

SAWS VIII

INFORM

IMPROVE

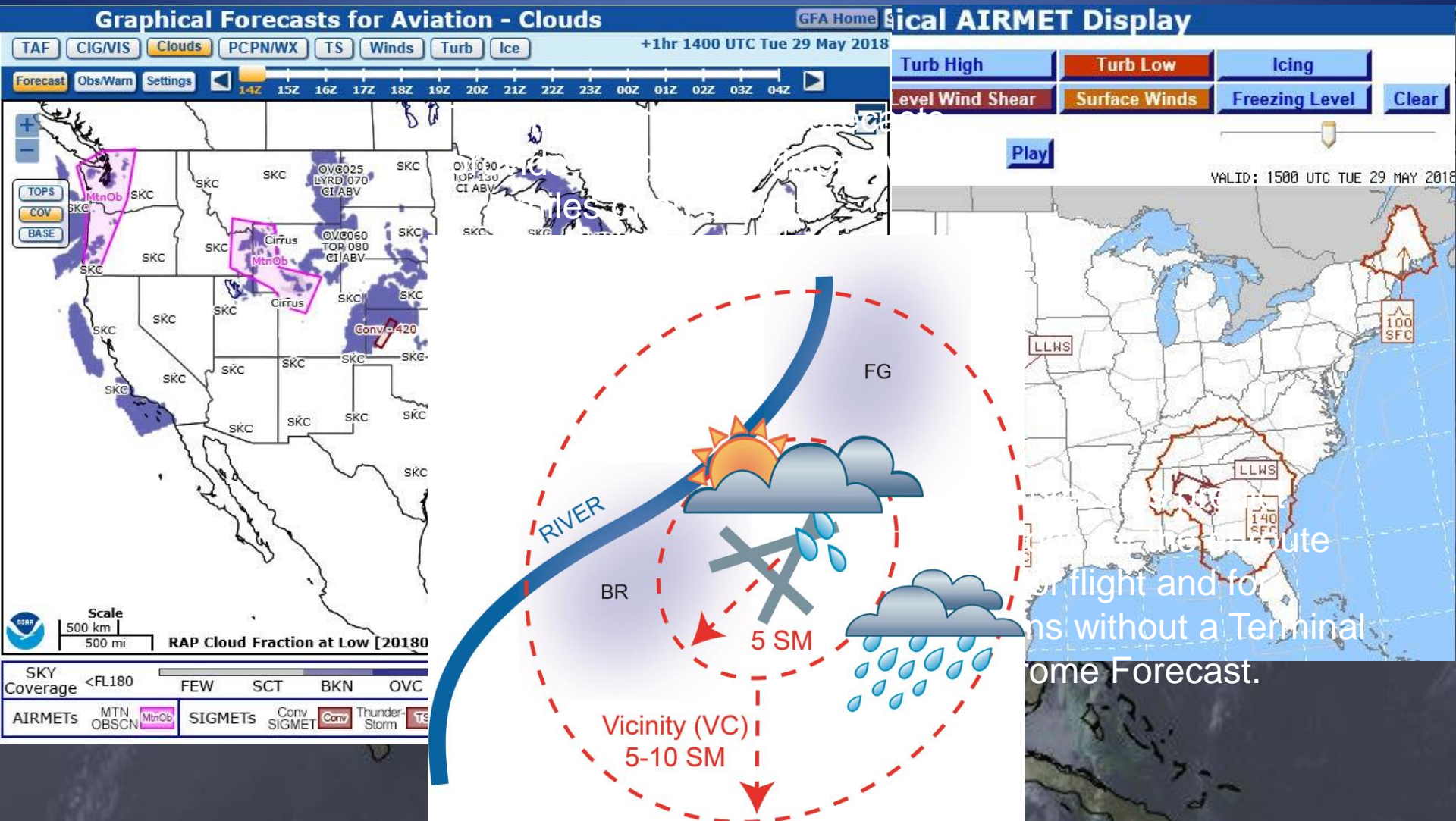
INNOVATE

Interpretation & Application of Aviation Weather Forecasts



Developed by
Terry Lankford
from the
National Weather
Association's *Weather
Theory for Pilot's Program*

Aviation Weather Forecasts



...to route
 for flight and for
 ns without a Terminal
 ome Forecast.

Forecast Limitations/Accuracy



In general forecasts for good weather are more likely to be correct than forecasts for poor weather.



Forecasts are most reliable for distinct weather systems.



Forecasts are most accurate during the first hours of the period.



Accuracy deteriorates the farther into the forecast.



Errors in timing are more prevalent than errors of occurrence.



Forecast issuance and valid times, and amendment criteria reflect these limitations.

Weather Advisories



SCOPE: Weather advisories typically forecast large scale events affecting, or in the judgment of the forecaster expected to have a significant impact on, aircraft operations.



PURPOSE: Weather advisories forecast adverse conditions for preflight planning and to alert enroute pilots to hazardous or potentially hazardous weather.



LIMITATIONS: Although some phenomena may be included or implied in other forecasts; pilots must consult advisories to obtain the complete weather picture. Yet, advisories cannot be issued for each individual thunderstorm, or instance of turbulence, icing, or IFR weather. Severe weather can develop before an advisory is written and distributed. The mere absence of an advisory is NOT a guarantee that hazardous weather does not exist or will not develop.

Warning

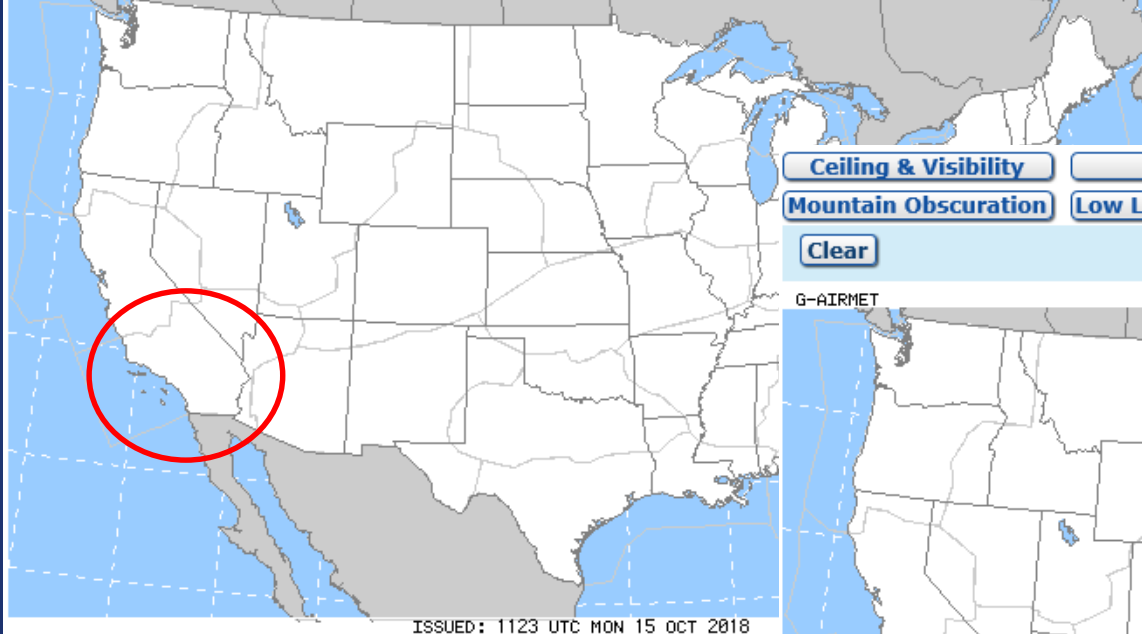
Graphical products display a "snapshot" of expected conditions at a specific valid time. Avoid interpolating between periods. Operationally, should lower conditions exist at the previous valid time, consider those conditions to exist through the next time period. Should lower conditions prevail at the subsequent valid time, apply those conditions during the intermediate interval. Users should assume lower conditions exist between "snapshot" valid times.



