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2018 - The Changing Role of the Pilot

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Assessing Small UAS Operator Flight Behavior and Potential Interference with Aviation Operations in Controlled Airspace

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Assessing sUAS Operator Flight Behavior & Potential Interference with Aviation Operations in Controlled Airspace



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Introduction: sUAS Interference in the NAS



See video on metadata page Or Click <u>https://youtu.be/jzXmxjGbelk</u>

Purpose

- Identify sUAS operator behaviors
 - Preferred Types of sUAS (DJI)
 - Date/time
 - Altitude
 - Location
- Evaluate potential aviation interference & safety hazards posed by sUAS

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- sUAS operating distance from aerodromes
- Impact to local airport traffic patterns, approaches / departures, local airspace
- Historical near midair collision (NMAC)/encounter analysis (DAB only)
- Determine effectiveness of geofencing

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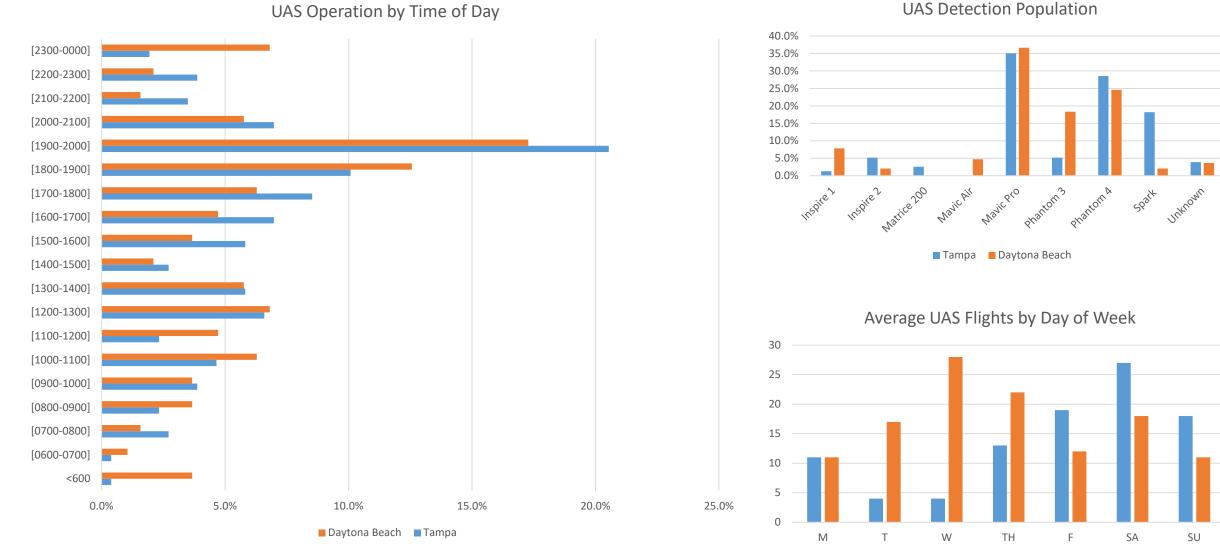
Method

- Applied, exploratory research methodology
- Detection sampling using DJI AeroScope
 - RF collection device that detects sUAS manufactured by DJI
 - ~10 SM detection range
- Data Collection (Convenient Sampling)
 - Tampa, FL (TPA), Class B, 19-day sampling
 - Daytona Beach, FL (DAB), Class C, 13-day sampling
- Analysis Tools & Reference Sources
 - Google Earth Pro (Data plotting)
 - EasyMapMaker (KML conversions)
 - AirNav (Heliport information)
 - FAA Raster Charts (Aeronautical information & overlays)
 - Google Maps (Location identification)
 - Symphony OpsVue (Historical aircraft tracking integrating ADS-B/Mode C, & Mode S data)
 - FAA UAS Facility Maps (UASFM)(Risk Analysis)



