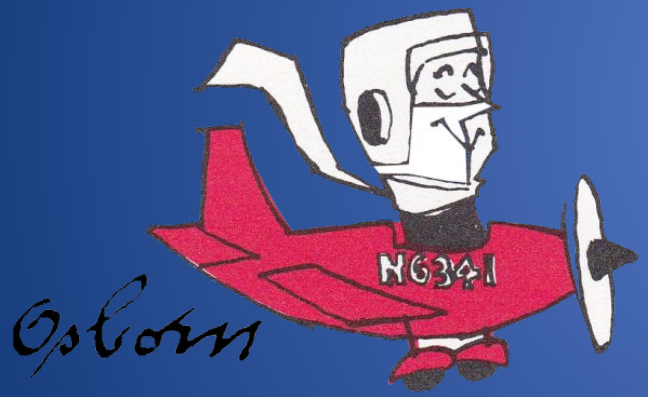
Interpretation & Application of Graphical Weather Forecasts



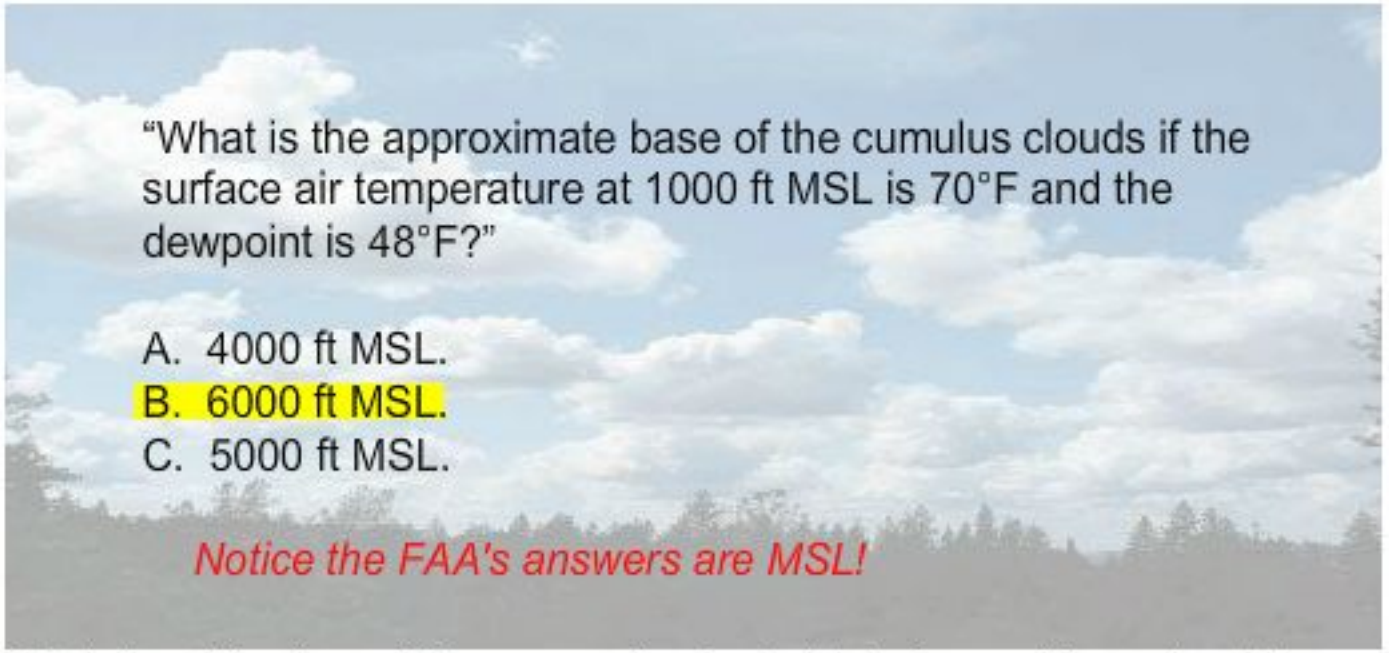
Developed
by
Terry Lankford

Reality Check

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

Sir William Napier Shaw
Manual of Meteorology, 1926

Overview



From AC 00-6A Aviation Weather: "You can estimate height of cumuliform cloud bases using surface temperature-dewpoint spread. Unsaturated air in convective currents cools at about 5.4°F (3.0°C) per 1000 feet; dewpoint decreases at about 1°F (5/9°C). Thus, in a convective current, temperature and dewpoint converge at about 4.4°F (2.5°C) per 1000 ft."

(Temperature) – (Dewpoint) ÷ 4.4 X 1000 = Cloud Base AGL

70 - 48 ÷ 4.4 X 1000 ≈ 5000 AGL

14 CFR 91.103 Preflight Action.

Regulations require familiarization with all available information concerning a flight. This information must include—

“...weather reports and weather forecast, fuel requirements,..." and "alternatives available ...before beginning a flight...."

This may involve the translation, interpretation, and application of graphical forecasts.

