



SOCEM: Sub-Orbital CubeSat Experimental Mission

2009 Summer CubeSat
Developers' Workshop

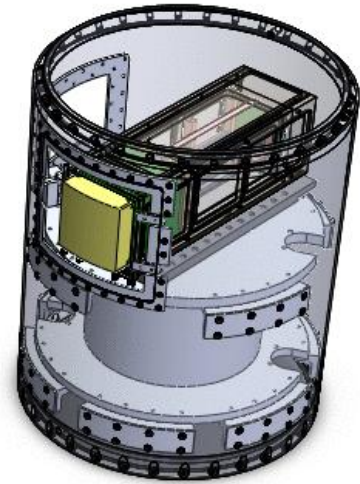
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Anthony Karam
Space Systems Laboratory
University of Kentucky

Overview



- Sub-
- **O**rbital
- **C**ubeSat
- **E**xperimental
- **M**ission



Mission Profile



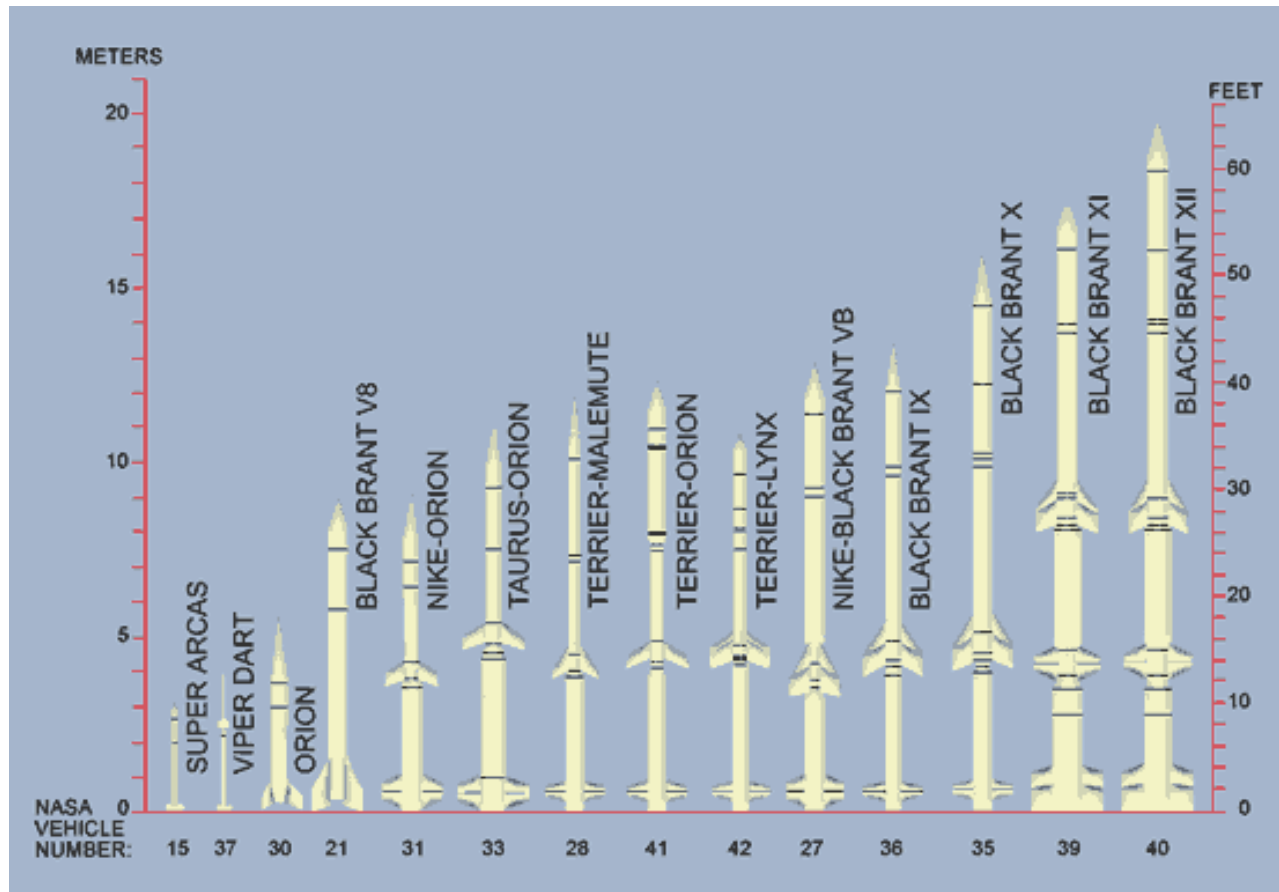
- NASA Sounding Rocket Program Office
- Terrier Improved Malemute, 17” dia.
- Mission
 - feasibility of launching CubeSats from the Wallops 17” sounding rocket form-factor
 - Once ejected, the CubeSats will carry out experiments and return data to ground stations on site and in Kentucky

