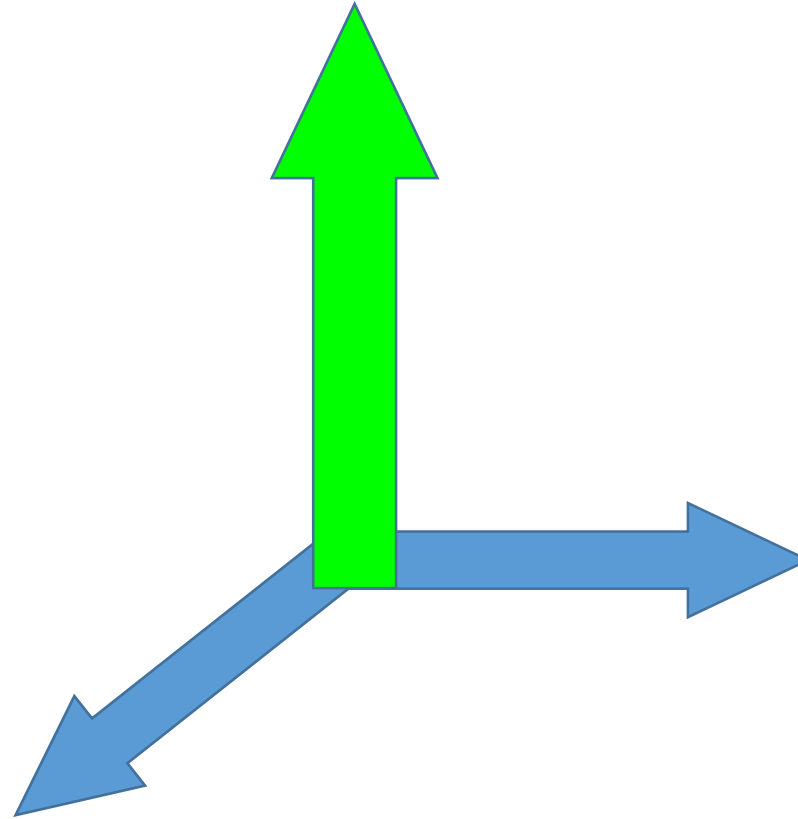


UP



A New Dimension in Learning

Geoff Bland (NASA), David Bydlowski (Wayne RESA), Andy Henry (Wayne RESA,
and the *AEROKATS and ROVER Education Network (AREN)* Team

NASA Earth Science

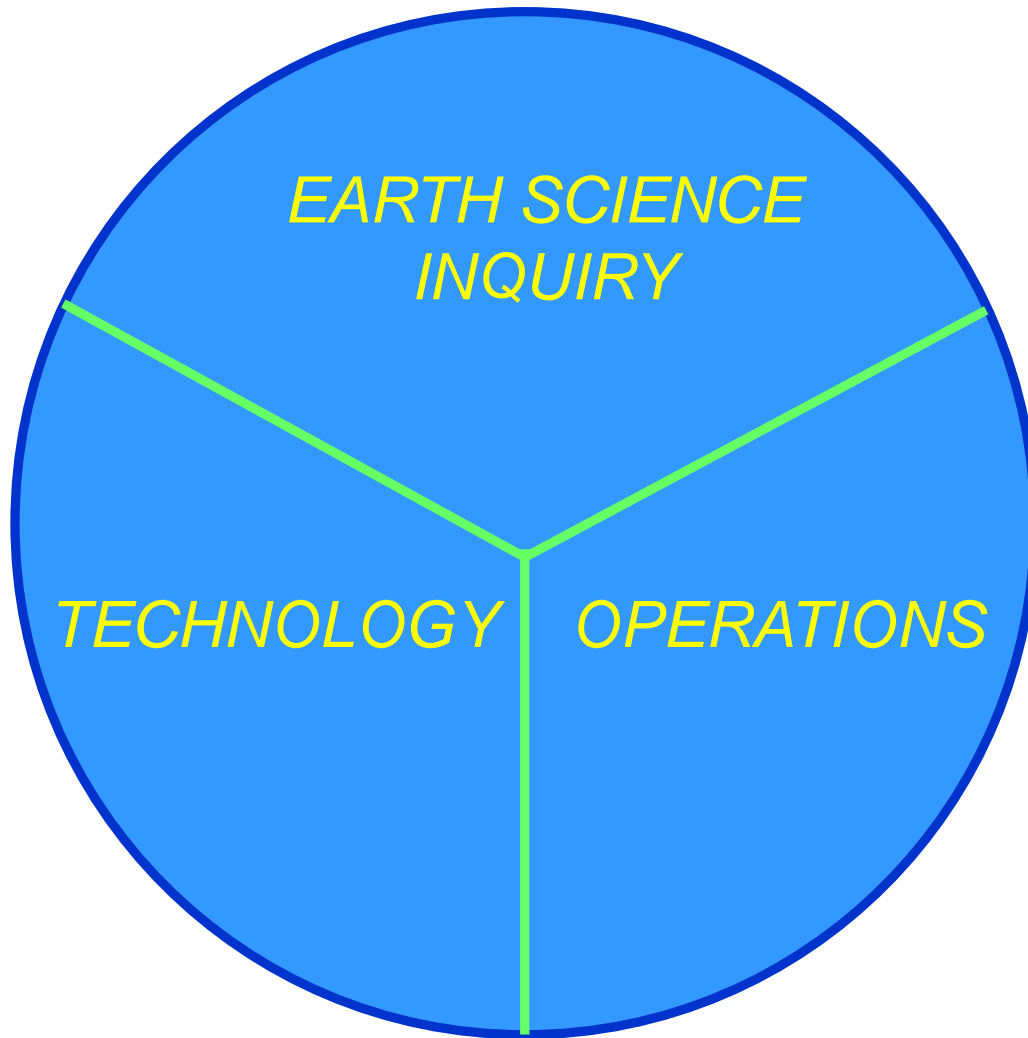
Capturing The Global View from Space



NASA Airborne Science Program

A Detailed Perspective





Train the Next Generation Workforce, Engage the Public, Enhance Life Long Learning...

UP – How to Make It Happen?