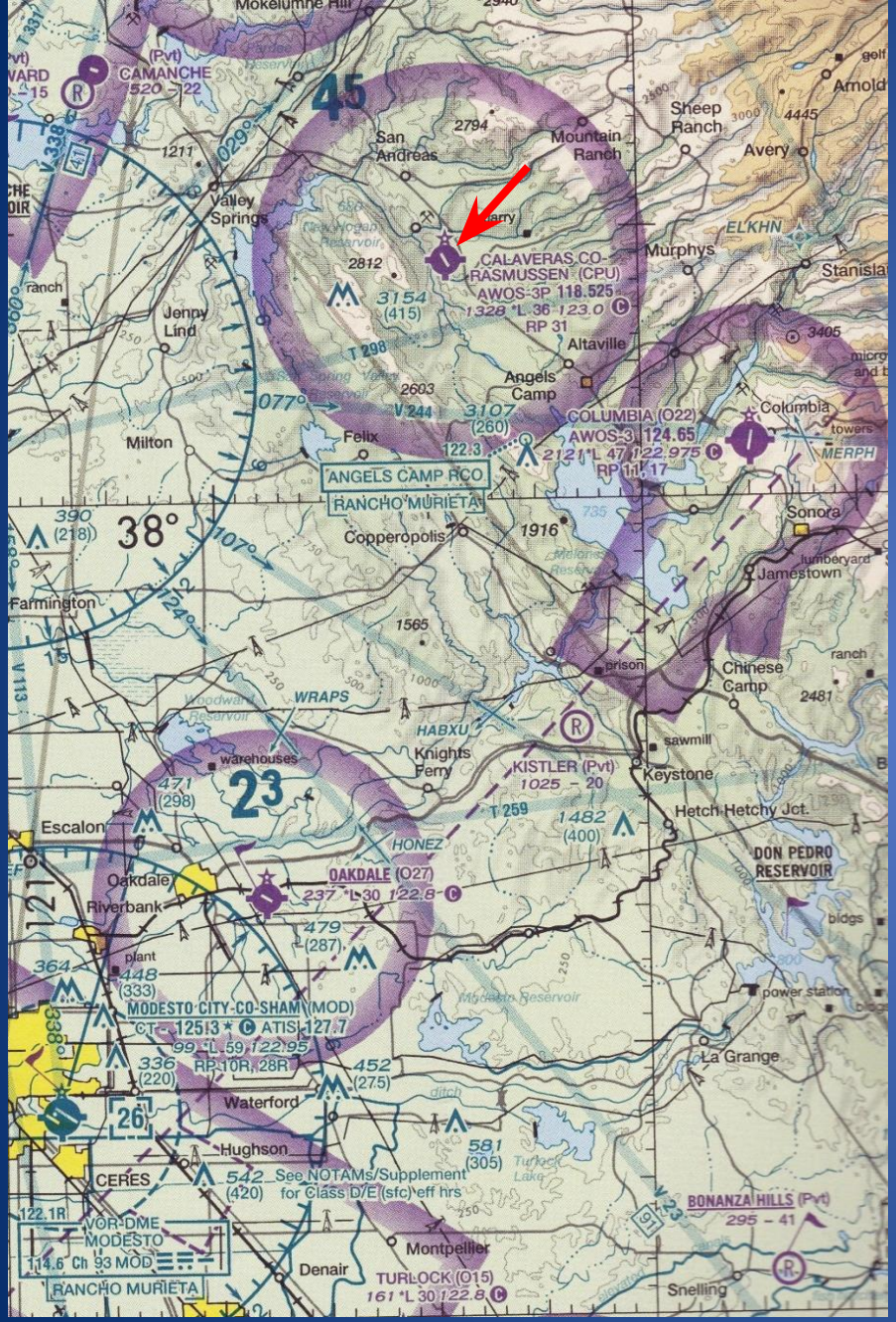
Graphical Forecasts

Graphical Forecasts for Aviation (GFA) replaced text area forecasts in 2017. They provide a forecast for the enroute phase of flight and locations without a TAF, with a temporal resolution of one hour available up to 15 hours—updated continuously.

Aviation Surface/Clouds forecast graphics, a low-bandwidth subset of the GFA, have a temporal resolution of three hour available up to 18 hours—updated every three hours.

Warning

Graphical forecasts (including Graphical AIRMETs) provide static “snap shot” images of expected conditions. Changes occur at a regular or irregular rate at an unspecified time between forecast periods—avoid interpolation between valid times.



SAN ANDREAS, CALIFORNIA — AL-6708 (FAA) — 19171

RNAV (GPS) RWY 31

CALAVERAS CO-MAURY RASMUSSEN FIELD (CPU)

WAAS CH 81842 W31A	APP CRS 311°	Rwy ldg 3602 TDZE 1328 Apt Elev 1328

RNP APCH.

Circling NA southwest of Rwy 31-13.

MISSED APPROACH: Climb to 4400 direct ZEGEX and hold, continue climb-in-hold to 4400.