Payload Section



Kentucky Space
Blow Off Door

Wallops Sounding Rockets



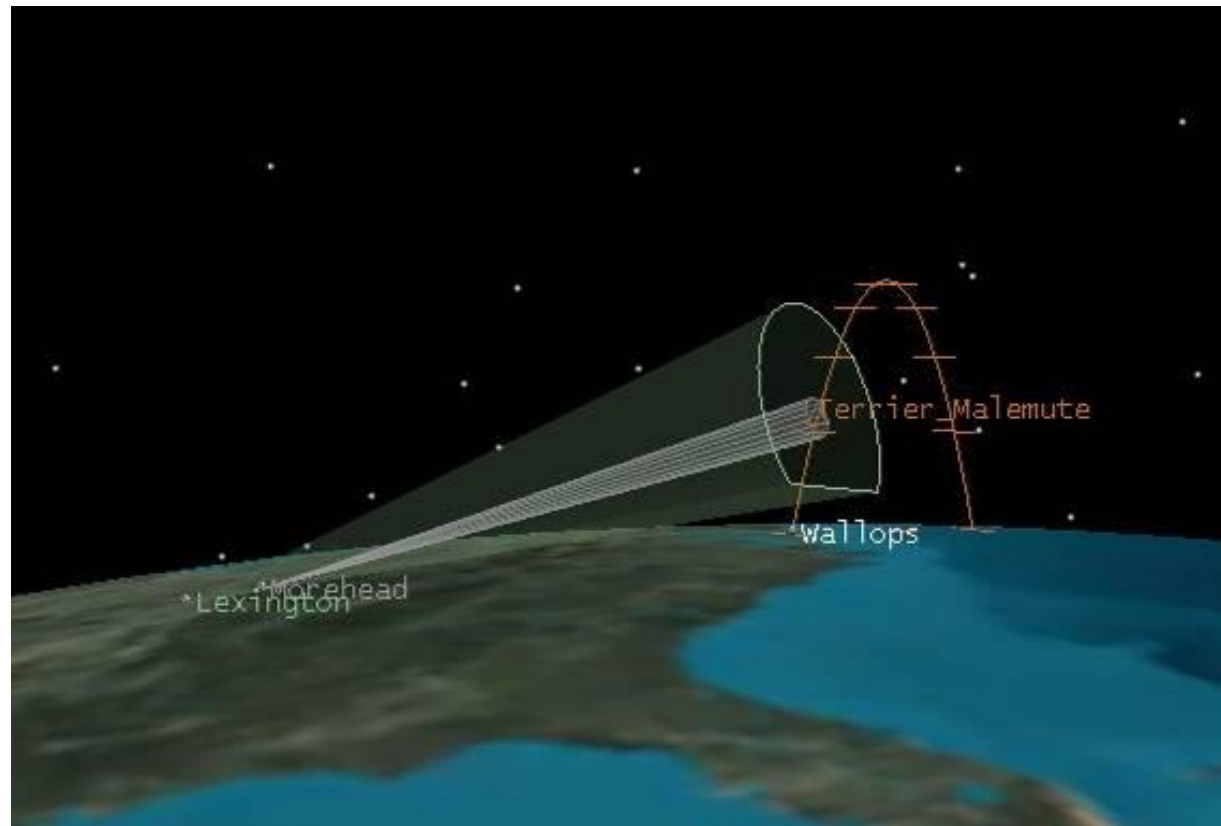
Terrier-Malemute

The Terrier-Malemute is a two-stage, solid fuel rocket consisting of a Terrier 1st stage and a Malemute 2nd stage. It is capable of lifting a 200 lb payload to an apogee of approximately 700 km or a 500 lb payload to approximately 400 km.