AIRMET Bulletin

Control panel for the top AIRMET display. It includes buttons for 'Ceiling & Visibility', 'Turb High', 'Turb Low', 'Icing', 'Mountain Obscuration', 'Low Level Wind Shear', 'Surface Winds' (highlighted in orange), and 'Freezing Level'. Below these are 'Clear', navigation arrows, time selection buttons (12Z, 15Z, 18Z, 21Z), and a 'Play' button.

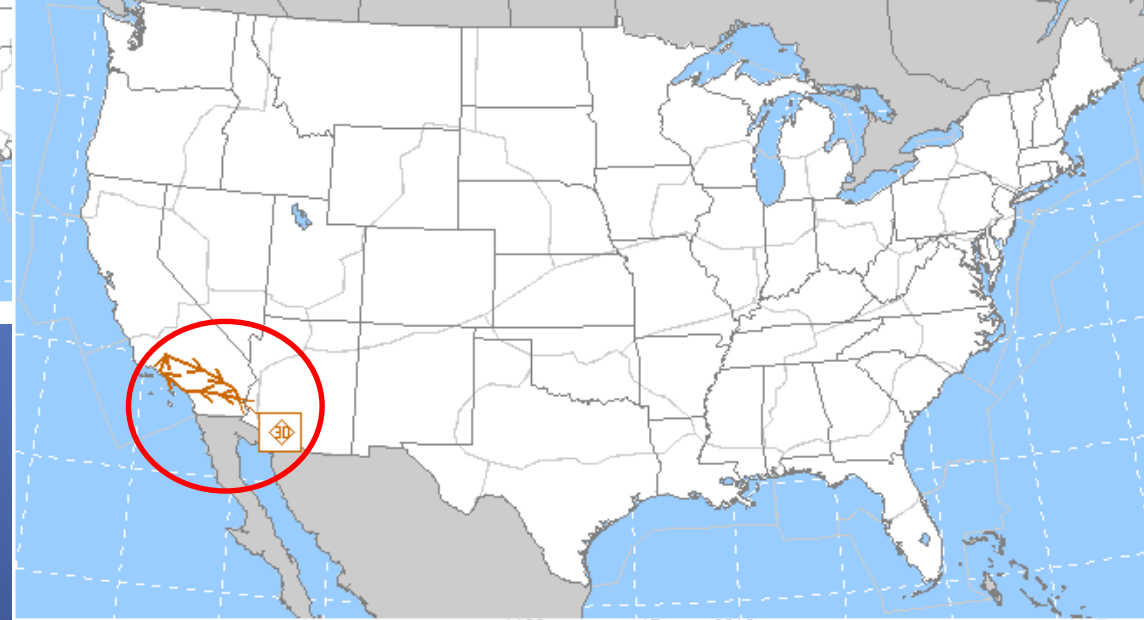
G-AIRMET VALID: 1200 UTC MON 15 OCT 2018



ISSUED: 1123 UTC MON 15 OCT 2018

Control panel for the bottom AIRMET display. It includes buttons for 'Ceiling & Visibility', 'Turb High', 'Turb Low', 'Icing', 'Mountain Obscuration', 'Low Level Wind Shear', 'Surface Winds' (highlighted in orange), and 'Freezing Level'. Below these are 'Clear', navigation arrows, time selection buttons (12Z, 15Z, 18Z, 21Z), and a 'Play' button.

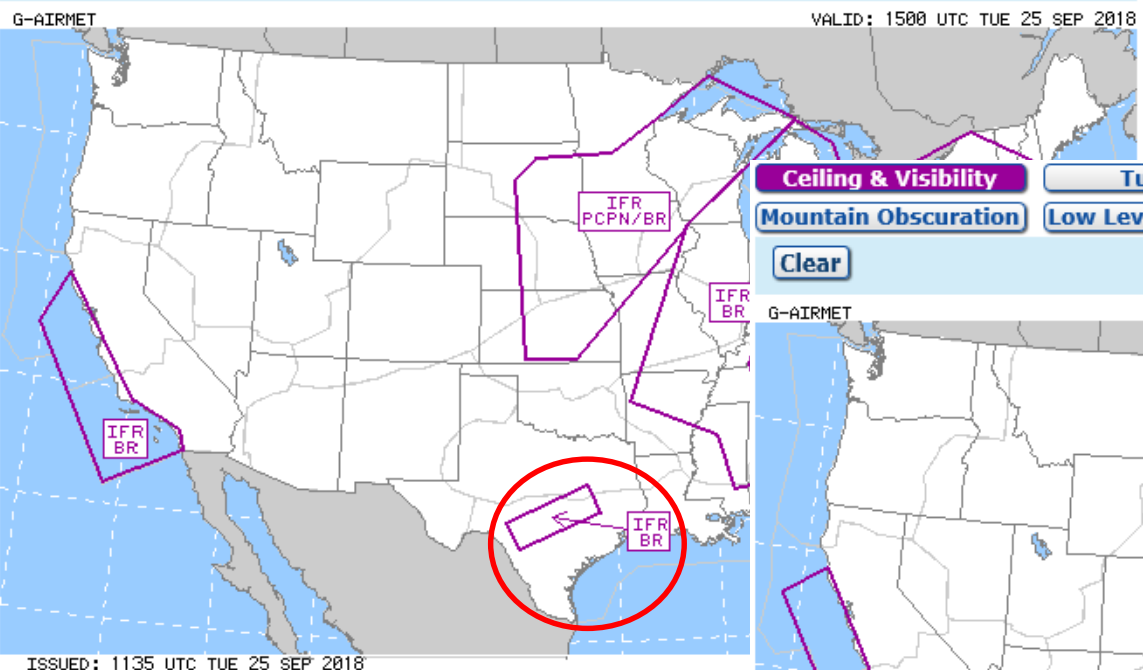
G-AIRMET VALID: 1500 UTC MON 15 OCT 2018



