Ballooning for High School Teachers and University Level Students

T.G. Guzik

Louisiana Space Consortium

National Council of Space Grant Directors Meeting

These programs involve personnel from multiple institutions

**Louisiana Space Consortium (LaSPACE)**

**NASA Wallops Flight Facility - Balloon Program Office (BPO)**
D. Gregory, G. Garde, J.A. Haggard, D. Fairbrother

**NASA Wallops Flight Facility – Education Team**
J. Winterton, L. Sherman

**Columbia Scientific Balloon Facility (CSBF)**
D.R.J. Ball, W. Stepp, J. Juneau, J. Jones, R. Salter, plus many other unsung CSBF rigging, balloon launch, electronics and support personnel.
Ballooning for High School Teachers

• In 2011 a team was organized to bring a scientific ballooning experience to high school teachers across the nation; the Wallops Balloon Experience for Educators (WBEE)
  – Louisiana Space Consortium (LaSPACE): Lead in developing the workshop content, materials, agenda, teaching and flight operations.
  – Columbia Scientific Balloon Facility (CSBF): Lead in workshop material preparation, facility organization and launch operations.

• Based upon the highly successful LaSPACE Aerospace Catalyst Experiences for Students (LaACES)
  – Focused on building a small payload designed to measure temperature, pressure and humidity as a function of altitude.

• Four day workshop held in 2011 and 2012
  – July 12 through July 15, 2011 included 30 high school teachers
  – July 24 through July 27, 2012 included 24 high school teachers
The General Workshop Agenda

• **Monday:** Workshop setup at CSBF, complete last minute details, welcome and orientation of workshop participants.

• **Tuesday:** Begin payload construction
  – Divide participants in teams of three: mechanical, electronics, software

• **Wednesday:** Complete payload construction
  – Prepare balloon string beacons and payloads
  – Review flight operations and weather forecast

• **Thursday:** Flight operations
  – Launch at about 7:30 am and follow flight through recovery
  – Return to CSBF and perform data analysis

• **Friday:** Wrap up
  – Education resources, Teacher planning session
Teachers had to complete assembly of payload kit

- Learned soldering, programming, sensor calibration, battery assembly and Styrofoam box construction.
Payloads were completed and prepared for flight
A good time was had by all!
The WBEE program received a NASA award

National Aeronautics and Space Administration

Presents the

RHG Exceptional Achievement OUTREACH - TEAM

to

Wallops Education Flight Opportunities

For exceptional achievement in implementing education flight opportunities for teachers that will improve STEM education across the United States.

Gregory Guzik

Signed this twenty-ninth day of November
Two Thousand Eleven

Robert Strain
Director, Goddard Space Flight Center
The High Altitude Student Platform (HASP)

• Operates as a partnership between the NASA Balloon Program Office (BPO) and Louisiana Space Consortium (LaSPACE)
  – BPO provides balloon, launch and flight services
  – LaSPACE maintains HASP & interfaces with the student payloads
• Developed in 2005 to address a looming crisis in training the next generation of aerospace scientists and engineers.
• Provides a regular flight opportunity for student groups across the world.
• During October 2011 a NASA Press Release announced the HASP 2012 flight opportunity
  – By the Dec. 2011 deadline, 17 applications for HASP seats were received.
  – Selected 12 payloads for flight plus one alternate.
• A similar NASA Press Release for HASP 2013 was distributed on October 19, 2012.
Major HASP Features

• Fly to an altitude > 36 km for a duration of ~20 hours

• Includes two major components
  – The upper frame (HASP) supports the multiple payloads
  – The bottom frame (CSBF frame) to support the balloon vehicle communication and support structure

• HASP includes a standard interface for each payload
  – Eight “small” experiments on booms and four “large” experiments on top
  – The HASP control electronics multiplexes and isolates the 12 experiments from the CBSF systems.