“AEROKATS”

Advancing Earth Research Observations with Kites and Terrestrial Sensors

- **AEROKATS and ROVER Education Network (AREN)** - part of the NASA Science Activation Collective (Kristen Erickson/NASA HQ)
- **David Bydlowski/PI**, and Andy Henry (Wayne Regional Educational Service Agency, Wayne MI)
- NASA GSFC, GSFC/WFF
- Anasphere LLC
- Chesapeake Environmental Center
- Montana State University
- Public Lab
- University of Maryland Eastern Shore
- University of South Florida
- Washington College

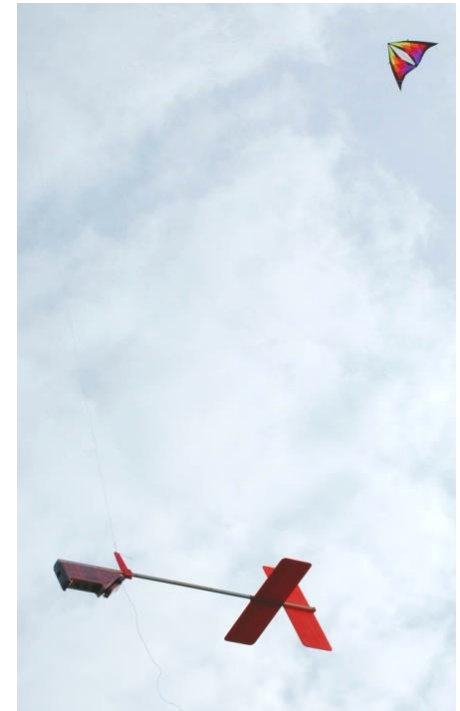
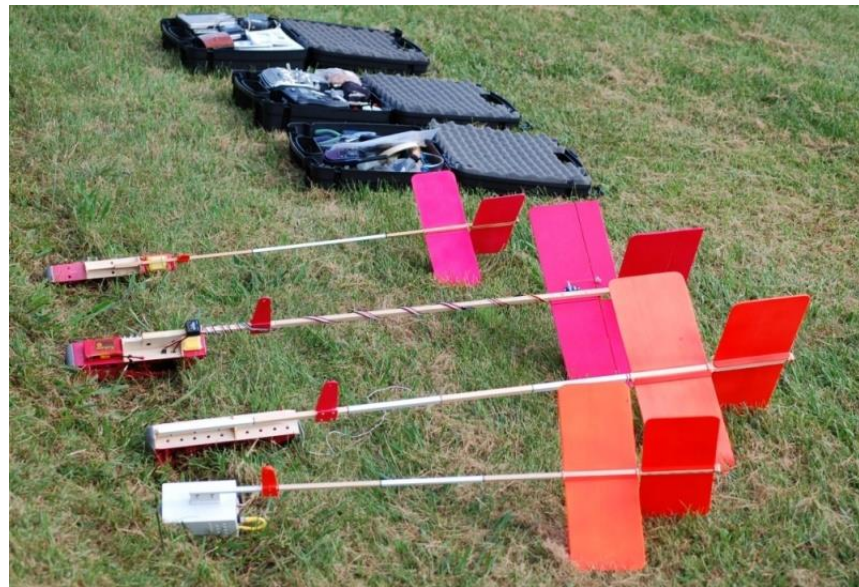
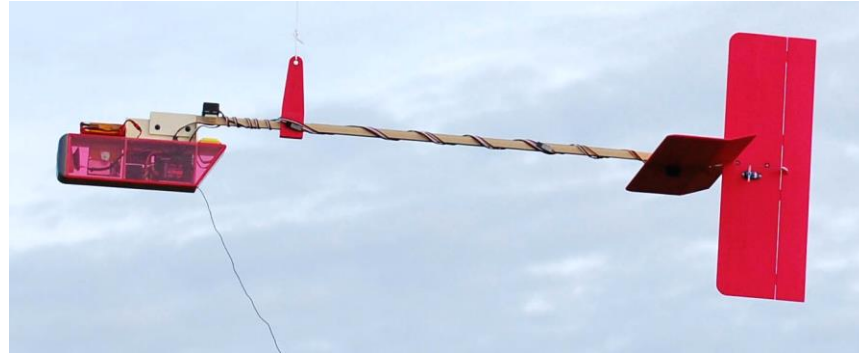


UP – How to Make It Happen?

- Practice, Practice, Practice:
 - Team Work: Communications, Roles/Responsibilities
 - Mission Planning: Weather, Go/No-Go)
 - Pre and Post Operations Briefings
 - Multiple Kite Types: Wind Speed, Proficiency
- Checklist, Procedures (e.g; GLOBE Protocols)
- Safety:
 - Risk Assessment and Mitigation
 - Personnel Protective Equipment (PPE) – Gloves, etc.