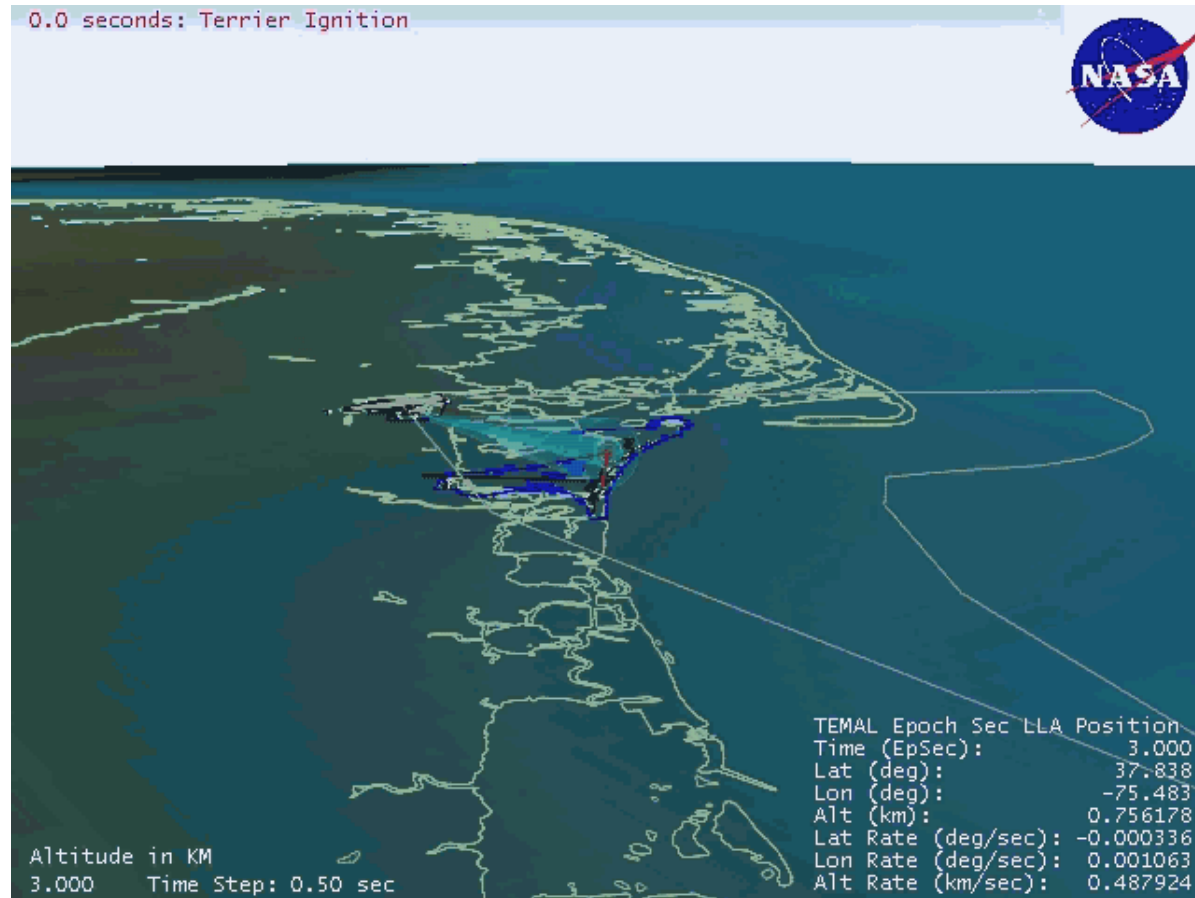


Mission Timeline

- 2nd Stage
Burnout (~M8,
~20 km)
- Door Deploy
(~M5, ~100 km)
- Apogee (~M1,
~300 km)
- Ocean Impact
(~M6)

