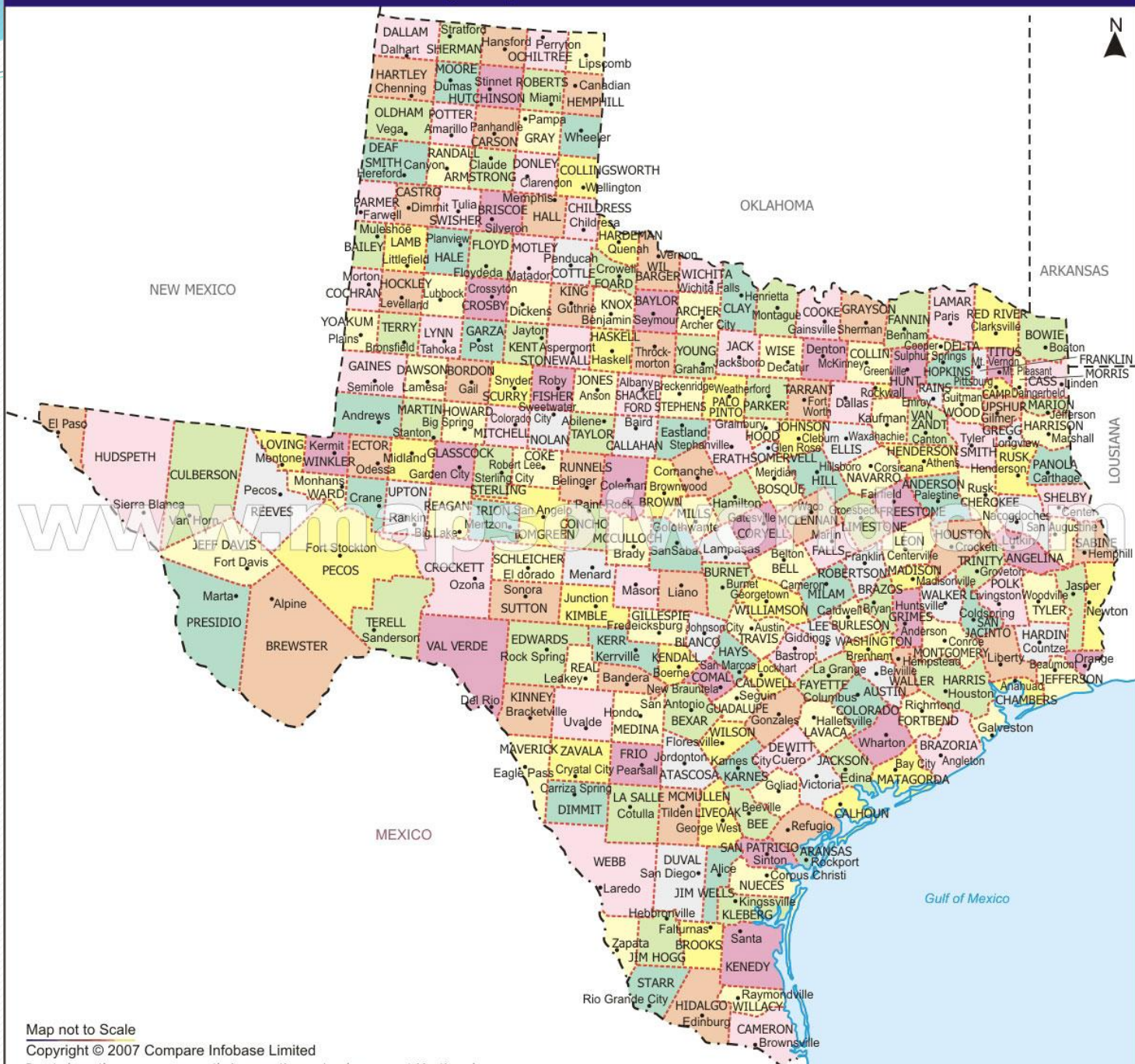


SCOAR Meeting  
June 27-28, 2013

# TAMU-CC UAS Program

David Bridges and L.-D. Chen  
School of Engineering and Computing  
Sciences

# Texas County Map with Administrative Seats



WWW.AMAMAP.COM

Map not to Scale  
Copyright © 2007 Compare Infobase Limited  
County have the same names as their respective seats wherever not Mentioned.