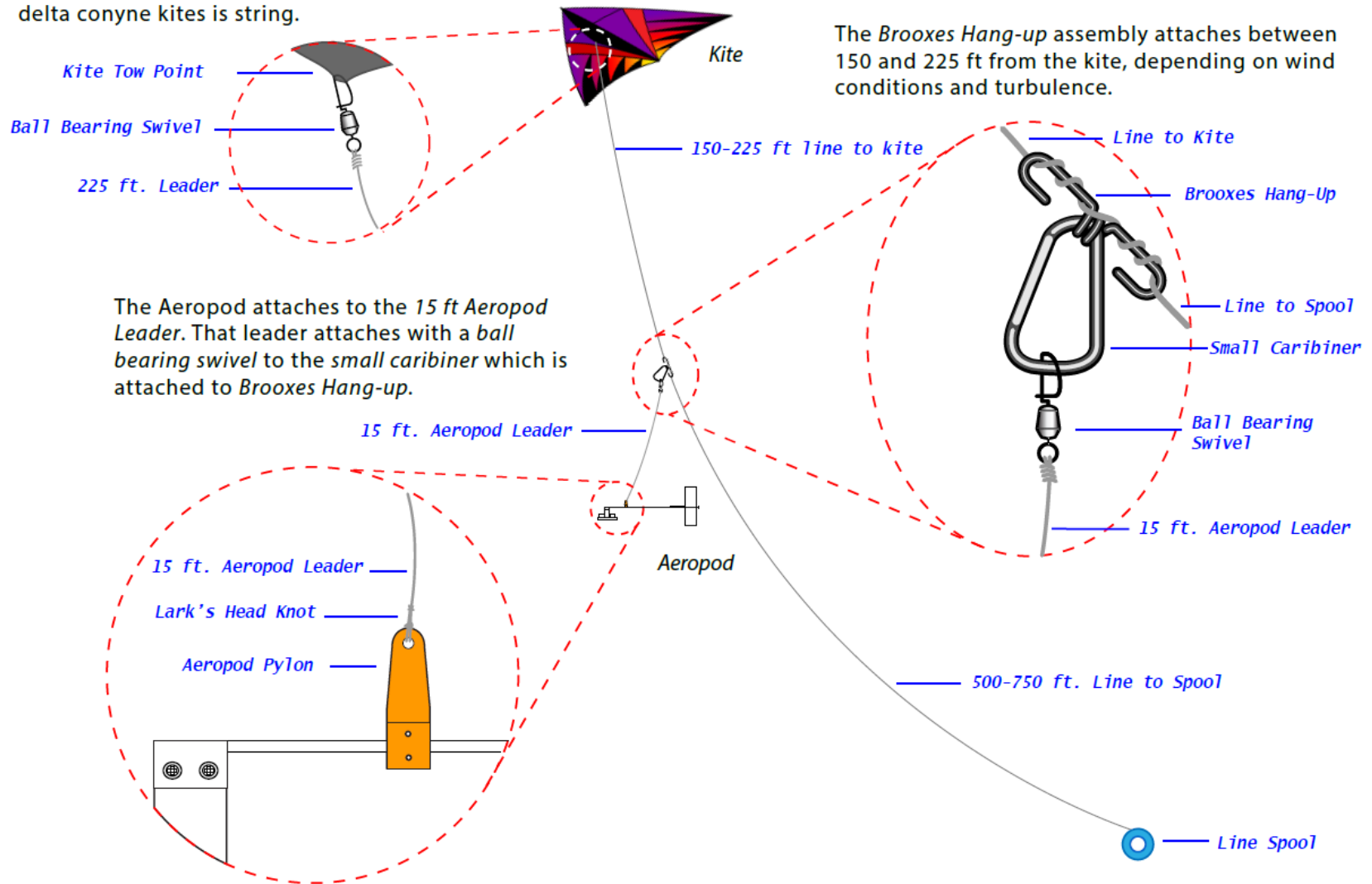


1912 Picavet Alternative - The Aeropod



The Kite attaches directly to the line with a ball bearing swivel at the *tow point* on the kite. The tow point on the ITW delta kites is fabric. The tow point on many delta conyne kites is string.

Kite, Line, and Aeropod Connections



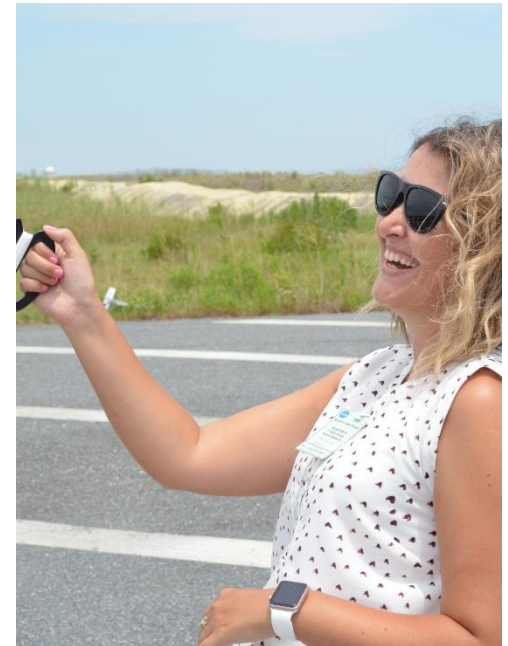
NOTE: Drawing not to scale

©AREN Project - Andy Henry 20170418

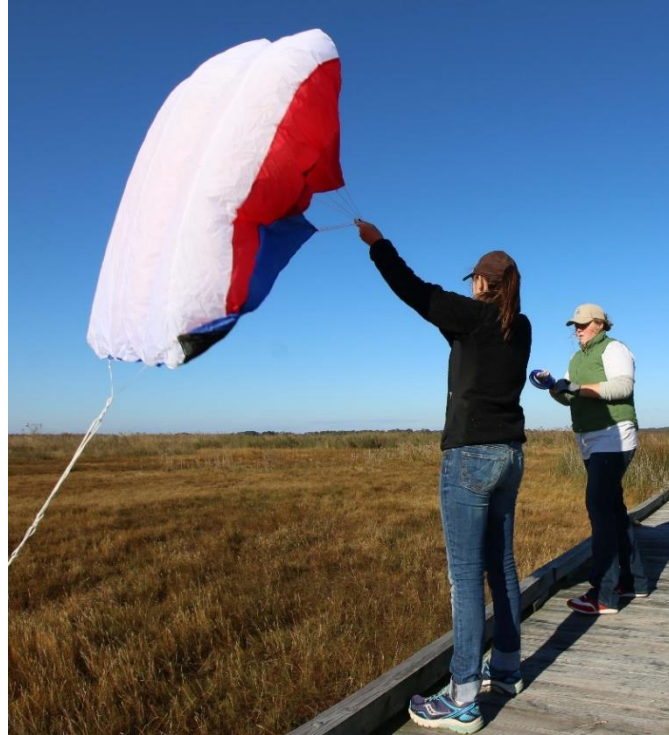
UP – How to Make It Happen?

AEROKATS Levels	<u>NuBee</u>	<u>Cadet</u>	<u>Pro</u>	<u>Expert</u>	<u>Master</u>
Activity Focus:	Kite Flying	<i>MonoCam</i> Imaging	<i>Profiler</i> or <i>ProCam</i>	Experimental System	New Measurement Tool or Method Concept
Roles:	Pilot/Co-Pilot	Instrument Operator	Instrument Operator and Data Analyst	Instrument or Platform Engineering and Fabrication	Development and testing of a new concept
Required Documentation:	Start LogBook	Share Image with Team Member	Written Report to Teacher (or other Adult)	Presentation to Peers	Application to Review Panel w/ Documented Results
“Certification” Upon Completion:	Self Declared	Team Member Endorsement in LogBook	Teacher (or other Adult) Endorsement in LogBook	Teacher (or other Adult) Endorsement in LogBook	Certificate from Review Panel

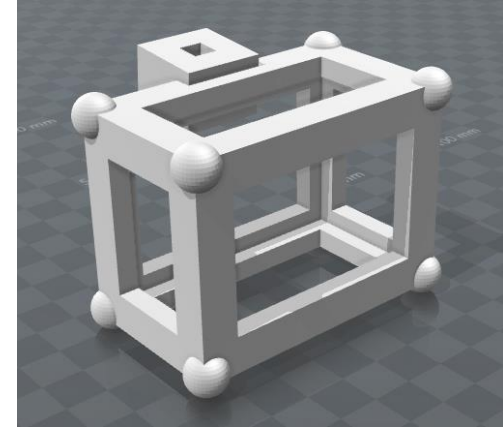
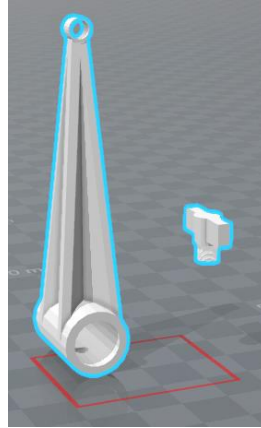
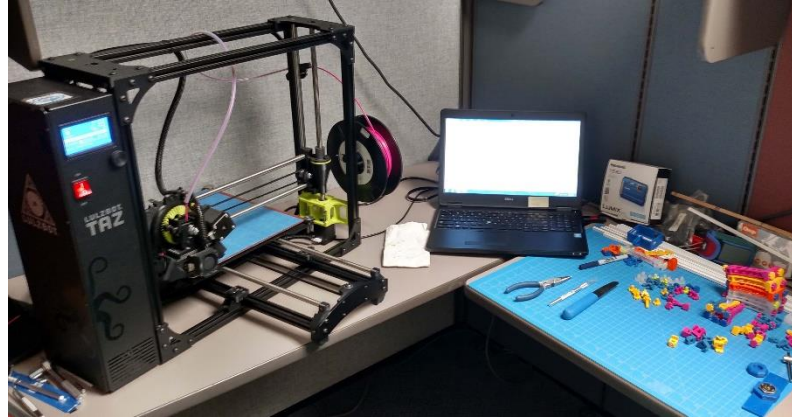
UP – How to Make It Happen?



