LONE STAR UAS
CENTER OF EXCELLENCE AND INNOVATION

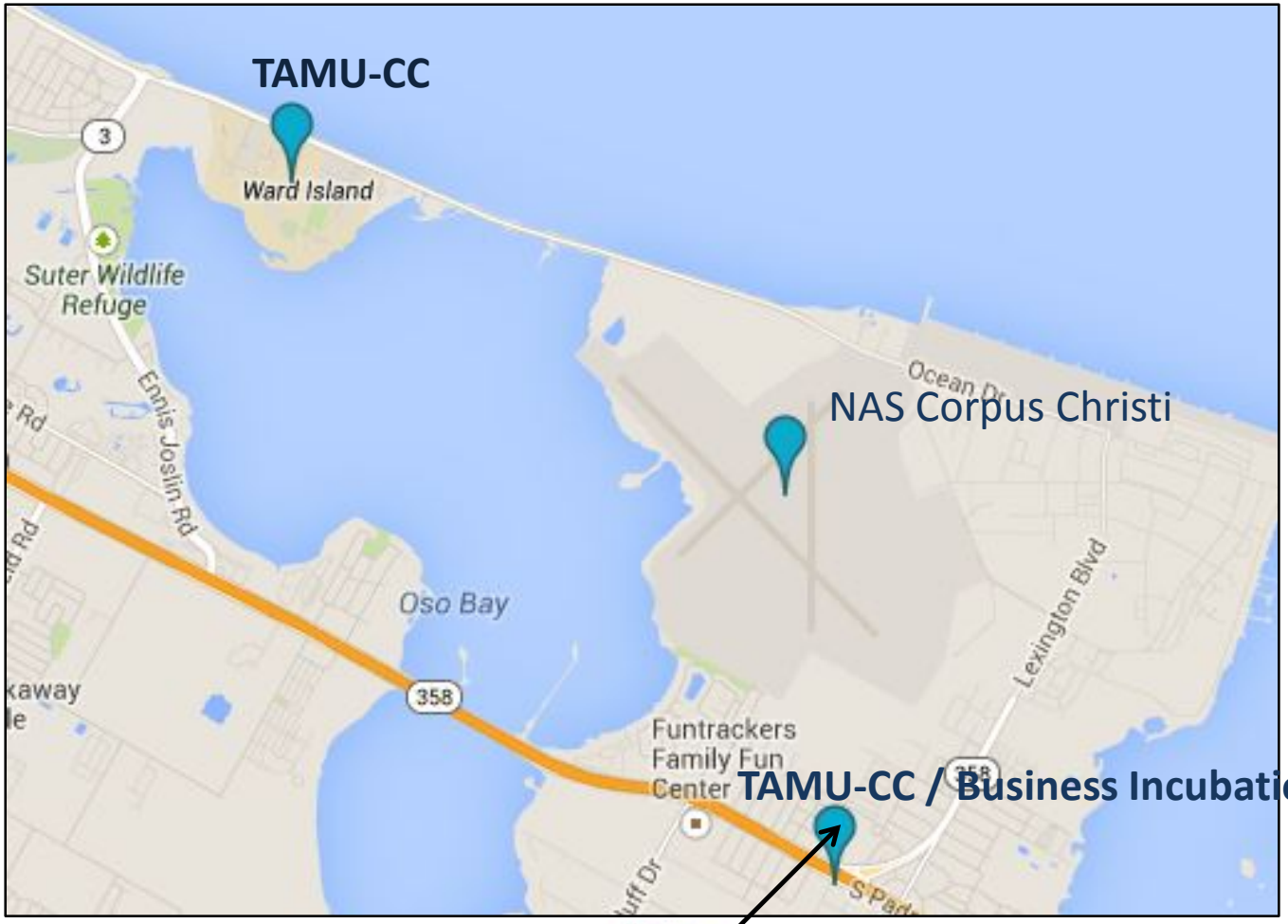
Bringing UAS to America's Skies

The Lone Star UAS Test Site

An update
Scientific Committee for Oceanographic Aircraft Research
San Diego, CA June 4-5 2014

Mike Starek (presenter)
Assistant Professor at Texas A&M University-Corpus Christi

Camber
TEXAS A&M UNIVERSITY CORPUS CHRISTI
TEXAS A&M ENGINEERING TEES



LONE STAR UAS
CENTER OF EXCELLENCE & INNOVATION

Lead Institution and State Agency

- Texas A&M University-Corpus Christi (TAMU-CC)
  - UAS operations since 2011: 30 flights, 32.1 hours w/ RS-16 UAS
  - 450-square-mile maritime FAA certificate of authorization (COA)

- Texas A&M University Engineering Experiment Station (TEES)
  - Seven COAs, 2012-2013
    - Center for Autonomous Vehicles and Sensor Systems: CANVASS
    - Unmanned Flight Laboratory
    - Vehicle Systems & Control Laboratory
    - Helicopter and Unmanned Systems Laboratory
    - Center for Robotic-Assisted Search and Rescue: CRASAR
    - Center for Emergency Informatics: Human-factors research

The LSUASC Team

(16 entities, 5 affiliated with universities)

