



SOCEM: Sub-Orbital CubeSat Experimental Mission

2010 Spring CubeSat
Developers' Workshop

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University of Kentucky

Benefits of Sub-Orbital Flight

Kentucky
Space™

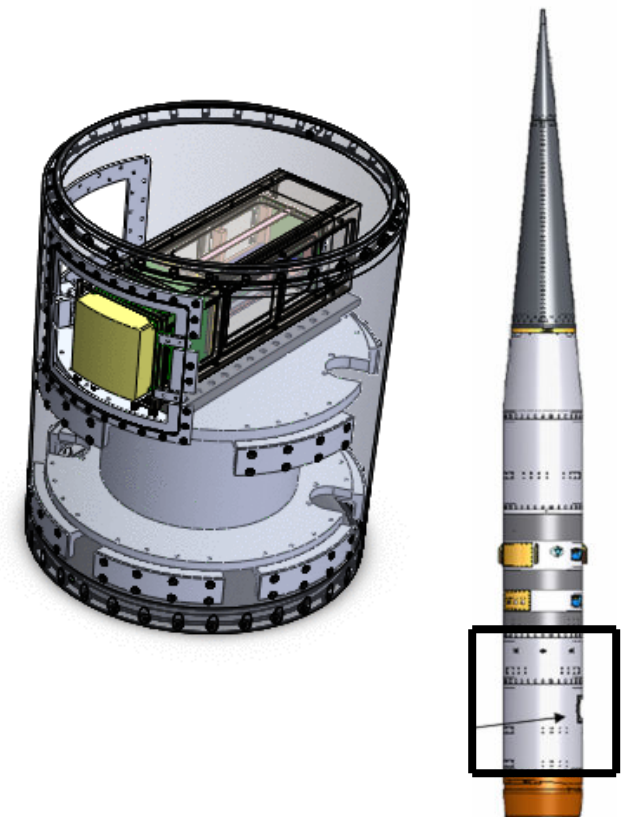
- ❑ Faster mission turnaround time
- ❑ Lower cost
- ❑ Increase TRL, test sub-systems



SOCEM Overview



- ❑ **Sub-Orbital CubeSat Experimental Mission**
- ❑ Demonstrated sub-orbital space flight for CubeSats
- ❑ Used standard Wallops' 17" diameter sounding rocket form factor



SOCEM Partners



- NASA Sounding Rockets Program Office (SRPO)



- Kentucky Space



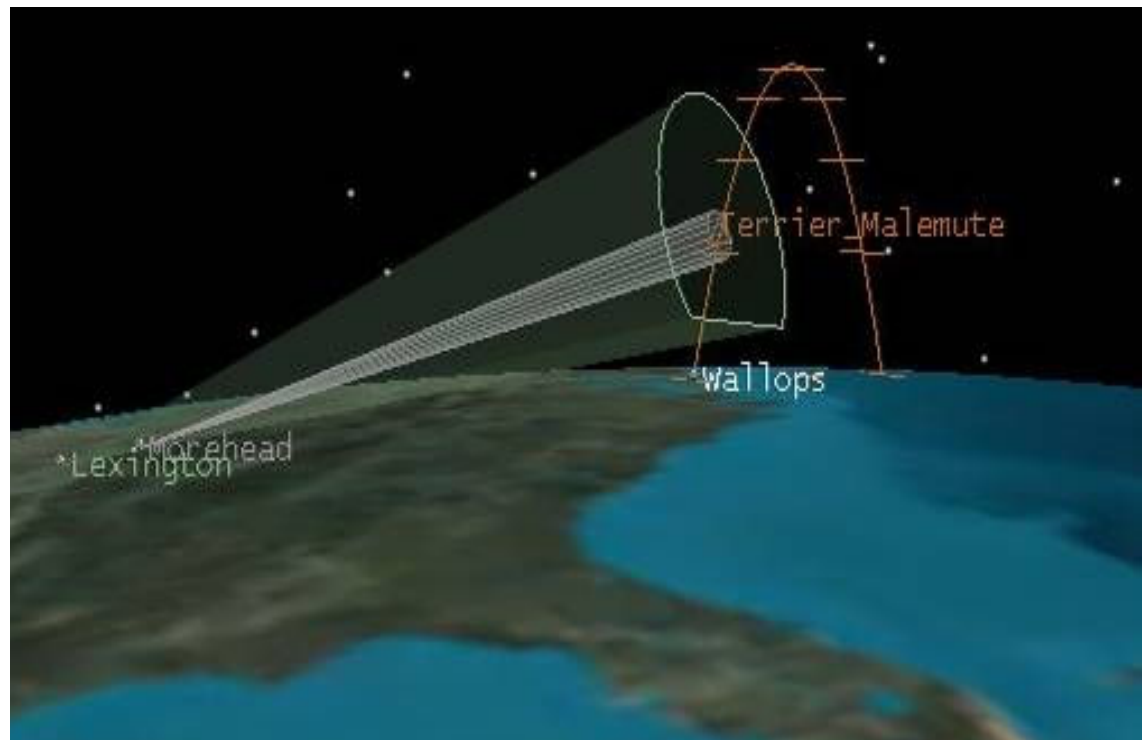
- California Polytechnic University (Cal Poly)