UP – How to Make It Happen?



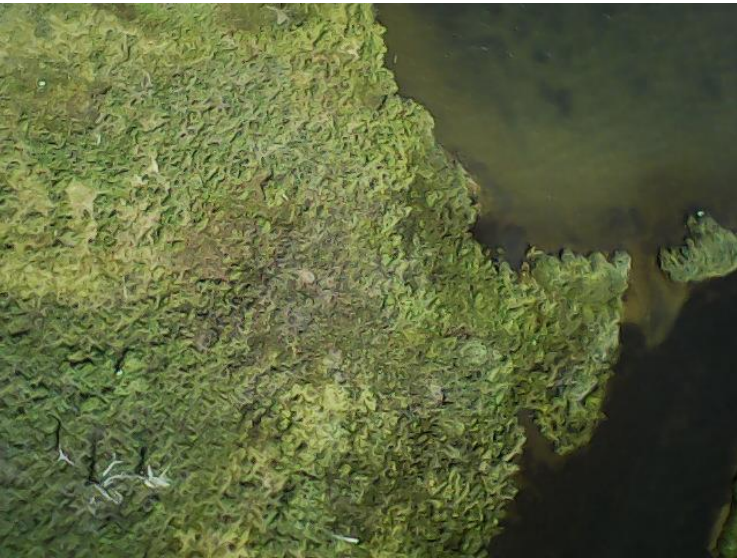
UP – How to Make It Happen?



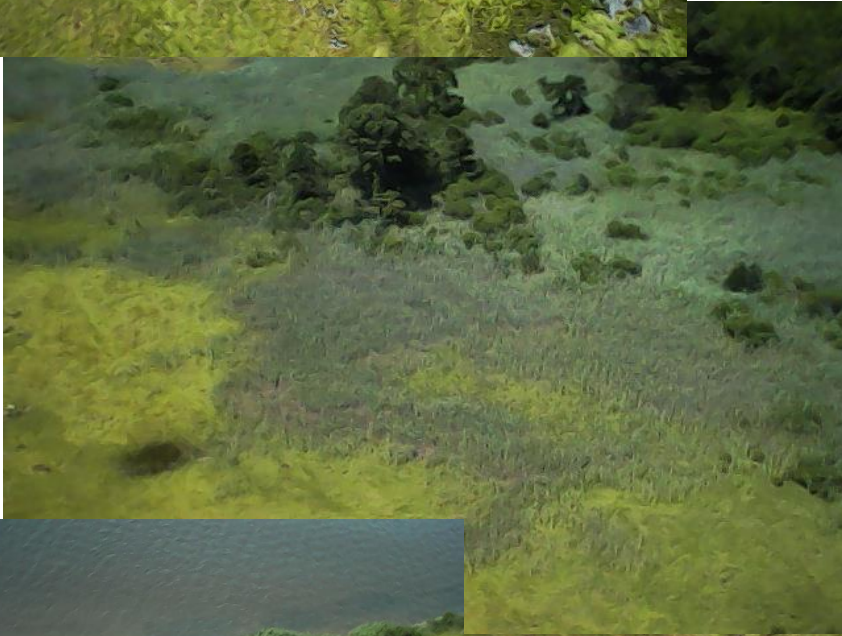
UP – How to Make It Happen?



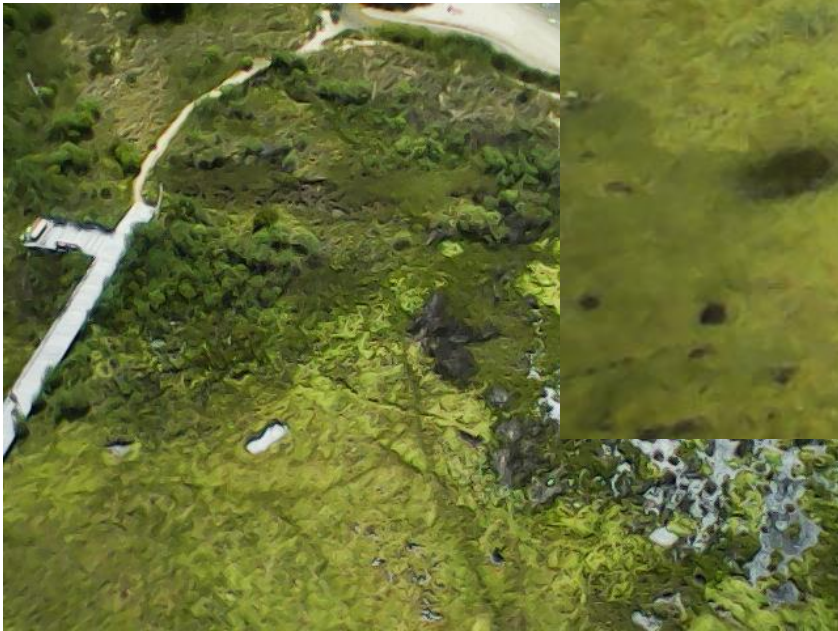
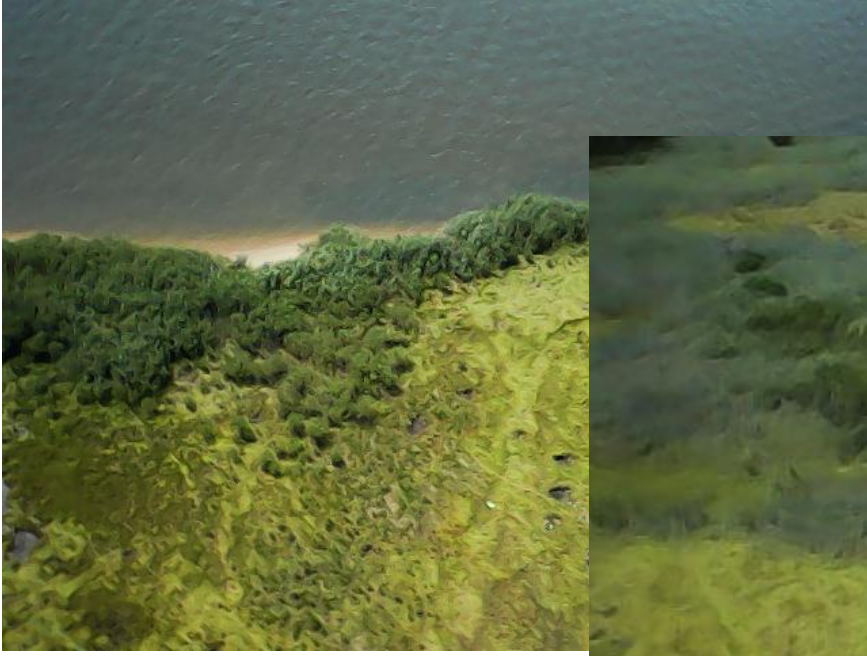
UP!