AWOS-3P 118.525	NORCAL APP CON 125.1 363.2	UNICOM 123.0 (CTAF)

MISSED APCH FIX

5 NM 145° 325° ZEGEX

LINDEN LIN 5200 087° (26.2)

MSA RW31 25 NM 8800

ELEV 1328 TDZE 1328

KATSO 1615± 5200 144° (23.5) 1341 2812 RW31 1535± 3154 1414± ZESUM 3 NM to RW31 311° (FAF) KACBY 3107 2603 3700 291° (5.5) 111° (IF/IAF) WUBEB 5 NM 291° 3478 2594 3897 5200 NoPT 342° (12.6) (IAF) HOFED

3602 x 60

311° to RW31

4400 ZEGEX VGSI and descent angle not coincident (VGSI Angle 3.00/TCH 26).

ZESUM 3 NM to RW31 KACBY WUBEB 5 NM Holding Pattern 0.8 NM to RW31 3.00° TCH 31 RW31 311° 2320 3700 291° 111° 291° 5200

0.8 NM 2.2 NM 4.3 NM 5.5 NM

CATEGORY	A	B	C	D
LP MDA	1600-1 272 (300-1)			NA
LNAV MDA	1860-1 532 (600-1)		1860-1½ 532 (600-1½)	NA
C CIRCLING	1860-1 532 (600-1)	2040-1 712 (800-1)	2360-3 1032 (1100-3)	NA

MIRL Rwy 13-31

SAN ANDREAS, CALIFORNIA — CALAVERAS CO-MAURY RASMUSSEN FIELD (CPU)

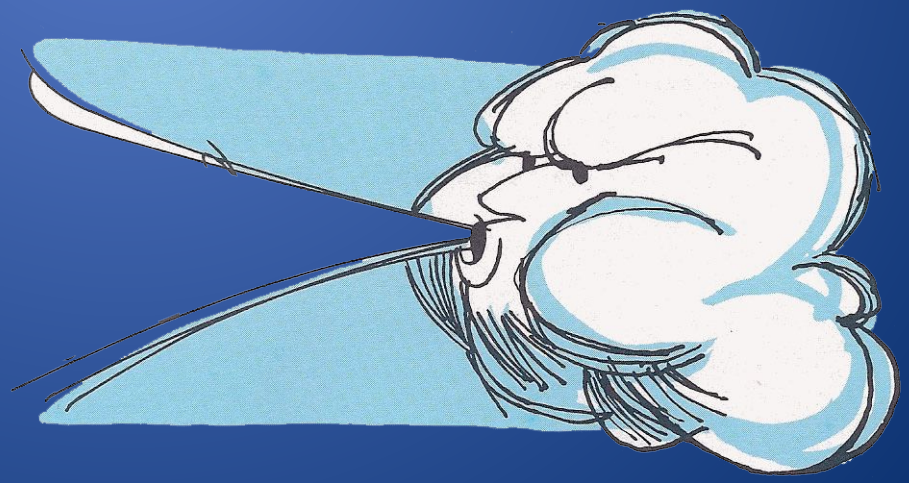
Amdt 1A 20JUN19 — 38°09'N-120°39'W — RNAV (GPS) RWY 31

