FAA Performance Based Weather Standards

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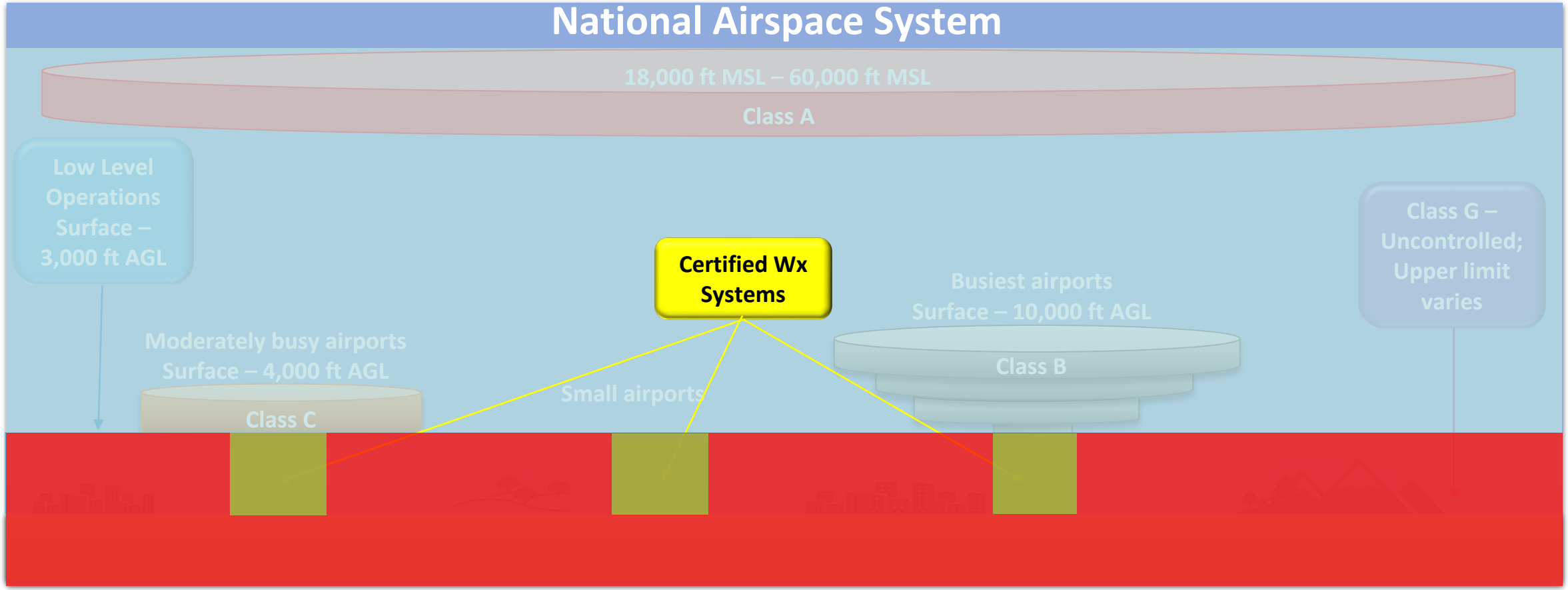
Federal Aviation Administration

Overview

- What's the Problem?
- Definitions
- Regulations overview
- Performance Based Weather, Benefits and Options
- What's Needed?
- Summary



Certified weather systems cover:

- 3% of the CONUS
- 2% of Alaska

Leaving significant gaps and compromising the safety of the system.

What's the Problem?

- Certified weather systems are at specific locations, generally Part 139 airports, and provide information "valid" for 5 SM from the center of the airport.
- UAS operations BVLOS need these weather elements to safely conduct ops.
- HAA operations, Airtours, and commercial helicopter ops have historically struggled with accessibility of weather information to make go/no-go decisions (Kobe Bryant accident).
- Missing elements in a METAR stop operations at airports.

What is “Certified” weather?

Certified weather information consists of weather elements reported in a METAR and distributed long-line into WMSCR. Air Traffic Offices have responsibility to ensure this information meets the standards.

Automated Weather Observing Systems (AWOS) for Non-Federal Applications AC 150-5220.16E CHG 1, Dated 01/31/2019

What is Performance Based Weather?

Performance Based Weather information includes observations, analyzed weather data, and forecasts. It consists of weather elements that are necessary for safe aviation operations. These elements are not necessarily available via current ground based weather reporting systems.

Performance Based Weather information will help fill the gap in areas where no weather information exists.

Performance Based Weather continued

- AFS is establishing standards “approved by the Administrator” to enable reliable weather information to be used by operators.
- Performance based weather consists of observations, analyzed weather, and forecasts that have been compared to established and approved standards.

Regulatory Requirements for Weather

Current FAA Regulations for commercial operations require an "approved" source of weather information. These sources are either:

1. produced by the NWS;
2. approved by the NWS within the lower 48; or
3. a source approved by the FAA Administrator.

Ref: 14 CFR Parts 121.101 and 135.213.