UP!



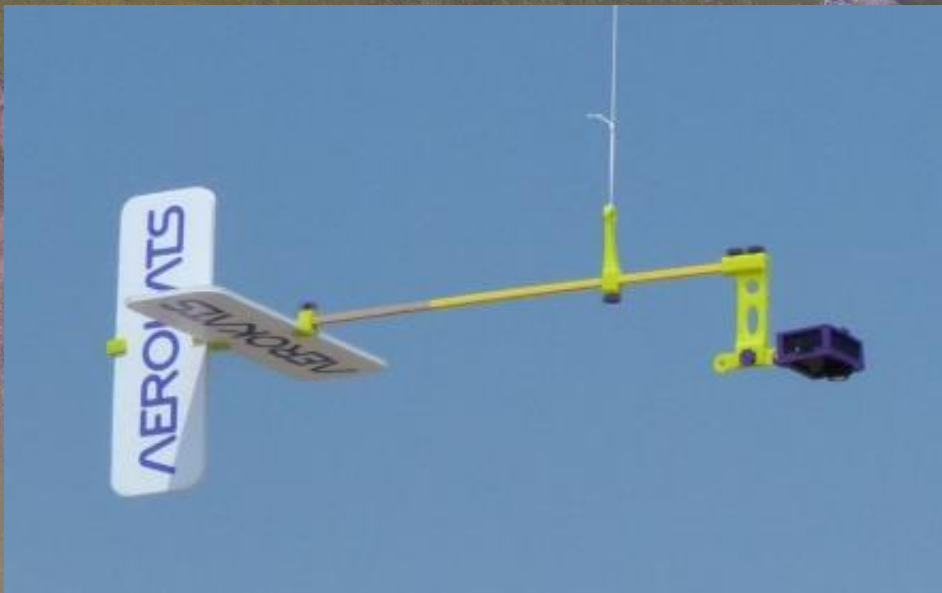
UP!



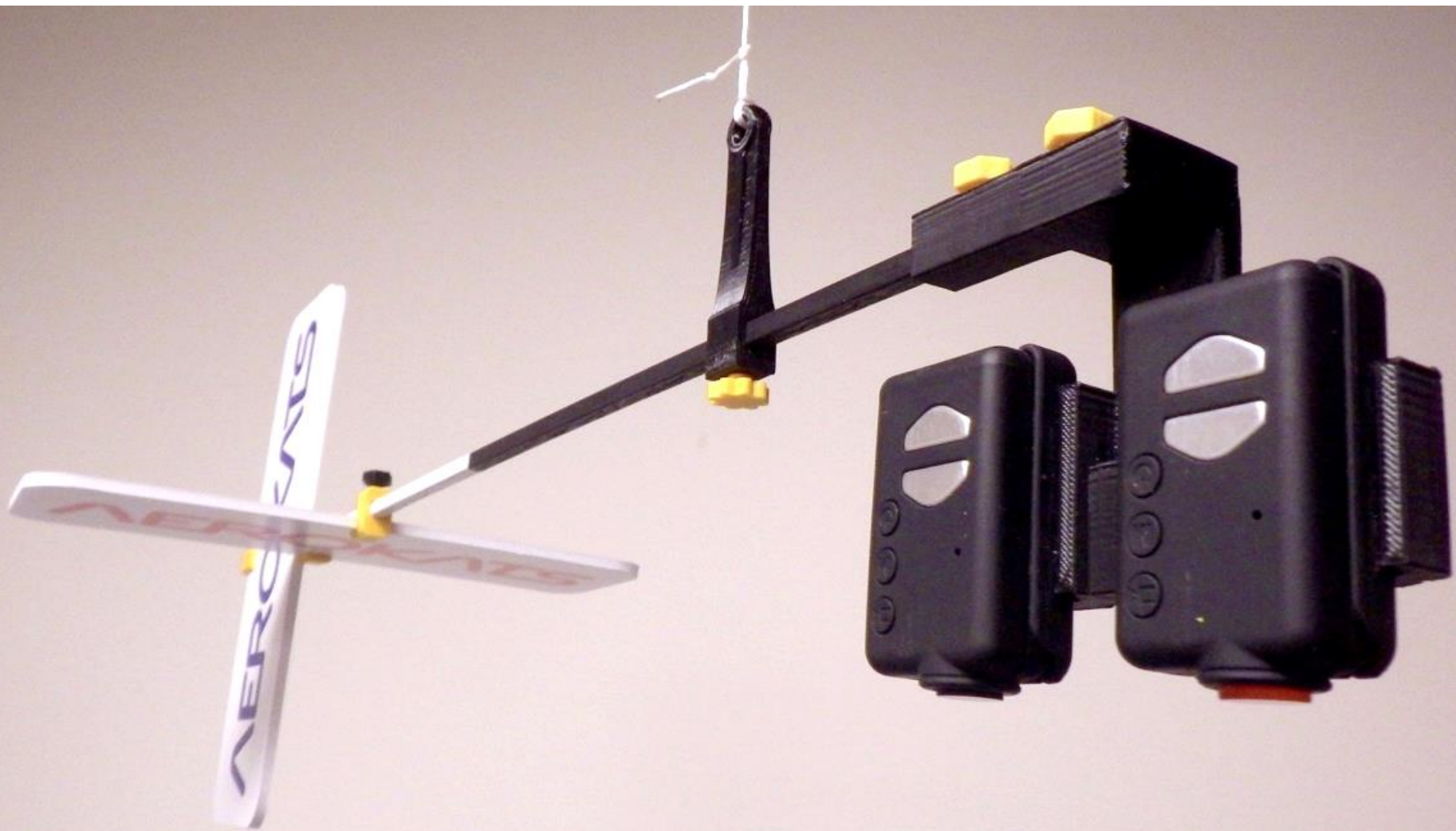
UP!



UP!