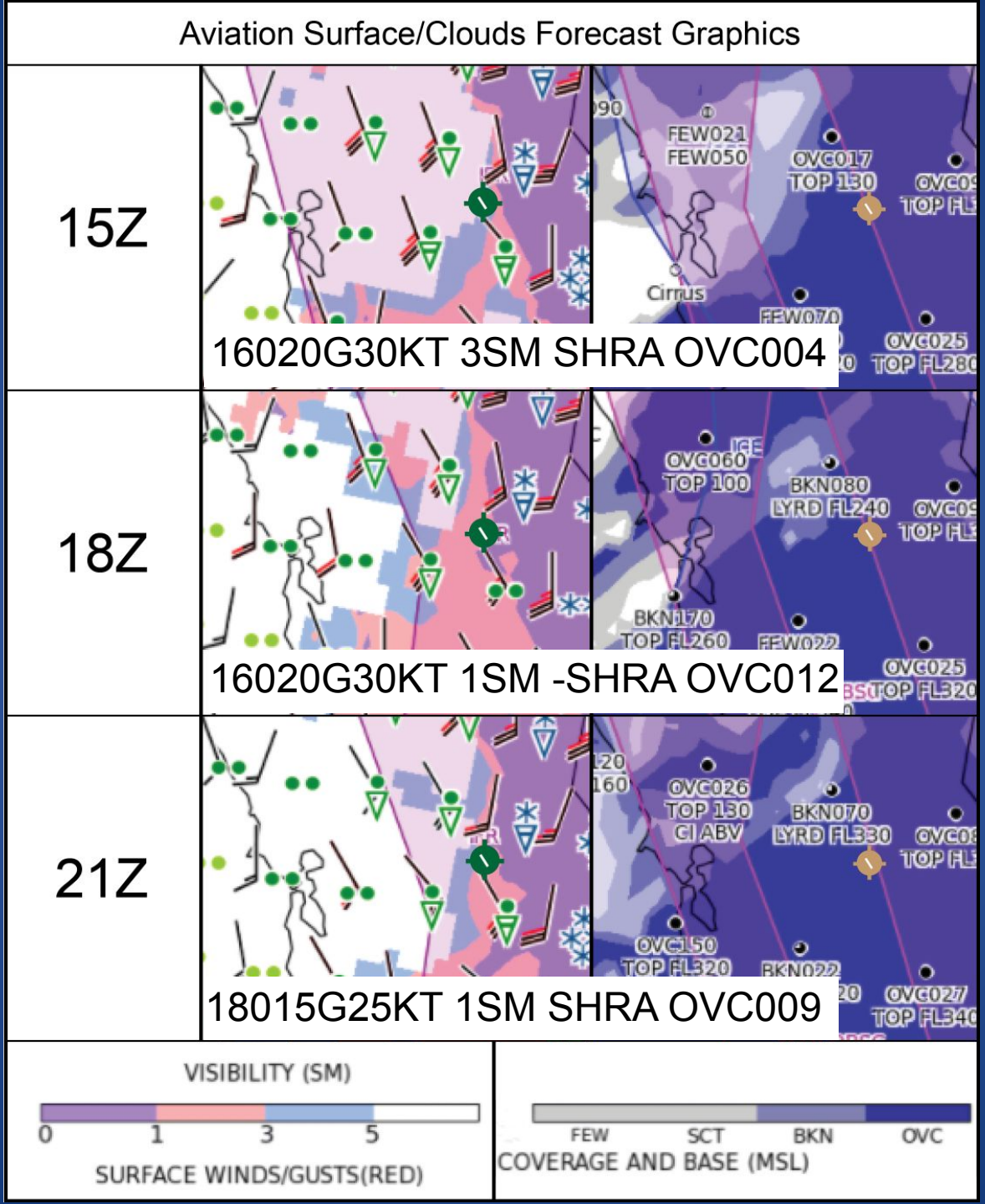
SW-2, 05 DEC 2019 to 02 JAN 2020

SW-2, 05 DEC 2019 to 02 JAN 2020

Warning

Ceilings, Visibilities, and Clouds heights (bases/tops) provide a range of values. Operationally, for Ceilings, Visibilities, and Clouds bases round DOWN; for Clouds tops round UP. For Winds apply the most significant (unfavorable) values.




Aviation Surface/Clouds Forecast Graphics
15Z
FEW021
FEW050
OVC017
TOP 130
Cirrus
FEW070
OVC025
16020G30KT 3SM SHRA OVC004
18Z
OVC060
TOP 100
BKN080
LYRD FL240
BKN170
TOP FL260
OVC025
16020G30KT 1SM -SHRA OVC012
21Z
OVC026
TOP 130
CI ABV
BKN070
LYRD FL330
OVC150
TOP FL320
OVC027
18015G25KT 1SM SHRA OVC009
VISIBILITY (SM)
0
1
3
5
SURFACE WINDS/GUSTS(RED)
FEW
SCT
BKN
OVC
COVERAGE AND BASE (MSL)