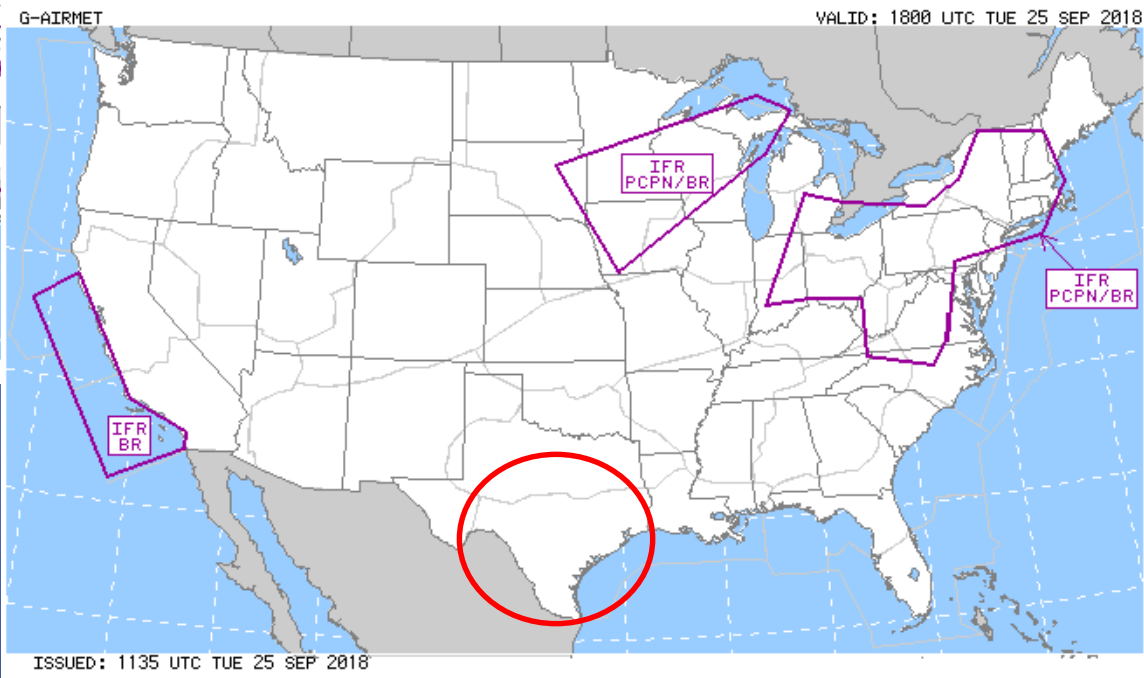
ISSUED: 1123 UTC MON 15 OCT 2018

AIRMET Bulletin





Ceiling & Visibility **Turb High** **Turb Low** **Icing**
Mountain Obscuration **Low Level Wind Shear** **Surface Winds** **Freezing Level**
Clear ◀ **12Z** **15Z** **18Z** **21Z** ▶ **Play**



Ceiling & Visibility **Turb High** **Turb Low** **Icing**
Mountain Obscuration **Low Level Wind Shear** **Surface Winds** **Freezing Level**
Clear ◀ **12Z** **15Z** **18Z** **21Z** ▶ **Play**



Operationally

-  Expect AIRMET phenomena to affect over 50% of the area at any time.
-  From a forecast perspective phenomena usually lies well within the delineated area. 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.
-  Mountain obscuration typically means VFR flight is possible in the valleys, but may not be possible through mountain passes and particularly across mountain ridges.
-  Whether or not an advisory is in effect, *never overlook* "real time" sources: which include pilot observations, METARs, PIREPs, and Radar and Satellite products.

SIGMETs

SLCX WS 011348

SIGMET XRAY 1 VALID UNTIL 011748

ID WY NV UT

FROM MLD TO 40ESE BPI TO 30SSW HVE TO 20ESE ILC TO MLD

OCNL SEV TURB BLW FL180. DUE TO STG LOW LVL WND. RPTD BY ACFT.
CONDS CONTG BYD 1748Z.



Convective SIGMETs

MKCE WST 021555

CONVECTIVE SIGMET 46E

VALID UNTIL 1756Z

FL GA AL AND FL AL CSTL WTRS

FROM 20NE ABY-110ESE LEV

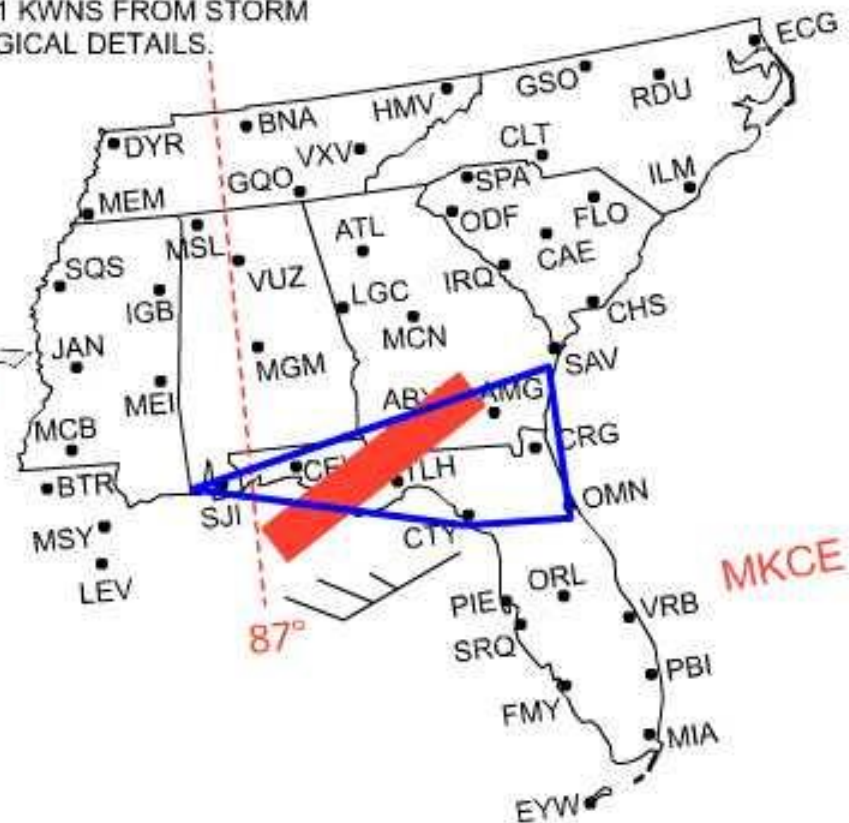
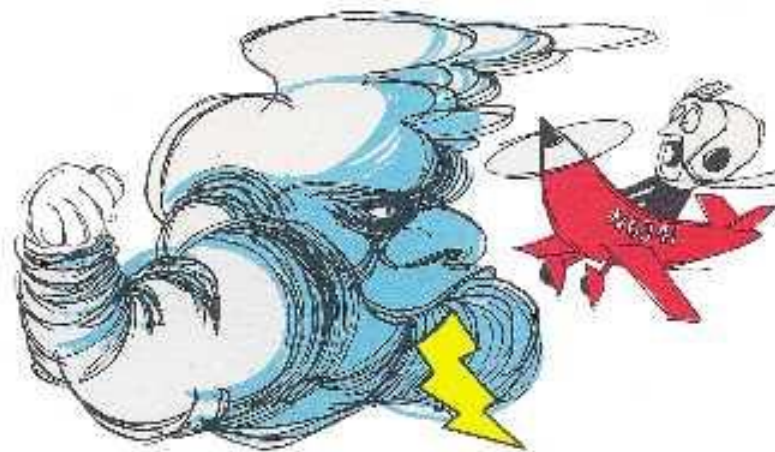
LINE TS 40 NM WIDE MOV FROM 24025KT TOPS ABV FL450.

TORNADOES...HAIL TO 2 IN. WIND GUST TO 60KT POSS.





OUTLOOK VALID 021755-022155

FROM 20SW SAV-OMN-CTY-40W SJI-20SW SAV

WST ISSUANCE POSS. REFER TO MOST RECENT ACUS01 KWNS FROM STORM PREDICTION CENTER FOR SYNOPSIS AND METEOROLOGICAL DETAILS.



Center Weather Advisories

-  Unscheduled products issued when conditions significantly affect IFR operations and to help pilots avoid hazardous weather.
-  Update or expand the AIRMETs, SIGMETs, or Convective SIGMETs, or may be issued prior to conditions meeting other advisory criteria.
-  May not be issued until reports confirm the phenomena.
-  Expand on reported events by describing areal and temporal coverage.

Center Weather Advisories

ZLA1 CWA 311930

ZLA CWA 103 VALID UNTIL 312045

FROM 15E TRM TO 60SSE TRM TO 45E MZB TO 40WSW

HEC TO HEC TO 15E TRM

OCNL SEV TURB BLW 150. STG MID/LOW LVL SW WINDS

OVR MTNS WITH LCL STG UDDF. ASSOC'D MTN WVE ACT.