Texas A&M University-Corpus Christi (TAMU-CC)	Texas Tech University (Lubbock, Texas)
Texas A&M Engineering Experiment Station (TEES)	Bay Area Houston Advanced Technology Consortium (BayTech)
Camber Corporation (Huntsville, Alabama)	Texas Department of Transportation/Aviation
Governor's Office of Aerospace, Aviation and Defense	Jerry Thompson Associates (JTA, Washington, D.C.)
Chase Field Industrial Complex (Beeville, Texas)	Aviation Specialties (Sierra Vista, Arizona)
University of Texas at Arlington Research Institute (UTARI)	Modern Technology Solutions Inc. (MTSI, Alexandria, Virginia)
Southwest Research Institute (SwRI, San Antonio, Texas)	AvMet Inc. (Reston, Virginia)
University of Texas at San Antonio (UTSA)	Charles Johnson Airport (Port Mansfield, Texas)

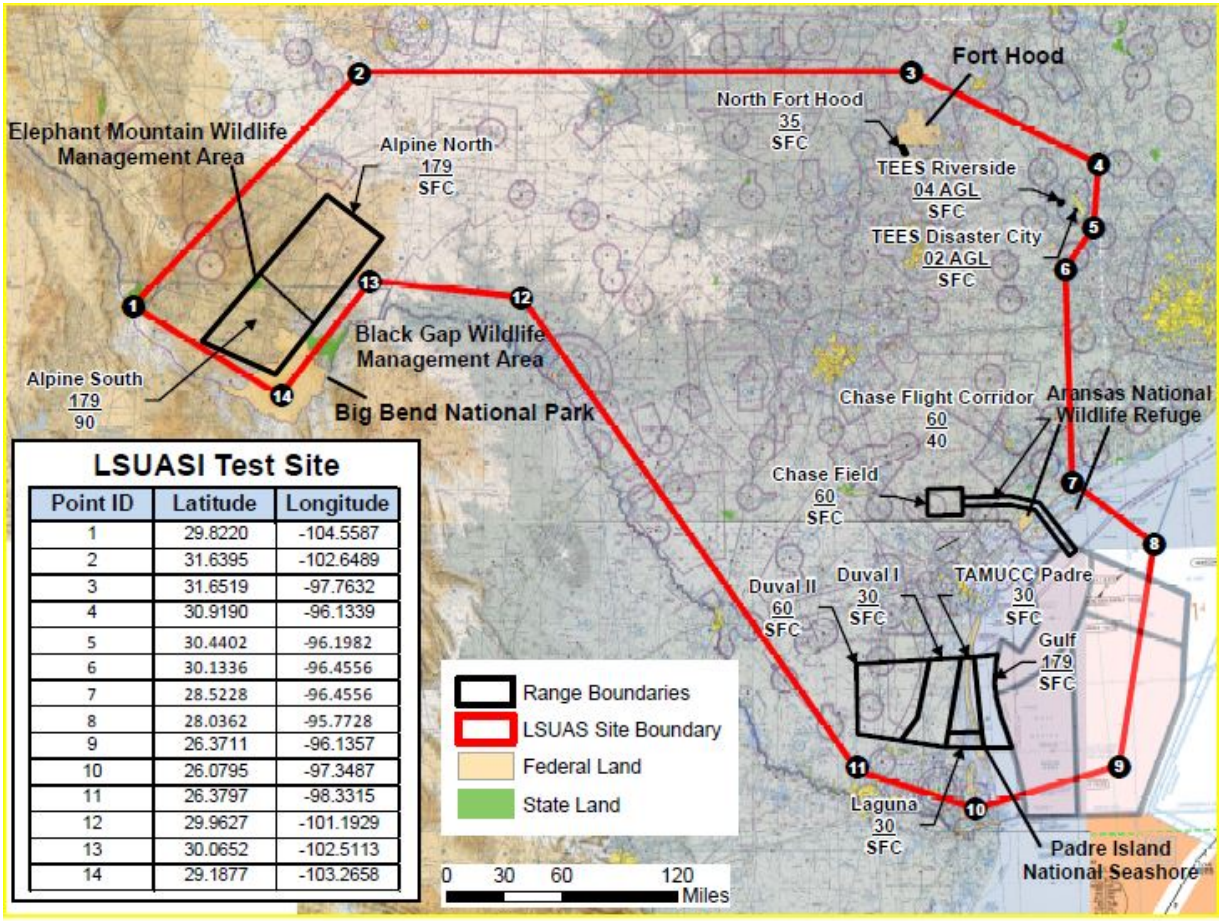
Lone Star UAS Test Site Status

- FAA proposal submitted on May 3, 2013
- Awarded by FAA on Dec. 30, 2013
- **2014 actions under way**
  - Develop capabilities

    Mission Control Center, Electronics / Systems Lab, Integrated Data Environment
  - Advisory board/executive director
  - COA applications proposed to FAA

  Outreach
    - Public: safety, privacy, environmental impact
    - Industry, state, national
    - Team R&D

Lone Star UAS Test Site Ranges



LSUASI Test Site

Point ID	Latitude	Longitude
1	29.8220	-104.5587
2	31.6395	-102.6489
3	31.6519	-97.7632
4	30.9190	-96.1339
5	30.4402	-96.1982
6	30.1336	-96.4556
7	28.5228	-96.4556
8	28.0362	-95.7728
9	26.3711	-96.1357
10	26.0795	-97.3487
11	26.3797	-98.3315
12	29.9627	-101.1929
13	30.0652	-102.5113
14	29.1877	-103.2658