Mission Timeline



Terrier-Improved Malimute:

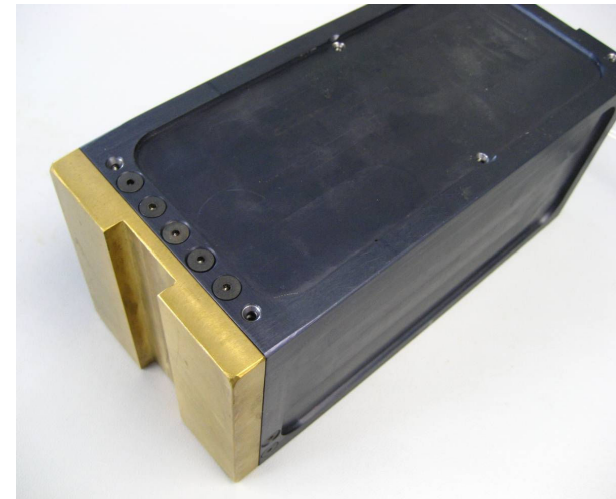
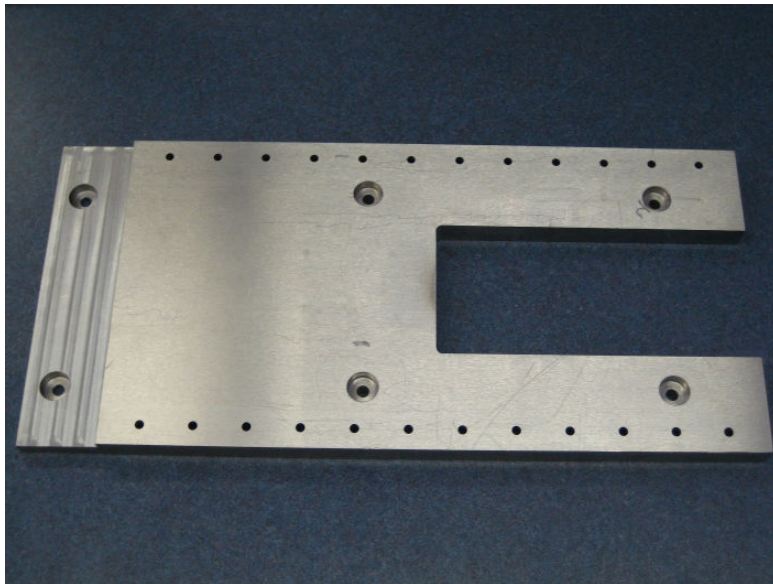
- 2nd Stage Burnout
(~M8, ~20 km)
- Door Deploy
(~M5, ~100 km)
- Apogee
(~M1, ~300 km)
- Ocean Impact
(~M6)



