



Bringing UAS to America's Skies

The Lone Star UAS Test Site

An update

Scientific Committee for Oceanographic Aircraft Research

Univ. of Miami, April 14, 2014

Presenter:

Michael Starek

Assistant Professor

School of Engineering and Computing Sciences



Texas A&M University Corpus Christi

The Island University

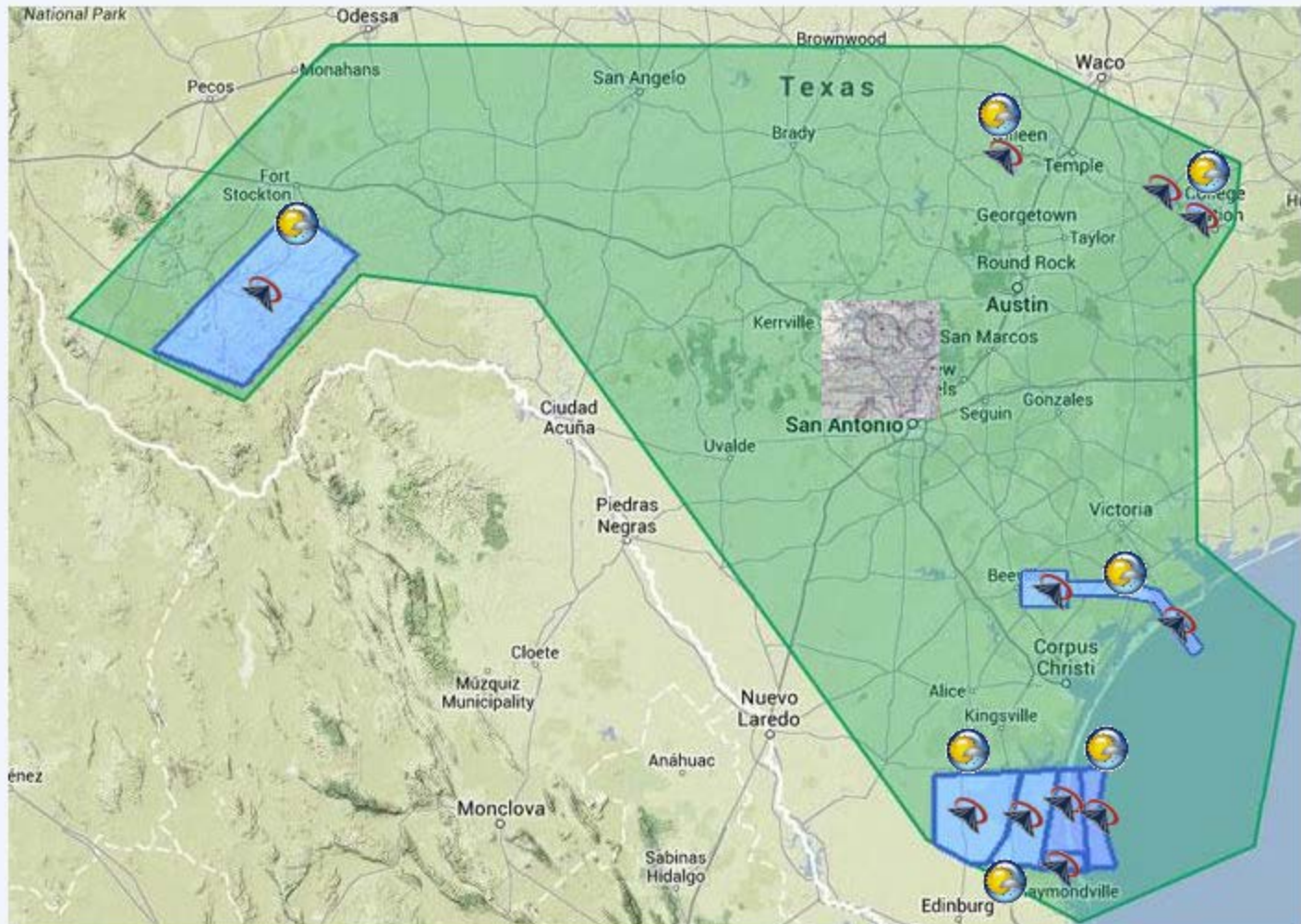


LONE STAR UAS



CENTER OF EXCELLENCE & INNOVATION

LSUASC Test Site



6100 mi², 11 geographically diverse ranges, sparsely populated coastlines

Active Coastal Ranges

(COAs tied to TAMUCC's RS-16 platform)

TAMUCC Padre Range



A topography map of the TAMU-CC Padre test range (left) and an RS-16 aircraft flies over Texas beaches (right)

~38 mi N-S, ~450 square miles total, 3000ft AGL

Laguna Range



A topography map of the Laguna Range (left) and an aerial view along Texas' Laguna Madre (right)

Launch from Charles R Johnson Airport in Port Mansfield, covers Mansfield inlet and beach area, ~18 miles E-W