SFC/CLDS Forecast Interpretation/Application

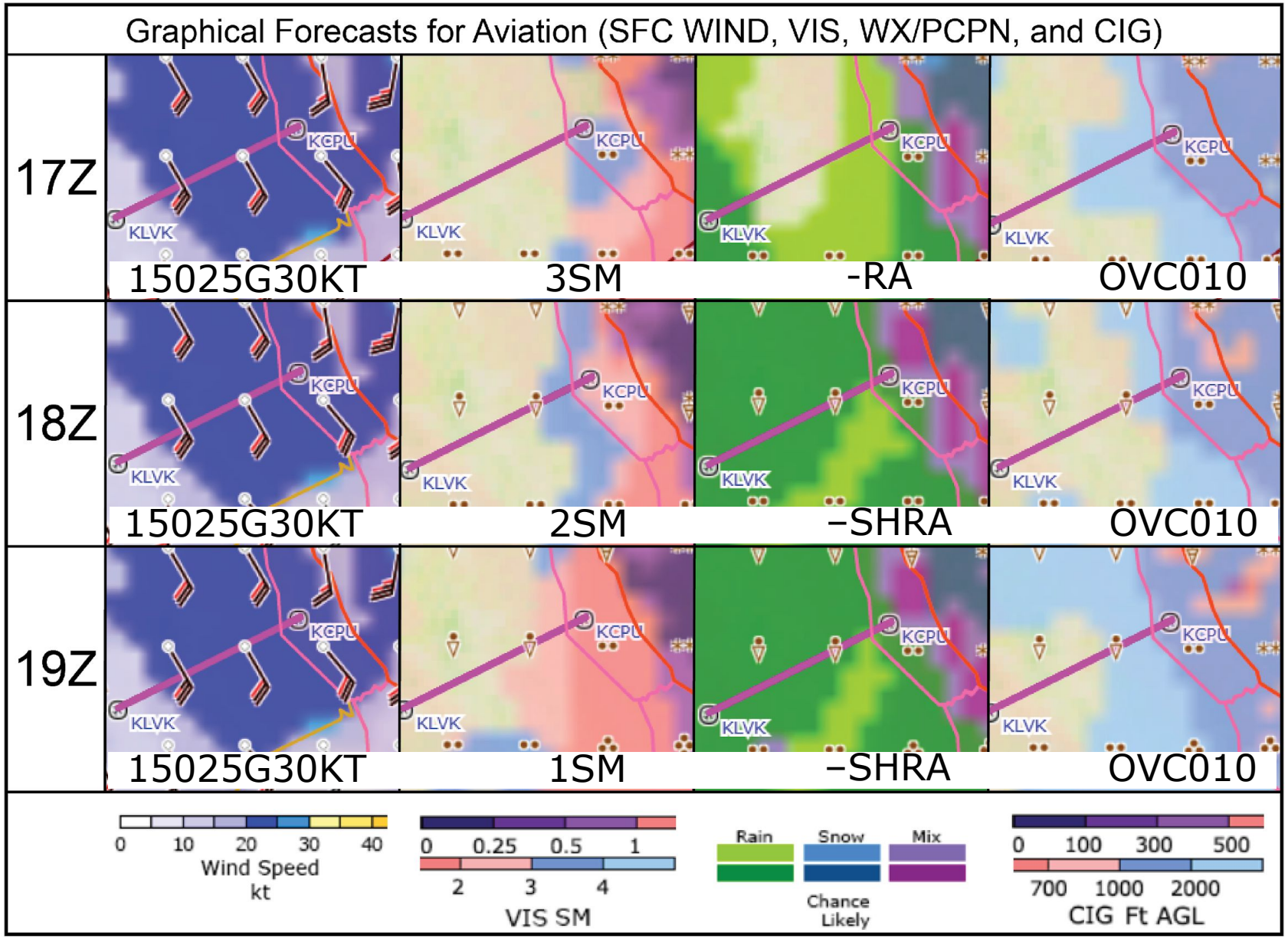
KCPU 271500Z 16020G30KT 3SM SHRA OVC004

271800Z 16020G30KT 1SM –SHRA OVC012

272100Z 18015G25KT 1SM SHRA OVC009

KCPU 271500Z 2715/2721 16020G30KT 1SM SHRA OVC004

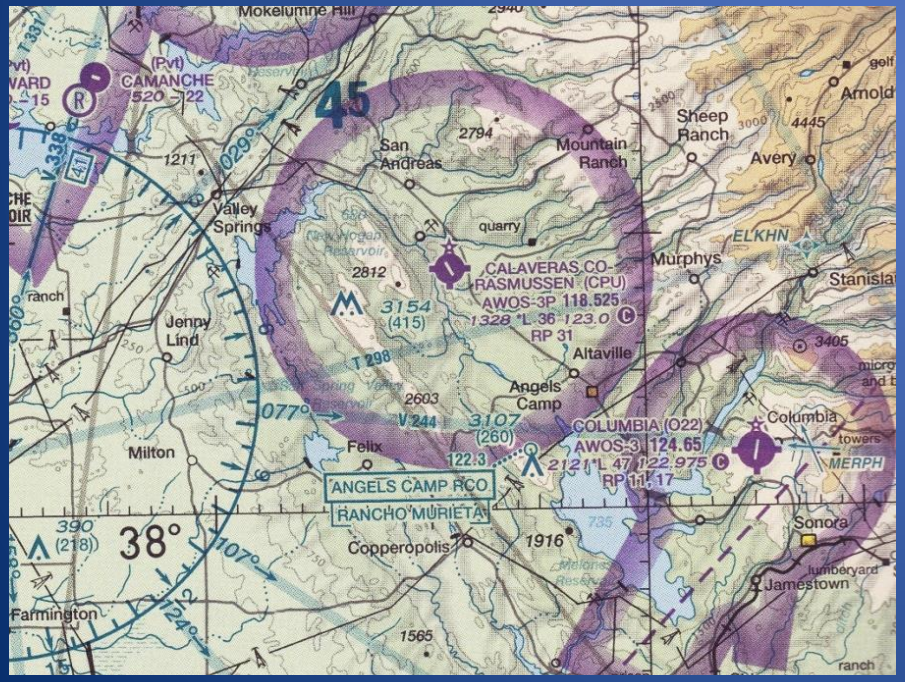
BECMG1821 18015G25KT OVC009

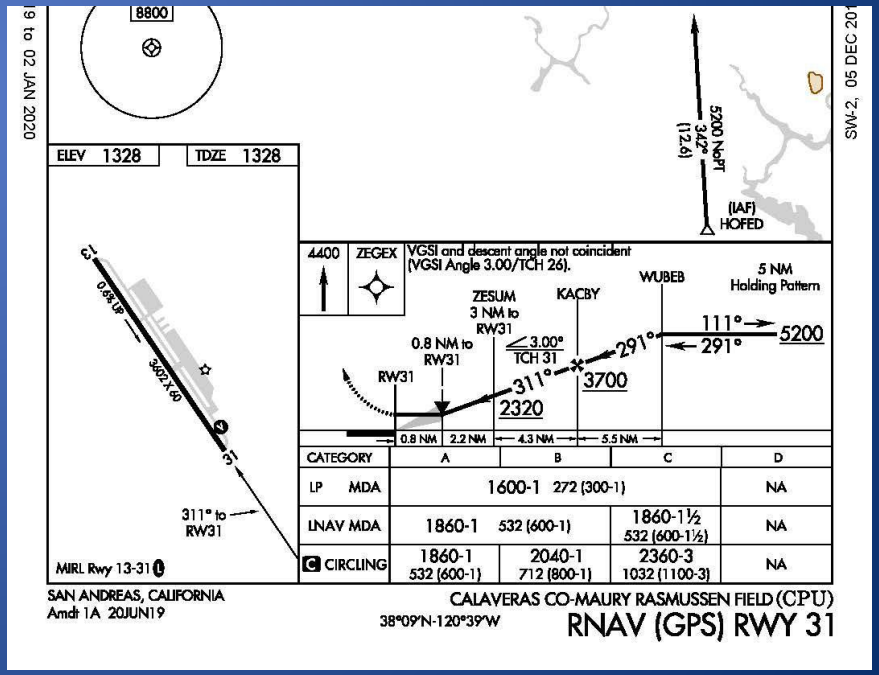

Graphical Forecasts for Aviation (SFC WIND, VIS, WX/PCPN, and CIG)
17Z
18Z
19Z
KCPU
KLVK
15025G30KT
3SM
-RA
OVC010
15025G30KT
2SM
–SHRA
OVC010
15025G30KT
1SM
–SHRA
OVC010
0 10 20 30 40
Wind Speed
kt
0 0.25 0.5 1
2 3 4
VIS SM
Rain
Snow
Mix
Chance
Likely
0 100 300 500
700 1000 2000
CIG Ft AGL

GFA Forecast Interpretation/Application

KCPU 271700Z 2717/2719 15025G30KT 2SM -SHRA OVC010

BECMG1819 1SM





KCPU METARs

KCPU 271455Z AUTO 16014G21KT 3SM BR OVC014
KCPU 271515Z AUTO 17013G17KT 7SM OVC012
KCPU 271535Z AUTO 16013G22KT 4SM BR OVC012
KCPU 271555Z AUTO 15014G21KT 2 1/2SM BR BKN010 OVC014
KCPU 271615Z AUTO 14014G20KT 2 1/2SM BR BKN013 OVC018
KCPU 271635Z AUTO 14014G21KT 3SM BR SCT010 BKN015 OVC021
KCPU 271655Z AUTO 15015G21KT 4SM BR OVC018

KCPU 271715Z AUTO 14009G15KT 3SM BR OVC016
KCPU 271735Z AUTO 15008G14KT 5SM BR BKN016 OVC020
KCPU 271755Z AUTO 14008KT 10SM OVC020
KCPU 271815Z AUTO 14010G16KT 10SM OVC020
KCPU 271835Z AUTO 15008KT 10SM OVC022