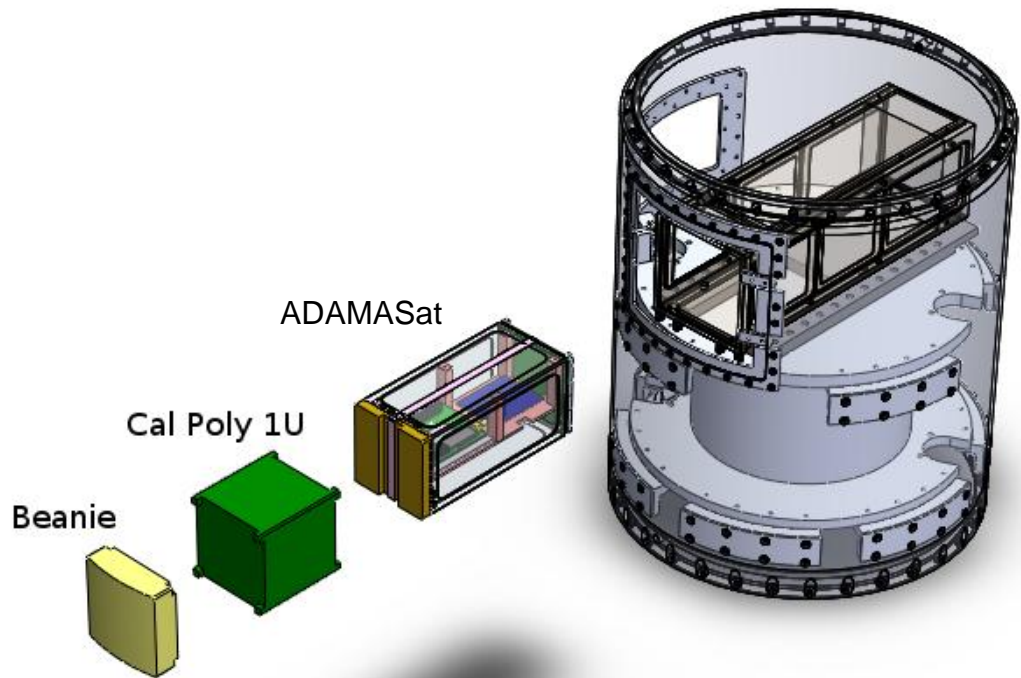


STK Simulation of a Similar Mission

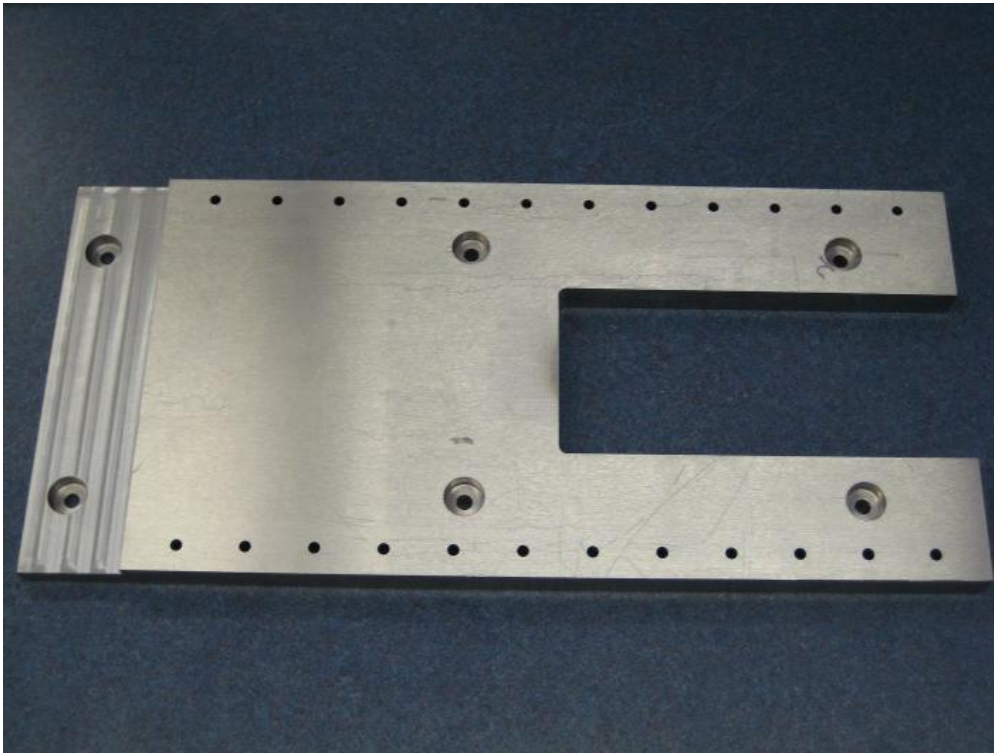


