CERTIFICATION AND STANDARDS – MANNED and UNMANNED FLIGHT

Presented to: Vertical Flight Society
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CURRENT STANDARDS FOR MANNED FLIGHT

- **Approved weather sources** – Title 14 CFR contains regulatory requirements for certificate holders and program managers to have adequate weather reporting facilities and to use approved sources of weather reports and forecasts to control flight operations.
  - The National Weather Service (NWS)
  - A source approved by the NWS
  - A source approved by the Administrator (ANG technical support)
  - Other resources
    - Enhanced Weather Information System (EWINS)
    - Supplementary Weather Product (may not meet regulatory requirements) – Supplementary Aviation Weather Reporting System (SAWRS)
    - Non-Federal Observation (NF-OBS) will replace SAWRS, sponsored by the NWS
    - Real Time Mesoscale Analysis (RTMA) – NWS provides alternative report of surface temperature
CURRENT STANDARDS FOR MANNED FLIGHT

- **Commercial Weather Information Providers (CWIP)** – A CWIP typically provides the weather reports and forecasts required by regulation for certificate holders and program
  - Repackaged weather information – retransmission of weather information provided by the NWS, but may not conform to NWS standards

- **EWINS** – gathering, evaluating, and disseminating aviation weather information, and issuing weather reports and forecasts prepared by properly trained and qualified aviation meteorologists or aircraft dispatchers

- **Flight Movement Forecast (FMF)** – issued for a single flight by a certificated aircraft dispatcher
STANDARDS FOR MANNED AVIATION WEATHER

- **Aviation Meteorologists** - each aviation meteorologist issuing a weather report or forecast as part of a certificate holder’s/program manager’s EWINS meets at least the following criteria:
  - Holds a degree in meteorology awarded by an accredited university or college or has officially documented experience as a military weather observer/forecaster;
  - Is an employee of the certificate holder or a CWIP approved for use in the certificate holder's FAA-approved EWINS; and
  - Successfully completes the initial and any subsequent recurrent training outlined in this section.

- **Aircraft Dispatchers Who Issue FMFs (FMF Authority)** - Before granting a certificate holder the authority to use FMFs as part of its FAA approved EWINS, POIs will verify that each aircraft dispatcher with FMF authority meets the following criteria:
  - Is a current and qualified aircraft dispatcher for the certificate holder; and
  - Successfully completes the training outlined in this section.
CURRENT WEATHER PRODUCTS (partial)

- ADDS Aviation Digital Data Service (ADDS) (http://adds.aviationweather.noaa.gov/)
- ASOS Automated Surface Observing System
- ATIS Automated Terminal Information Service
- AWOS Automated Weather Observing System
- CWA Center Weather Advisory
- EFAS Enroute Flight Advisory System
- FSS Flight Service Station
- HIWAS Hazardous In-flight Weather Advisory System
- LLWAS Low Level Wind Shear Alert System
- METAR Meteorological Terminal Aerodrome Forecast
- NOAA National Oceanic and Atmospheric Association
- NWS National Weather Service
- TAF Terminal Aerodrome Forecast
- TIBS Telephone Information Broadcast Service
- TWB Transcribed Weather Broadcast

AWOS-3 reports all the items in a METAR – time of observation, wind, visibility, sky coverage/ceiling, temperature, dew point and altimeter setting.
Pilot Weather Reports (PIREPs)

a. FAA air traffic facilities are required to solicit PIREPs when the following conditions are reported or forecast: ceilings at or below 5,000 feet; visibility at or below 5 miles (surface or aloft); thunderstorms and related phenomena; icing of light degree or greater; turbulence of moderate degree or greater; wind shear and reported or forecast volcanic ash clouds.

b. Pilots are urged to cooperate and promptly volunteer reports of these conditions and other atmospheric data such as: cloud bases, tops and layers; flight visibility; precipitation; visibility restrictions such as haze, smoke and dust; wind at altitude; temperature aloft, and other significant weather data. Reports of observed adverse weather may be made for conditions enroute and on the ground that have the potential to prevent accidents. PIREPs are not just for adverse weather, and should be submitted when favorable weather is encountered where adverse weather conditions are forecast.

c. PIREPs should be given to the ground facility with which communications are established; i.e., FSS, ARTCC, or terminal ATC. Data obtained from PIREPs is also incorporated in numerical weather models, ultimately improving forecast accuracy and usefulness.
14 CFR part 107 - §107.51 - Operating limitations for small unmanned aircraft.

A remote pilot in command and the person manipulating the flight controls of the small unmanned aircraft system must comply with all of the following operating limitations when operating a small unmanned aircraft system:

(c) The minimum flight visibility, as observed from the location of the control station must be no less than 3 statute miles. For purposes of this section, flight visibility means the average slant distance from the control station at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night.