KCPU 271855Z AUTO 14013G20KT 10SM OVC022
KCPU 271915Z AUTO 14011G19KT 4SM BR OVC020
KCPU 271935Z AUTO 13015G19KT 2 1/2SM BR SCT010 BKN018 OVC022
KCPU 271955Z AUTO 16006G14KT 4SM BR SCT010 SCT013 OVC021

KCPU 272015Z AUTO 13005KT 3SM BR OVC021
KCPU 272035Z AUTO 14003KT 5SM BR OVC022
KCPU 272055Z AUTO 14012KT 5SM BR OVC022

GFA: 1SM OVC010

SFC/CLDS: 1SM OVC004

Operational Considerations

- Update weather enroute.
  - Check METARs for destination and alternates.
  - Check TAFs—especially at TAF update times.
- Monitor fuel reserves.
- Land short or divert.
  - Should conditions approach, or deteriorate below, regulatory or (*realistic*) personal minimums—including surface winds.
- Do not hesitate to execute a missed approach should circumstances warrant.

Advantages

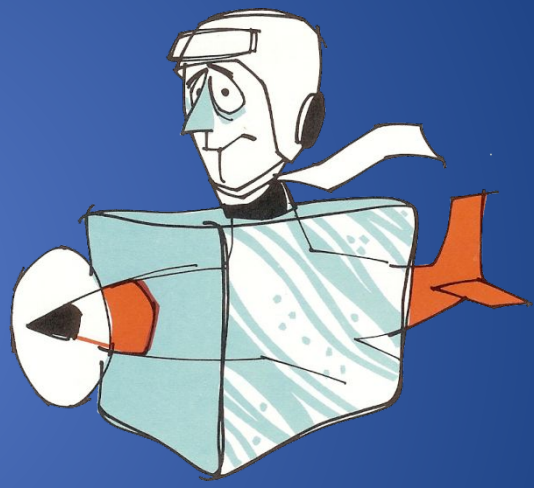
- GFA Suite is updated continuously.
- GFA Suite displays are scalable and customizable.
- Temporal resolution of the GFA Suite is 1 hour; Aviation Surface/Clouds 3 hours.
- Forecasts to 15 hours for the GFA Suite; 18 hours for Aviation Surface/Clouds products.

Limitations

- Point forecasts may not represent surrounding conditions.
- Displays may suffer from clutter—especially the GFA suite.
- 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 (including flight deck observations) and apply personal minimums.

