specific locations throughout the United States, including network locations in Hawaii and Alaska. The forecasts are made twice a day based on the radiosonde upper air observations taken at 0000Z and 1200Z.

Winds and Temperature Aloft (FB)

- If the wind speed is forecast to be greater than 99 knots but less than 199 knots, the computer adds 50 to the direction and subtracts 100 from the speed. To decode this type of data group, the reverse must be accomplished.
- For example, when the data appears as "731960," subtract 50 from the 73 and add 100 to the 19, and the wind would be 230° at 119 knots with a temperature of -60 °C.
- If the wind speed is forecast to be 200 knots or greater, the wind group is coded as 99 knots. For example, when the data appears as "7799," subtract 50 from 77 and add 100 to 99, and the wind is 270° at 199 knots or greater.
- When the forecast wind speed is calm, or less than 5 knots, the data group is coded "9900," which means light and variable.

Winds and Temperature Aloft (FB)

FD WBC 151745
 DATA BASED ON 151200Z
 VALID 1600Z FOR USE 1800-0300Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
ALS			2420	2635-08	2535-18	2444-30	245945	246755	246862
AMA		2714	2725+00	2625-04	2531-15	2542-27	265842	256352	256762
DEN			2321-04	2532-08	2434-19	2441-31	235347	236056	236262
HLC		1707-01	2113-03	2219-07	2330-17	2435-30	244145	244854	245561
MKC	0507	2006+03	2215-01	2322-06	2338-17	2348-29	236143	237252	238160
STL	2113	2325+07	2332+02	2339-04	2356-16	2373-27	239440	730649	731960