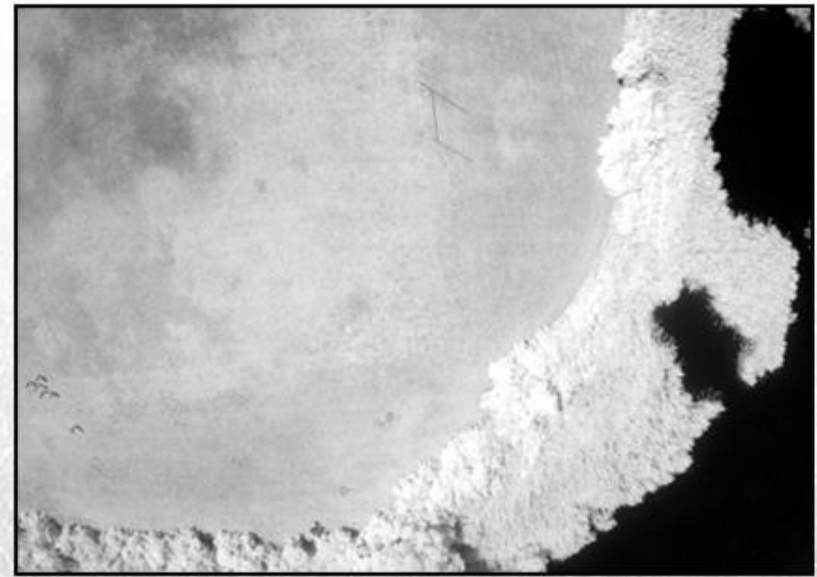
TwinCam



Twin Cam Image Processing - Classification Example



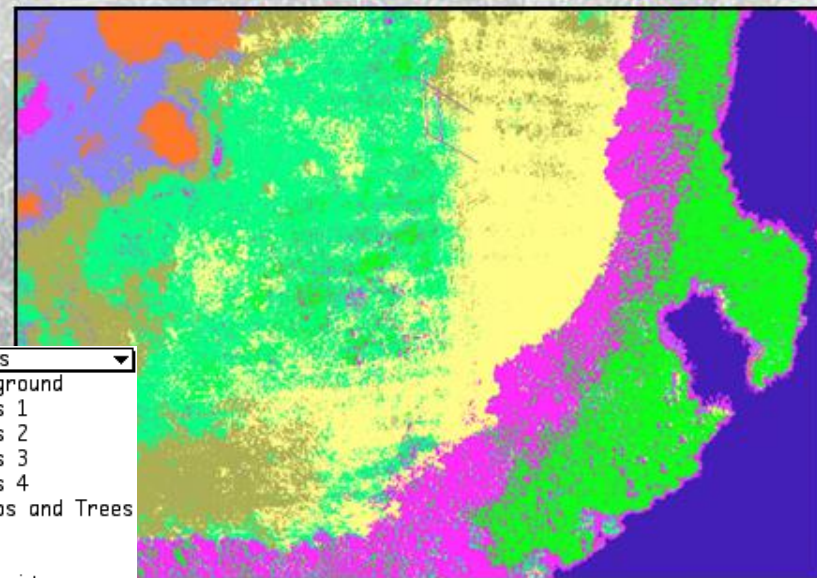
Visible (RGB)



Near Infrared (N)



Composite (NRG)

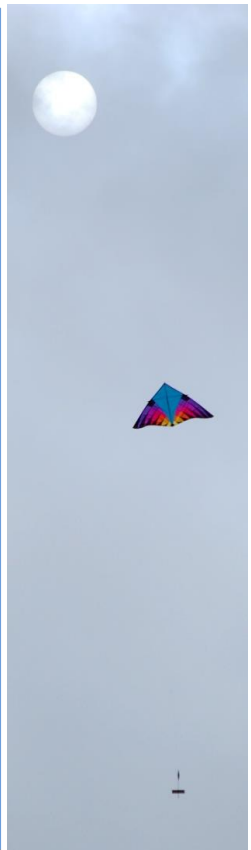
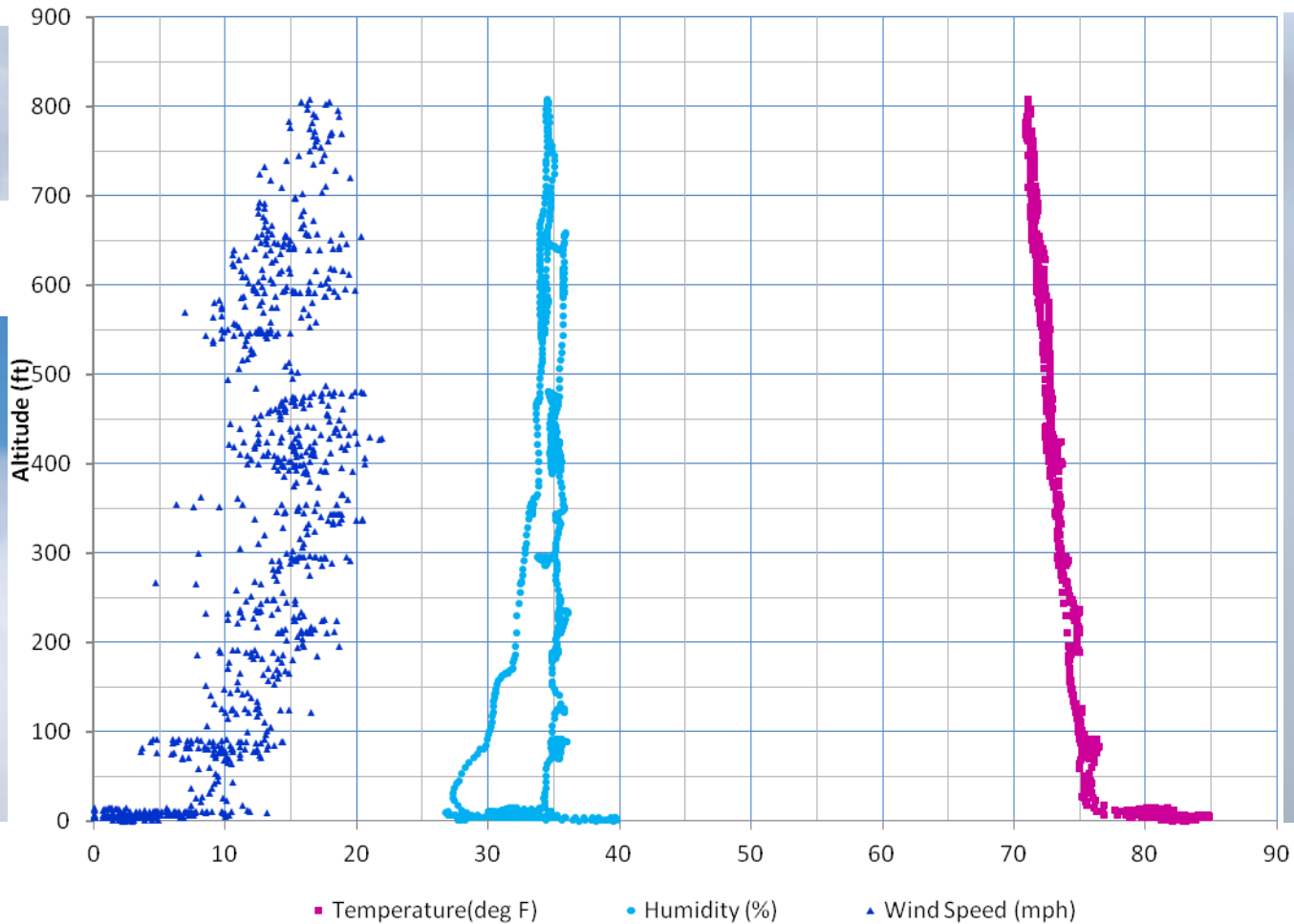
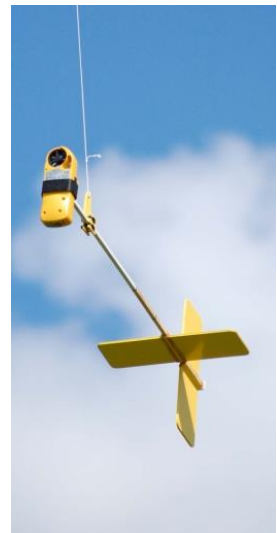