Closure

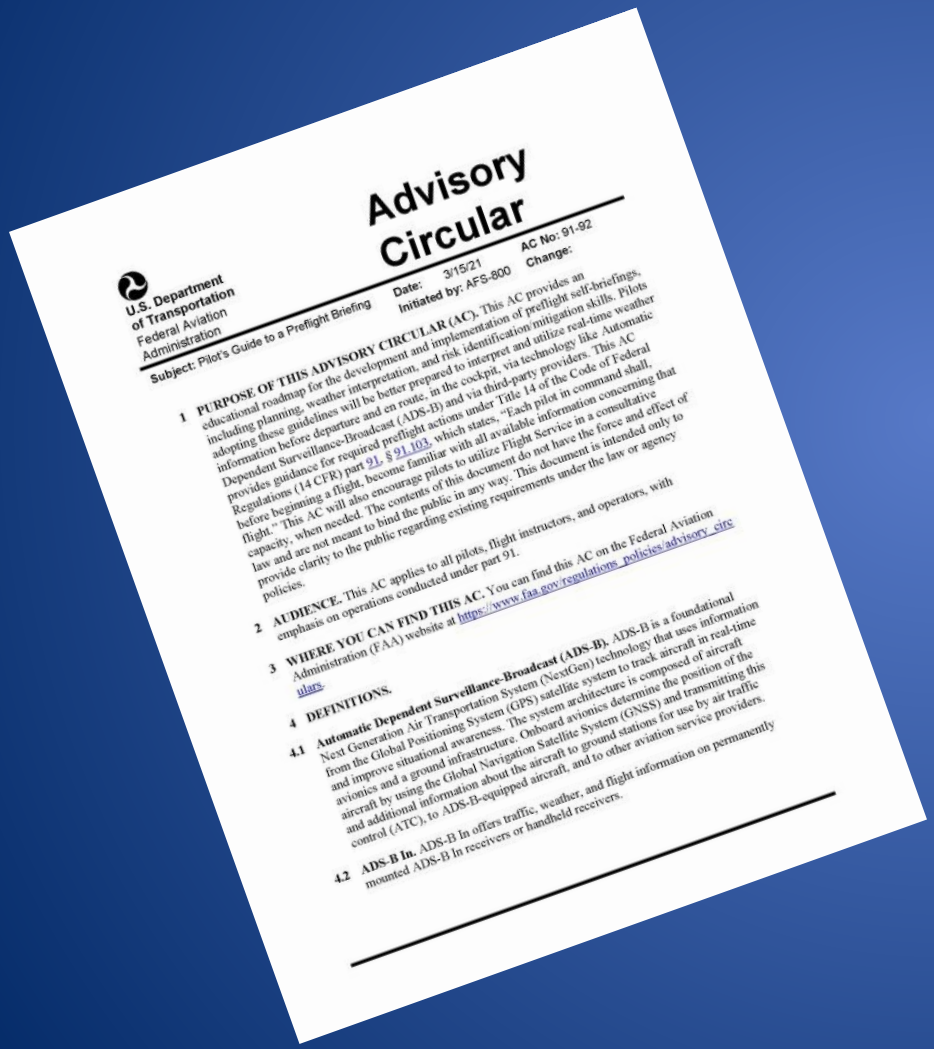
Many weather phenomena are transitory (e.g. turbulence and icing).



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

AC 00-6 Aviation Weather (1965)

AC 91-92 Pilot's Guide to a Preflight Briefing



Advisory Circular

U.S. Department of Transportation
Federal Aviation Administration

Subject: Pilot's Guide to a Preflight Briefing

Date: 3/15/21 Initiated by: AFS-800 AC No: 91-92 Change:

1 PURPOSE OF THIS ADVISORY CIRCULAR (AC). This AC provides an educational roadmap for the development and implementation of preflight self-briefings, including planning, weather interpretation, and risk identification/mitigation skills. Pilots adopting these guidelines will be better prepared to interpret and utilize real-time weather information before departure and en route, in the cockpit, via technology like Automatic Dependent Surveillance-Broadcast (ADS-B) and via third-party providers. This AC provides guidance for required preflight actions under Title 14 of the Code of Federal Regulations (14 CFR) part 91, § 91.103, which states, "Each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight." This AC will also encourage pilots to utilize Flight Service in a consultative capacity, when needed. The contents of this document do not have the force and effect of law and are not meant to bind the public in any way. This document is intended only to provide clarity to the public regarding existing requirements under the law or agency policies.

2 AUDIENCE. This AC applies to all pilots, flight instructors, and operators, with emphasis on operations conducted under part 91.

3 WHERE YOU CAN FIND THIS AC. You can find this AC on the Federal Aviation Administration (FAA) website at https://www.faa.gov/regulations_policies/advisory_circulars.

4 DEFINITIONS.

4.1 Automatic Dependent Surveillance-Broadcast (ADS-B). ADS-B is a foundational Next Generation Air Transportation System (NextGen) technology that uses information from the Global Positioning System (GPS) satellite system to track aircraft in real-time and improve situational awareness. The system architecture is composed of aircraft avionics and a ground infrastructure. Onboard avionics determine the position of the aircraft by using the Global Navigation Satellite System (GNSS) and transmitting this and additional information about the aircraft to ground stations for use by air traffic control (ATC), to ADS-B-equipped aircraft, and to other aviation service providers.

4.2 ADS-B In. ADS-B In offers traffic, weather, and flight information on permanently mounted ADS-B In receivers or handheld receivers.