(d) The minimum distance of the small unmanned aircraft from clouds must be no less than:

1. 500 feet below the cloud; and
2. 2,000 feet horizontally from the cloud.
UAS/UTM WEATHER PROBLEM

• MIT LL Study says current government weather products are not “good enough”

• Current published weather data standards by NOAA, WMO, ICAO, and others do not have sufficient resolution for certain types of UAS operations

• Gaps in low altitude and boundary layer airspaces

• Need to improve awareness of UAS weather: winds, icing, turbulence, thermals, etc.

• Latency of weather information

• No published or in-development standards for UAS

• Commercial weather providers may significantly alter NWS products
IMPROVING GAPS

• Possible products

| Ground-Based LIDARS & Radiometers | Weather Scout Drones | Commercial Satellites |
POSSIBLE SOLUTIONS

• Meteomatics meteodrone – technology’s ability to bridge weather gap
  • BVLOS approved
  • Sensors can determine wind speed and direction, temperature, pressure, dew point, relative humidity
  • Radiation shielded and mounted in rotor downwash
WCAMs VWOS PRODUCT

- Alaska product under development
- Replaces AWOS where it doesn’t exist
- 360° camera with textual imaging
- Camera has pan/tilt/zoom capability
- Night vision enhanced
- Similar to long-line METARs
- 4 camera bodies with 4 camera lenses in each
- Present weather sensors
WEATHER OPTIONS

• SERVICES AVAILABLE TO UAS PILOTS
  – METAR, TAF, SIGMET, AIRMET, PIREP, Significant Weather Charts, Wind and Temp Aloft, ASOS, AWOS, ATIS, NOTAMs, FAA Weather Cameras (AK), TWEB…

• AVIATION DIGITAL DATA SYSTEM (ADDS) HEMS TOOL – possible product for use in UAS operations (VFR only)
  – Tool developed by NWS to provide ceiling and visibility assessment in areas between METAR and TAF reporting/forecasting sites
  – ADDS HEMS tool allows user to identify gridded weather assessments in 5 km x 5 km blocks, including ceiling, visibility, radar, convection, icing, temperature, relative humidity, wind.
  – Overlays on graphical data includes wind barbs, METARs, PIREPs, AIRMETs/SIGMETs, TAFs, VORs, state and county boundaries, base map of terrain and cultural information

• UAS OPERATORS
  – Possible approval for operators to become qualified weather observers

• Risk Based Regulatory Framework
  – Address needs and close gaps
  – Private sector involvement
FAA NEXTGEN AVIATION WEATHER

- The suite of available aviation weather product types is expanding, with the development of new sensor systems, algorithms and forecast models. The FAA and NWS, supported by various weather research laboratories and corporations under contract to the Government, develop and implement new aviation weather product types. The FAA's NextGen Aviation Weather Research Program (AWRP) facilitates collaboration between the NWS, the FAA, and various industry and research representatives. This collaboration ensures that user needs and technical readiness requirements are met before experimental products mature to operational application.

- The AWRP manages the transfer of aviation weather R&D to operational use through technical review panels and conducting safety assessments to ensure that newly developed aviation weather products meet regulatory requirements and enhance safety.
CURRENT PART 107 UAS FACTS

• Total Remote Pilots: 160,748*(174,252*)
  - includes remote pilots who took the initial knowledge test + current manned pilots who took online training in lieu of the knowledge test

• UAS Registrations
  - Total: 1,493,687 (includes commercial and hobby) (1,571,478)

• Non-Airspace Waivers approved total 3,529 (4,126)
  - BVLOS: 65 (68)
  - Ops over People: 93 (129)
  - Night: 3,266 (3,807)

• LAANC Airspace Requests (other than Class G)
  - Total: 178,437 (208,005)
  - Auto-approved: 148,424 (172,874)

• Parentheses indicate updated 4/6/2020
WHAT NEXT?

- Do new weather applications require certification, or are they acceptable as “good enough?”
- Are government weather services able to close gaps?
- Could METARS be expanded beyond current 5nm area?
- Will operators enlist weather observers who could become certified? (where will they be positioned?)
- Are part 135 UAS certifications comprehensive enough where weather is concerned?
- We don’t have EWINS for boundary area weather – yet
- Can we use performance based standards for weather?
- Will UAS operators provide PIREPS, and what information can be gathered for wider use? Automatically reported by drone?
- FAA cannot develop policy that is more restrictive than regulations (FAA Reauthorization Act of 2018)
- From the perspective of the end user, what are the needs?
- How do we educate non-aviators? They don’t know what they don’t know
- Can we leverage Swiss, EASA, TCCA, other entities?
- GOES Satellite?
- WCAMs VWOS – Weather Cameras - Validated Weather Observation System?
Questions?