



TRUWEATHER
SOLUTIONS, INC

DRONE ENABLE 2022 SYMPOSIUM
Weather Data Requirements to Support
Safe and Profitable UAS/UAV Operations

Don Berchoff
TruWeather Solutions

16 Nov 2022

THE EMERGING PROBLEM

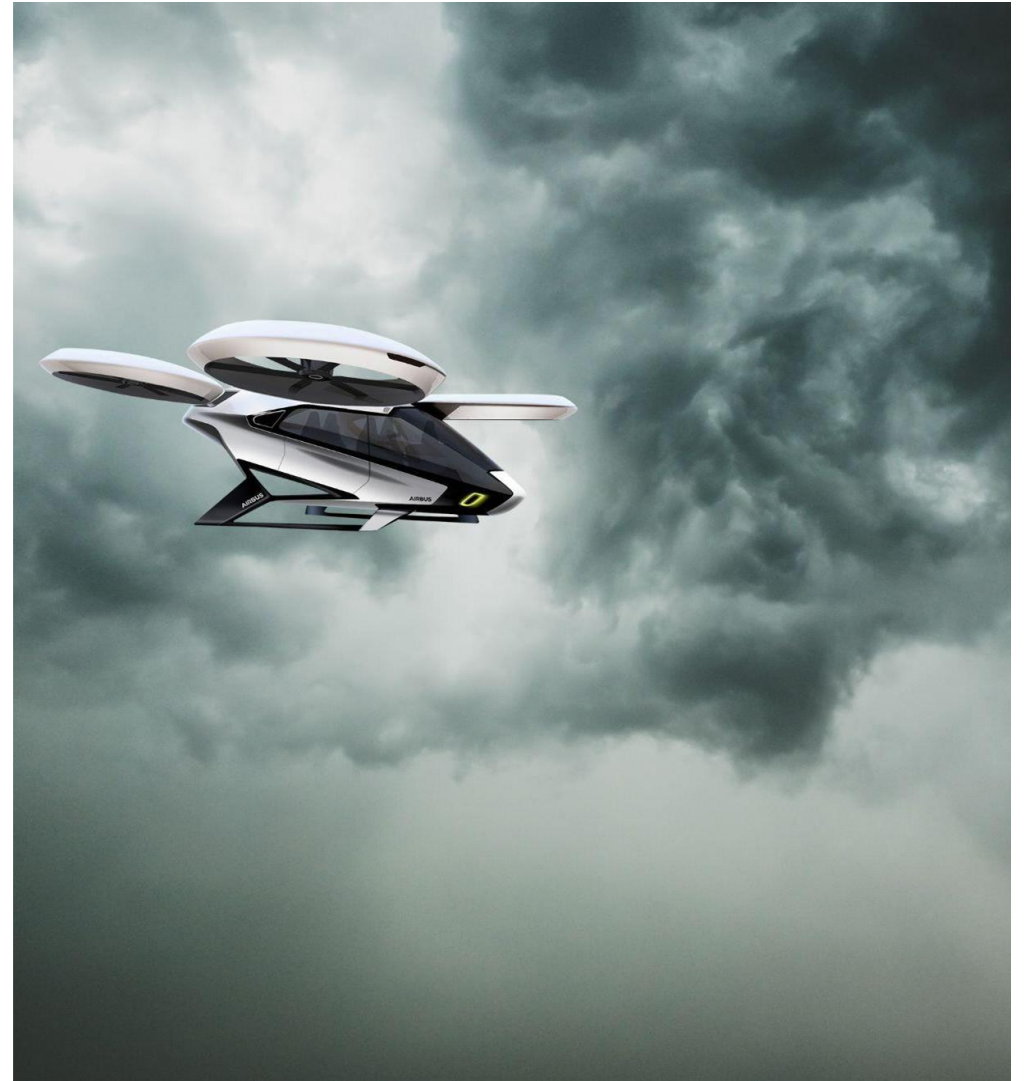
Lack of BVLOS Low Altitude Weather Data Measurements

Uncrewed aircraft are lighter and electric-powered thus more weather sensitive

Some micro-weather hazards will be unknowable to a remote pilot or automated decision systems

Current aviation weather system is too coarse to detect micro-climate hazards

IMPACT: Greater risk of accidents or conservative business decisions reduce revenue per aircraft, service reliability and client confidence



UNDERSTANDING THE PROBLEM

Numerical Weather Predictions and AI/ML without new data is not the solution for micro-climate granularity

What We Know:

- Global models at 9KM resolution; need sub-1KM
- 50% error rates in wind speed at 80M AGL compared to models not uncommon
- Only 3% of US has real ceiling height and visibility measurements
- METARS available where UAS DO NOT FLY
- Weather Satellites & Radar Not Sufficient

Must Address the Weather Data Shortfall

- Below 3,000 FT
- In Urban Areas



MICRO WEATHER THREATS

AAM and BVLOS Challenge



- ✓ Loss of "human" sensor
- ✓ Wind AGL, updrafts/downdrafts
- ✓ Icing in cloud, freezing drizzle, freezing fog
- ✓ Micro-climate low cloud ceilings & visibility
- ✓ Weather impacts by airframe/payload types



- ✓ Turbulence, wind shear in urban canyons
- ✓ Pop-Up thunderstorms
- ✓ Micro-bursts
- ✓ Heat Island effect