ZJX3 CWA 021515

ZJX CWA 303 VALID UNTIL 021715

FROM 40S CEW-75NE CEW-50N AMG-75S TLH-40S CEW

AREA LIFR CIGS AOB 005 AND VIS 1/2-2SM IN PCPN/FG.

CONDS SPRDG EWD THRU 17Z



Graphical Forecasts for Aviation



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.

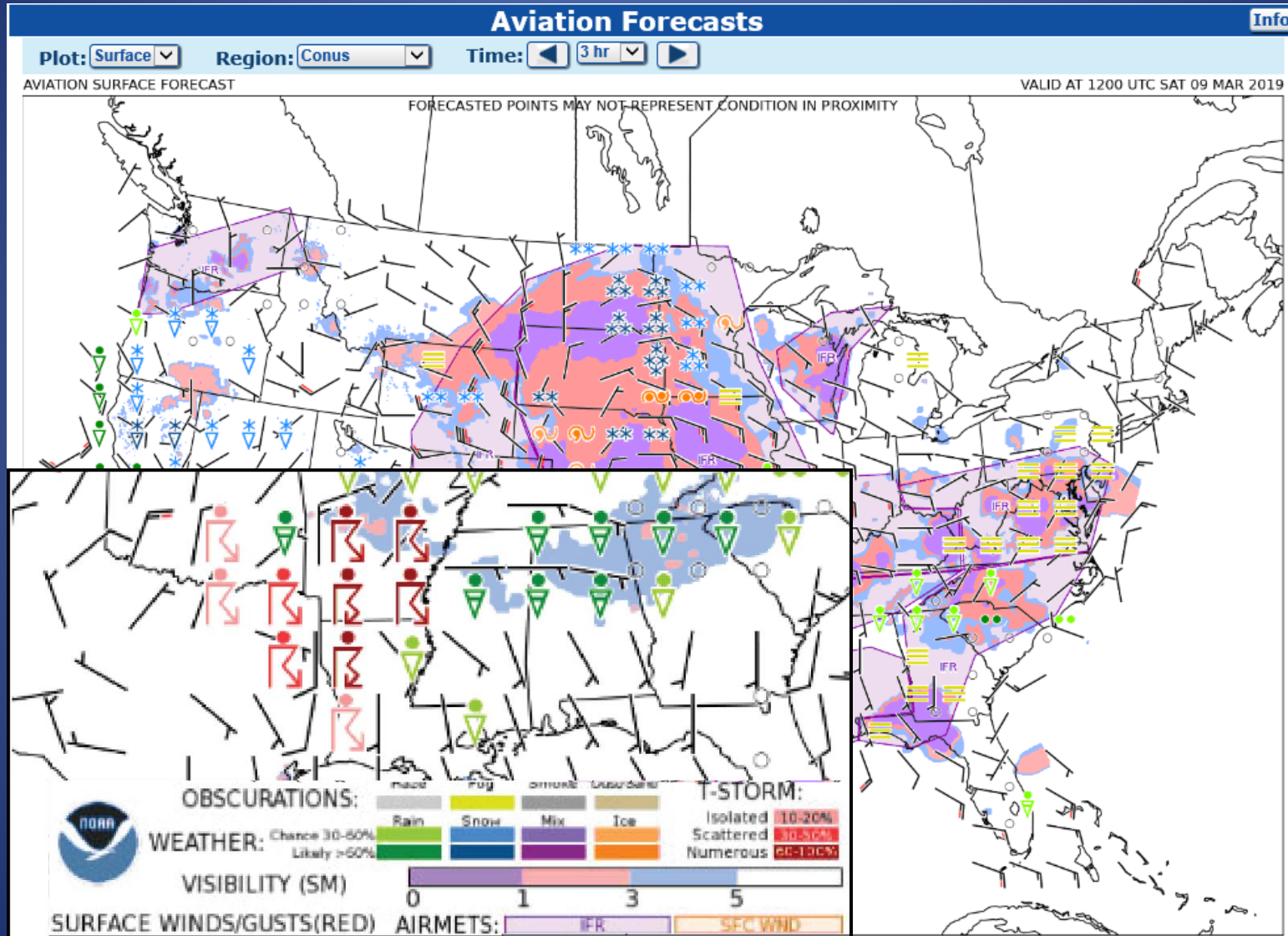


PURPOSE: The GFA provides a forecast for the enroute phase of flight and for locations without a Terminal Aerodrome Forecast.

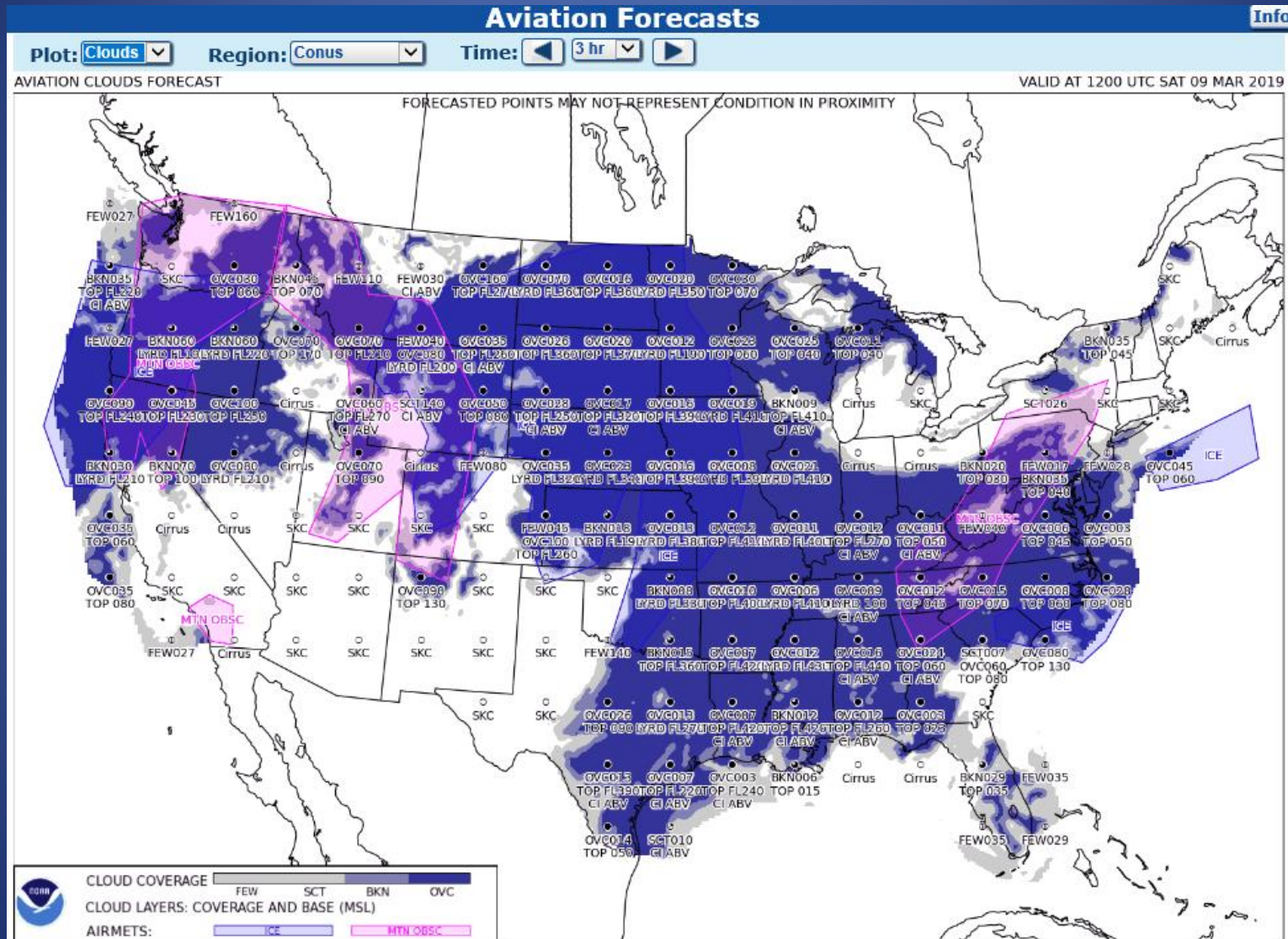


LIMITATIONS: The GFA is not intended to cover every phenomena. Events predicted in other products might not appear. The GFA suite requires users to view several pages to obtain pertinent data, and can suffer from clutter.

