

Flight Education Programs:

High Altitude Student Platform (HASP)

HASP Overview and Summary

The High Altitude Student Platform (HASP) project has been very successful in providing access to near-space for science / engineering payloads in the 3 to 20 kilogram range developed by undergraduate and graduate students from across the country. Since its first flight in 2006, HASP has flown about 18 student payloads from 12 institutions, several test packages for the Columbia Scientific Balloon Facility (CSBF), and has accepted 13 payloads for its next flight in 2008. A HASP flight exceeds an altitude of 120,000 feet and duration of 16 to 18 hours. The payloads developed by the students have investigated a variety of topics including remote sensing, cosmic rays, high altitude dust collection, and testing satellite prototype systems.

The HASP system itself has proven to be very reliable providing power, telemetry and commanding to all the student payloads throughout the flights. In addition, the innovative HASP interface and control electronics has been modularized and mounted on a single lightweight structural plate. This allows the entire electronics package to be easily slid out of the HASP structure providing desktop checkout / maintenance / repair of the full electronics package and easy "plug and play" change out

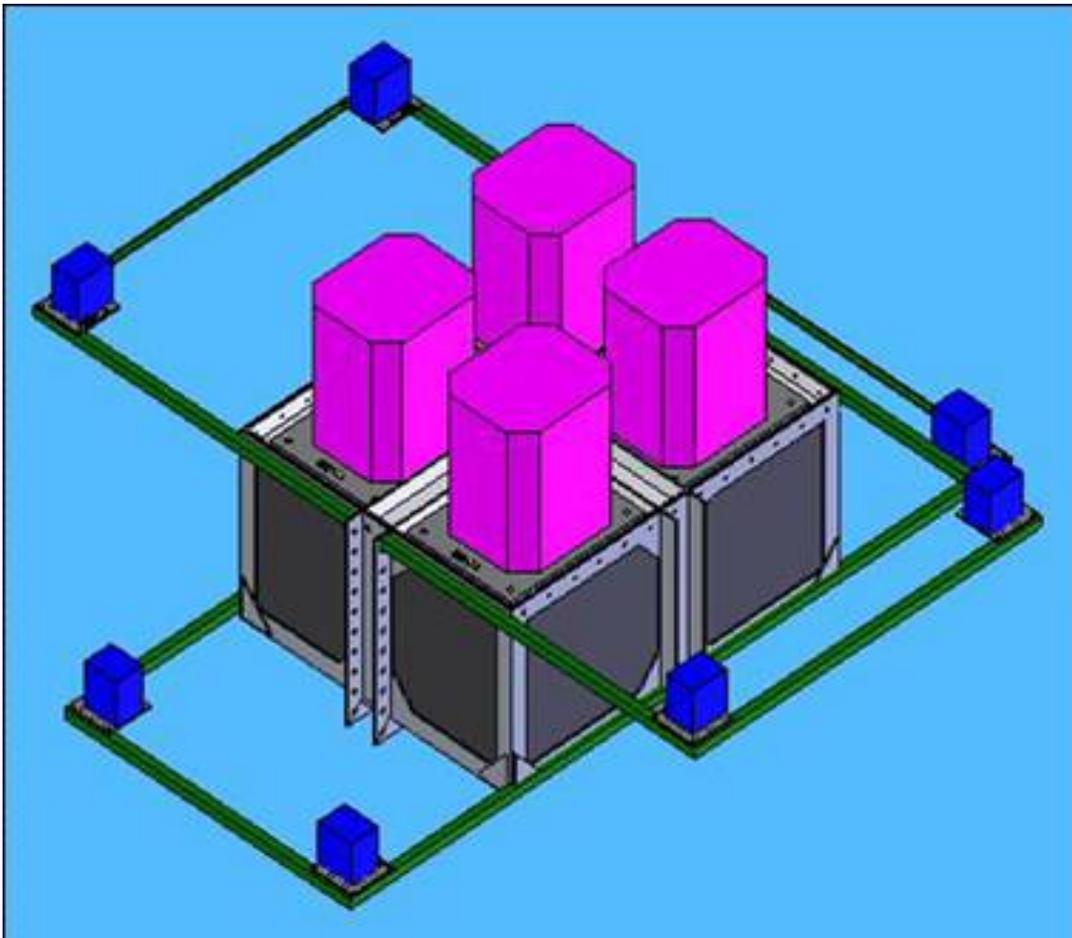
with a backup electronics plate in case of encountering a problem on the flight line. A consequence of such innovations is that HASP is shipped to the flight line almost fully ready and requires only a few days of preparation.

The initial three year flight program phase from 2006 through 2008 is focused on developing HASP, flight testing the platform and proving that HASP provides a valuable service for training a new generation of aerospace scientists and engineers. To bring HASP quickly to flight status (about 15 months from the start of project funding to first flight) we chose to use a mini-SIP control system which added ~600 pounds to the ~400 pound HASP. This increased the total suspended weight, including about 540 pounds of ballast, to 2000 pounds, requiring the use of a 11 million feet³ balloon for flight. While we feel that this decision was correct at the time, we believe that the HASP weight can now be significantly reduced allowing either a smaller balloon to be used and/or improving the student payload to infrastructure mass ratio.