Parts Overview

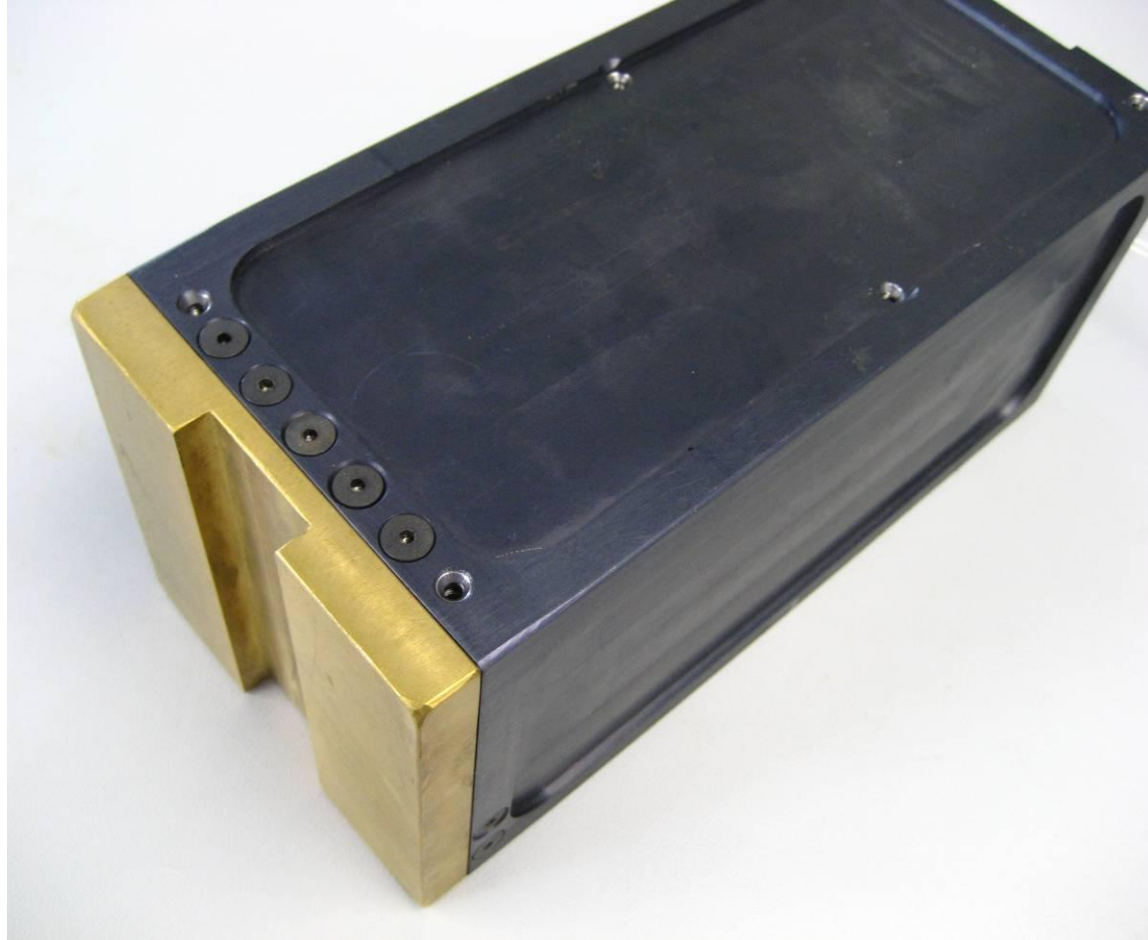
- ❑ Beanie
- ❑ Cal Poly 1U
- ❑ ADAMASat
- ❑ PCL (Cal Poly)
- ❑ Pedestal