Operator Behavioral Indications

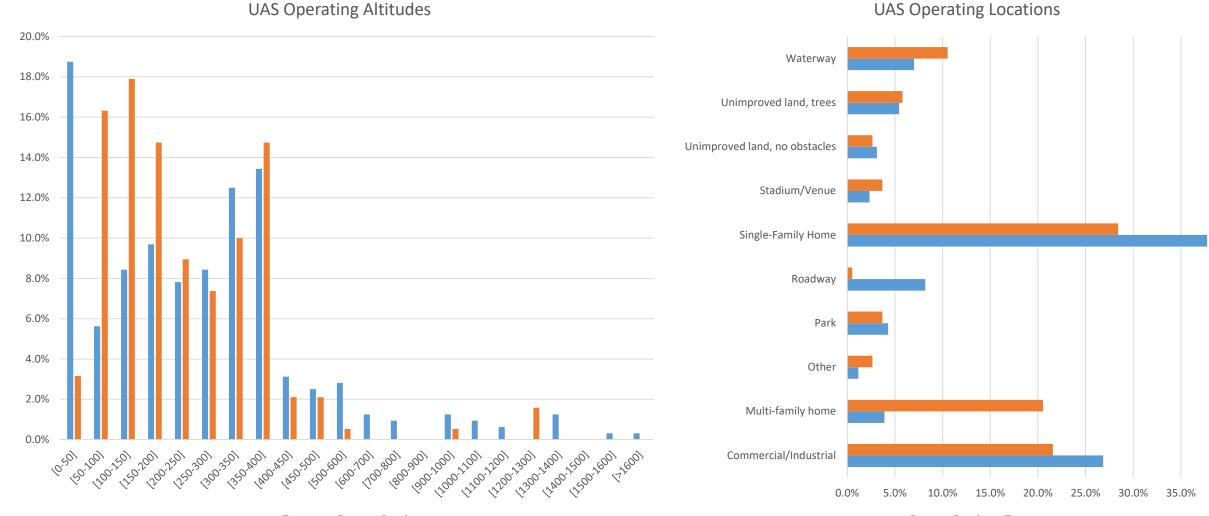
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Tampa Daytona Beach

Operator Behavioral Indications

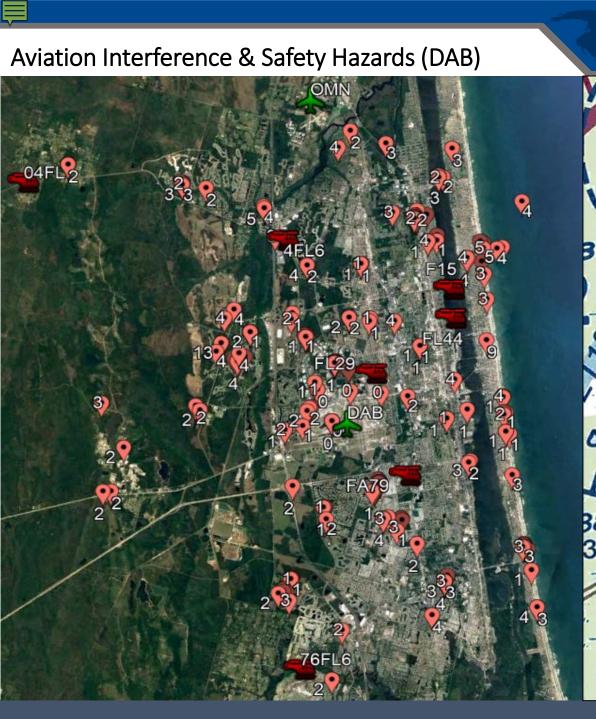
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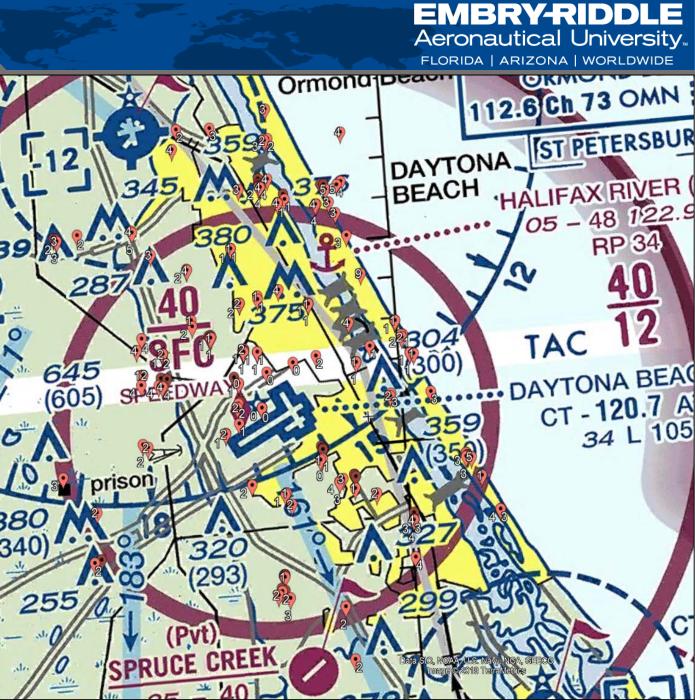