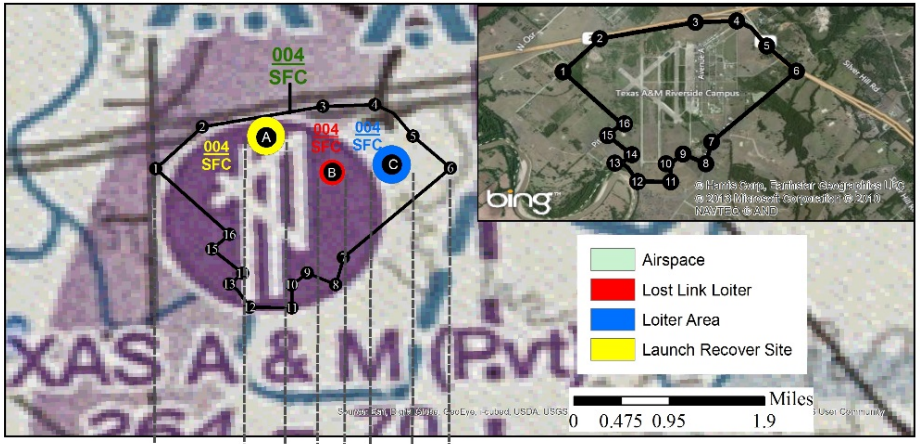
6100 mi², 11 geographically diverse ranges, sparsely populated coastlines

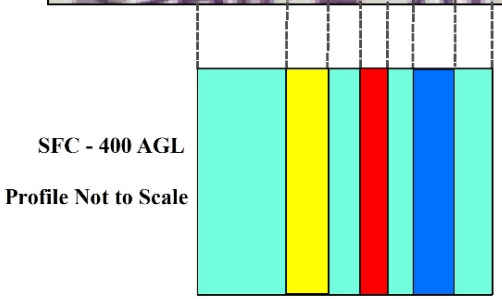
Current Active Ranges
(COAs tied to specific platforms)

TAMU-CC Padre Range

- Approx. 38 mi. north to south
- Approx. 450 sq. mi.
- Approx. 36 mi. south of campus (as crow flies)

TAMU/TEES Riverside Range





Test Range Airspace

1	30.6398 / -96.4994	12	30.6199 / -96.4859
2	30.6459 / -96.4928	13	30.6232 / -96.4888
3	30.6488 / -96.4753	14	30.6248 / -96.4869
4	30.6491 / -96.4678	15	30.6282 / -96.4913
5	30.6445 / -96.4623	16	30.6304 / -96.4888
6	30.6399 / -96.4569	A	30.6445 / -96.4836
7	30.6271 / -96.4724	B	30.6394 / -96.4738
8	30.6231 / -96.4735	C	30.6406 / -96.4651
9	30.6248 / -96.4776		
10	30.6231 / -96.4799		
11	30.6198 / -96.4798		