Gulf Range

Not Active



A topography map of the range along the Gulf waters (left) and a view of the Gulf from a coastal beach along the Padre Island National Seashore (right)

Shares boundary with Padre COA, ~41 nm x 11 nm, proposed 18,000 ft ceiling

LSUASC Recent Highlights (since June 2014)

| | |
|---|----------------|
| Tested Ground Based Radar and Spectrum Deconfliction equipment | 2015-03 |
| Demonstrated communication of client with NASA UAS Traffic Management System | 2015-03 |
| Selected to test FAA's COA On-Line System | 2015-02 |
| FAA Data Survey | 2015-01 |
| Submitted Research Considerations Proposal to FAA | 2015-01 |
| Research mission established fiber communications linkage | 2014-10 |
| First external customer research mission | 2014-10 |
| FAA Safety Readiness Survey | 2014-08 |

LSUASC Research Lessons Learned

- Established procedures for operating UAS at an active airport
- Validated live streaming communications architecture (satellite, fiber, cellular)
- Demonstrated communication between LSUASC Client and NASA UAS traffic management system
- Identified 3 intrusions in remote operational area
- Determined rotary aircraft more effective chase plane solution than a fixed wing



LSUASC Path Forward

- Expand distributed research environment
- Mature Mission Control Center (MCC), Mobile Mission Control Centers (MMCCs), and Range Operations Centers (ROCs)
- Request additional Broad Area COAs
- Adapt research infrastructure
- Engage more funding opportunities



TAMU-CC UAS Research Program

March 2015 Test Flight over Laguna Range



Flight operations led by

Dr. David Bridges

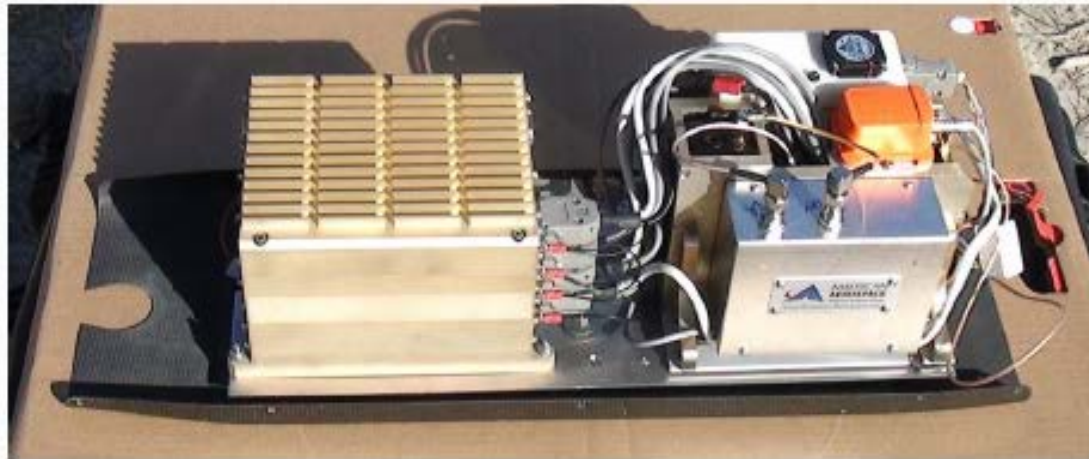
Associate Professor of Mechanical Engineering

Director, Unmanned Aerial Systems Program

TAMU-CC American Aerospace RS-16

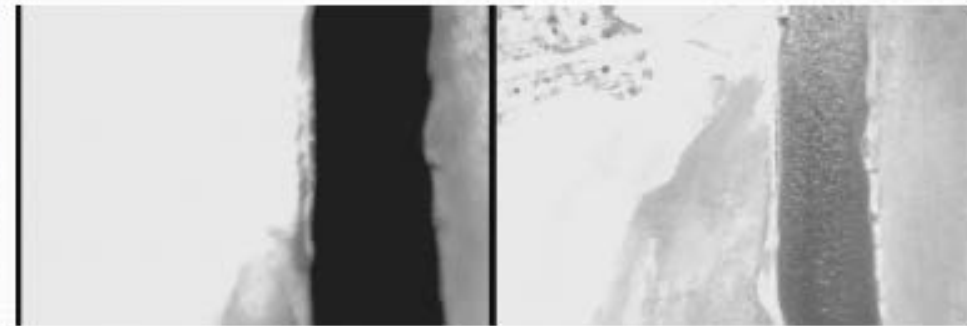
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| AAAI Three-Band HDVMP October 10, 2012 | | | | | | | | |
|--|-------------|----------------|--------------|------|---------------------------------|------------------|---------------------------------|------------------|
| | | | | | 1,000' AGL | | 3,000' AGL | |
| Camera | Type | Band (microns) | Pixels (MPx) | HFOV | Ground Sample Distance (Inches) | Swath Width (Ft) | Ground Sample Distance (Inches) | Swath Width (Ft) |
| Ultraviolet | Interlaced | 0.3 to 0.4 | 0.307 | 18.4 | 6 | 324 | 18.2 | 972 |
| Infrared | Interlaced | 8 to 12 | 0.307 | 18.4 | 6 | 324 | 18.2 | 972 |
| Visible | Progressive | .45 to .65 | 2.073 | 18.4 | 2 | 324 | 6 | 972 |
| | | | | 52 | 6.1 | 976 | 18.3 | 2928 |