Aviation Surface Forecasts



Aviation Clouds Forecasts









Winds and Temperatures Aloft Tabular Forecasts

DATA BASED ON 080600Z

VALID 081200Z FOR USE 0800-1500Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
BIH		9900	9900+07	2612+01	2634-12	2741-25	275341	276052	277063
BLH	3610	0408+17	9900+13	3408+05	3124-11	3128-24	313240	314350	315562
FAT	3308	3205+13	2906+06	2817-01	2633-11	2642-25	265141	265752	266963
FOT	2026	2132+06	2338+00	2346-05	2467-17	2462-28	258343	740652	740864
ONT	0207	3505+17	9900+12	2610+05	2723-11	2824-24	293040	284151	285662
RBL	1817	2220+08	2428+02	2438-03	2558-16	2563-28	258242	259251	750264
SAC	2206	2315+10	2519+04	2528-02	2549-13	2656-26	257442	257951	258663
SAN	3408	0105+18	9900+13	9900+06	2917-11	2919-23	292540	293750	295262
SBA	0410	3613+16	3312+09	2915+03	2524-11	2531-24	263640	264350	275263
SFO	2607	2513+11	2518+05	2528-01	2546-13	2554-25	256842	257751	248163
SIY		2234+06	2347+00	2451-04	2563-17	2462-28	258043	259752	740964
WJF		0109+15	3109+10	2715+04	2625-11	2728-24	283241	284251	285763
AST	2320	2324+01	2429-05	2347-10	2364-21	2377-33	741146	741356	259860
IMB			2424-01	2430-06	2456-18	2569-30	268545	269554	259863
LKV			2448+00	2556-04	2558-16	2555-28	257243	269553	750464
OTH	2320	2333+03	2437-03	2246-06	2357-19	2466-30	249245	750155	249662
PDX	2015	2431+02	2441-03	2450-09	2375-19	2376-31	249247	750557	259560
RDM		2527+05	2525-01	2432-06	2463-18	2467-30	258545	259955	259863
GEG		1809+00	2217-05	2622-10	2559-22	2575-32	760347	761358	278659
SEA	1407	1915+01	2324-05	2429-12	2365-22	2381-33	741747	741956	259660
YKM	9900	2313+01	2631-03	2647-10	2359-20	2486-31	259447	760458	269059

Advantages

-  Displays designed for the non-meteorologist users.
-  Provides a single source for multiple products.
-  Updated continuously.
-  Displays scalable and customizable (GFA Suite).
-  Temporal resolution (GFA Suite) 1 hour; (Aviation Surface/Clouds) 3 hours.
-  Forecasts to 15 hours (GFA Suite); (Aviation Surface/Clouds) 18 hours.

Limitations



Users may eliminate areas of hazardous weather by disabling certain Weather Grids (GFA Suite).



Weather Symbols are point forecasts and may not represent surrounding conditions.



Displays may suffer from clutter.



No amendments. (Although, Weather Advisories automatically amend the forecast.)








Automated; may not be as accurate as forecasts with human involvement (e.g. Weather Advisories and TAFs).



Operationally, use all available information and apply personal minimums.

Perceived Inaccuracies

-  Expect differences between Weather Grid and Weather Symbol depiction of weather phenomena.
-  Weather Grid and Weather Symbol displays may be based on difference computer models.
-  A Weather Grid depiction of "Chance" represents a 30 to 60% probability; a Weather Symbol may ONLY have a probability of "Slight Chance" ($\leq 20\%$ probability).
-  Thunderstorm Weather Grid coverage may indicate "Chance;" but, not have a high enough probability to warrant a thunderstorm Weather Symbol.
-  Depictions are correct within the scope of each product. Both may differ from Weather Advisories and TAFs.

Terminal Aerodrome Forecasts



SCOPE: TAFs forecast events at and adjacent to designated airports.



PURPOSE: TAFs provide a specific, aerodrome forecast for departure, destination, and alternates.



LIMITATIONS: TAFs are not written for all airports. They do not cover all hazardous events. Pilots must not extrapolate the forecast, especially in mountainous areas. Actual conditions may differ from the forecast as long as they fall within prescribed parameters.

TAF Change Groups

PREVAILING: An equal to or greater than 50% probability of occurrence, expected to last more than half of the forecast period.

FROM: FM d d t t t t

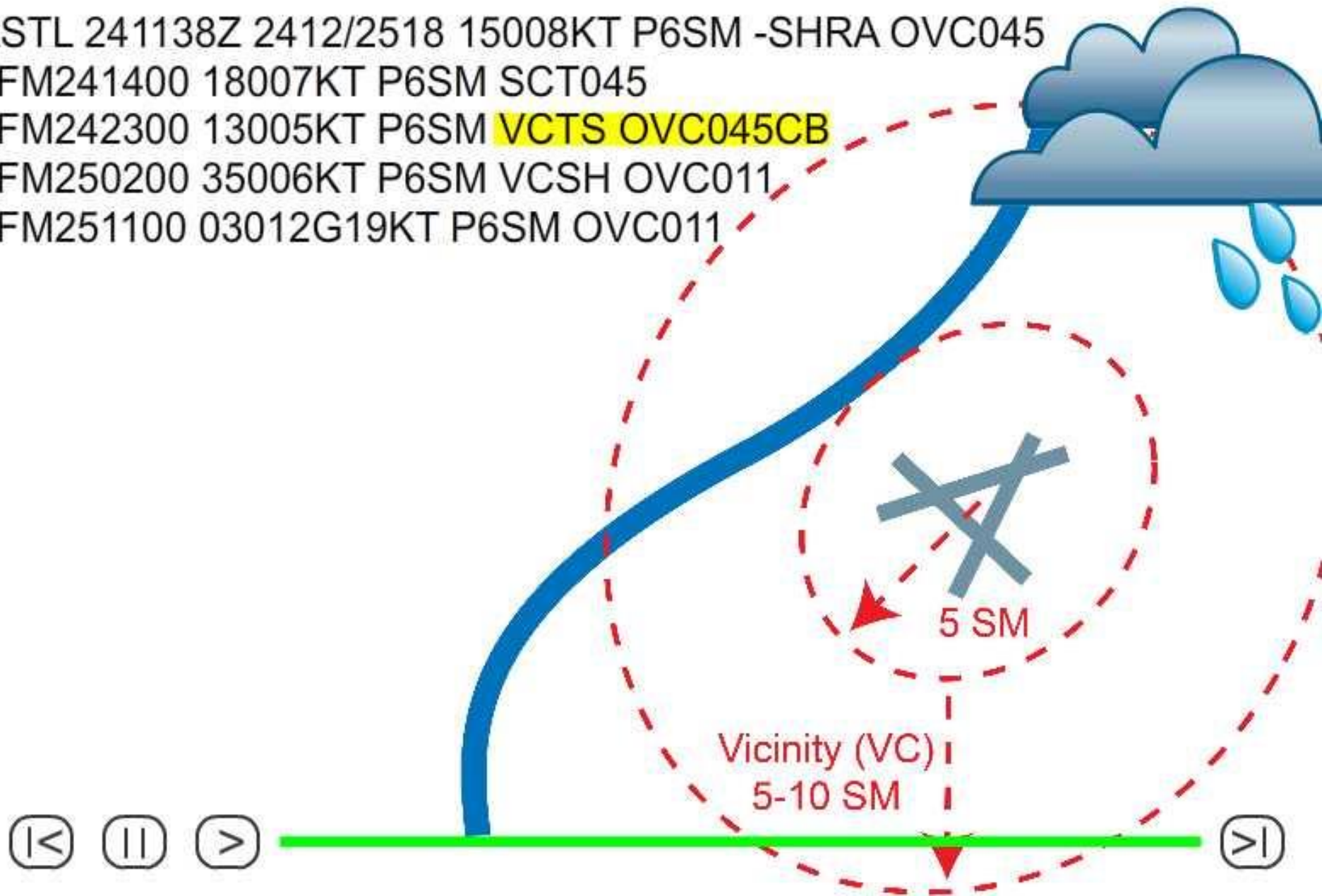
TEMPO: A 50% or greater probability of occurrence, expected to last for generally less than an hour at a time, and cover less than half of the forecast period.