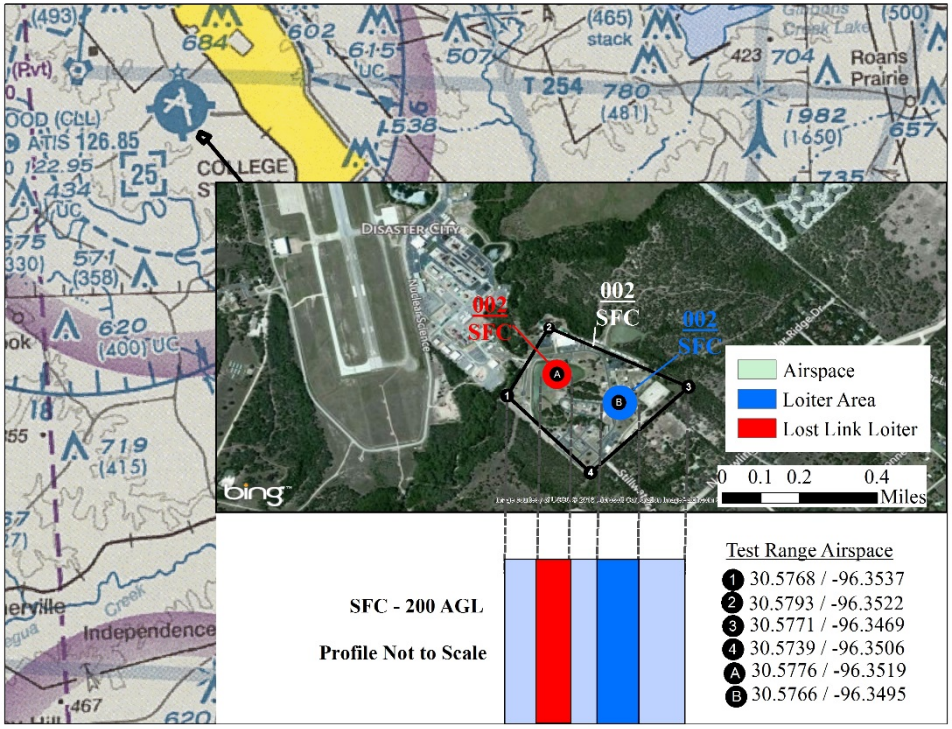
Airspace Dimensions

- ALT: SFC to 400’
- 2.2 NM east-west,
- 1.8 NM north-south

Texas A&M Flight Test Station

- Former military airbase
- 7,000’x150’ runway
- No functioning control tower

TAMU/TEES Disaster City Range

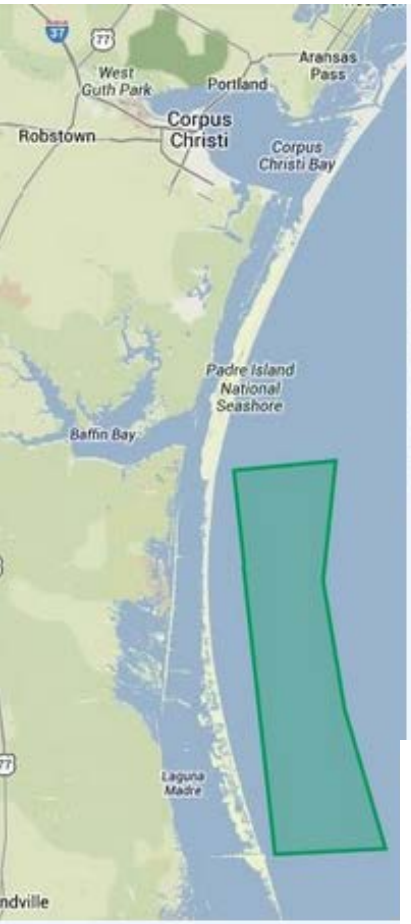


Dimensions of the Airspace:

- ALT: SFC to 200’
- ~0.4 NM east-west
- ~0.3 NM north-south

Center for Robotics Search and Rescue
Dr. Robin Murphy

Gulf Range
(not active)



Open Gulf range within Texas' waters

- 41 NM x ~11 NM
- ~450 NM^2
- ALT – SFC to 18000 ft

Proposed use is for medium to large-scale UAS to launch from Charles R. Johnson Airport in Laguna Madre Range

Lone Star UAS Test Site Research

FAA research focal areas

- UAS system safety and data gathering
- UAS airworthiness
- Command & control link issues
- Control station layout and certification
- Ground and airborne sense-and-avoid technologies
- Environmental impacts of UAS operations

Combinations of R&D team members working on these different aspects

Lone Star UAS Test Site Expertise

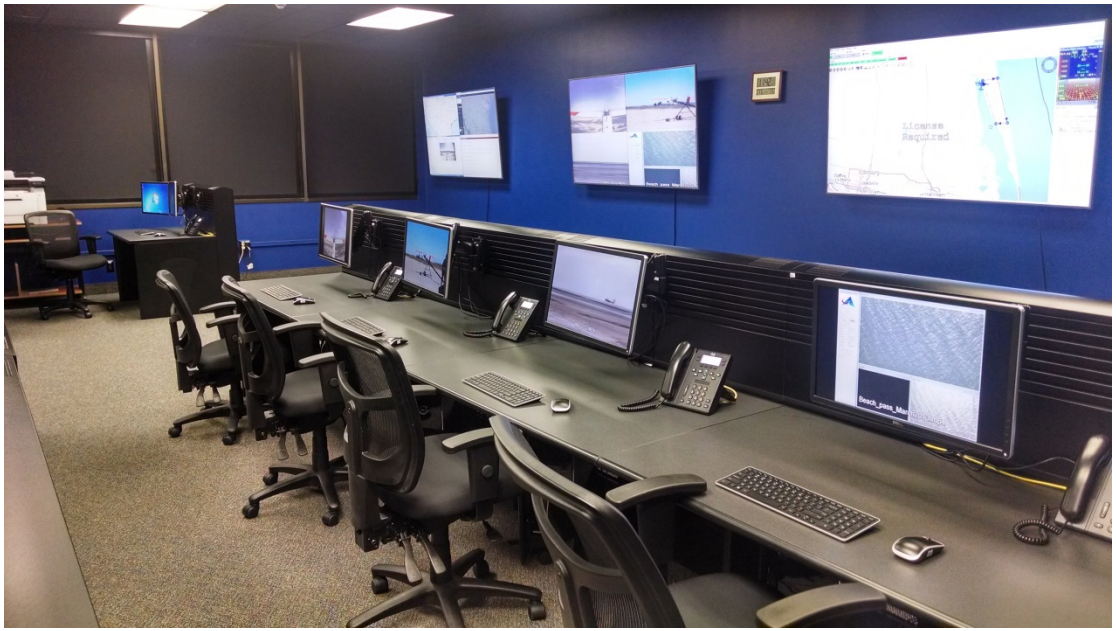
- FAA operations and coordination
- UAS acquisition, operations and maintenance
- UAS range operations (autonomous and manual)
- COA development
- Payload integration, assembly &testing
- Control of the ‘air wing’ & mobile Command Centers to reduce vendor costs/negotiatiation
- Integration/development and verification of ground control station