# TAMUCC Major Research Initiatives

## Coastal & Marine

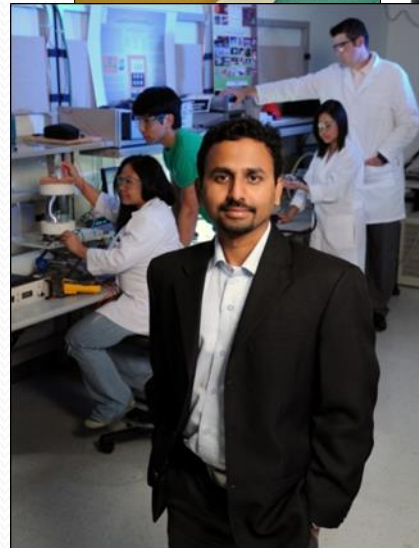
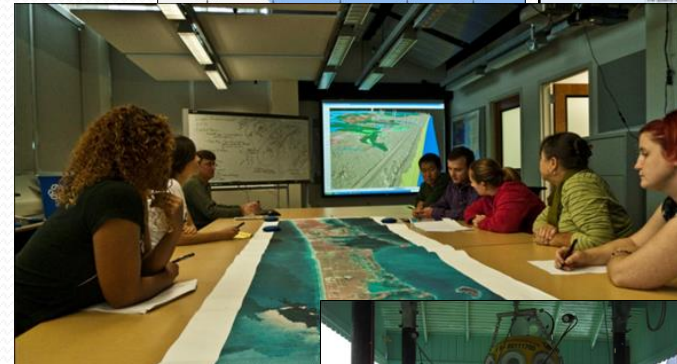
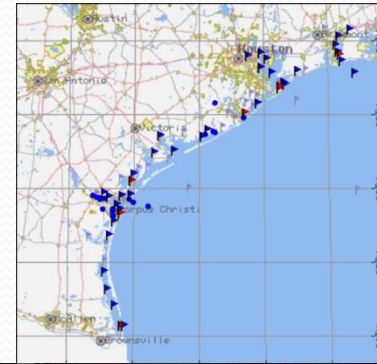
- Economic & environmental sustainability
- Ecosystem evaluation
- Shoreline mapping
- Water supply studies
- Policy

## Engineering Science

- Geospatial Computing
- Unmanned Aerial Systems
- Remotely Operated Vehicles: Robotic Vehicles
- Plasma

## Genomics

- A new direction focusing on marine organisms





# TAMU-CC UAS Program – Overview

- UAS program begun approximately 2 years ago
- UAV purchased and COA approved
- Demonstration flight of UAV October 2011
- D. Bridges arrived August 2012, named UAS program director March 2013
- UAV Training Exercise – January 2013
  - Primarily proficiency training
  - Training in ground crew, mission commander roles
  - Internal and external pilots still external contractors
- UAV Operational / Scientific Exercise – March 2013
  - Expansion of operational capabilities
  - Preliminary science missions with multispectral camera payload