Regulatory Requirements for Weather

- **§ 135.213 Weather reports and forecasts.**

(a) Whenever a person operating an aircraft under this part is required to use a weather report or forecast, ***that person shall use that of the U.S. National Weather Service, a source approved by the U.S. National Weather Service, or a source approved by the Administrator***. However, for operations under **VFR**, the pilot in command may, **if such a report is not available**, use weather information **based on that pilot's own observations** or on those of other persons competent to supply appropriate observations.

Performance Based Weather Benefits

- Improved Coverage with “approved” weather source information
  - Certified weather systems that provide weather information have limited coverage
  - UAS operations occur beyond where certified weather systems are available
- Safety is improved
  - Go/No-Go decisions are better informed
  - Helicopter Air Ambulance (HAA) lifesaving operations
  - BVLOS operations
- Efficiency increases
  - Documenting Performance Based Weather Standards (PBWS) will allow for other data to be used when elements are missing in a METAR (certified weather report)
    - Less diversions and fewer cancellations during unavailable “Certified” weather

PBWS Tiered approach for Analyzed Weather

- ASTM F38 working on the Standard, three notional tiers have been established, tier 3 represents the current “certified” weather system standards.
- Tier 2 and 1 have lower performance standards and are planned to be used less risky operations.
- The tiered concept allows for higher level performance based on higher risk operations (AAM)

Rationale and Options

- PBWS establishes data accuracy accepted by the Administrator and is a critical component to the FAA's Operational Improvement.
- Potential sources of Performance Based Weather information
  - NWS – Analyzed Products i.e., Real Time Mesoscale Analysis (RTMA)
  - FAA - Visual Weather Observation System (VWOS)
  - FAA - Weather Cameras/Visibility Estimate via Image Analytics (WCAMS/VEIA)
  - Commercial - Weather Information Providers (WIPs)

Summary

- Development of PBWS
  - Flight Standards has determined it is necessary to develop weather data standards for flight operations beyond where current certified/approved weather reporting is being performed
  - These standards will be the basis for the approval of weather information for low altitude operations
  - In Sync with efforts on going with ASTM-F38
  - Standards for Forecast information coming later
  - Key to supporting the FAA OI effort to Qualify WIPs

Draft PBWS Standards for Analyzed Weather

	Tier 1- PBWS Draft			Tier 2- PBWS Draft			Tier 3 - PBWS Draft Based on FMH-1, ASOS, and AWOS		
Observed Element	Range	Accuracy	Confidence Level	Range	Accuracy	Confidence Level	Range	Accuracy	Confidence Level
Ceiling/Cloud Height	Surface to 800ft	-200/+300 ft	90%	Surface to 800ft	± 200ft	90%	Surface to 2000ft	± 100 ft	90%
	> 800ft to 3000 ft	- 300/+500 ft		> 800ft to 3000 ft	-200/+400ft		>2000ft to 12,500ft	5%	
	> 3,000ft to unlimited	-700/+1200 ft		> 3,000ft to unlimited	-500/+1,000 ft				
Visibility	0 to 1 mile	± ½ mile	90%	0 to 1 mile	± ¼ mile	90%	0 to 1¼ miles	± ¼ mile	90%
	>1 to 3 miles	± 1 mile		>1 to 3 miles	± ½ mile		1½ to 1¾ miles	+ ¼, -½ mile	
							2 to 2½ miles	± ½ mile	
	>3 to unlimited miles	± 1.5 mile		>3 to unlimited miles	± 1 mile		3 to 3½ miles	+ ½, -1 mile	
							4 to 10 miles	± 1 mile	
Temp	-40 to 50 °C	± 4 °C	90%	-40 to 50 °C	± 2 °C	90%	-50°C to 50°C	±0.6°C	90%

Draft PBWS Standards for Analyzed Weather

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Observed Element	Range	Accuracy	Confidence Level	Range	Accuracy	Confidence Level	Range	Accuracy	Confidence Level
Wind Speed	Calm to 10 knots	± 3 knots	90%	Calm to 10 knots	± 2 knots	90%	2 to 10 knots	± 1 knots	90%
	>10 to 20 knots	± 5 knots		>10 to 20 knots	± 3 knots		>10 to 20 knots	± 2 knots	90%
	>20 to 40 knots	± 7 knots		>20 to 40 knots	± 5 knots		>20 to 40 knots	± 2 knots	90%
	>40 to 85 knots	TBD		>40 to 85 knots	TBD		>40 knots to 85 knots	RMSE ± 5%	90%
Wind Direction	45 degree increments	± 20°	90%	45 degree increments	± 10°	90%	10° increments	± 5° when wind is greater than or equal to 5 knots	90%
Pressure	28.5 to 31.5" Hg[2]	± .2" Hg	90%	28.5 to 31.5" Hg[2]	± .1" Hg	90%	16.9"Hg to 31.5"Hg	± 0.02"Hg	90%
Dew Point	-40 to 50 °C	± 4 °C	90%	-40 to 50 °C	± 2 °C	90%	-34 to -24 °C	±2.2 °C	90%
							-24 to -01 °C	±1.7 °C	
							-01 to +30 °C	±1.1 °C	