# 2021 WIND STUDY

**Drift Case Investigations** 



### **Current State**

#### What do we do now?

- Find the three closest AWOS/ASOS weather stations
  - Automated Weather Observing System / Automated Surface Observing System
  - Maintained by the Federal Aviation Administration (FAA) and National Weather Service (NWS)
- Look for closest recorded times relative to complaint
- Compare the data from each weather station
- Determine if relevant to case



### Study Design

Does it work in the real world?

- Our Investigators record conditions in the field during complaint investigations:
  - Wind Speed and Direction
    - Anemometer
    - Calibrated Anemometer
    - Engenia Spray Tool
    - Pocket Spray Smart
    - RRXtend Spray App
  - Weather Station Data
    - Three closest stations
    - Closest time available



#### Data Collected



#### **2021 Complaint Investigations**

- Data collected during 34 cases
  - April to August
  - Variety of methods

Distance to Station (Miles)	Average	Std. Dev.
Closest Weather Station	18	9
All Weather Stations	32	17

#### **Difficulties**

#### Why this isn't easy

- Too many variables
- Limited amount of data
- Recording observations/ directions differently



- Rapid changes in weather station data
- Boom Height vs. Weather Station Height
- Circular Statistics
- Local Topography





### First Blutwind Speed

**Comparing Unadjusted Data** 

- AWOS/ASOS stations typically at 30 feet above ground
- Boom height ~24 inches, essentially ground level
- Field Recordings < Station Recordings</p>
- Deviation: 3 mph





### Wind Diree#idjusted

#### **Simplifying Direction**

- "Rounded" all data points to one of the 4 cardinal or 4 ordinal directions. (N, NE, E, SE, S, SW, W, NW)
- Built model using stations  $\leq 30 \text{ miles}$
- Deviation 57°
- 42% of all adjusted datapoints matched exactly







## Wind Speletjusted

**Correcting for Height Above Ground** 

 Adjusted using 1/7 Hellman Power Law Method

$$v_2 = v_1 \left(\frac{z_2}{z_1}\right)^{\alpha} \qquad \alpha = 0.143$$

Deviation 2 mph







### Comparison to MisspußDStudynate Hub ADIM Workshop)

Did we get close to a study with >1,500 data points?

	Missouri Study	OISC Study
Data Points Collected	>1500	34 cases, ~100 datapoints
Wind Speed Variation	2-6 mph	2 mph
Wind Direction Variation	25-60°	57°



### Thoughts and Next Steps

How useful is this?

- AWOS/ASOS stations are reliable for data gathering and can be useful information in drift cases.
- All models have exceptions.
- Topography and timing are important.
- AWOS/ASOS stations only part of an investigation



#### What can we do next?