# TAMU-CC UAS Program – UAV

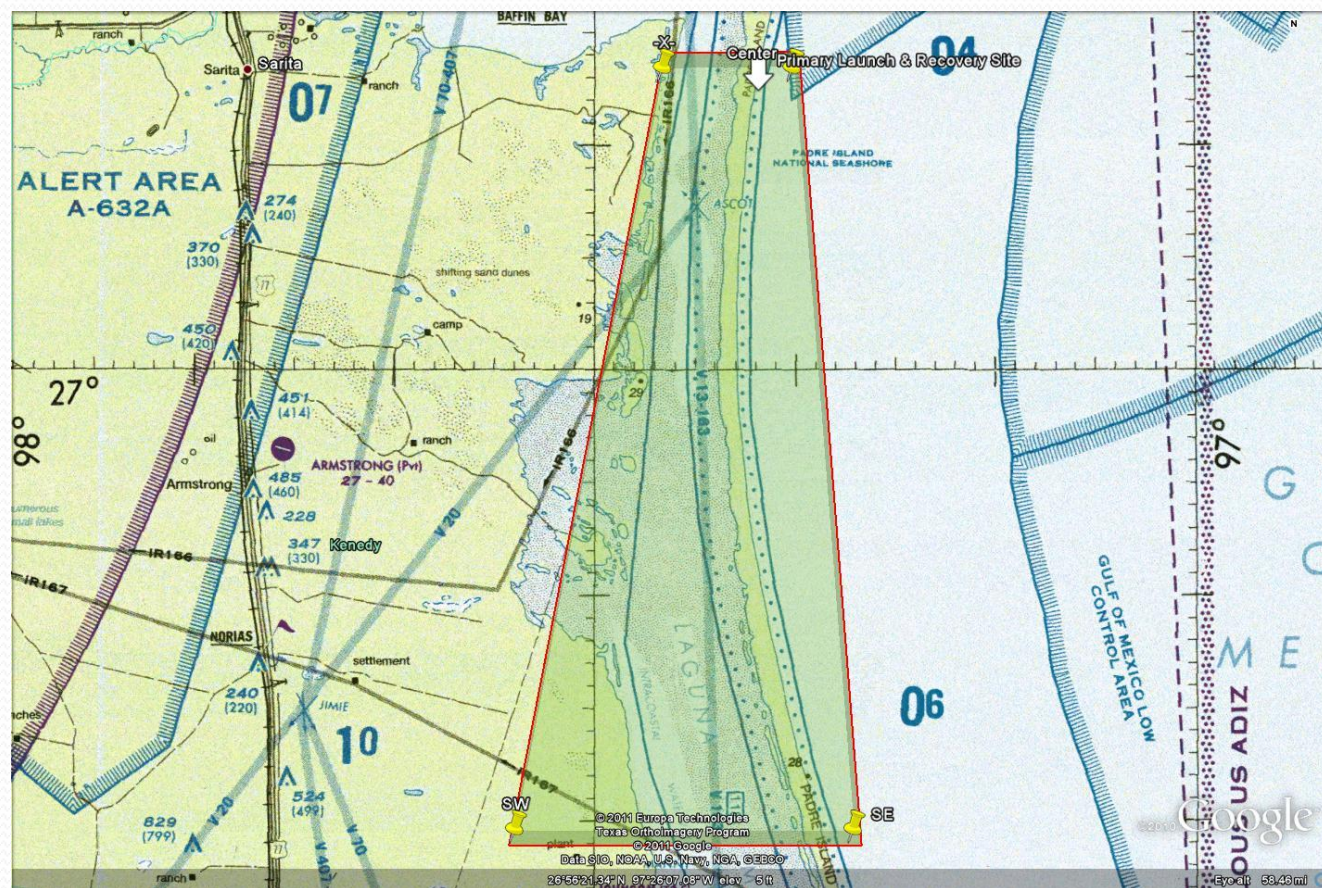
- American Aerospace Advisors, Inc. RS-16 UAV

Wingspan	12' 11"
MGTW	85 lbs
Endurance	12-16 hrs
Ceiling	15,000'
Max Speed	65 kts
Payload Envelope	6 x 6 x 20.5"
Payload Capacity	25 lbs
Payload Power	100 watts
Launch	Pneumatic Catapult
Recovery	Belly Land