→ ***Proposal support to estimate costs for range use***

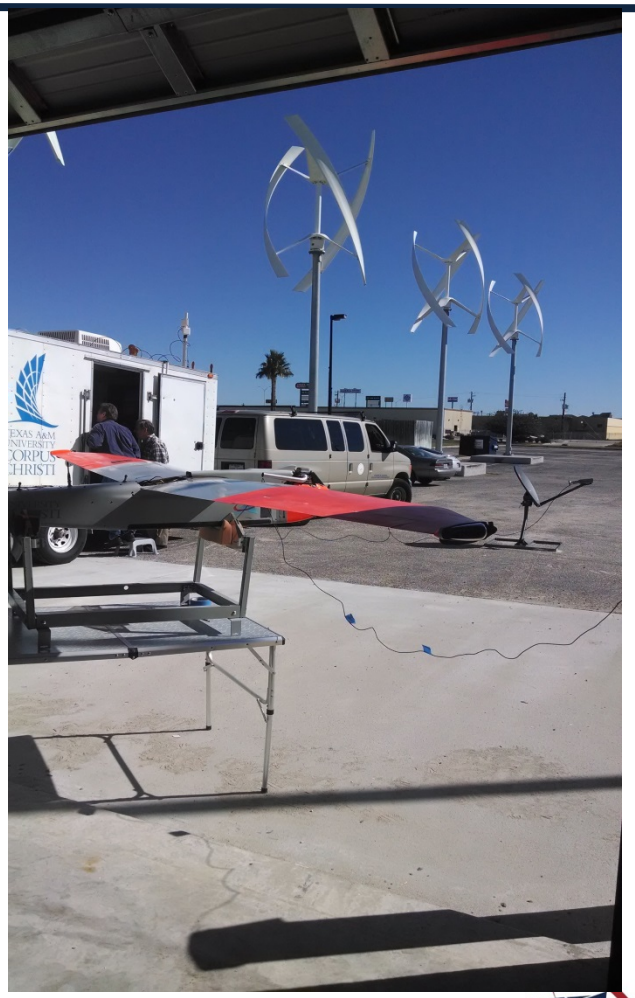
→ ***Fees charged for services (e.g. COA or lab use) but not airtime***

Command Centers

Mission Control Center



Mobile Control Center

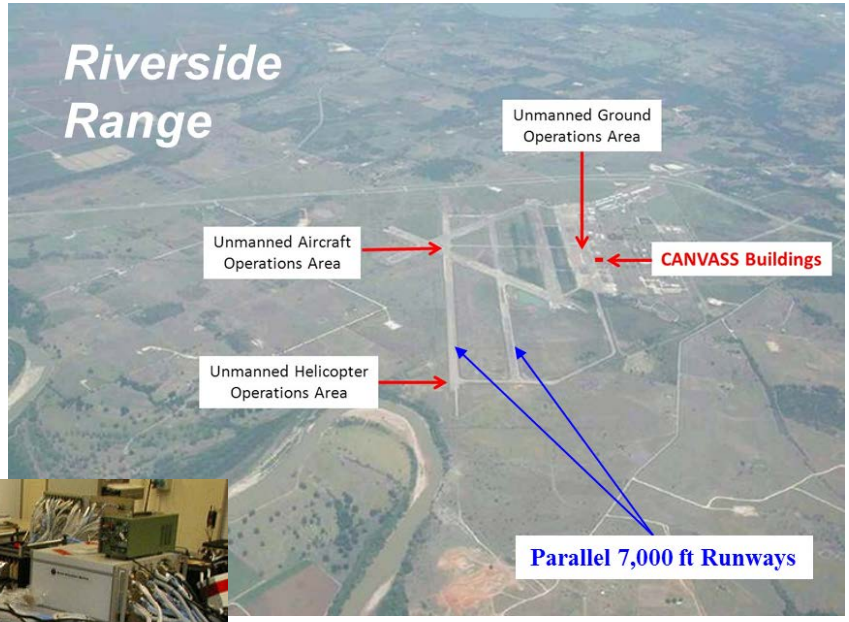


Electronics Lab/ Systems Integration Lab

Support Centers

Coastal Bend Business Incubation Center

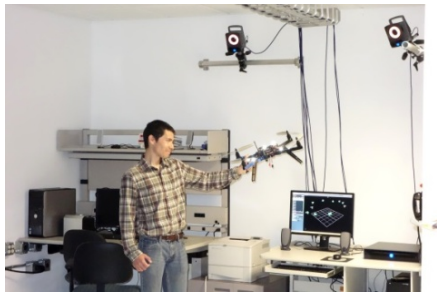
CANVASS



Electronics Lab/ Systems Integration Lab (Notional)