Figure 17. Winds and temperatures aloft forecast

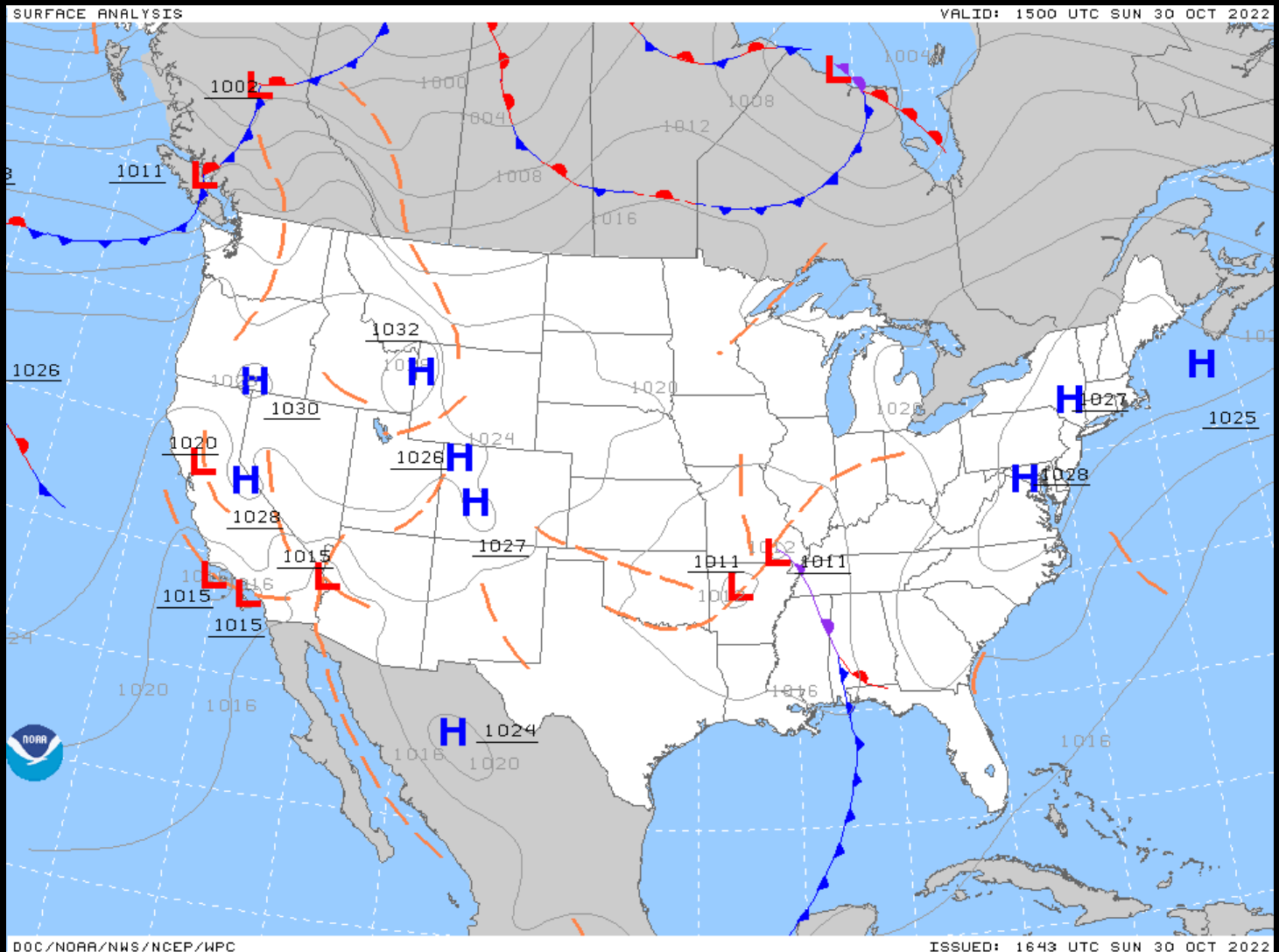
Weather Charts

Weather Products

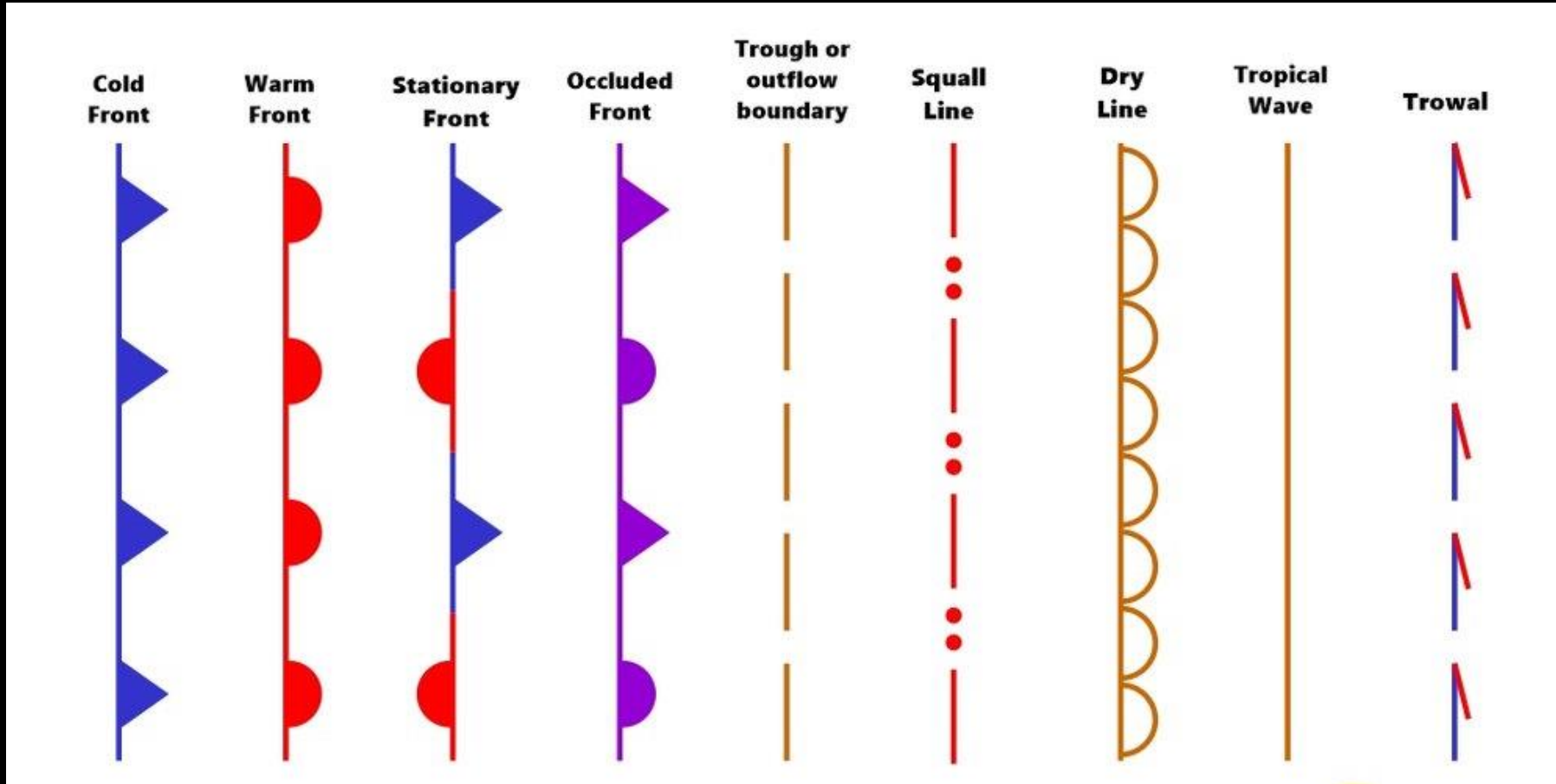
Surface Analysis Chart

- The surface analysis chart depicts an analysis of the current surface weather.
- This chart is transmitted every 3 hours and covers the contiguous 48 states and adjacent areas.
- A surface analysis chart shows the areas of high and low pressure, fronts, temperatures, dew points, wind directions and speeds, local weather, and visual obstructions.
- Grey lines are isobars that depict areas of equal pressure. Central high or low pressure are underlined.

Surface Analysis Chart



Surface Analysis Chart



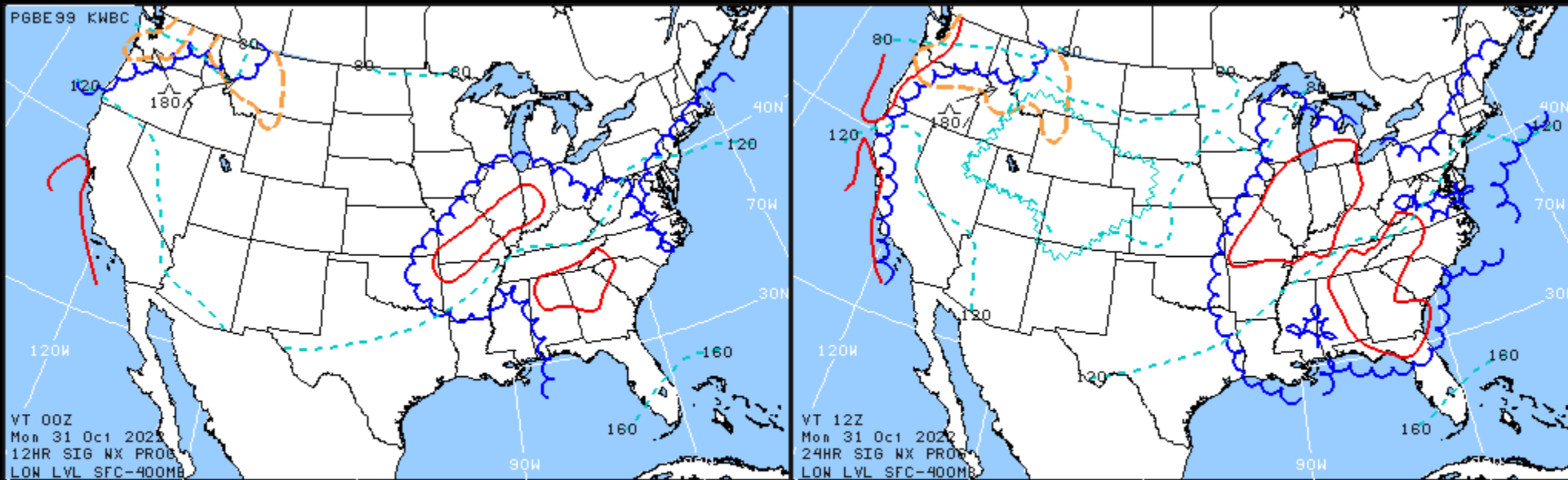
Low-Level SigWx Prog Chart

- The two panels depict freezing levels, turbulence, and low cloud ceilings and/or restrictions to visibility (shown as contoured areas of MVFR and IFR conditions).
- These charts enable the pilot to pictorially evaluate existing and potential weather hazards they may encounter. Pilots can balance weather phenomena with their aircraft capability and skill set resulting in aeronautical decision-making appropriate to the flight.
- Prognostic charts are an excellent source of information for preflight planning; however, this chart should be viewed in light of current conditions and specific local area forecasts.

Low-Level SigWx Prog Chart

- Valid from Surface to FL240
- Forecasts 12 and 24 hours

Low-Level SigWx Prog Chart



Flight planning only. See TAFs for specific terminal forecast.