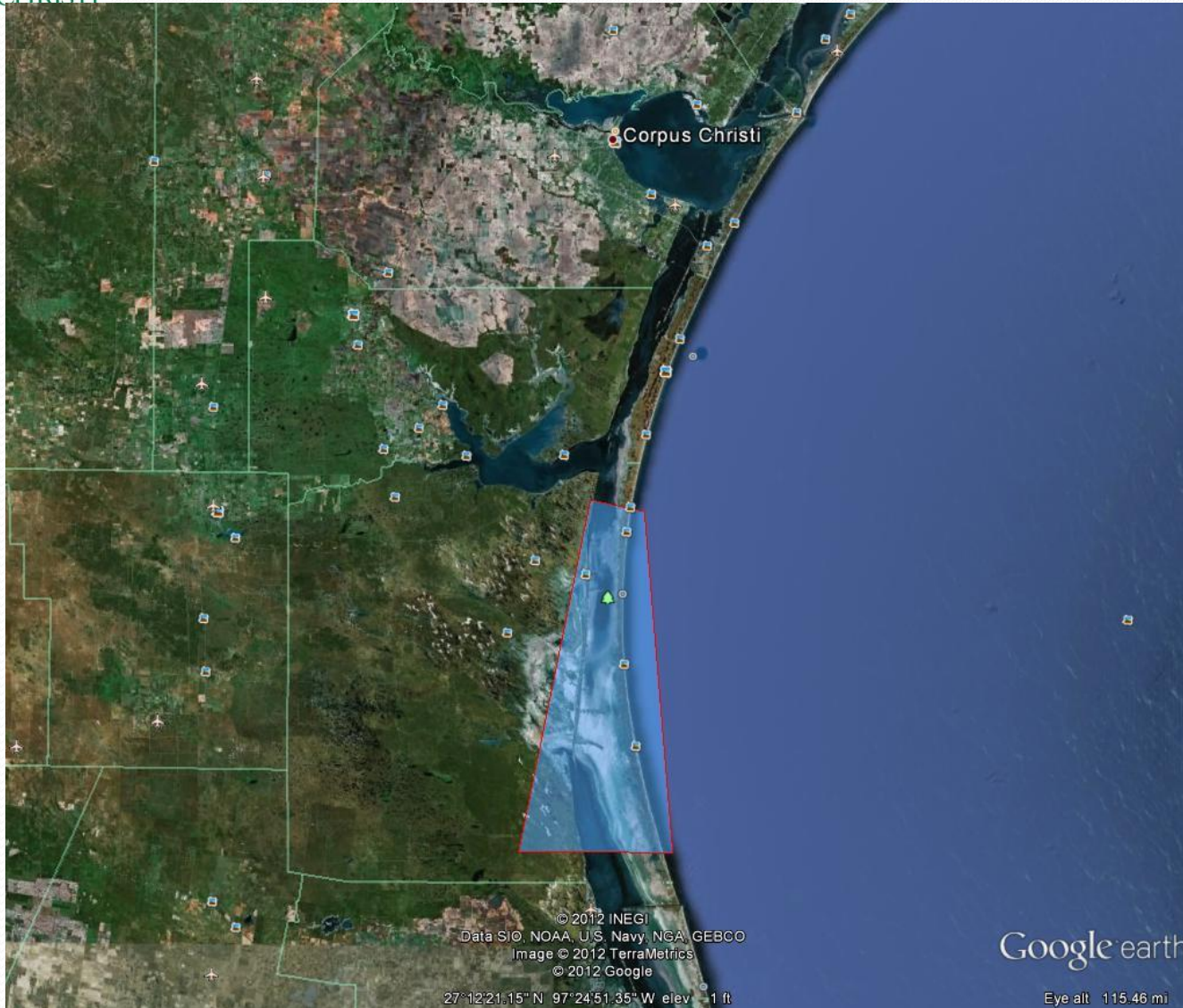


# TAMU-CC UAS Program – COA

- TAMU-CC possesses FAA Certificate of Waiver or Authorization (COA)
- Includes parts of Padre Island and Kenedy County
- Maritime environment
- COA defines region and establishes flight rules, one of which requires continuous visual observation of UAV



# TAMU-CC UAS Program – COA



- Approx. 38 mi. north to south
- Approx. 450 sq. mi.
- Approx. 36 mi. south of campus (as crow flies)
- Most recently have operated from private ranch in Kenedy Co.

# TAMU-CC UAS Program – Oct 2011

- Demonstration flights in October 2011
- Flew from South Padre Island Beach





# TAMU-CC UAS Program – Jan 2013



- Primarily training on UAV operations
- Internal & external pilot duties handled by external contractors
- Focus on flight procedures and adherence to COA



# TAMU-CC UAS Program – Mar 2013

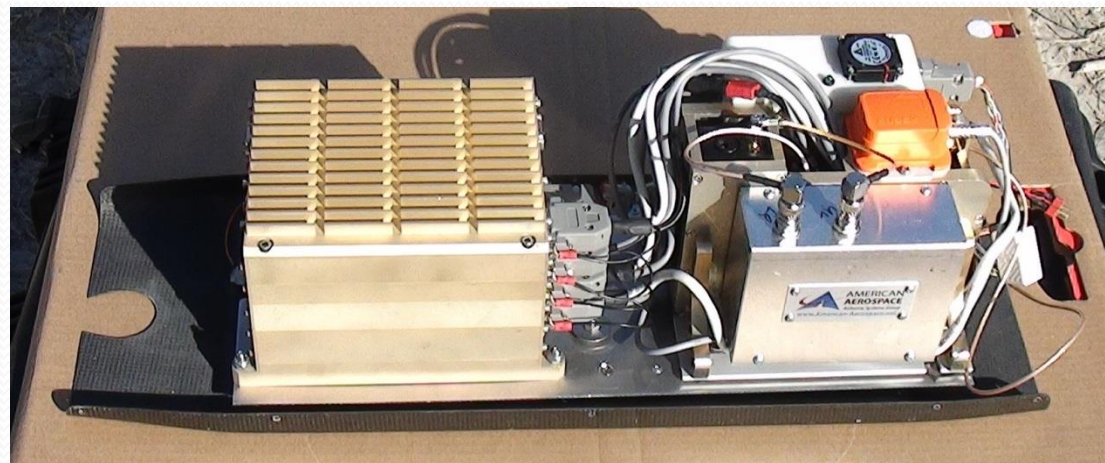
- Primary purposes: to expand operational capabilities and to conduct scientific image data acquisition
- Operational capabilities
  - Airborne observer (use of chase plane)
  - Hand-off from one ground control station (GCS) to another
  - Expansion of range to enable Gulf overflights
  - Pre-dawn launch
- Scientific missions
  - Use of multi-spectral camera payload (high-definition video, infrared, ultraviolet)
  - Acquire images of petroleum products, sea grass, cattle, land-water interface, shore-bird habitat for use by various researchers