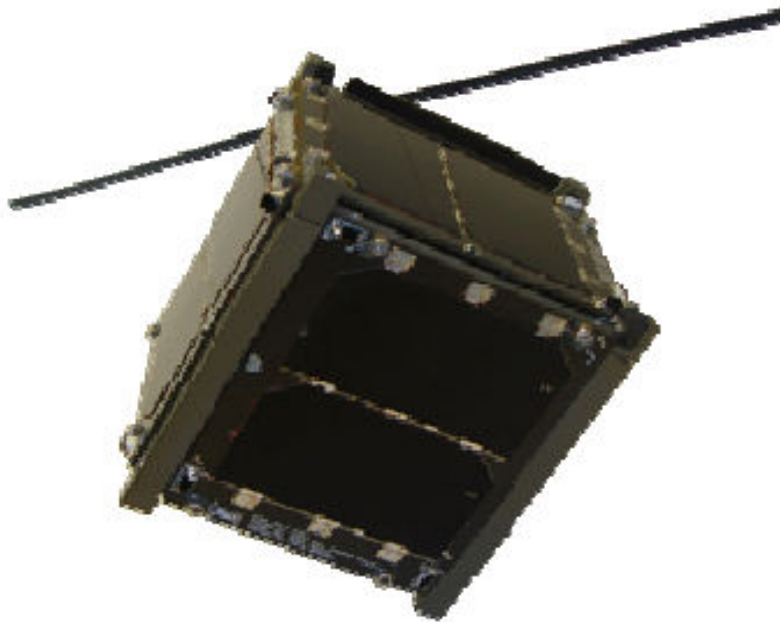
Sounding Rocket Considerations



- ❑ Thermal
- ❑ Spin Balancing
- ❑ Managing CG of payloads



Cal Poly 1U



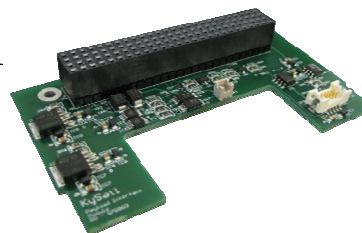
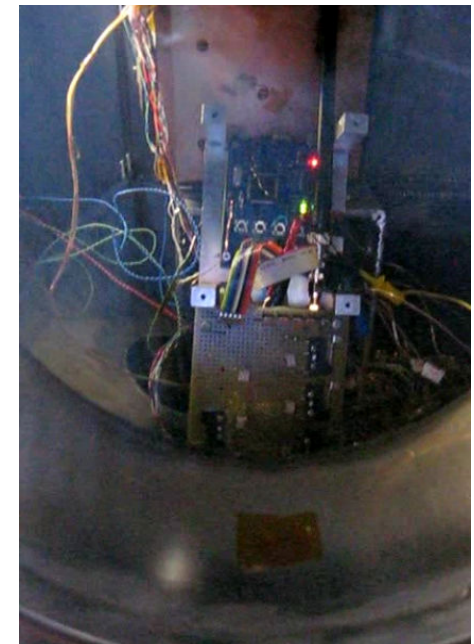
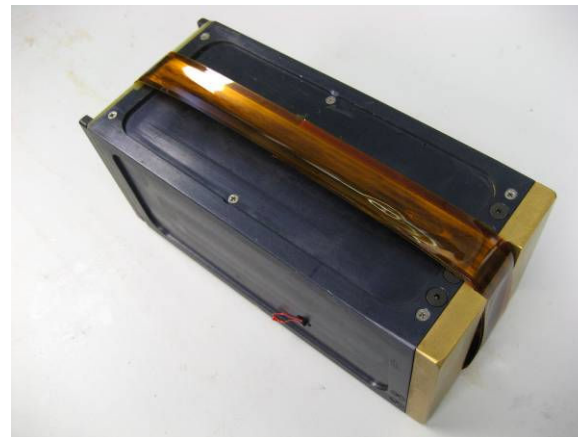
CAL POLY