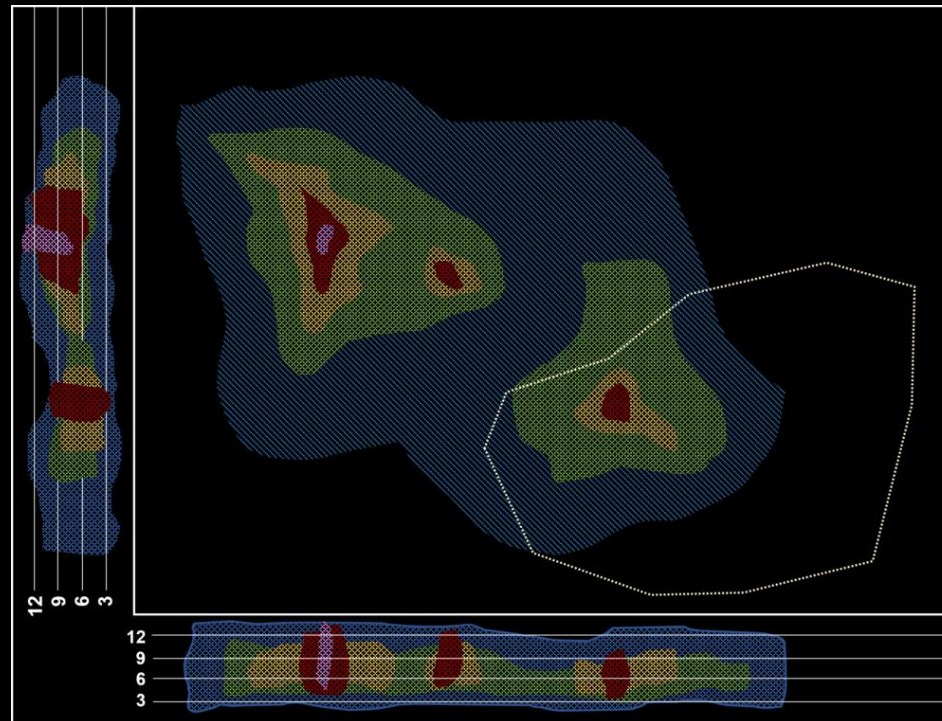
- ceiling less than 1000 ft and/or visibility less than 3 miles
- ceiling 1000-3000 ft inclusive and/or visibility 3-5 miles incl
- moderate or greater turbulence
- freezing level above mean sea level
- freezing level at surface
- TStorms imply possible svr or greater turb. svr icing and LLWS.

Additional Weather Resources

Weather Products

ATC Radar

- ATC Radar does not provide the level of detail the NEXRAD or Airborne radar.
- Albeit modern weather radar system have greatly improved.



EFB/EFD Weather Displays

- Many aircraft manufacturers now include data link weather services with new electronic flight display (EFD) systems. EFDs give a pilot access to many of the data link weather services available.
- In-Cockpit weather resources are great but come with the limitation of time.
 - Many weather products take a few minutes to create and distribute.
 - Due to this limitation you should not use in-cockpit radar as a means for navigating thunderstorms.
 - Always check the age of the information or report.

ADS-B Flight Information Stream FIS-B

- Flight Information Service–Broadcast (FIS-B) is a ground broadcast service provided through the Automatic Dependent Surveillance–Broadcast (ADS-B) Services network over the 978 MHz UAT data link.
- The FAA FIS-B system provides pilots and flight crews of properly-equipped aircraft with a flightdeck display of certain aviation weather and aeronautical information which are listed below.
 - METAR, PIREP and TAF
 - NEXRAD (regional and CONUS) precipitation maps
 - Notice to Airmen (NOTAM)
 - AIRMET/SIGMET
 - Temporary Flight Restrictions (TFRs)
 - Winds and Temperatures Aloft

Knowledge Check

What was the date and time of the report?

KCPR 011505Z 21023G32KT 10SM CLR 12/M04 A2990 RMK
AO2 PK WND 20034/1526 RAB43E50 SLP097 P0000
T01171044

- A. 1505 Local time on the 01st of the month
- B. 1505 Zulu time on the 01st of the month
- C. 0100 Local time on 15th of the month
- D. 0115 Zulu Time on the of the month

Knowledge Check

What was the date and time of the report?