TAMU-CC Support & Research Centers

iCore



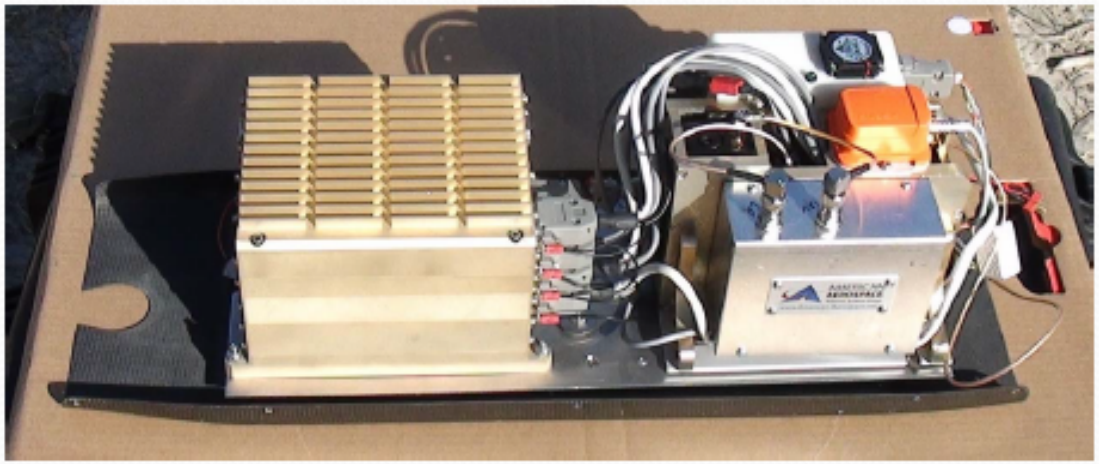
Unmanned Systems Lab

Wind Tunnel

Geospatial Computing Lab

TAMU-CC American Aerospace RS-16

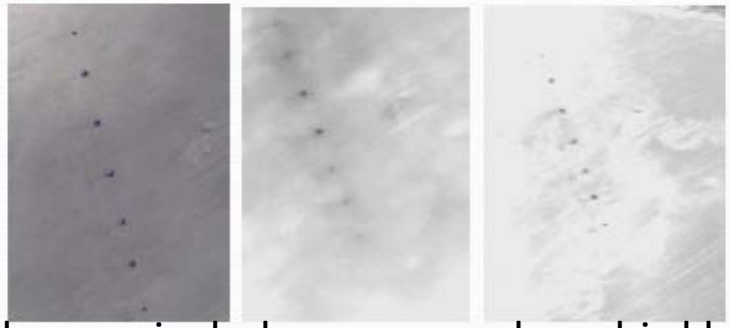
AAAI Three-Band HDVMP October 10, 2012								
					1,000' AGL		3,000' AGL	
Camera	Type	Band (microns)	Pixels (MPx)	HFOV	Ground Sample Distance (Inches)	Swath Width (Ft)	Ground Sample Distance (Inches)	Swath Width (Ft)
Ultraviolet	Interlaced	0.3 to 0.4	0.307	18.4	6	324	18.2	972
Infrared	Interlaced	8 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

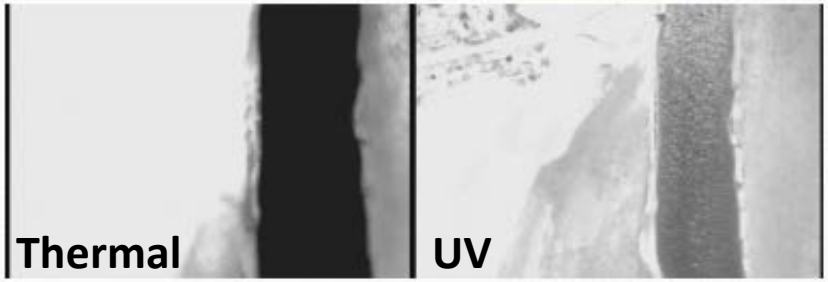


Imaging Payload (25 lb): UV , Visible (RGB), Thermal IR

March 2013 Flight over Laguna Madre

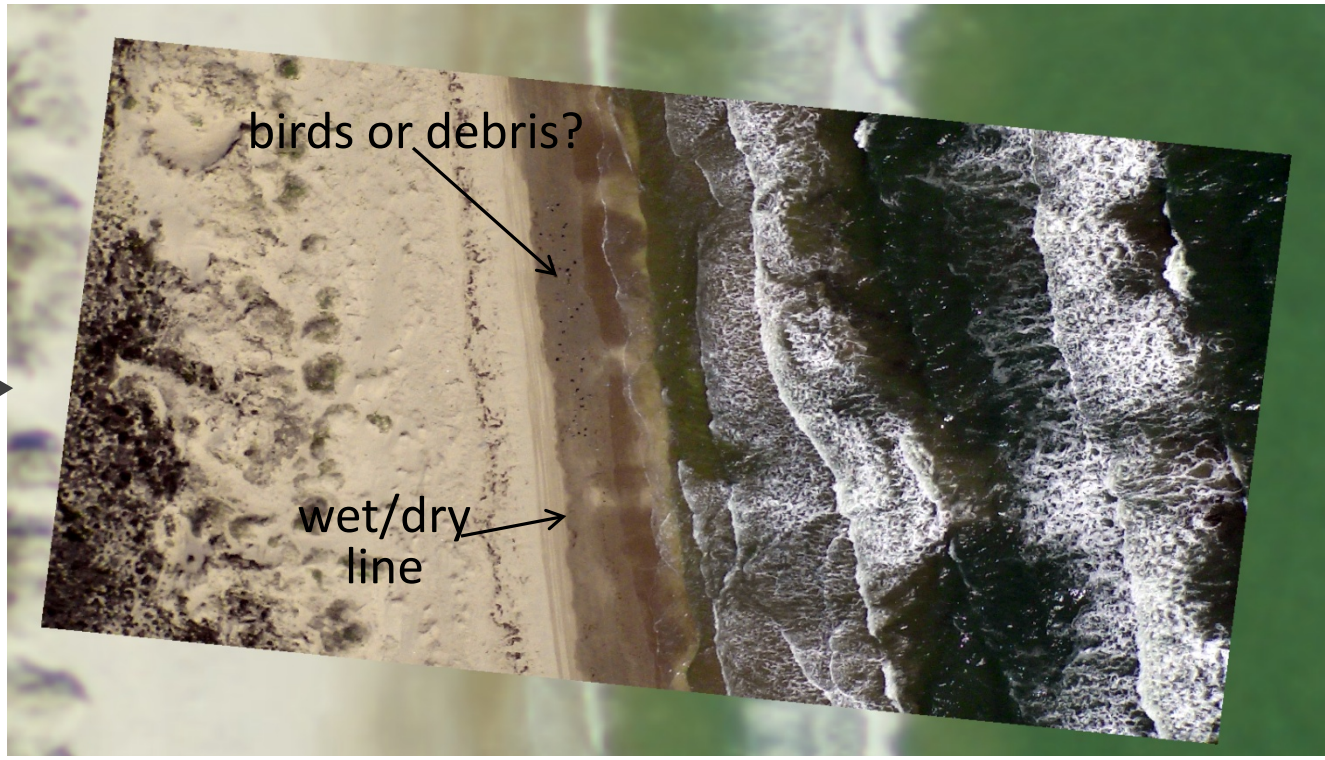
- Sample images





Research areas include seagrass, shore bird habitat, innudation mapping and model calibration…
Petroleum targets: crude oil, distillate, gasoline, diesel