Classified

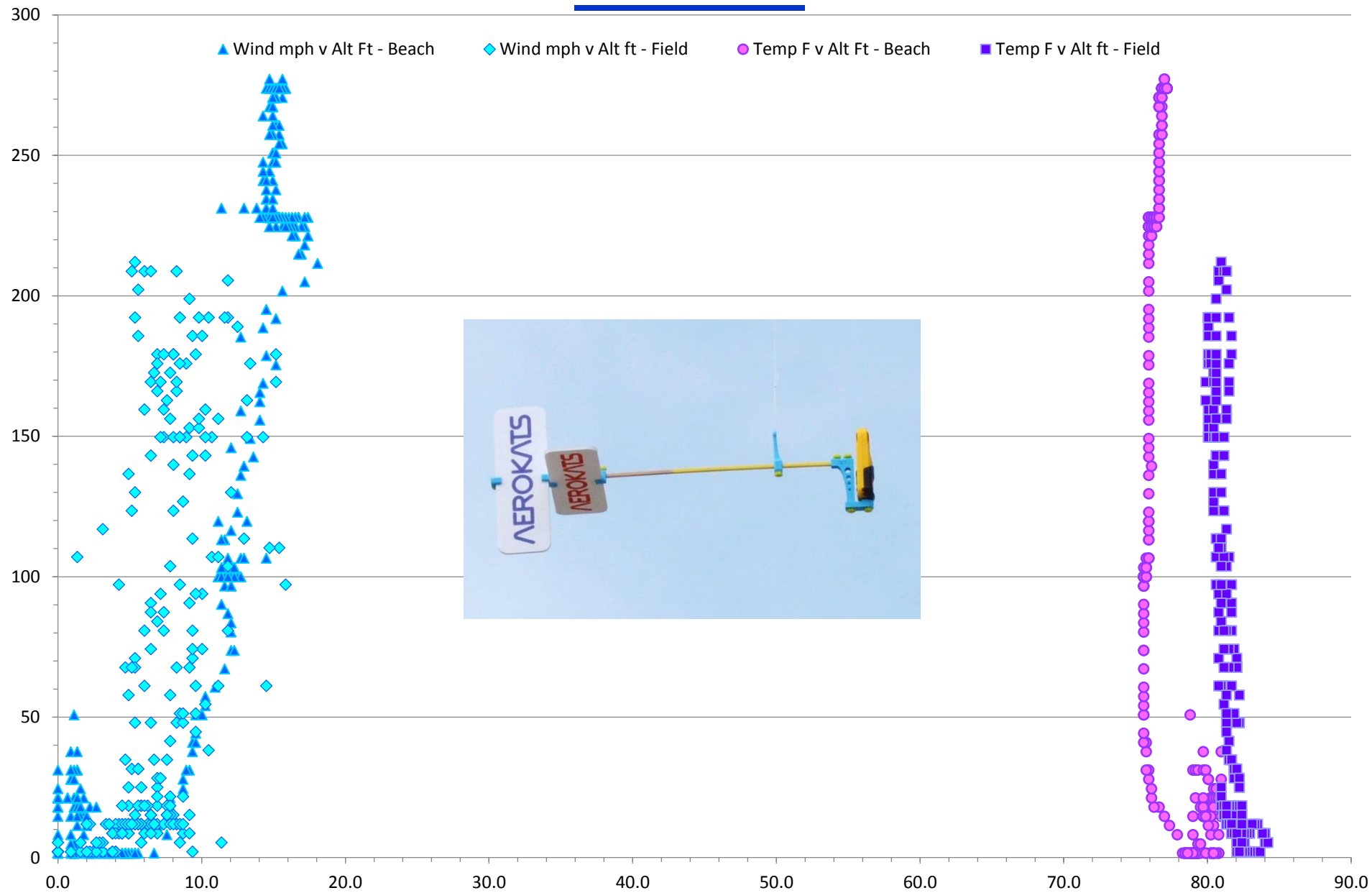
- Classes
- background
 - Grass 1
 - Grass 2
 - Grass 3
 - Grass 4
 - Shrubs and Trees
 - Phragmites
 - Grass 5
 - Water