PROB30: A 30% probability of occurrence.

TEMPO/PROB30 d d h h / d d h h

VCTS/CB Groups

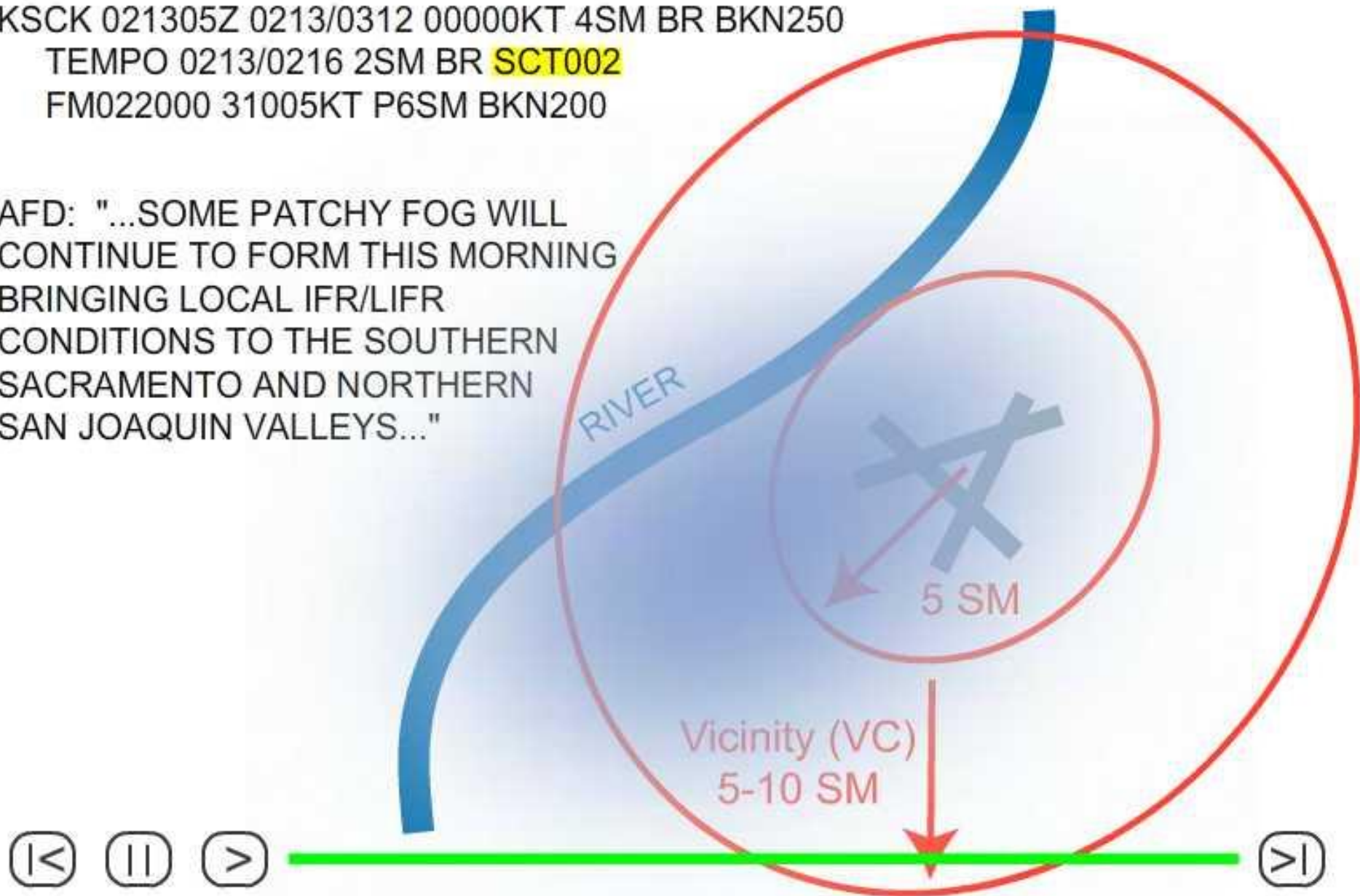
KSTL 241138Z 2412/2518 15008KT P6SM -SHRA OVC045
FM241400 18007KT P6SM SCT045
FM242300 13005KT P6SM **VCTS OVC045CB**
FM250200 35006KT P6SM VCSH OVC011
FM251100 03012G19KT P6SM OVC011



Slight Risk

KSCK 021305Z 0213/0312 00000KT 4SM BR BKN250
TEMPO 0213/0216 2SM BR **SCT002**
FM022000 31005KT P6SM BKN200

AFD: "...SOME PATCHY FOG WILL CONTINUE TO FORM THIS MORNING BRINGING LOCAL IFR/LIFR CONDITIONS TO THE SOUTHERN SACRAMENTO AND NORTHERN SAN JOAQUIN VALLEYS..."



