

Why Public Unmanned Aircraft Systems (UAS) Enhance the Airport Environment

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Why do UAS's Enhance the Airport Environment?

- Not all do...
- UAS enhances the safety inspection process
 - UAS cost less than conventional aerial surveys
 - UAS can be deployed and return results within the same day



Defining the Problem

- Safety Inspection process has limitations
- Small GA Airports can't afford full scale traditional aerial mapping
- Data becomes outdated between surveys
 - Due to extended time periods between surveys
 - Extended time frames due to high costs



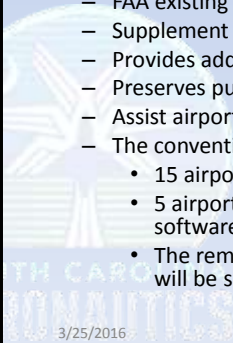
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UAS Need

- **Strengthening the SCAC/FAA partnership**
 - Obstruction validation
 - Compliance with grant assurances
 - 5010 inspection contract compliance
 - Eventual support for FAA/NTSB in accident response
- **Identifying and mitigating obstructions while reducing program costs**
 - FAA existing and new obstruction mitigation rules for GA airports
 - Supplement the state's regulatory airport land use and compatibility program
 - Provides additional safety for aircraft operations
 - Preserves public health, safety and welfare for people near airports
 - Assist airports with their Obstacle Action Plans (OAP)
 - The conventional imagery acquisitions costs are \$10,000 per airport.
 - 15 airports are budgeted annually
 - 5 airports captured with UAS technology will pay for the equipment and software
 - The remaining 10 airports will only cost "time", and the following years costs will be significantly reduced or eliminated.



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Project Goal

- Our goal is to provide high quality data for approaches to enable obstruction removal for all South Carolina airport facilities. The integration of an Unmanned Aircraft System (UAS) along with GIS and our core safety initiatives are the foundation for our GIS program.



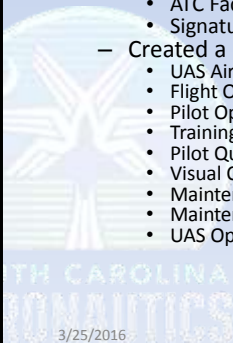
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FAA Certificate of Authorization (COA) Process for UAS Operations

- **COA Steps:**
 - Letter from Attorney General from the State
 - Access to FAA COA online application
 - FAA performs the review process in phases
 - Admin Review Check
 - ATC Feasibility Check
 - Safety Review
 - ATC Facility Coordination
 - Signature
 - Created a UAS Operation manual
 - UAS Airworthiness Statement
 - Flight Ops Manual
 - Pilot Ops Manual
 - Training Manual
 - Pilot Qualifications and Records (Private Pilot required)
 - Visual Observer Qualifications and Records
 - Maintenance Procedures
 - Maintenance Records
 - UAS Operational Area Maps



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FAA Certificate of Authorization (COA) Process for UAS Operations

- **Current COA Limitations:**
 - No Class A, B, C, or D Airspace
 - Stay within visual line of sight
 - No night time operations
 - No financial compensation



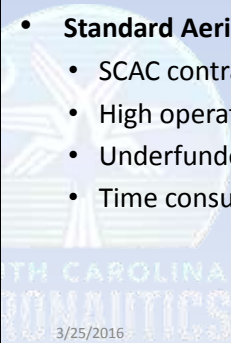
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Current Standard Data Collection Methods

- **Inspection Process:**
 - Collected using a standard total station survey instrument
 - Limited to only the trees you can see from the runway end
 - Data can become less accurate at longer distances
 - Chance of error in data from data entry process
- **Standard Aerial Mapping:**
 - SCAC contractually outsources mapping and aerial photography
 - High operational costs using conventional aircraft
 - Underfunded GA airports can't afford these services
 - Time consuming (typically weeks or more) before data is available



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Benefits of using a UAS

- [Cost savings](#)
- Time savings
- On-demand mapping and aerial photography for the FAA and the SCAC
- Data validation for SCAC CLUE Tool process
- Data validation for AIP construction projects
- Future assistance with state emergency response needs