# TAMU-CC UAS Program – Mar 2013

- Multi-spectral camera payload

AAAI Three-Band HDVMP October 10, 2012								
Camera	Type	Band (microns)	Pixels (MPx)	HFOV	1,000' AGL		3,000' AGL	
					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

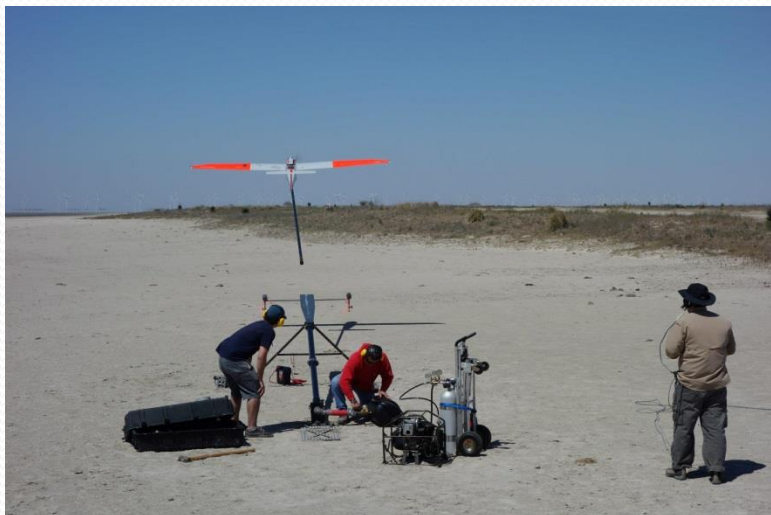
On-board computer tags each image with time and location using on-board GPS and inertial navigation system (INS)



# TAMU-CC UAS Program – Mar 2013



# TAMU-CC UAS Program – Mar 2013



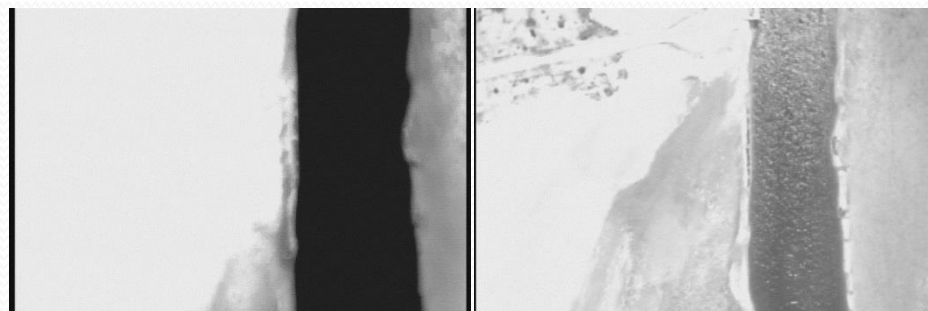
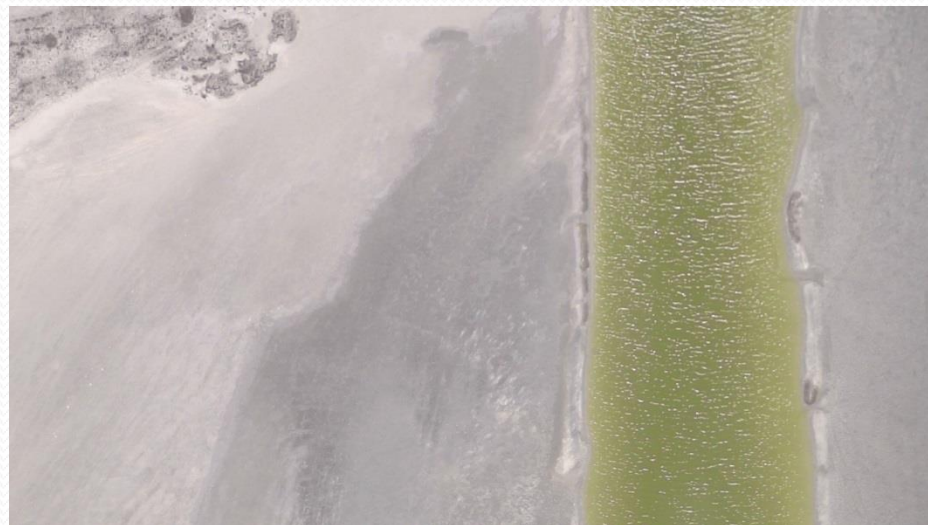
# TAMU-CC UAS Program – Mar 2013