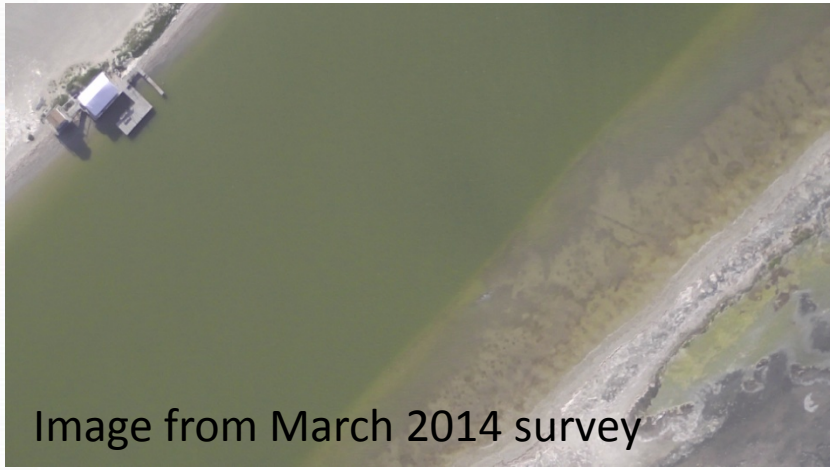
Example: Shoreline Mapping
Padre Island National Seashore



~ 2 km swath of
overlapping imagery

~15 cm ground resolution at 1200'AGL
~120 m x 170 m area

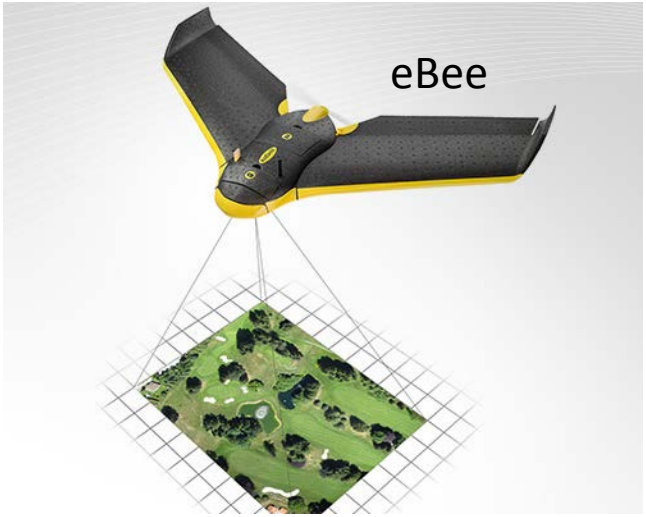
RS-16 LaunchVideo

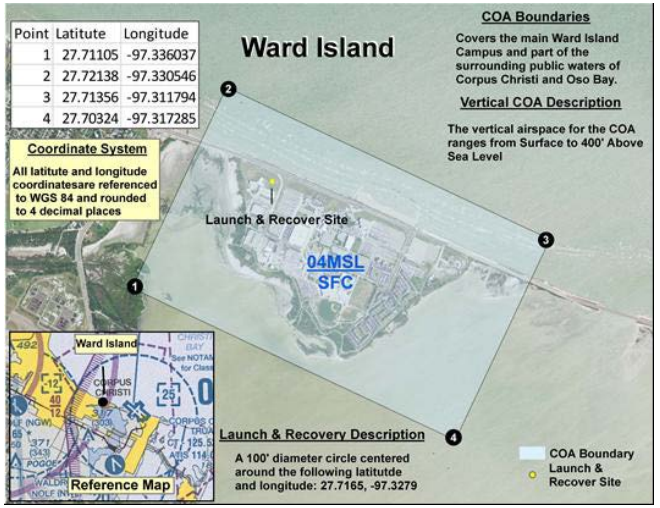


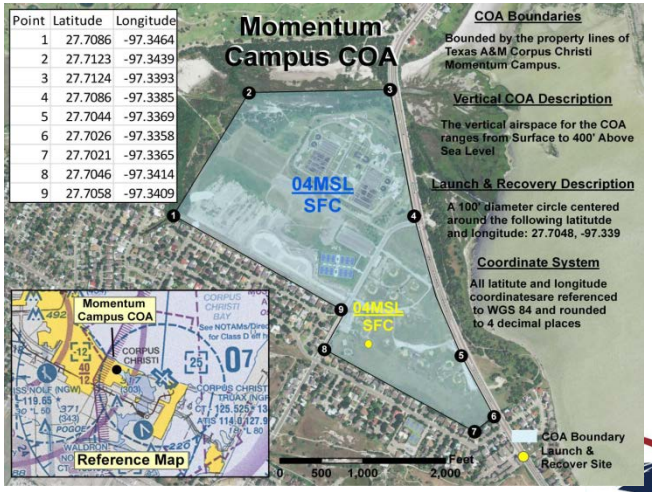
http://www.youtube.com/watch?v=E6jppmODs-0