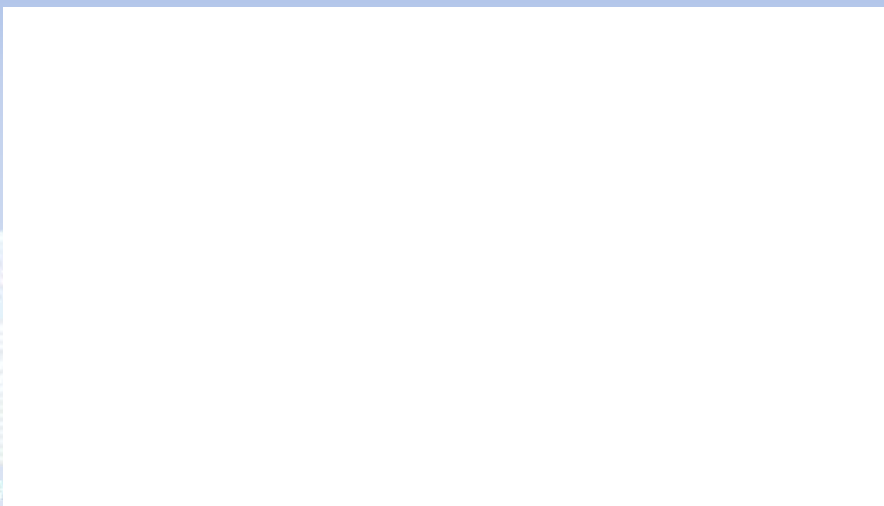


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POWER OF THE SCAC UAS

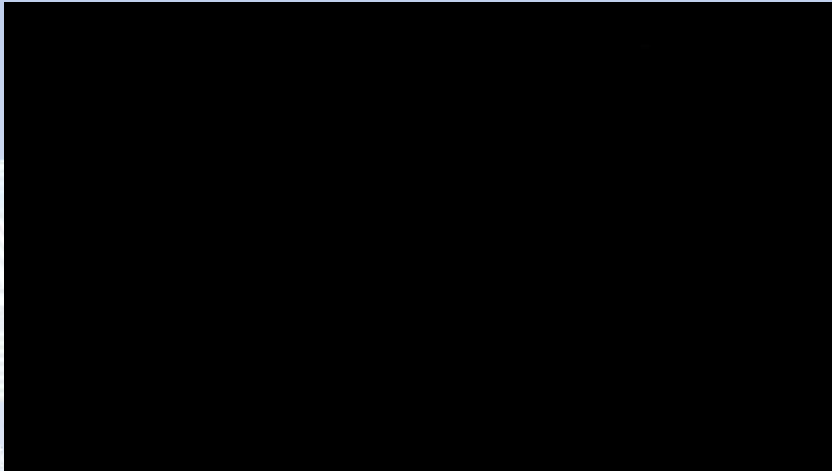


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UAS Data Collection Process



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UAS Data Post-Processing

- Data was post processed using the Pix4D software to acquire ortho mosaics, or better known as aerial imagery and .las point cloud Digital Terrain Model (DTM)
- Post processing can be completed internally therefore saving significant amounts of time



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UAS Data Post-Processing



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UAS Data Post-Processing

- Using ESRI ArcMap Desktop, paired with the ESRI 3D analyst and spatial analyst extensions, we were able to insert 3D approach surfaces for visualization and analysis.
- We created a surface TIN (Triangulated Irregular Network) model in order to drape the aerial photo on the surface creating a more “realistic” environment.

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End result for obstruction analysis



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Analysis results format

- Interactive web application:
 - [3D Airport Surface Application](#)
- Hard copy map
- Map package to be given to others with access to ESRI ArcMap
- Can be exported into AutoCad or any other mapping or engineering software that recognizes .tin models

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SCAC Airport GIS Program Mission

SCAC GIS Mission:

The mission of the SCAC GIS staff is to support the activities of the SC Aeronautics Airport Development group, aviation community, and citizens by providing and maintaining accurate, current and complete geospatial data that will help ensure the safety and growth of aviation in the state. This support will be provided through leveraging a Geographic Information System (GIS). Using the GIS, the results will enable airport sponsors, pilots, engineers, planners, and other stakeholders to make decisions impacting the future of South Carolina airports and aviation in an informed and logical manner.



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NEW GIS APPLICATIONS

All Data Viewer:

- All GIS Data available in our current system
- Includes things like airfield facilities, electrical, NGS Monuments, pavement data, PART 77, topo mapping, and other misc. data

Pavement Study Viewer:

- All GIS data available from the 2013 PCN Pavement Condition Study

Electrical Study Viewer:

- All GIS data available from the Statewide Electrical Study

Safety Inspection Viewer:

- Data from the annual airport safety inspections
- Includes approach violations, issues found on airfield and all associated airfield PART 77 surfaces.

Runway Friction Testing Results:

- Report information from runway friction testing done by SCAC.

Land Use Compatibility Tool:

- This interactive site is designed to assist the general public in understanding airspace and land use compatibility near airports by evaluating a "test case" development proposal against FAA and SCAC standards.

FCC Tower Data:

- Download link to FCC tower data (Google Earth needed)



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SCAC Airport GIS Program

SCAC GIS Program Tasks:

- The South Carolina Aeronautics Commission is responsible for the collection, maintenance, and dissemination of airport data through a physical inspection of all active aircraft landing facilities open to public use.
 - This program includes:
 - Condition of all airfield facilities (ex: lights, pavements, hangars, terminal buildings)
 - Evaluation of flight approach surfaces per FAA PART 77 standards
 - Submitting and verifying data uploaded to the FAA facilities directory and approach manuals distributed every 56 days
- We have been able to utilize the GIS technology to help us to provide accurate and timely data to all of those involved.
- Supporting role for Airport Planning, Engineering, and Maintenance projects



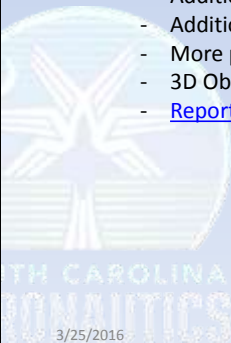
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GIS Program Future Proposed Capabilities

- Addition of a Quad Copter
- Provide assistance to other state agencies. (SCDNR, forestry, law enforcement)
- Assist the FAA local FSDO office with accident investigation.
- Expanded UAS sensor capabilities (thermal, LIDAR, infrared)
- Real-time live video feed from UAS
- Class D airspace capabilities
- Addition of on board ADS-B
- Additional GIS online mapping applications
- More pavement data on pavement application
- 3D Obstruction data surface applications for obstruction mitigation
- [Report an airport Issue Application](#) & [Geoform](#)



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**Thank You -
Questions?**

**Send feedback or
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