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# Rocket Report

4 1  
3 2 2007

Sounding Rockets Program Office

### In Brief...

New Astrophysics and Solar- and Helio physics proposals have been received from NASA HQ and are under review.

The Hy-Bolt payload is in the T&E lab for bend and vibration testing.

The Kletzing TRICE 40.018 and 40.022 payloads were successfully launched from Norway on December 10, 2007.

Several Orion static burns, instrumented by NASA Ames, were conducted on Wallops Island. More on page 2.

McCandliss LIDOS team is at White Sands preparing for their second flight, scheduled for January 2008. First flight was in August 2007.

A new student flight program, University Student Experiment Ride Share (USERS), is under consideration. PennState University is a potential partner in this effort.

Two Aegis Readiness Assessment Vehicles - Class A (ARAV-A) were launched from Barking Sands on November 6, 2007.

## Earle STORMS off the Pad!

Congratulations to the Earle Team! After two years of waiting, and only a few days left in the window, the 36.218 UE Black Brant IX was successfully launched on October 30, 2007 at 04:12:00 Z. The Principal Investigator is Dr. Greg Earle from University of Texas at Dallas.

The STORMS mission investigated mid-latitude ionospheric irregularities associated with terrestrial weather systems. Specifically the mission studied density depletions in the F-region created from electrical fields formed in response to plasma motion. Extensive use was made of ground based assets including the new Dynasond, Wallops weather station, Traveling Ionospheric Disturbance Detector Built in Texas (TIDDBIT) HF radar, and GPS receivers.

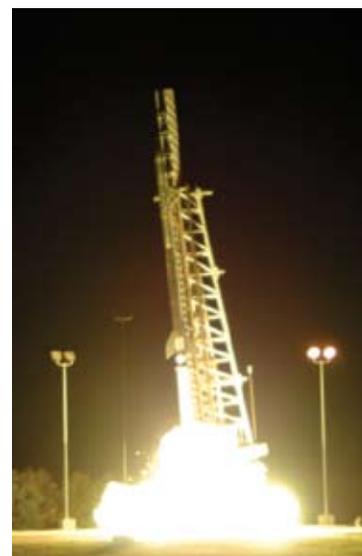


Photo by Wallops Photolab

## Second successful Extreme Ultraviolet Normal Incidence Spectrometer (EUNIS) flight.



Photo by Visual Information Branch, WSMR

EUNIS, a successor to the Solar Extreme Ultraviolet Research Telescope and Spectrograph (SERTS) instrument, was successfully flown for the second time on November 6, 2007. SERTS flew ten times from 1983 to its retirement in 2000.

EUNIS, developed by a team at Goddard Space Flight Center, is designed to study the physical properties of the solar corona and is used to calibrate orbital solar observatories, such as SOHO, TRACE, Hinode/EIS and STEREO. More about EUNIS on page 2.

## EUNIS - Solar Science

The first EUNIS flight from White Sands Missile Range, NM took place on April 12, 2006. The instrument performed flawlessly measuring more than 10 new, yet to be identified, spectral lines. Additionally, measurements were made of the hottest lines for which Doppler velocities have been reported in a bright point.

Principal Investigator Dr. Douglas Rabin/NASA Goddard Space Flight Center and his team have published the first findings from this mission in **The Astrophysical Journal**, 656: L41–L44, 2007 February 10.

EUNIS flew again on November 6, 2007 and this flight was every bit as successful as the first. The second flight accomplished co-observing with Hinode/EIS for underflight radiometric calibration, 1.33-s image cadence with 1.25-s exposures in video mode, and 225 science images in each of two wavelengths.



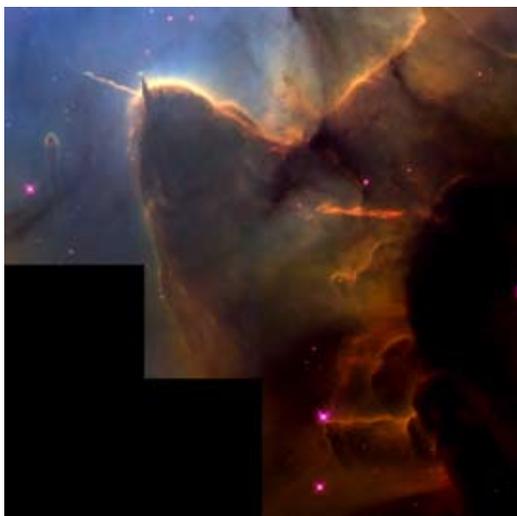
Photo by Visual Information Branch, WSMR

Recovery of the EUNIS payload in the desert down range from the White Sands launch site.

For more information about the EUNIS instrument and missions, visit <https://eunis.gsfc.nasa.gov>

## Long-Slit Imaging Dual Order Spectrograph (LIDOS) looks at the Trifid and Orion Nebulae

The first successful flight of the LIDOS instrument took place in August 2007 and the second flight is planned for January 2008. LIDOS utilizes the new improved NSROC developed Celestial Attitude Control System (CACS) for accurate pointing and pitch, yaw and roll command uplink capability.



The Trifid Nebula (above) was the first science target for LIDOS. Image Credit NASA (Hubble) and Jeff Hester, Arizona State Univ

In January 2008 LIDOS, on its second flight, will target the Orion Nebula. The science objectives, for both flights, include measuring the spectra of the stars and the surrounding gas and dust, constrain the optical properties of the dust in the far-UV, search of molecular hydrogen (H<sub>2</sub>) emission, and quantify the relationship between the incident radiation field, optical properties of the dust, and the formation and destruction of molecular hydrogen.