Profiler

Boundary Layer Studies



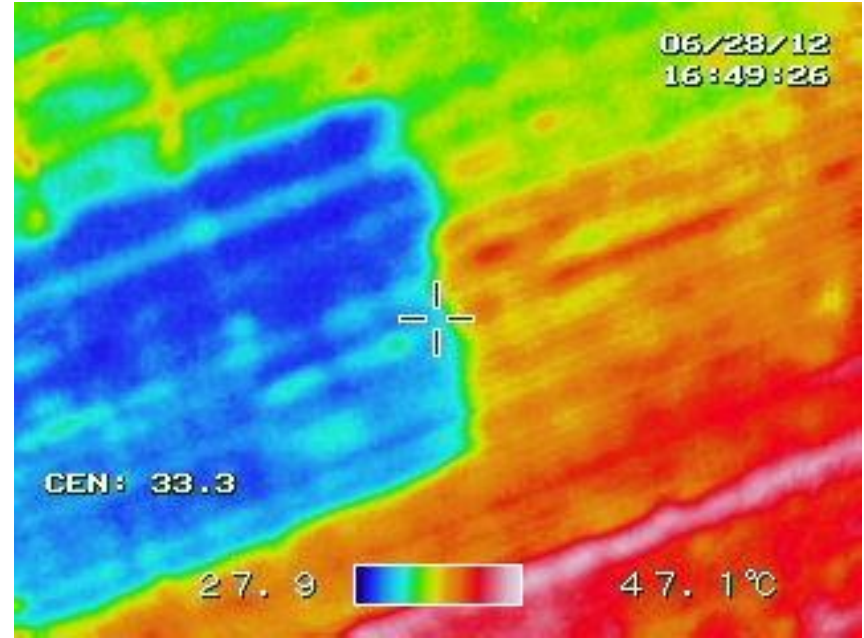
Profiler



ThermoPod



ThermoPod

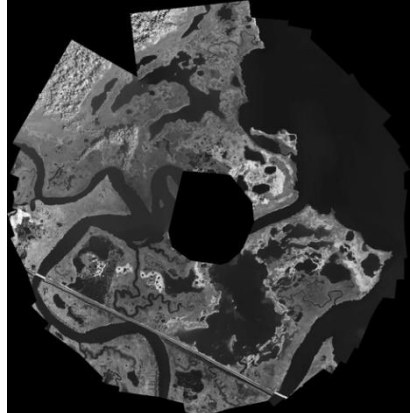
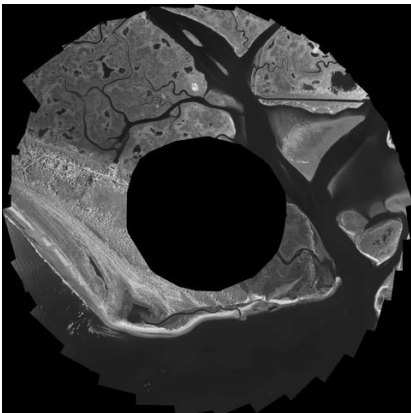
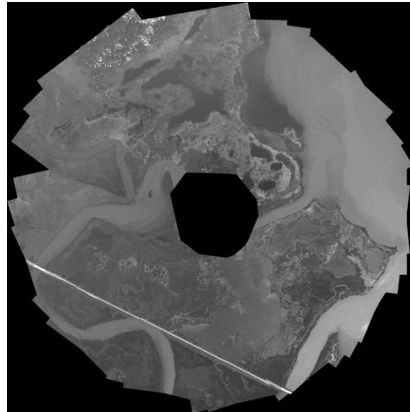
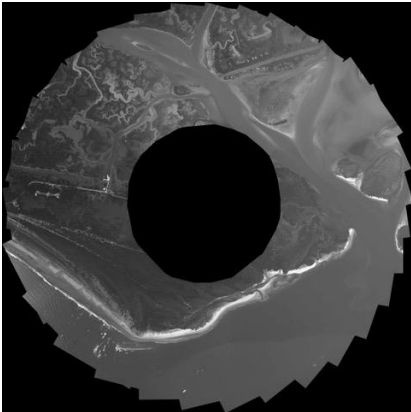


Pilot Class with Pilots



<https://www.globe.gov/web/aren-project/overview/aerokats/-safety>

Vanilla Aircraft 5 Day Mission



Schmidt Ocean Institute R/V *Falcor*



Thanks – Things are Lookin' Up!

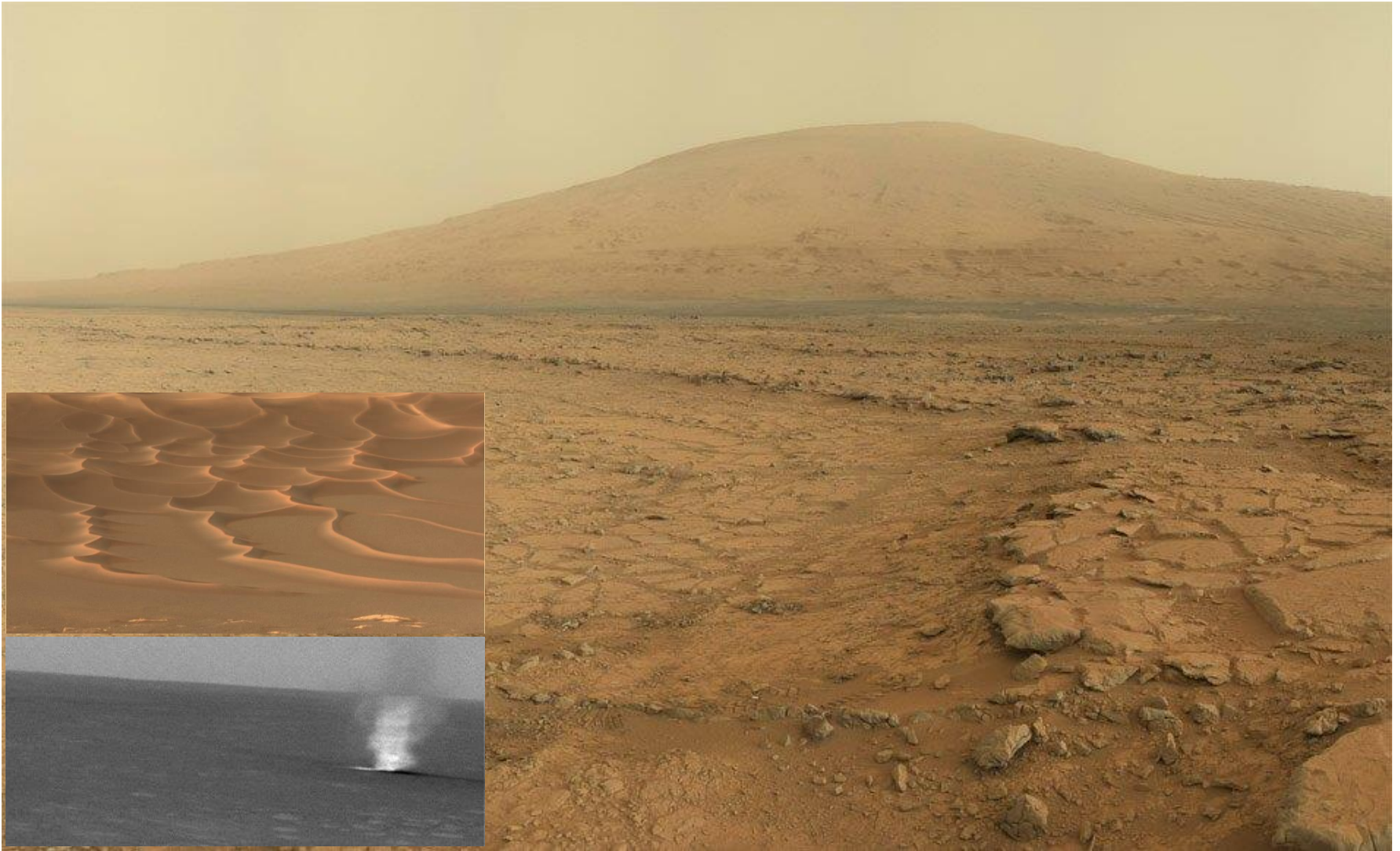
- Kristen
- Mary
- Linn
- Ming-Ying
- Dave
- Andy
- Sallie
- Suzi
- Kelly
- Kim
- John
- Jeff
- Liz
- Doug
- Jemima
- Chris
- Willie
- Xavier
- Anil
- Judy
- Alissa
- Eileen
- Hanna
- Dr. N
- Patrick
- Ted
- Kay
- Brian
- Tony Murphy
- Mathew L
- Becki
- Doug Stout
- IntotheWind
- TerraKite Productions



<https://www.globe.gov/web/aren-project/overview>



Waaaaay UP!





- Session Title: ED13E. Amazing Technologies and Capabilities That Contribute to STEM II
- Day/Time: Monday, 11 December 2017: 13:40 - 15:40, Morial, 242
- Abstract Title: A New Dimension for Earth Science Learning
- Presentation Type: Oral
- Final Paper Number: ED13E-04
- 14:33 – 14:49 [ED13E-04 A New Dimension for Earth Science Learning](#) **Geoff Bland**¹, Andy Henry², David Bydlowski² and AREN Team, (1)NASA Goddard Space Flight Center, Greenbelt, MD, United States, (2)Wayne County Regional Educational Service Agency, Wayne, MI, United States