Multispectral Imaging Payload: UV , Visible (RGB), Thermal IR

- Sample images



Thermal

UV

UAS Exercise: March 4-6, 2015

- LSUASC Laguna COA, centered on Charles R. Johnson Airport in Port Mansfield, TX
- Purpose
 - Maintenance / Engineering Development
 - Check aircraft C2 range
 - Check modifications to systems in Mobile Mission Control Center
 - Check capability of helicopter as chase aircraft
 - Scientific image acquisition
 - Land / water interface
 - Urban areas

Accomplishments

- Maintenance / Engineering Development
 - 3 flights, total flight time 7 hours
 - Used helicopter as chase aircraft, worked very well
 - Verified at least 10 nm range of C2 link, ability to reach Gulf
 - Verified systems modifications in Mobile Mission Control
- Scientific image acquisition
 - Acquired image data along seashore and bay boundaries
 - Mapped Port Mansfield urban area for GIS studies



Flight lines along Padre Island Seashore

Gulf of Mexico

Port Mansfield

Shoreline (2000 ft AGL - ~4 inch GSD in RGB)



Inlet



Laguna-side





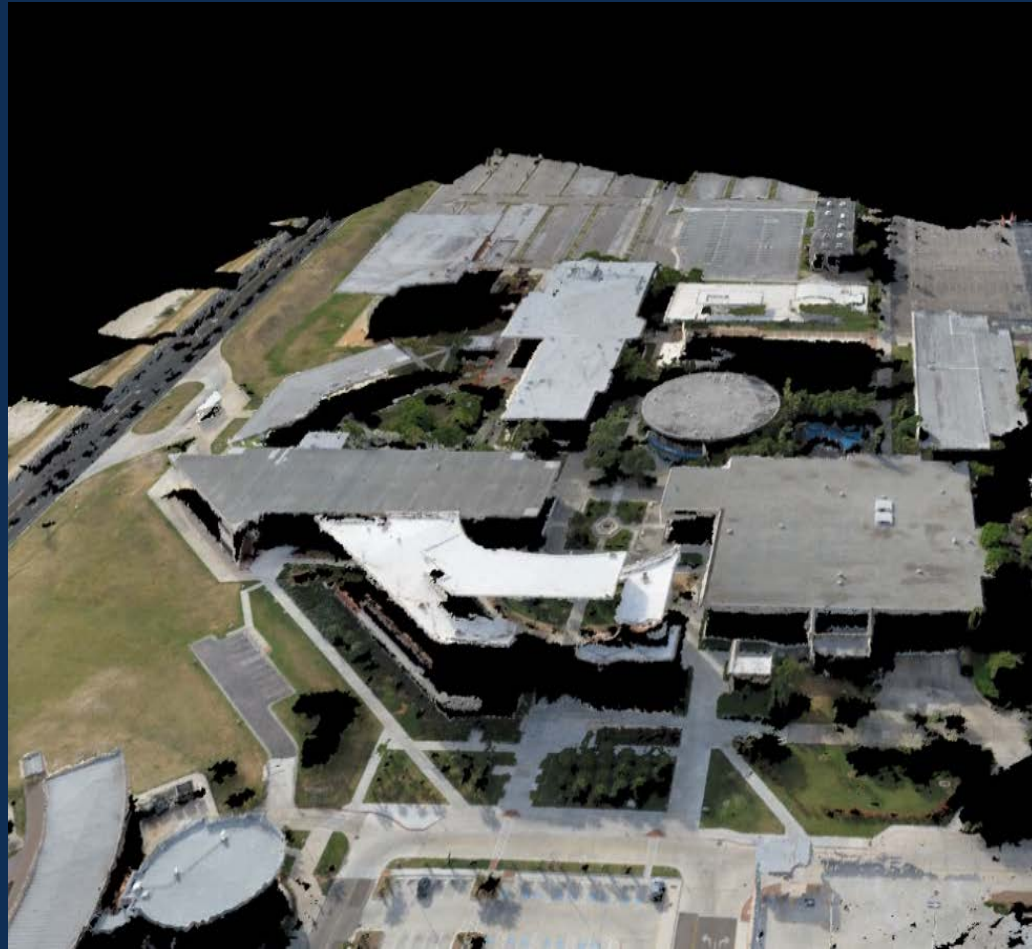


Video Example

Small-scale UAS Survey of Campus



eBee



Example 3D point cloud; [fly through](#)

Thank You SCOAR & Univ. of Miami!

Questions?



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LONE STAR UAS



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CORPUS CHRISTI