Tampa Daytona Beach

Daytona Beach Tampa

EMBRY-RIDDLE Aeronautical University. Aviation Interference & Safety Hazards (TPA) FLORIDA | ARIZONA | WORLDWIDE (340) AOE 468 233 ango 450 (212)C clearance required (418)C TPA APP ON 119 458 (418) 339 (320) ID: 259 ADIL 397' 6 ID: 241 108 VPRVR 1356' 258 ID: 280 304 1332' FL92 BRA 61F AMPA ¥ 441-535 TPF AWOS-3 118.925 *L 36 122.725 C RP 4, 36 148 XRAY MCF" 38 Riverview 16 CHEMICAL Hillsborough 2. Gibsonton PLANT Bay AV





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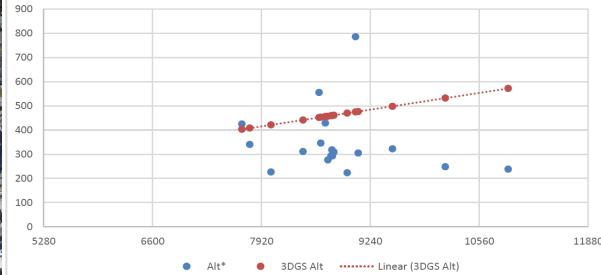
Significant Findings (TPA)

- Several sUAS breaches into Class B surface area & surrounding shelf
- Geofencing areas sometimes offset from aeronautical hazard (heliports)
- Visual approach to Peter O. Knight (TPF), Runway 18 reveals sUAS collision hazard





TPF RW18 3-Degree Visual Approach UAS Activity

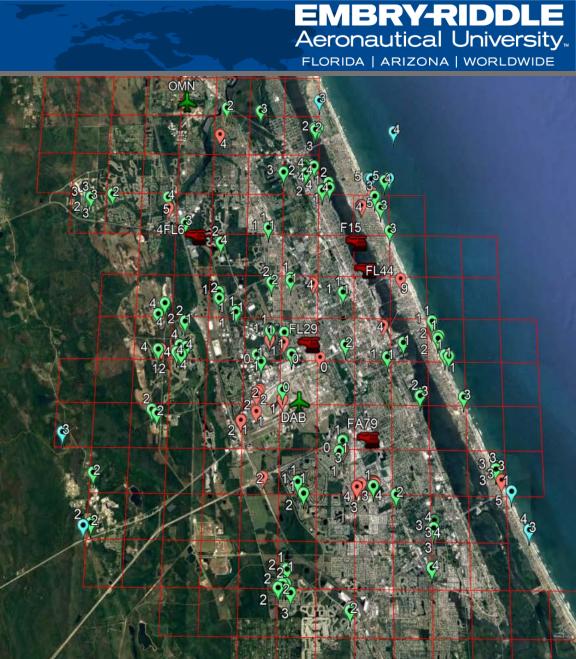


Risk Analysis Using FAA UAS Facility Maps (DAB)

- FAA established UAS Facility Maps as risk management tool for automated sUAS flight authorization via Low Altitude Authorization & Notification Capability (LAANC)
 - LAANC not active in DAB area during data collection
 - LAANC UASFM segments / altitudes used for risk analysis only
- 93% of sUAS flights detected within UASFM segments
- 21.5% of sUAS flights exceeded maximum UASFM designated altitudes

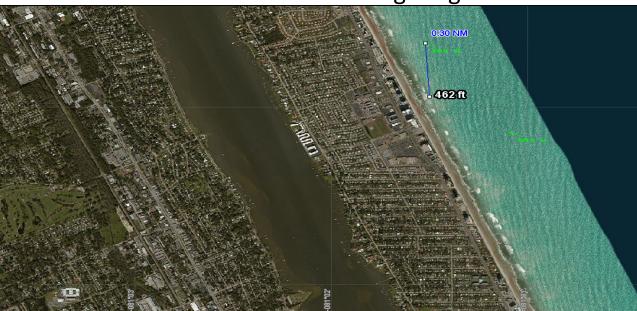
Detected UAS by Altitude Compliance with Prescribed Maximums in UASFM Segments