Federal Aviation Administration

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Course Overview

Conducting Preflight Self-Briefings for Student and VFR Pilots

Description: The number one causal factor for General Aviation accidents is inadequate preflight planning. This course was developed by Flight Service to provide student and Visual Flight Rules (VFR) pilots guidance on how to conduct a safe and regulatory compliant preflight self-briefing using automated weather resources. The objective is to ensure that the pilot understands aviation weather basics and learns to apply meteorological and aeronautical information in a systematic manner to plan a safe flight. The course includes scenarios, real-life examples, videos, references and practice exercises for pilots to conduct on their own or with their CFI materials. The FAA encourages pilots to leverage automated resources and develop weather and aeronautical interpretation skills in order to assess flight safety risks.

Cost: No

Course Overview: Introduction, Course Content, Review

Review Course

U.S. Department of Transportation
Federal Aviation Administration
800 Independence Avenue, SW
Washington, DC 20591
1-866-TELL-FAA (1-866-835-5322)

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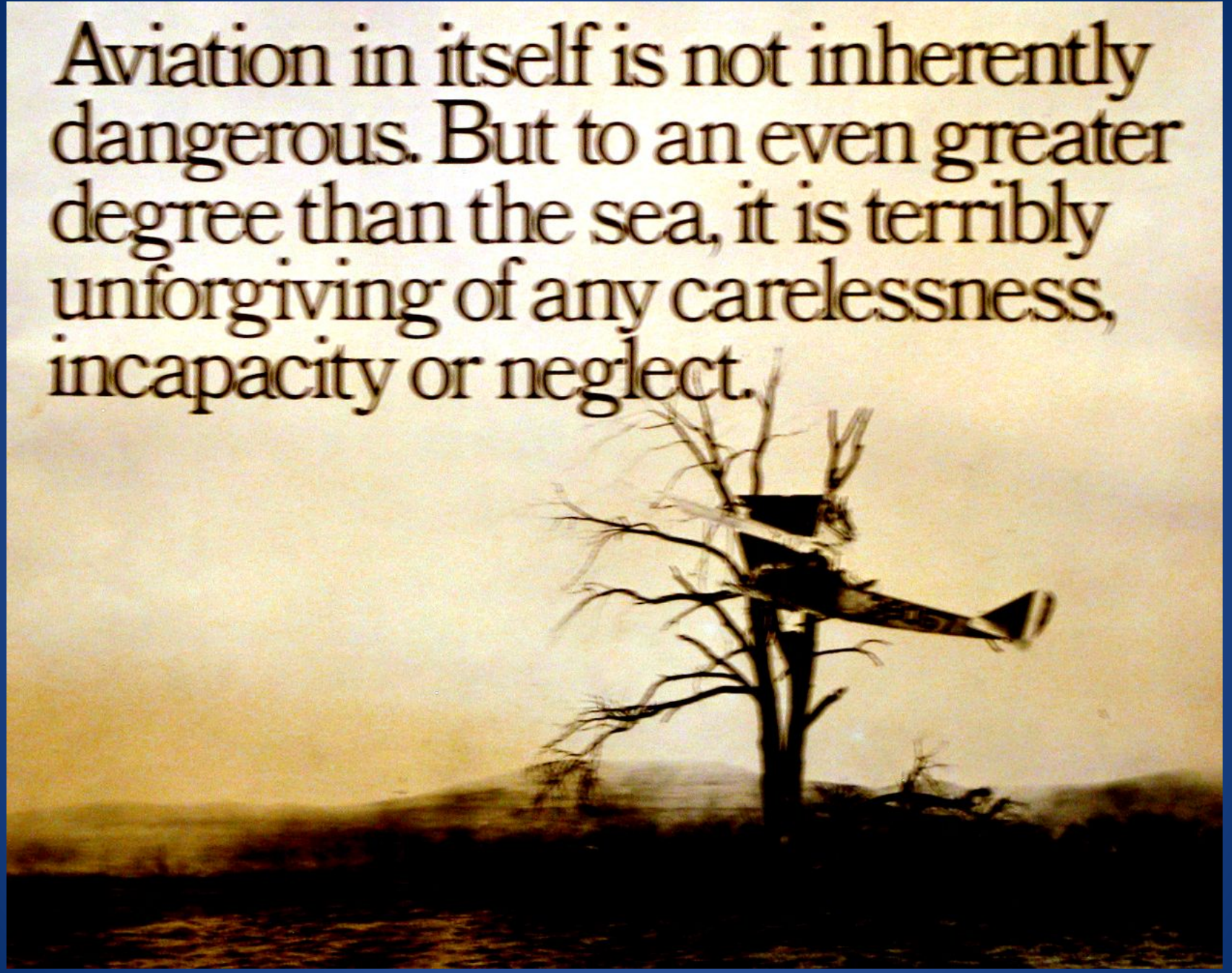
Hours: Monday - Friday, 10:00 AM to 4:00 PM EST
faasafety@faa.gov

ALC-683 Conducting Preflight Self-Briefing for Student and VFR Pilots.


Aviation in itself is not inherently dangerous. But to an even greater degree than the sea, it is terribly unforgiving of any carelessness, incapacity or neglect.

Send questions, comments, or suggestions to:

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WeatherTheory@comcast.net