KCPR 011505Z 21023G32KT 10SM CLR 12/M04 A2990 RMK
AO2 PK WND 20034/1526 RAB43E50 SLP097 P0000
T01171044

- A. ~~1505 Local time on the 01st of the month~~
- B. 1505 Zulu time on the 01st of the month
- C. ~~0100 Local time on 15th of the month~~
- D. ~~0115 Zulu Time on the of the month~~

Knowledge Check

What was the lowest ceiling?

**KBUF 011654Z AUTO 23006KT 4SM BR BKN004 OVC010 14/13
A3004 RMK AO2 SLP175 T01390128 \$**

- A. 10,000' AGL Overcast layer
- B. 400' MSL Broken later
- C. 4,000' AGL Broken layer
- D. 400' AGL Broken layer

Knowledge Check

What was the lowest ceiling?

KBUF 011654Z AUTO 23006KT 4SM BR BKN004 OVC010 14/13
A3004 RMK AO2 SLP175 T01390128 \$

- ~~A. 10,000' AGL Overcast layer~~
- ~~B. 400' MSL Broken later~~
- ~~C. 4,000' AGL Broken layer~~
- D. 400' AGL Broken layer**

Knowledge Check

Which of the following would show areas of turbulence?

- A. METAR
- B. TAF
- C. Radar
- D. AIRMET

Knowledge Check

Which of the following would show areas of turbulence?

- A. ~~METAR~~
- B. ~~TAF~~
- C. ~~Radar~~
- D. **AIRMET**

Knowledge Check

How long is a TAF valid?

- A. 1 hour
- B. 24-30 hours
- C. 4 hours
- D. 6 hours

Knowledge Check

How long is a TAF valid?

A. ~~1 hour~~

B. 24-30 hours

C. ~~4 hours~~

D. ~~6 hours~~

Knowledge Check

If you are planning a flight for tomorrow evening, what type of weather briefing should you get?

- A. Abbreviated
- B. Standard
- C. Forecast
- D. Outlook

Knowledge Check

If you are planning a flight for tomorrow evening, what type of weather briefing should you get?

- ~~A. Abbreviated~~
- ~~B. Standard~~
- ~~C. Forecast~~
- D. Outlook**

Knowledge Check

What are the clouds going to be at 2000Z?

KGEG 011641Z 0117/0212 05004KT 5SM -RA BR BKN015
FM020200 24005KT 4SM -RA BR BKN012
FM020800 27006KT P6SM OVC015
PROB30 0208/0212 4SM -RASN BR OVC008

- A. Broken at 1,500' AGL
- B. Broken at 1,200' AGL
- C. Overcast at 1,500' MSL
- D. Overcast at 800' AGL

Knowledge Check

What are the clouds going to be at 2000Z?

KGEG 011641Z 0117/0212 05004KT 5SM -RA BR BKN015
FM020200 24005KT 4SM -RA BR BKN012
FM020800 27006KT P6SM OVC015
PROB30 0208/0212 4SM -RASN BR OVC008

- A. Broken at 1,500' AGL
- B. ~~Broken at 1,200' AGL~~
- C. ~~Overcast at 1,500' MSL~~
- D. ~~Overcast at 800' AGL~~

Knowledge Check

What is the forecast valid times of this TAF?

KGEG 011641Z 0117/0212 05004KT 5SM -RA BR BKN015
FM020200 24005KT 4SM -RA BR BKN012
FM020800 27006KT P6SM OVC015
PROB30 0208/0212 4SM -RASN BR OVC008

- A. 0117Z to 0212Z
- B. 1641Z to 0111Z
- C. 1700Z to 1200Z
- D. 0100 Z to 0410Z

Knowledge Check

What is the forecast valid times of this TAF?

KGEG 011641Z 0117/0212 05004KT 5SM -RA BR BKN015
FM020200 24005KT 4SM -RA BR BKN012
FM020800 27006KT P6SM OVC015
PROB30 0208/0212 4SM -RASN BR OVC008

- A. ~~0117Z to 0212Z~~
- B. ~~1641Z to 0111Z~~
- C. 1700Z to 1200Z
- D. ~~0100 Z to 0410Z~~

Knowledge Check

What is the biggest limitation with NEXRAD in-cockpit radar displays?

- A. Screen size is too small
- B. Delay of information
- C. Quality of radar data
- D. All of the above

Knowledge Check

What is the biggest limitation with NEXRAD in-cockpit radar displays?

- ~~A. Screen size is too small~~
- B. Delay of information**
- ~~C. Quality of radar data~~
- ~~D. All of the above~~