Amendment Criteria



Winds



Visibility



Ceiling

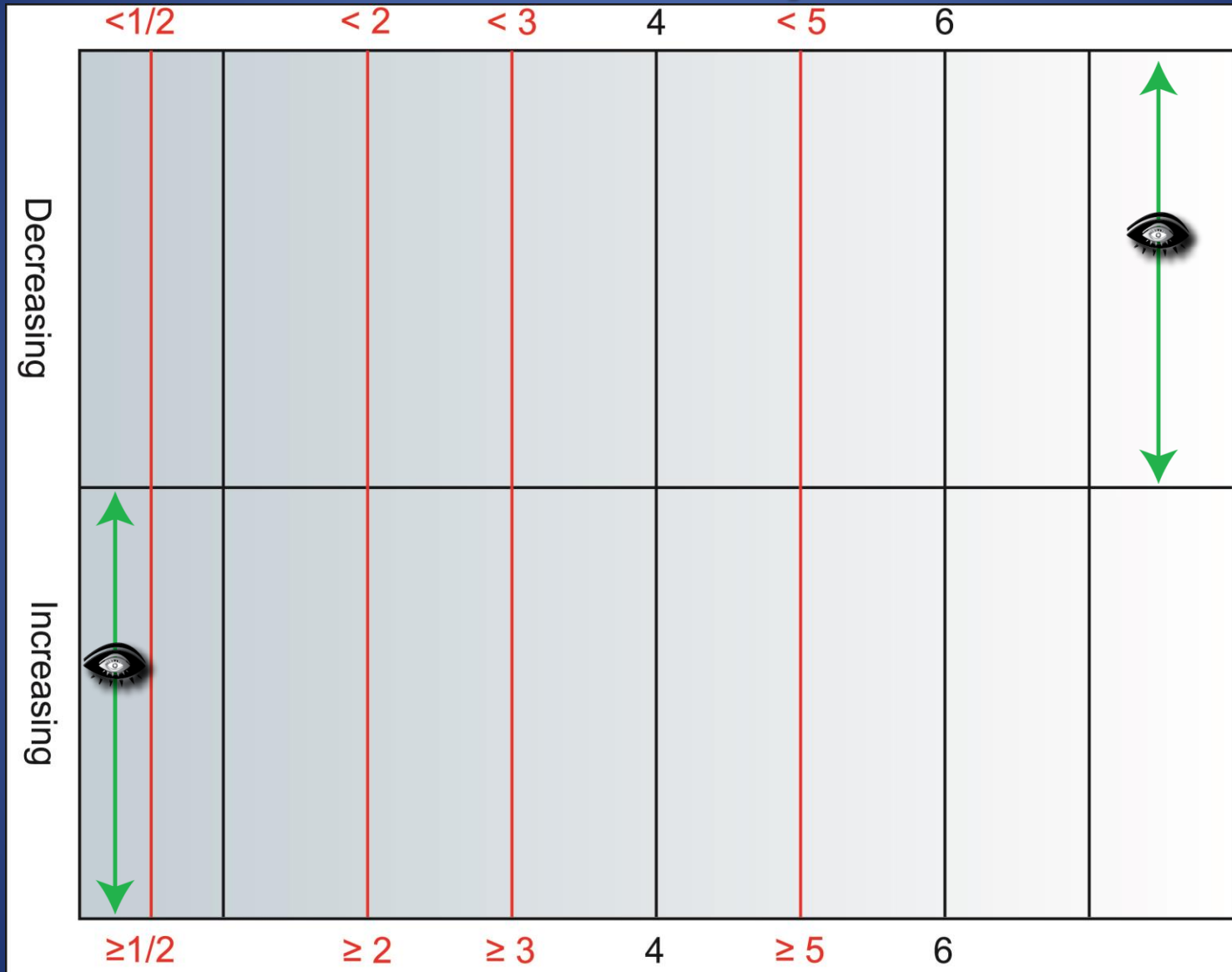


Ceiling/Visibility Controlling
Elements

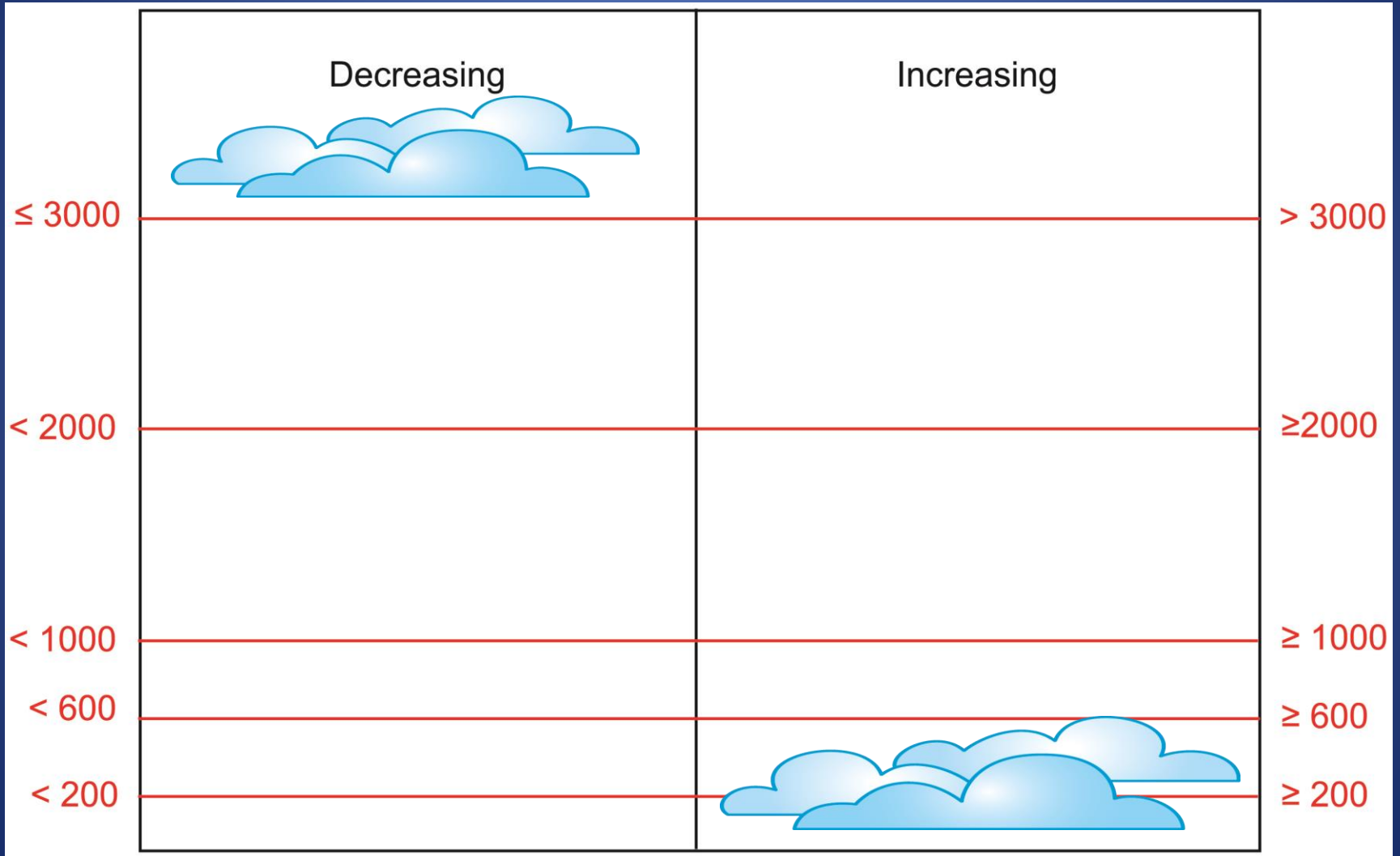


Weather Phenomena

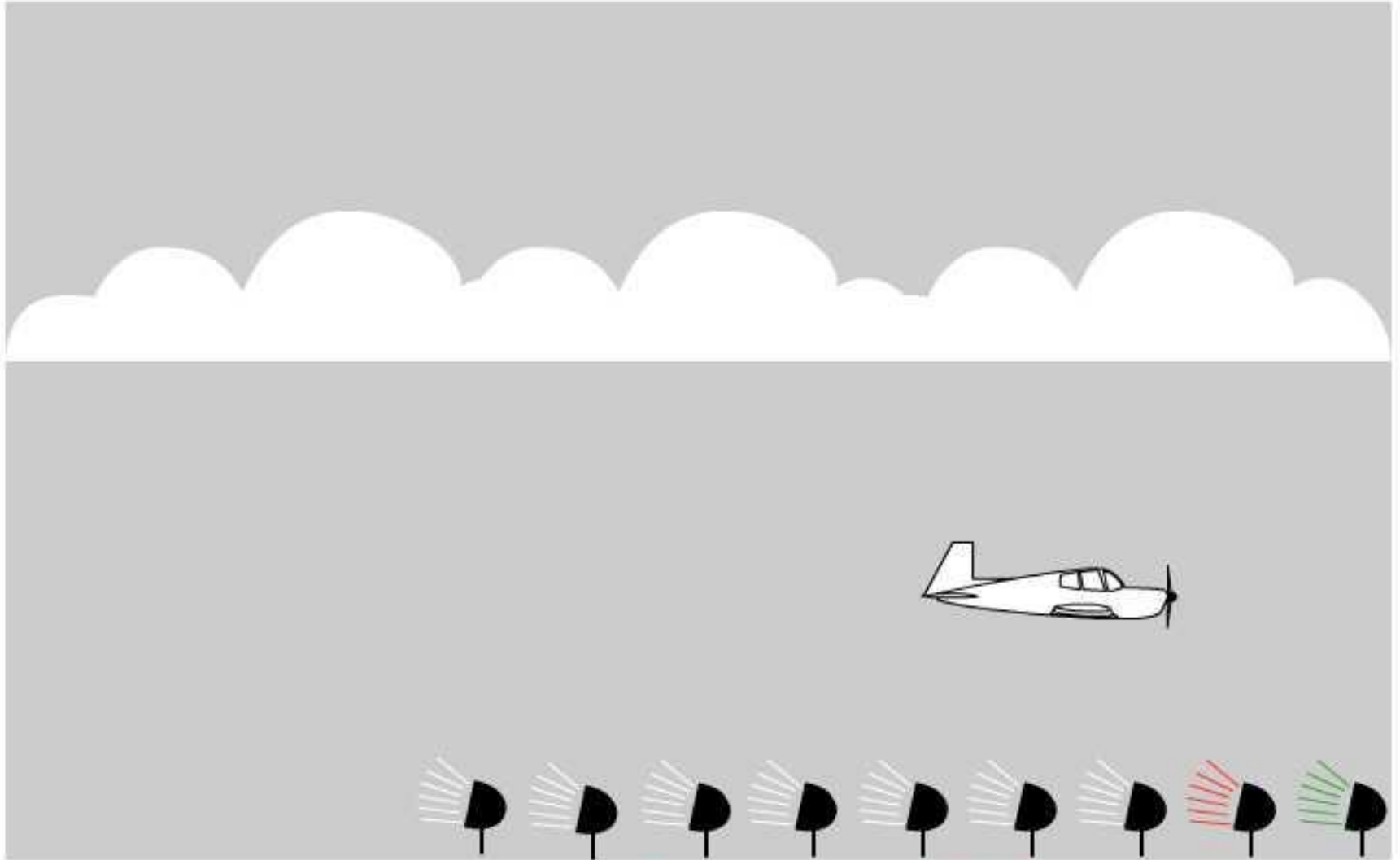
Visibility



Ceiling



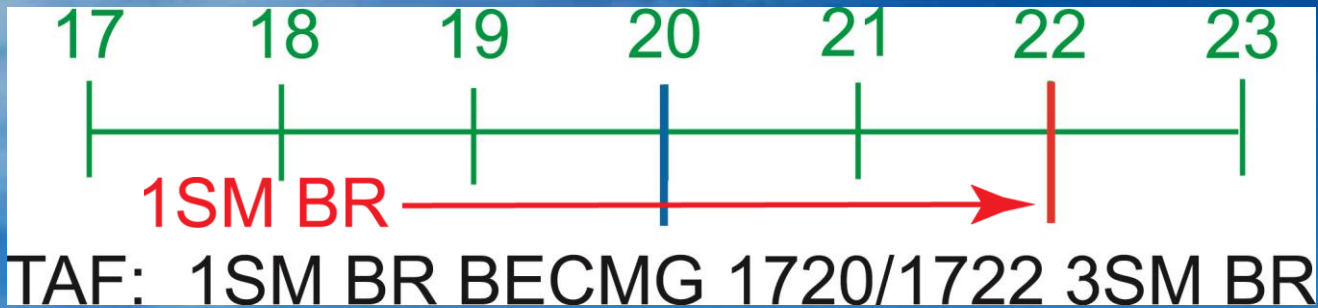
Amendment Criteria



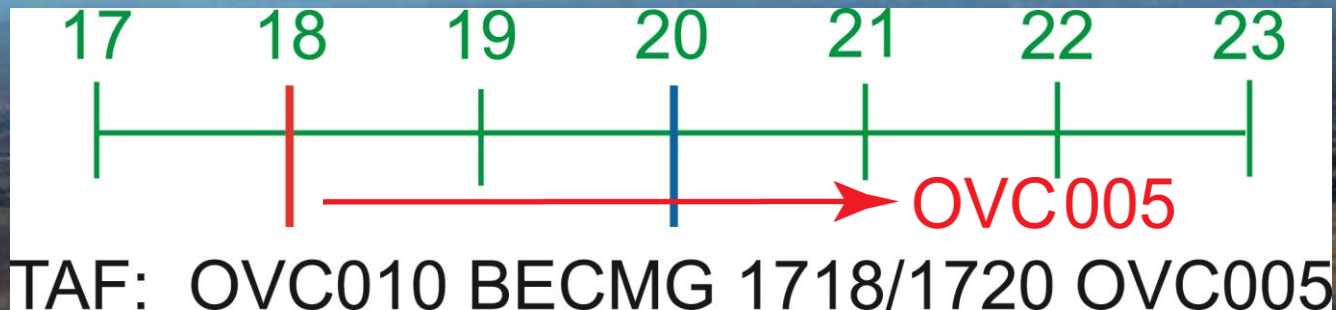
METAR ... 2SM...OVC010...












Military/International TAFs



TAF KNKX 0509/0609 VRB05KT 9999 BKN030 OVC045 QNH2996INS
TEMPO 0510/0516 9000 -RA BR BKN025
FM051630 26007KT 9999 SCT045 BKN100 QNH2997INS
BECMG 0603/0605 VRB05KT 9999 BKN025 OVC050 QNH3002INS
T12/0512Z T19/0521Z



TAF Perceived Inaccuracies

-  Perceived TAF inaccuracies occur when observed conditions differ from the TAF. Variations are to be expected.
-  With prevailing groups there is only a *greater than or equal to 50%* probability of occurrence, lasting for more than half the forecast period.
-  Forecasters are guided by parameters in the TAF Weather Categories table.
-  Conditions may differ from reported, but the forecast remains *accurate* as long as conditions fall within these categories and do not exceed amendment criteria.
-  Some weather phenomena are considered operational significant, other are NOT.
-  The decision to amend depends on the forecaster's assessment of conditions.
-  Should elements change earlier or later than forecast, but represent the expected trend and will soon recover, an amendment will not normally be issued.
-  Changes may not be expected to persist.
-  The forecaster might not believe observations are representative or expect conditions to change rapidly.

Closure

Watch out for absolutes; weather is complex and dynamic. There are few if any “never” or “always” when it comes to weather.

Many weather phenomena are transitory (e.g. turbulence and icing).

"Every theory of the course of events in nature is necessarily based on some process of simplification of the phenomena and is to some extent therefore a fairy tale."

Sir William Napier Shaw (circa 1920)

"The weather-wise pilot looks upon a forecast as professional advise rather than as the absolute truth."

AC 00-6 Aviation Weather (1965)

Weather Theory for Pilots



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

The National
Weather Association's
Aviation Meteorology
Committee
presents
**Weather Theory
for Pilots**

Terry Lankford
WeatherTheory@comcast.net



National Weather Service
Monterey, CA

www.wrh.noaa.gov/mtr/

**Oakland Center
Weather
Service Unit**

[www.wrh.noaa.gov/
ZOA/](http://www.wrh.noaa.gov/ZOA/)