• Include CosmoCam for real time video during launch & flight

(Student payloads mounted on HASP 2012)
# HASP 2012 Institutions and Payloads

<table>
<thead>
<tr>
<th>Institution</th>
<th>Payload Title / Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boston University, Georgia Institute of Technology</td>
<td>Student Platform Integrated First Flight (SPIFF) - Test of CubeSat interface technology</td>
</tr>
<tr>
<td>Gannon University</td>
<td>High Altitude Radiation Detector (GU-HARD-PL02)</td>
</tr>
<tr>
<td>University of Minnesota</td>
<td>High Altitude X-Ray Detector Testbed</td>
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<tr>
<td>Montana State University</td>
<td>Single Event Effect Detector</td>
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<tr>
<td>University of Maryland</td>
<td>University of Maryland StratoPigeon III (UMDSP III) - Test of LDB recoverable data capsule</td>
</tr>
<tr>
<td>University of North Dakota, University of North Florida</td>
<td>Measurement of the ozone profile in the stratosphere using nanocomposite sensor</td>
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<tr>
<td>Arizona State University</td>
<td>High Altitude Turbine Survey (HATS)</td>
</tr>
<tr>
<td>University of Colorado</td>
<td>HELIOS (Hydrogen-alpha Exploration with Long Infrared Observation Systems of the Sun)</td>
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<tr>
<td>Louisiana State University</td>
<td>Sampling for Microorganisms in the High (SMITH) Atmosphere</td>
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<tr>
<td>Louisiana State University</td>
<td>Terrestrial Gamma-Ray Flash (TGF)</td>
</tr>
<tr>
<td>InterAmerican University of Puerto Rico</td>
<td>ARIES-DYNAMICS - Test of CubeSat ADS system</td>
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</tbody>
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HASP 2012 Flight Profile

Launch: 9/1/2012 14:19 UTC
Float: 9/1/2012 16:28 UTC
Terminate: 9/2/2012 01:17 UTC
Impact: 9/2/2012 02:07 UTC
Ave Float Altitude: 37,180 m
Float Duration: 8.8 hours
HASP 2012 Flight Path
HASP has involved students from more than 30 institutions in North America

HASP Activities Status as of October 2012

- Alberta, Canada: 1
- States Utilized HASP
- States have Not Utilized HASP

Slide courtesy of NASA BPO
Many individual experiments have flown on HASP over the years

- HASP was flown each year (except 2010) from 2006 through 2012
- The 2010 flight was delayed until August 2011
- To date close to 500 students from 31 institutions across 17 states plus Puerto Rico and Alberta, Canada have been involved in developing a HASP experiment.
- More than 80% of payloads flown on HASP are successful.

<table>
<thead>
<tr>
<th>Year</th>
<th>Launch Date</th>
<th>Float Duration (hours)</th>
<th>Students</th>
<th>Payloads</th>
<th>Accepted</th>
<th>Flown</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>September 4, 2006</td>
<td>15.0</td>
<td>25</td>
<td>8</td>
<td>8</td>
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<tr>
<td>2007</td>
<td>September 2, 2007</td>
<td>16.5</td>
<td>70</td>
<td>11</td>
<td>10</td>
<td>8</td>
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<tr>
<td>2008</td>
<td>September 15, 2008</td>
<td>31.8</td>
<td>96</td>
<td>13</td>
<td>12</td>
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<tr>
<td>2009</td>
<td>September 11, 2009</td>
<td>12.0</td>
<td>50</td>
<td>10</td>
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<td>2010</td>
<td>August 31, 2011</td>
<td>8.0</td>
<td>78</td>
<td>11</td>
<td>8</td>
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<td>2011</td>
<td>September 8, 2011</td>
<td>15.7</td>
<td>117</td>
<td>11</td>
<td>5</td>
<td>5</td>
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<tr>
<td>2012</td>
<td>September 1, 2012</td>
<td>8.8</td>
<td>62*</td>
<td>14</td>
<td>11</td>
<td>10*</td>
<td></td>
</tr>
<tr>
<td>Total 06 to 12</td>
<td>107.8</td>
<td>498</td>
<td>78</td>
<td>60</td>
<td>49</td>
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HASP 2013 Call for Payloads

CFP document and application materials is available on the “Participant Info” tab of the HASP website

http://laspace.lsu.edu/hasp/Participantinfo.php

Q&A Teleconference November 16, 2012 at 10 am (central time)
Dial 1-866-717-2684, ID 6879021

Email PDF version of application by 11:59 pm (central time) on December 14, 2012 to guzik@phunds.phys.lsu.edu

Notification of successful applicants by mid-January 2013