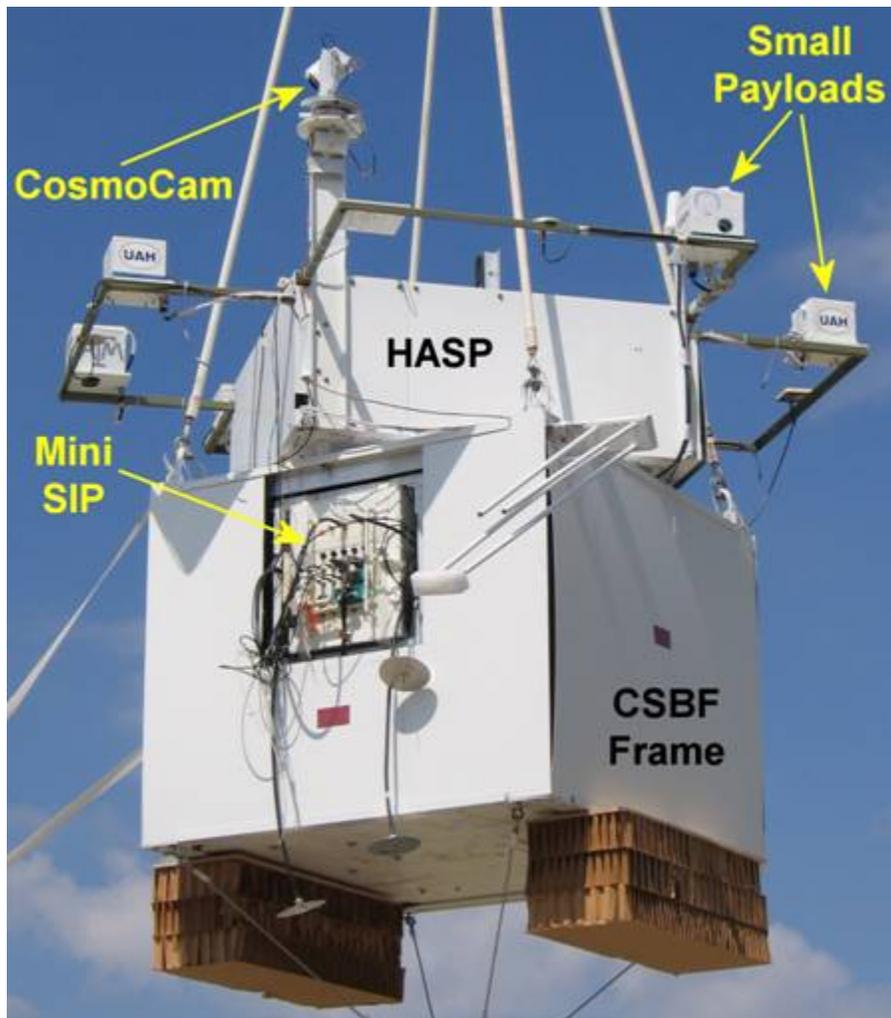
HASP 2006 Overview

- Provides student teams the opportunity to develop and operate inexpensive small payloads on a dedicated balloon platform.
 - Flight test up to 12 student built payloads.
- First HASP Flight contained 7 student payloads from 5 institutions as follows:
 - University of Alabama - Huntsville: Infrared telescopes to remotely study the thermal characteristics of the balloon envelope (3 small)
 - Texas A & M University: Video camera system to study remote sensing from high altitude (1 small)
 - University of Louisiana - Lafayette: Nuclear emulsion stack to investigate high energy cosmic rays (1 large)
 - Louisiana State University (Mechanical Eng.): Study the flow characteristics of various rocket nozzles as a function of altitude (1 large)
 - Louisiana State University (Physics): Prototype of an accelerometer based inertial navigation system (1 small)



2007 HASP Features

- Support & flight test up to 12 student built payloads
 - Eight small payloads < 1 kg & four large payloads < 10 kg
 - Fly to an altitude > 36 km for a duration of ~20 hours
- Provide payloads with serial uplink/downlink, discretes, 28 VDC power, & analog downlink
 - Downlink available in near real time
- Include CosmoCam for real time video during launch & flight
- NASA partnership supports three flights
 - First flight September 4, 2006
 - Second flight September 2, 2007



2008 HASP Student Call for More Payloads

- **Hawk Institute for Space Science (UMES):** Multi-sensor CubeSat prototype test (1 small)
- **Louisiana State University - Baton Rouge:** Measure the flux of secondary neutrons as a function of altitude (self-contained)
- **Louisiana Tech University:** Flight test of micro scale radiation detectors (1 small)
- **McNeese State University:** Measurement of microwaves in the 45-60 GHz band (1 large)
- **Montana State University:** Passive high altitude particle capture experiment (1 large)
- **Pennsylvania State University:** Cosmic ray particle experiment (1 small)
- **Tulane University:** Prototype star tracking instrument - Canceled prior to integration
- **University of Alabama - Huntsville:** Infrared imaging of the balloon thermal characteristics (1 large)
- **University of Colorado:** Assessment of astronomical observations from balloons (1 large)
- **University of Maryland:** Flight test of compact radio telemetry system (1 small)
- **University of North Dakota:** Development and test of a micro scale ozone detector (1 small)
- **Virginia Tech:** Prototype for a Lunar magnetic field instrument (self-contained)
- **West Virginia University:** High altitude cosmic ray detector (1 small)

Student Payload Statistics

- 32 student payloads have been accepted for flight since 2006
 - 8 flown on HASP 2006
 - 11 picked for HASP 2007
 - 13 scheduled for HASP 2008
- Greater than 70% success during 2006 & 2007
- A total of 191 students have been involved with HASP
 - 25 in 2006
 - 70 in 2007
 - 96 in 2008
- Participants from 16 institutions across 10 states
- Payloads cover a broad range of subjects