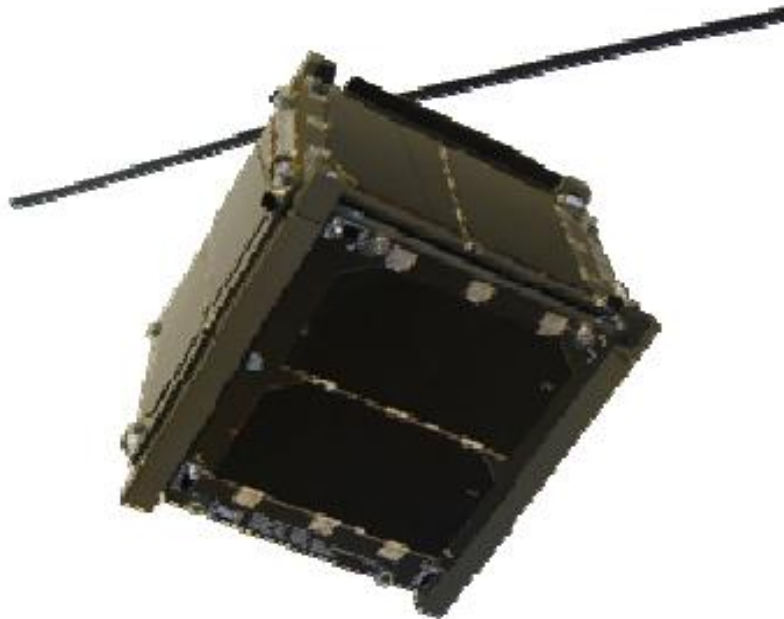
Mass & Thermal Considerations



Centripetal Force Considerations



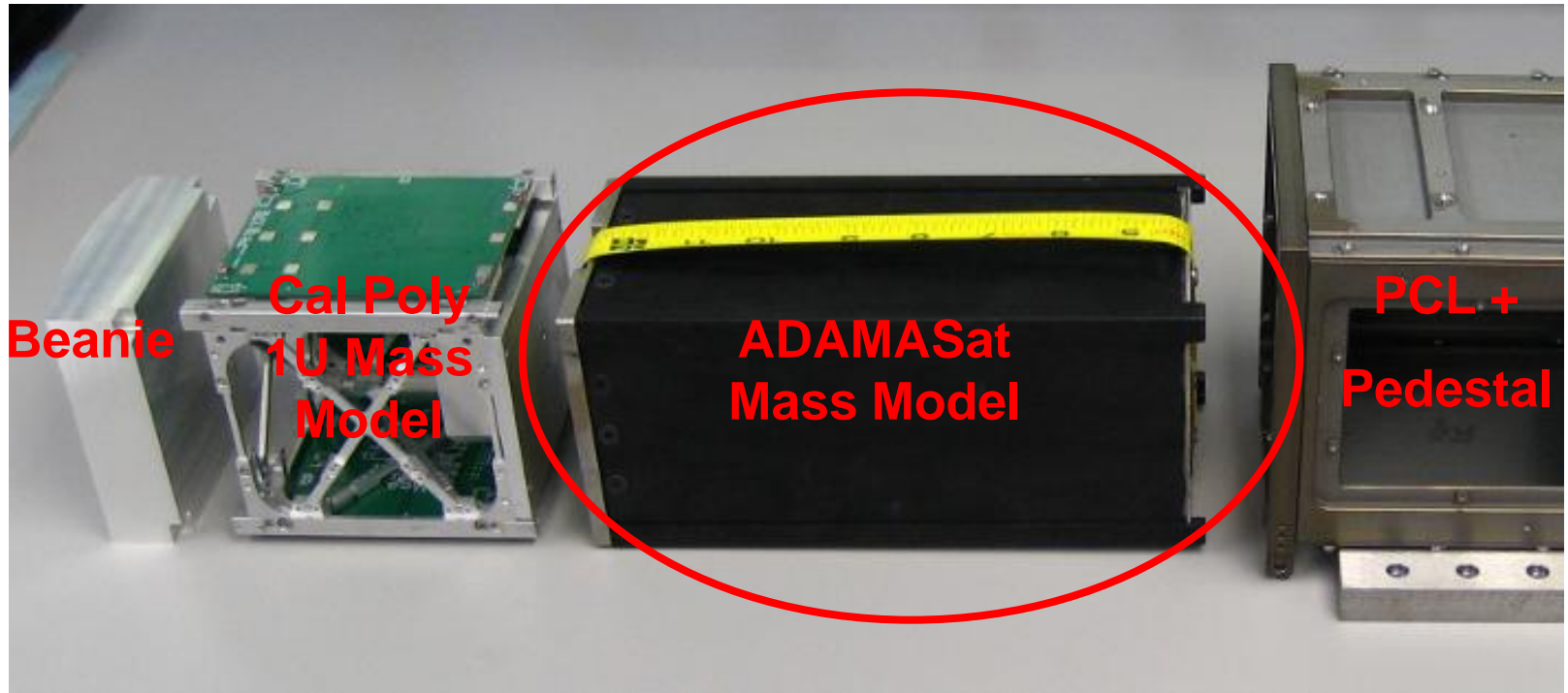
Cal Poly 1U



CAL POLY

- Comm Testing
- Flight Heritage Development

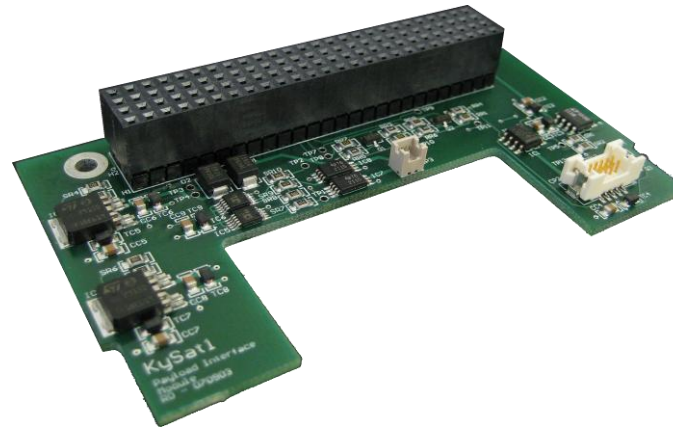
ADAMASat



ADAMASat



- Antenna
Deployment and
Monofilament
Actuator
Satellite
- Space