- Comm Testing
- Flight Heritage
Development for an
attitude determination
system

ADAMASat



- ❑ Antenna Deployment and Monofilament Actuator Satellite
- ❑ Space Qualifying KySat-1 Antenna Deployment Cutters
- ❑ Tested hardware and circuitry for orbital missions



Ground Stations and HAM Outreach



- 3 Ground Stations on Island
- 2 Stations in KY
- Cal-Poly used remote site at Wallops
- Created GUI for HAM community to track mission

The screenshot displays the Kentucky Space ADAMASat FREE GUI. It includes a 'COM Port Settings' section with 'COM1' selected and a baud rate of '9600'. Below this is a 'Real-Time Cutters Display' with four cutters (Cutter 1 to Cutter 4) showing their respective cut times and temperatures. A 'Temperatures Plot' shows CPU and Thermistor temperatures over mission time. A 'Log' section at the bottom provides a detailed table of mission data.

Call Sign	Packet #	Mission Time	Reset Status	Thermistor Temp	CPU Temp	Cutter 1 Status	Cutter 1 Time	Cutter 1 Temp	Cutter 2 Status	Cutter 2 Time	Cutter 2 Temp	Cutter 3 Status	Cutter 3 Time	Cutter 3 Temp
K3HWJ	122	373.618 s	ff	11.0749 °C	13 °C	Cut	1.574 s	9.2332 °C	Cut	1.438 s	9.25317 °C	Cut	1.438 s	9.26715 °C
K3HWJ	121	370.618 s	ff	11.0072 °C	13.1 °C	Cut	1.574 s	9.2332 °C	Cut	1.438 s	9.25317 °C	Cut	1.438 s	9.26715 °C
K3HWJ	120	367.618 s	ff	10.9893 °C	13.1 °C	Cut	1.574 s	9.2332 °C	Cut	1.438 s	9.25317 °C	Cut	1.438 s	9.26715 °C
K3HWJ	119	364.618 s	ff	10.9714 °C	13.1 °C	Cut	1.574 s	9.2332 °C	Cut	1.438 s	9.25317 °C	Cut	1.438 s	9.26715 °C
K3HWJ	118	361.618 s	ff	10.9535 °C	13 °C	Cut	1.574 s	9.2332 °C	Cut	1.438 s	9.25317 °C	Cut	1.438 s	9.26715 °C

Timeline



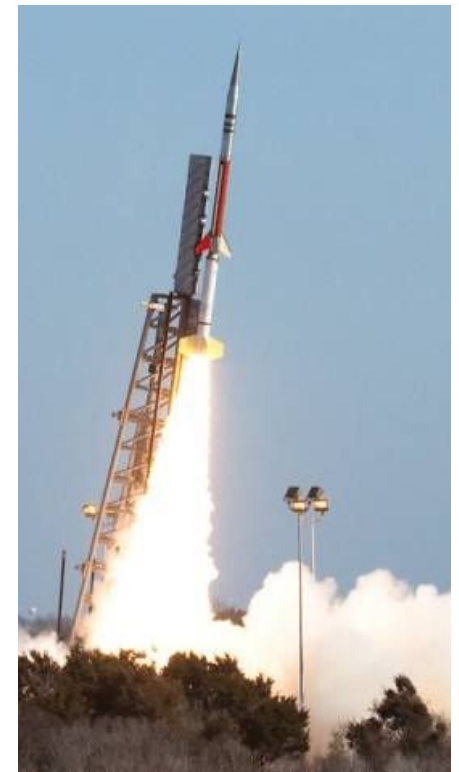
- ❑ Initial Designs (January)
- ❑ Design Review (April)
- ❑ Fit Check (October)
- ❑ Flight Hardware Delivery (December)
- ❑ Spin Balance and Vibration Testing (January)
- ❑ Flight Integration (March)
- ❑ 1st Launch Attempt (March 11th)



Launch!!!



