5 Years of Lessons via MDSGC Payloads at Capitol

Capitol Technology University

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Crawl

- Presenting a problem or challenge
- The birth of an idea
- The inspiration behind the idea
- Developing a mission
- Establishing goals and objectives
Walk

- Model and Test
- Identify and integrate
- Validation
- Present findings to the science community and peers

HAB with University of Maryland (UMD) courtesy of the MDSGC
TRAPSat flying at 80,000 ft courtesy of UMD and the MD Space Grant
Run

- Industry equipment
- Industry methods
- Gaining TRL (Technology Readiness Level)
- Mission Testing
Fly

- Standardized engineering process
- Provides real world STEM application
- Completion
- Taking the idea to the final test

TRAPSat
ROCKSAT-X
payload
- top

Sounding rocket launch 8/17/16
- bottom
Student Benefits

• Job Ready
• Class equivalent
• Comprehensive STEM student education
• Maintaining industry relations which will lead to stronger networks
• Work on multidisciplinary team

Right : Mike Strittmatter
Left : Chris Murray
<table>
<thead>
<tr>
<th>Payload</th>
<th>Date</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS-45 (TrapSat)</td>
<td>Nov 8 2014</td>
<td>Captured debris in LEO</td>
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<tr>
<td>NS-45 (APRS)</td>
<td>Nov 8 2014</td>
<td>Use APRS to send info</td>
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<tr>
<td>NS-46 (Hermes)</td>
<td>Apr 2015</td>
<td>Use Iridium to triangulate</td>
</tr>
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<td>Apr 2015</td>
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</tr>
<tr>
<td>NS-46 (Pi in the Sky)</td>
<td>Apr 2015</td>
<td>A balloon launch with a Raspberry Pi and a camera</td>
</tr>
<tr>
<td>NS-47 (TrapSat)</td>
<td>Apr 18, 2015</td>
<td>Captured debris in LEO</td>
</tr>
<tr>
<td>NS-47 (Hermes)</td>
<td>Apr 18, 2015</td>
<td>Use Iridium to triangulate</td>
</tr>
<tr>
<td>NS-56 (Cloud 360)</td>
<td>July 23, 2016</td>
<td>Using 360 degree video to test clouds</td>
</tr>
<tr>
<td>NS-56 (HABScope)</td>
<td>July 23, 2016</td>
<td>Doing infrared Astronomy</td>
</tr>
<tr>
<td>NS-58 (Cloud 360)</td>
<td>Sept 2016</td>
<td>Using 360 degree video to test clouds</td>
</tr>
<tr>
<td>NS-60 (Hermes)</td>
<td>Nov 13, 2016</td>
<td>Use Iridium to triangulate</td>
</tr>
<tr>
<td>NS-63 (TrapSat Burn)</td>
<td>Apr 15, 2017</td>
<td>Testing nichrome wire</td>
</tr>
<tr>
<td>NS-64 (CTU PR)</td>
<td>May 7, 2017</td>
<td>A PR flight by CTU to take pictures of the atmosphere</td>
</tr>
<tr>
<td>NS-76 (Aether)</td>
<td>Apr 13, 2018</td>
<td>Testing for the sounding rocket</td>
</tr>
</tbody>
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TrapSat

- Took pictures and captured small debris in LEO
- Aerogel was used to capture particles
- Take an image of the debris
- This helped determine location of debris
Removable Aerogel Support Container (RASC) from camera
APRS (Automated Positioning Reporting System)

• Use APRS to use reserved frequency to send information

• Process data into packets

• Send through the antenna
HABScope

- Used infrared cameras to do infrared Astronomy
- First Capitol Project to use attitude Stabilization
- Could not fly for RockSat mission as it was too heavy
Cloud 360

• Was a mission that was created for the Capitol Brazil program

• Took PH readings and 360 degree video for the entire flight

• Correlate the PH data to the specific cloud
Hermes

- The purpose was to use triangulation to locate the payload.

- GPS at high altitudes is not allowed

- Iridium module was used instead
TrapSat Burn

• Wanted to test burning nichrome wire to expose aerogel

• Flight was successful

• Programmed with 10-15 minute delay before the burn
Why it Matters?

• Builds technical skills
• Establishes career skills
• Builds confidence
Technical Skills

• It’s a hands on experience
• Helps to learn about payload requirements
• Working across majors
• Can evolve your project into a sounding rocket
• HAB skills translate to NASA projects
Career skills

- Working on a multi-disciplinary team
- It helps with networking
- It improves your people skills
- Dealing with deadlines
- Working across institutions

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