Modernize Weather Standards to Close Data Gaps

“For certain data (e.g. weather, obstacle information, etc.), one could expect that the standards that exist today for conventional aviation, in terms of delivery, update rate, data management and overall maintenance, may not be adequate.” CAAI, Aviation Infrastructure Division

ASTM F38 Weather Standards Group drafting UAS Weather Standards:

- Recommends moving from certifying sensors to a data performance standard
- FAA supports the transition to performance-based regulations and policy
- Private industry is working with NASA and FAA on methods to quantify weather data accuracy and methods of compliance
- *All weather data will require quality quantification, validation and metadata
- Recommends CAAs and ANSPs consider providing 3rd Party Weather Providers opportunities to become approved weather sources to drive weather innovation

**NASA AMES recognized Weather Data as a data set that require repudiation protection.*



FROM THE GROUND UP

Deployment of ground-based and mobile low-altitude weather sensing technology will address the weather gap challenge, including drone reports

[Observing Weather and Climate from the Groud Up - A Nationwide Network of Networks \(2009\)](#)

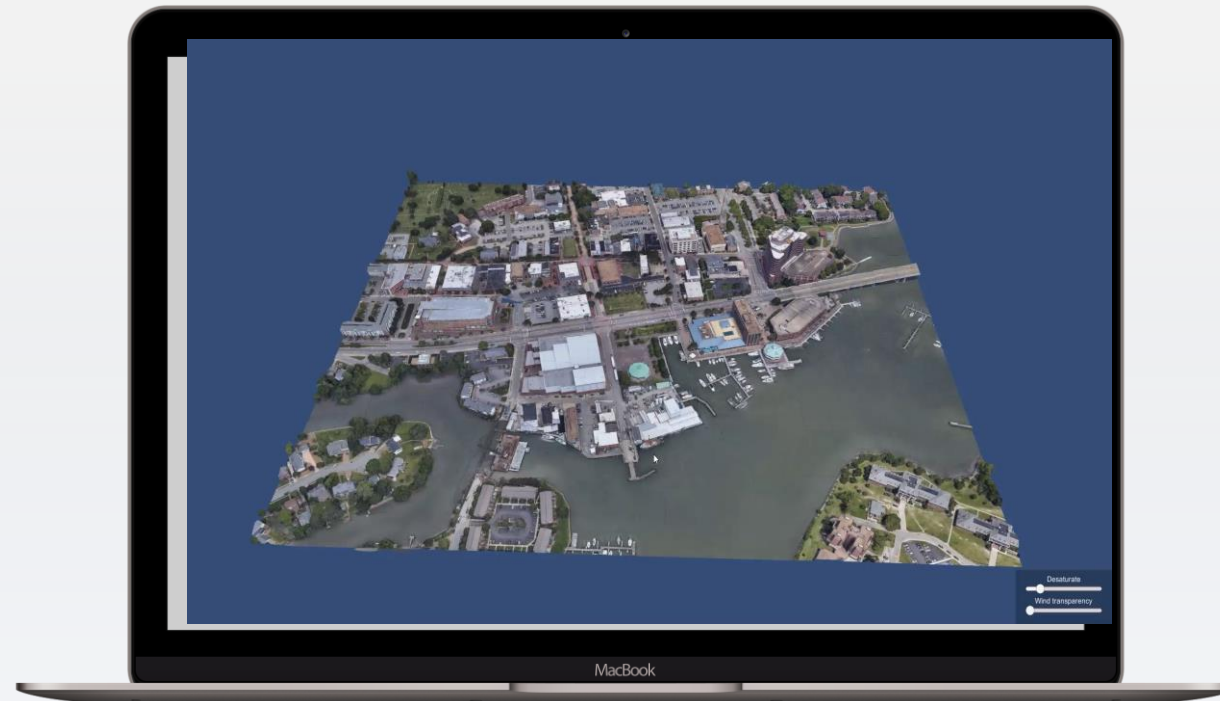
NASA Funded Weather Sensing Testbed

Test Novel Weather Sensing Infrastructure

There is no government or commercial data set today that provides precision wind in built-up areas

35+ sites with sensors including 2 scanning wind lidars, 24 low-cost weather stations, 6 high end wind systems, 2 fully functional weather stations, several drone mounted mini-weather stations.

The basis of testing Weather Data Performance Standard Methods and Means of Compliance In Place



Simulation of TruWeather's Computational Fluid Dynamics (CFD) modeling of winds around Hampton City architecture is provided by Envision Innovative Solutions (envision-is.com).

The ability to achieve the commercial promise and benefits of UAS/AAM is highly dependent on access to high quality weather data.



Consideration of ASTM Draft Weather Standards and 3rd Party Weather Information Providers to support UTM and AAM services.

A dark, stormy sky with heavy, grey clouds dominates the upper half of the image. Below the sky, a dense line of green trees and foliage stretches across the horizon. In the foreground, a dark asphalt surface, likely a helipad, is visible. A large, white, circular marking with a bold 'H' inside is painted on the asphalt, centered in the lower half of the frame. The overall mood is dramatic and somewhat ominous due to the weather.

There is an opportunity to align weather aviation service policy, regulations, services and business models to improve safety, system efficiency and business economics to autonomous flight

A new paradigm of substantial weather data and services, and sustainable weather infrastructure is needed to enable OEMs and operators to safely increase drone and vertiport throughput.

Thank You

Contact:

Don.Berchoff@TruWeatherSolutions.com