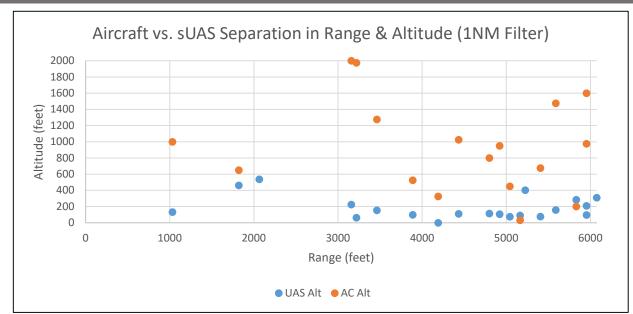




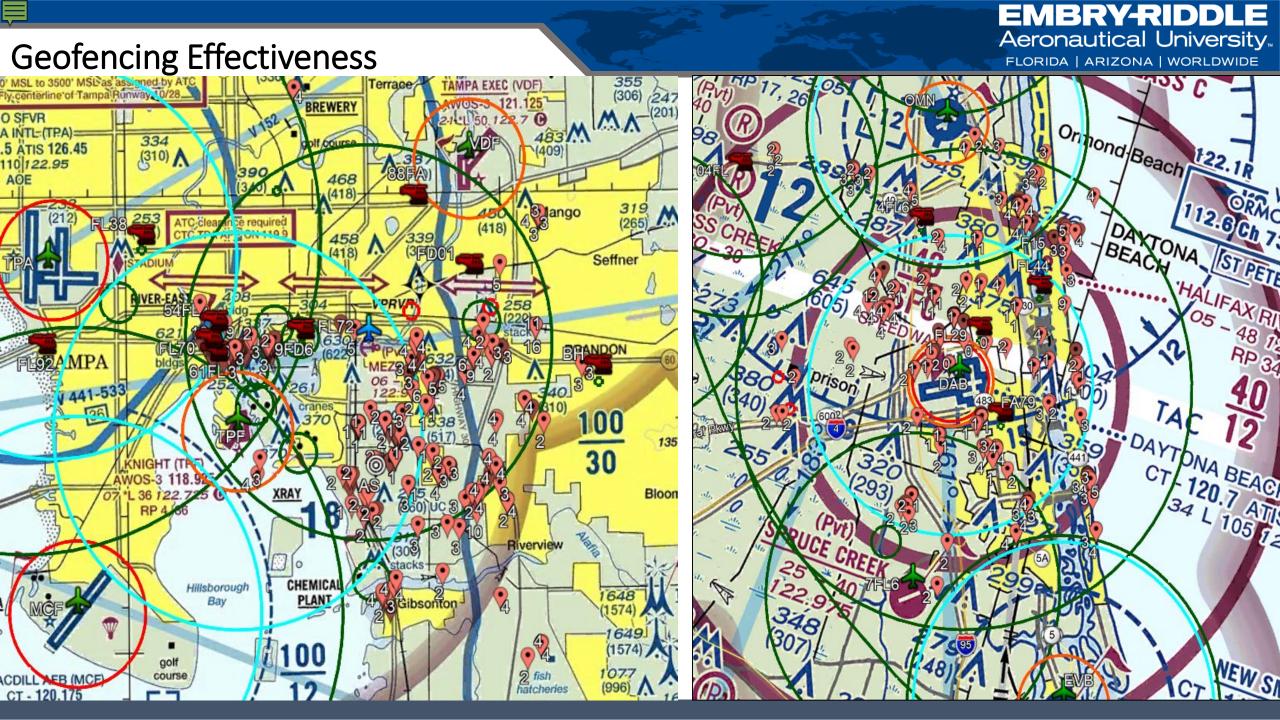
Historical NMAC/Encounter Analysis (DAB)

- Coastline (likely banner towing)
 - A/C#1 at 650' MSL @ 0.30 NM
 - A/C#2 at 475' MSL @ ~0.50 NM
 - sUAS at 462' MSL
- DAB Runway 7L
 - A/C#1 detected at touchdown point (30' MSL)
 - sUAS at 90' MSL 0.25 NM left of approach path
 - ILS RWY 7L Threshold Crossing Height is 88' MSL





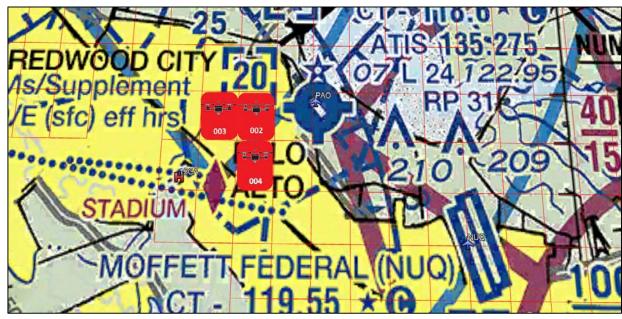




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Recommendations

- Integrate geofencing design with LAANC
 - Impose geofencing restrictions on UASFM segments
 - Encode LAANC authorizations with a geofencing unlock code to access UASFM segments
- Create Pilot sUAS situational awareness tools
 - Leverage ADS-B Flight Information Service-Broadcast (FIS-B) and Aeronautical Exchange Model (AIXM) to provide pilots with awareness of active LAANC UAS Facility Map segments
- Codify operational restrictions within 14 CFR
 - Model Aircraft operators are required to operate in accordance with the safety guidelines and within the programming of a "nationwide community-based organization (CBO)"
 - Integrate operational CBO restrictions (such as those recommended by AMA) into 14 CFR 101
 - Establishes permanent operational rules & enables better enforcement for non-compliant operators



Questions?

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