- Sample images



HDV image overlaid on Google Earth image

High-definition video



IR

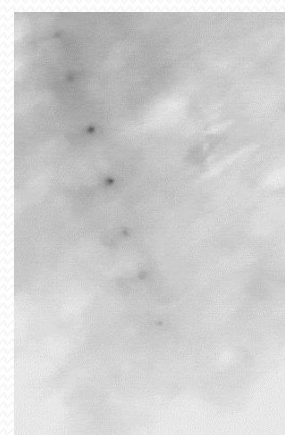
UV

# TAMU-CC UAS Program – Mar 2013

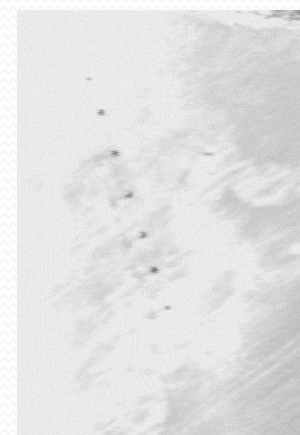
- Petroleum targets – crude oil, distillate, gasoline, diesel, water (as standard)
- Fly over and acquire image data, attempt to identify
- Goal is to advance capability of detecting and tracking oil spills



HDV



IR



UV

# TAMU-CC UAS Program – Current and Future Plans

- Payload workshop scheduled for June, 2013
  - TAMU-CC personnel from various departments invited (MEEN, GIS, PENS)
  - Purpose of workshop is to develop full capabilities of multi-spectral camera payload
  - March 2013 imagery served as working data for workshop
- Beginning planning for next exercise, date TBD
- Effort to develop capabilities in sensor development, will target (to degree possible) sensors that will assist in “sense and avoid”
- Development of 3-course UAS curriculum track for undergraduates





# TAMU-CC UAS Program – Opportunities for Collaboration

- UAV and payload capabilities known
- Geography / terrain of COA known
- Can acquire image data; other payloads ?
- Limited extent of COA suggests development of sensors, technologies, methods now that can be applied elsewhere when limitations are lifted
- Funding – some questions still to be answered concerning allowed funding sources (in context of interpretation of what constitutes “commercial use,” which is forbidden)
- In some circumstances, may be able to provide sample image data acquired while exercising UAV capabilities (“free data”)
- Let’s talk: [david.bridges@tamucc.edu](mailto:david.bridges@tamucc.edu)

# The Lone Star UAS Center of Excellence

- Congress mandated that the FAA select 6 test sites for UAS development; specifically, integration of UAS into national airspace (NAS)
- Primary issue with UAS: they lack “sense and avoid” capability
- Manned aircraft avoid collisions by seeing other aircraft and turning out of the way (“see and avoid”)
- Goal of test sites is to develop sense and avoid technologies for UAS and to develop policies and procedures that will allow their integration and safe use alongside manned aircraft
- FAA issued a “Screening Information Request” (SIR), their form of an RFP



# The Lone Star UAS Center of Excellence

- State of Texas Response to FAA SIR
- *LSUAS Center of Excellence* proposed to FAA to operate the **Lone Star UAS Test Site**
- Headquarters: Texas A&M University-Corpus Christi
  - Operations/command & control center
  - Safety management & reporting to FAA
  - Data aggregation & assurance
  - Research & development program
  - Business development office



# Lone Star Center of Excellence & Innovation

## Planning for the future

- Texas has submitted a response to FAA SIR.
  - If selected: The test-site will be a magnet for UAS companies.
  - If not selected: We will continue to develop infrastructure and authorized airspace for UAS industrial development.
- UAS research and development will continue.
- TAMUCC is committed to
  - Collaborative research development.
  - Collaborative project development.
- TAMUCC is committed to developing authorized airspace for UAS operations.