RS-16 Operations lead by Dr. David Bridges

TAMUCC Campus COA (Sensefly eBee)

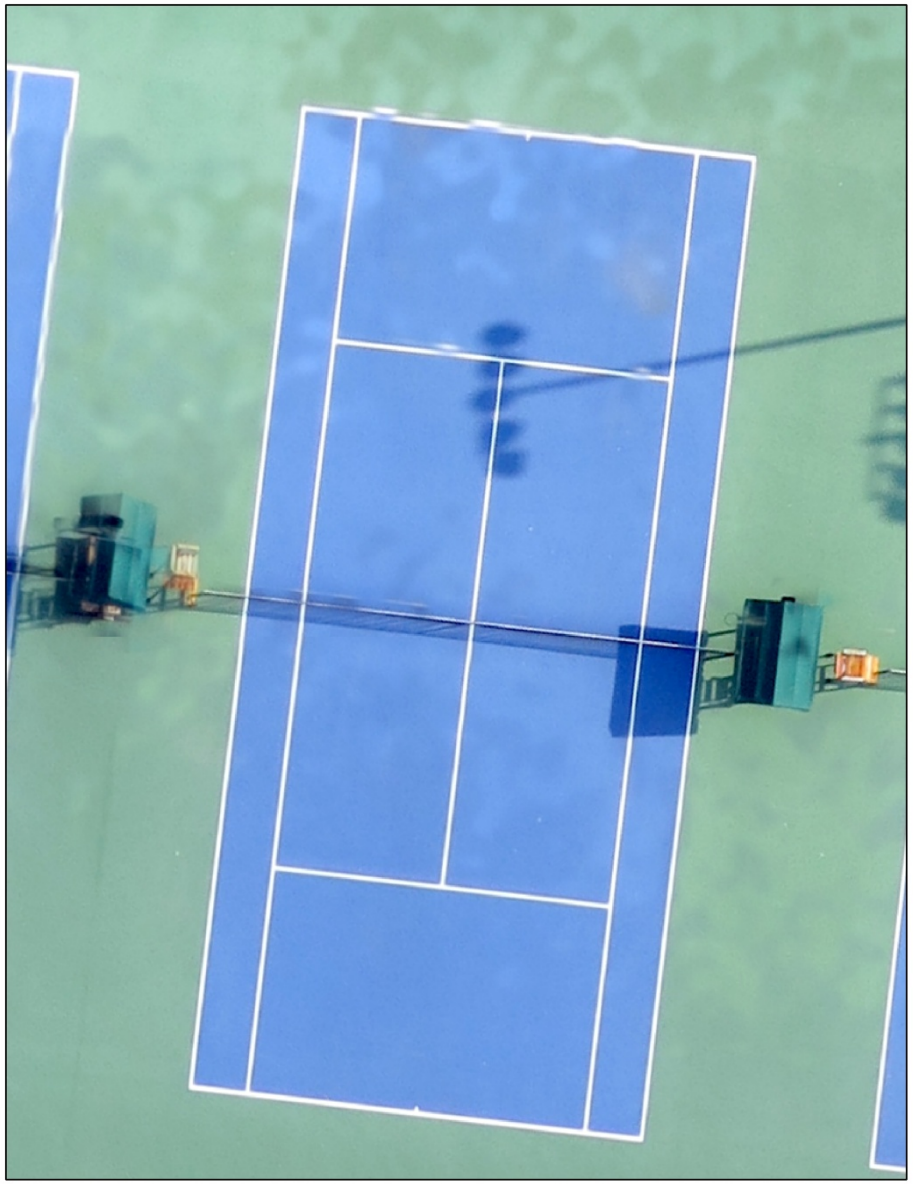






07. K (1.5 lbs), RGB & Near-IR camera
45 minute flight time, 27 mph wind (max)
up to 10 km^2, 3cm/pixel resolution

*COA Altitude – SFC to 400 ft
*Can only fly when NAS airspace closes (Sunday 8-10 AM)



Applications for campus:
Facilities assessment and coastal hazards monitoring

Thank You SCOAR & Scripps!

Questions?

Lone Star UAS Test Site
http://lsuasc.tamucc.edu/
Dr. Ron George: ronald.george@tamucc.edu

TAMU-CC UAS Coastal Activities
Michael Starek : michael.starek@tamucc.edu

LONE STAR UAS

Lone Star UAS Test Site Research

- UAS system safety and data gathering
  TAMUCC, UTARI, AvMet Inc.
- UAS airworthiness
  TEES, TAMUCC, SWRI
- Command & control link issues
  TEES, UTARI
- Control station layout and certification
  TAMUCC, TEES, Texas Tech
- Ground and airborne sense-and-avoid technologies
  TAMUCC, TEES, SWRI, UTARI
- Environmental impacts of UAS operations
  SWRI

Lone Star UAS Test Site Status

- Community and media outreach: **Camber/TAMU-CC**
- MCC, ESIL and IDE initial capability: **Camber/TAMU-CC**
- Advisory board/executive director: **LSUASC UASTS Team**
  - Board members
  - Executive director
- COA applications for airspace proposed to FAA: **TAMU-CC**
- Business plan: **Camber/TAMU-CC**
  - Complex development landscape
  - Working group formed: Camber, TAMUCC, TEES
  - Principles: Diversity, collaboration, fairness