Qualifying PIM
- Space
Qualifying Line
Cutters



ADAMASat Radio Link

ADAMASat

1/2 wavelength dipole antenna; tape
measure folded to sides of ADAMASat

300 mW Transmitter at 144.39 MHz

1200 baud AFSK

Ground Stations:

Deployed at Wallops:

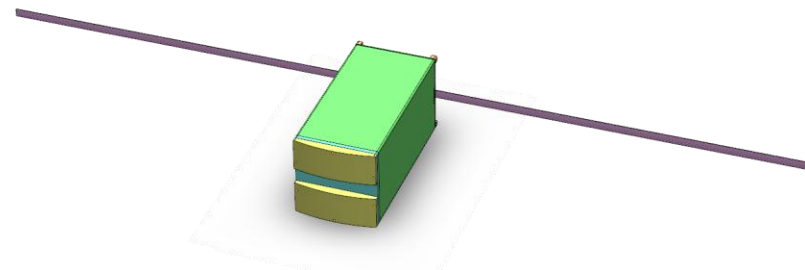
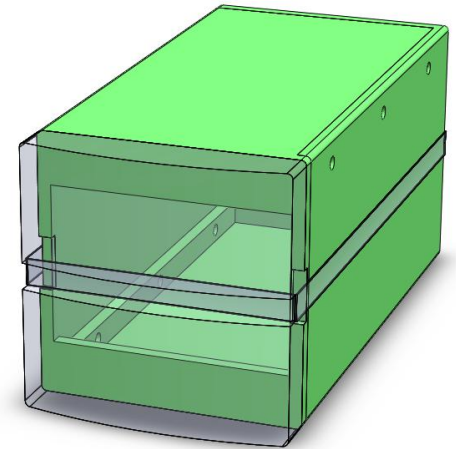
3dB CP arrow antennas