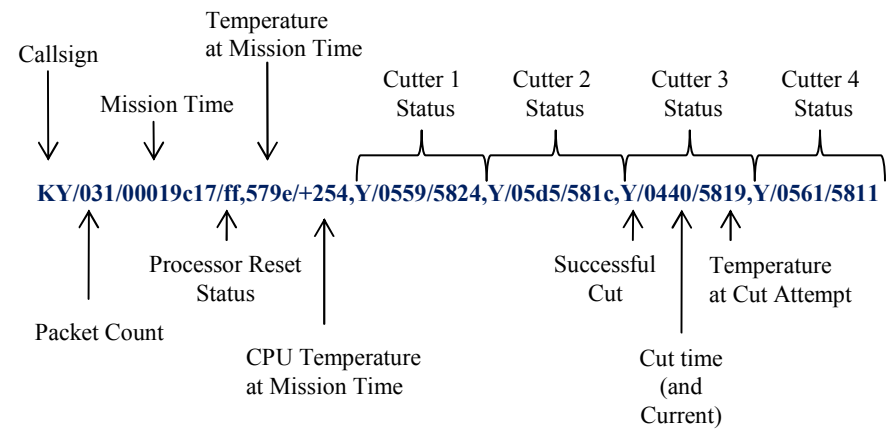
- ❑ Launch at 10:09 am EST March 27th 2010
- ❑ First Time Kentucky Space reached space
- ❑ Received and decoded telemetry packets on site
- ❑ HAMS received packets in Massachusetts and Kentucky



ADAMASat Results

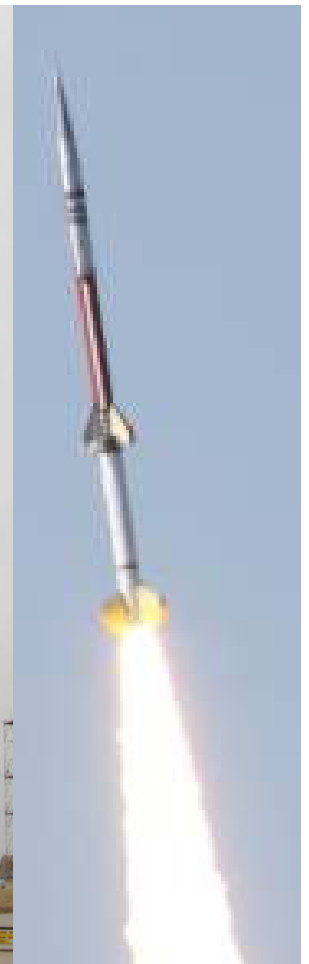


- All cutters worked within 1.5 seconds
- All cut on first current level
- Cal-Poly received telemetry



1. {KY/091/0004482a/ff,72bd/+127,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
2. {KY/092/000453e2/ff,72b5/+127,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
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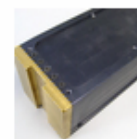
Launch Photos



Media & Promotion



- Mission overview and Launch videos located under UKSpaceLab account on YouTube
- Had live twitter updates on day of launch (lots of retweets)
- Great to leverage different communities
- Can't Control News Cycle; bad timing
- For more information:
<http://ssl.engr.uky.edu/suborbital/socem>



KySpaceADAMASat

UK students are watching their payload go to space station aboard [#STS131](#) follow [@ukspacelab](#) for updates!!

1:26 AM Apr 5th via Echofon

<http://ssl.engr.uky.edu/suborbital/SOCEM> contains launch video and pictures, and is being updated for other mission results

11:05 AM Mar 30th via web

Thanks!



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