SOCEM: Sub-Orbital CubeSat Experimental Mission

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2010 Spring CubeSat Developers’ Workshop

Space Systems Laboratory
University of Kentucky
Benefits of Sub-Orbital Flight

- 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 Malemute:

- 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

- 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
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/092/000453c2/ff,72b5/+127,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
3. KY/093/000450a/ff,75aa/+127,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
4. KY/095/0004770a/ff,729a/+127,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
5. KY/096/000482c2/ff,7290/+127,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
6. KY/097/00048e7a/ff,7288/+128,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
7. KY/099/00045a5a/ff,7278/+128,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
8. KY/100/0004b1a2/ff,726c/+128,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
9. KY/101/0004bd5a/ff,7266/+128,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
10. KY/104/0004d082/ff,724a/+128,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
11. KY/105/0004ec3a/ff,7241/+129,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
12. KY/115/0005616a/ff,71e0/+130,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
13. KY/116/00056d22/ff,71d8/+130,Y/0626/7523,Y/059e/7519,Y/059e/7512,Y/0468/7507
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
Thanks!

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