24dB Link Margin

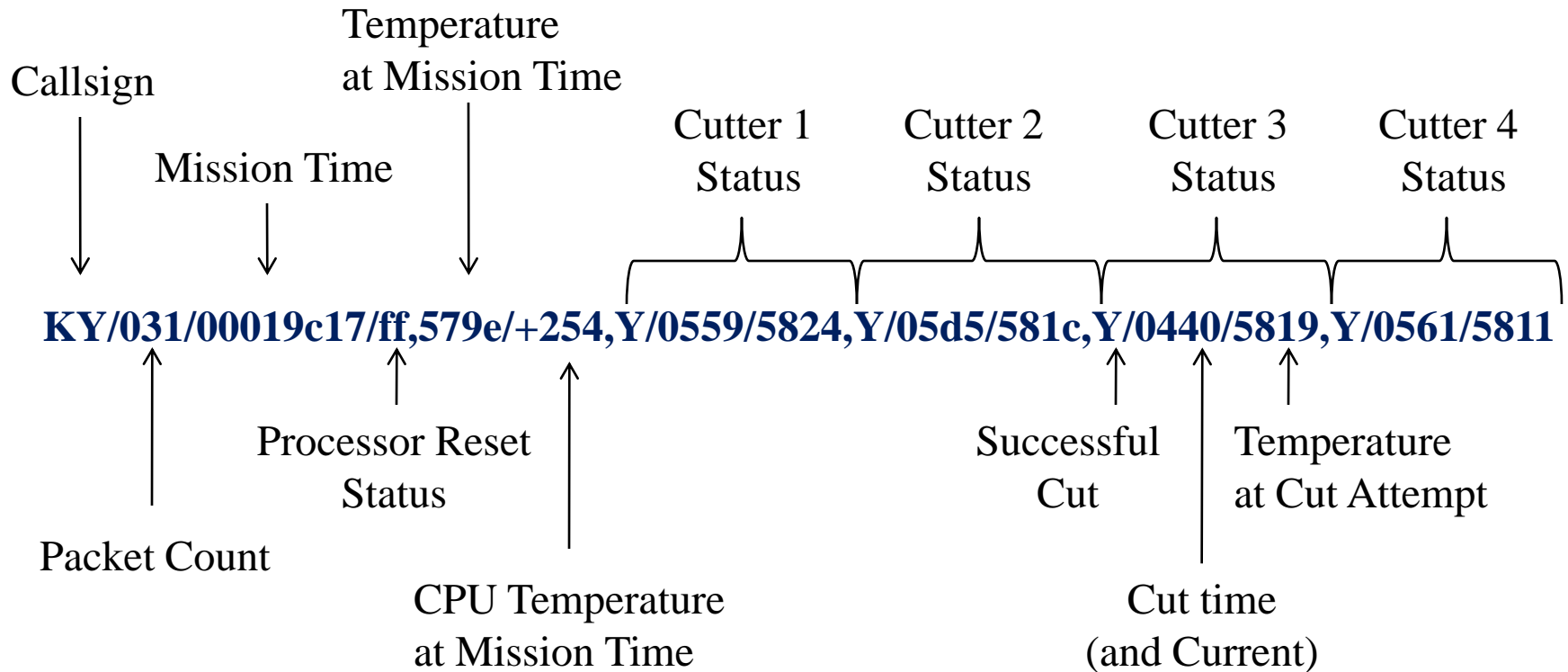
Kentucky:

10dB CP yagi antennas

20dB Link Margin



Transmitted Status Packet



ADAMASat: GUI



Kentucky Space AdamaSat Telemetry Window

Call Sign Filter
Delimit with commas and/or spaces; leave blank for no filter:

Real-Time Cutters Display

| Cutter 1 | Cutter 2 | Cutter 3 | Cutter 4 |
|------------|------------|------------|----------|
| Cut | Cut | Didn't Cut | Waiting |
| 1.369 s | 1.493 s | 1.088 s | |
| 23.9417 °C | 23.9593 °C | 23.9651 °C | |

Estimated Flight Details
(I'm still working on this part.)

Link Quality
(I'm still working on this part too.)

Log

Show Raw Packets
 Show Cutter Info

| Call Sign | Packet # | Mission Time | Reset Status | Thermistor Temp | CPU Temp |
|-----------|----------|--------------|--------------|-----------------|----------|
| KJ4HVJ | 2 | 134.208 s | ff | 24.2033 °C | 25.2 °C |
| KJ4HVJ | 1 | 105.495 s | ff | 24.2053 °C | 25.4 °C |

Mission Milestones

- Test Fit SOCEM
Hardware and Satellite
Mass Models
- Vibes, T-Vac, Ejection
Test (Wallops)
- Flight Model Integration
- Launch



Mass Model Fit Check

Thanks!



Anthony Karam
t.k@uky.edu

453 F Paul Anderson Tower
University of Kentucky
Lexington, KY 40506