The Orion Nebula will be the second science target for LIDOS. Image Credit NASA (Hubble) and C.R. O'Dell and S.K. Wong, Rice University.

References: McCandliss, Feldman, France & Lupu, "Experimenter's Data Package, 36.220 UG".

## Orion static burn aids Crew Exploration Vehicle (CEV) Launch Abort System (LAS) team

By Cliff Horne/NASA Ames (AOX)

The new Crew Exploration Vehicle (CEV) will be equipped with launch abort system (LAS) similar to the Apollo abort tower forward of the crew module. In the event of an abort on the pad or during ascent, the CEV will be subjected to brief but intense unsteady pressure loading from the LAS rocket plumes. The CEV launch configuration is in the midst of an extensive program of analyses and simulations to define the unsteady loads environment, including wind tunnel simulation of the LAS motor plumes during various abort scenarios.

In order to reduce the uncertainty of these simulations and to improve confidence in the ability to estimate flight loads from small-scale simulations using warm/cold or substitute plume gas, NASA WFF and Ames researchers collaborated in recent measurements of the near-plume unsteady pressures of five improved Orion sounding rocket motors. These motors are approximately one-half size of the LAS motors, and provided an excellent validation of temperature scaling methods recently developed for estimating the unsteady loads.

The tests were conducted at an existing burn pad at the south end of Wallops Island. WFF staff erected a temporary 40-foot high stand to support 11 water-cooled unsteady pressure transducers and a far-field microphone. Instrumentation and data acquisition equipment



Improved Orion static firing on Wallops Island, November 20, 2007.

Photo by Wallops Photolab

provided by Ames was housed in a temporary enclosure 120 feet from the burn pad. High-speed and standard video records of the firings were provided by the WFF imaging team. An existing wide-band fiber optic cable link between the burn pad area and the instrument/ video control building provided real time control of video and data acquisition from outside of the safety exclusion zone.

Thanks to the preparation and efforts of the support team, the test was set-up and completed within a week, and a preliminary assessment of the results confirms excellent data quality for all of the firings. Although the burn pad was not designed for noise testing, the remote location, low background noise, and lack of reflecting structures at this site provided an ideal acoustic test environment. The WFF high-speed videos at 400 frames per second clearly imaged the high-speed convecting flow structures responsible for the intense noise generation.

Further tests of CEV abort configurations are being considered for testing at WFF, and the successful results of this first test demonstrate the value of the Wallops capabilities in this type of research.

Another year has gone by and the Sounding Rocket Program has been as busy as ever. We conducted 17 core science missions and a technology demonstration mission for Langley Research Center. In addition, NSROC supported several very successful target missions for the Aegis program in Hawaii. While our Poker campaign was not perfect, we were very successful in pulling off the most complicated Poker campaign ever. We flew another tailored trajectory, launched a salvo of four rockets in a span of about 15 minutes, and flew a payload that included two rocket assisted sub-payloads. We then went on to conduct missions from White Sands, Wallops, and Norway. In addition to meeting our science mission obligations we also completed the development of the new celestial ACS, moved forward on the Mesquito development, helped with the Hy-Bolt and IRVE payloads, and even conducted Orion static motor firings that may help with the design of new crew escape system for the Shuttle replacement. Our can-do attitude and hard work has lead to this success – so we are all to blame...

It's hard to believe we are entering the final year of the NSROC contract. This year looks to be yet another busy one for us. The NASA mission workload will be steady as we have several missions scheduled for WSMR and another Poker Flat campaign on the horizon. There are several reimbursable missions already booked for next year with more anticipated. We have established a good base of reimbursable customers and the excellent work you do keeps them coming back.

NSROC's participation in the historic ARAV intercept launches is a shining example of that work. Equally impressive is the work of the ACS groups at Wallops and White Sands – congratulations on receiving the Robert L. Krieger award! Reports of the results from Dr. McCandliss' mission revealed improved accuracies from the Celestial ACS by a factor of 6 with increased observation time as a bonus. The ACS enhancements are a truly significant accomplishment for our program.

Despite extremely heavy surge loads, travel requirements and budget constraints, the NSROC Team has excelled. Increased work demands increased staff, especially in the engineering

It would appear that more great work is on the horizon. Our 2008 flight manifest is full, and we anticipate an increase in both NASA and reimbursable missions in the coming years. This may cause us to be stressed once again – at least occasionally, but keep in mind that SRPO and NSROC management is working hard to find the right balance between workload and resources.

In closing, I would like to thank everyone, including the SRPO, NSROC, Safety, AETD, Code 840, and other Code 800 organizations for your hard work and perseverance. I know its been hard keeping up moral in spite of a heavy workload, budget uncertainty, increased administrative requirements, and the ongoing conflict between work life and home life, but you have! Your attitude and work ethic makes me proud...

GREAT JOB! And I wish everyone good health and a great 2008!

*Phil Eberspacher*  
Chief/Sounding Rockets Program Office



disciplines; we are recruiting in several areas of the contract to keep pace. If you know of people who qualify for open positions, please let us know in the program office

The coming year signals the recompetete of the NSROC contract. Our managers and staff will soon be busy writing the proposal for the next contract and, hopefully, the next award. We are getting good support from Northrop Grumman and a corporate proposal team is being formed now. This contract is very visible within NGTS and getting much attention from senior management.

As I look at our successes over the past nine years, I want you to know that I truly appreciate your willingness to go the extra mile and your continued outstanding performance. I hope you were able to take some time for yourselves and your families during the holidays. I wish us all a happy and successful 2008.

*Rob Maddox*  
NSROC Program Manager

# Rocket Report

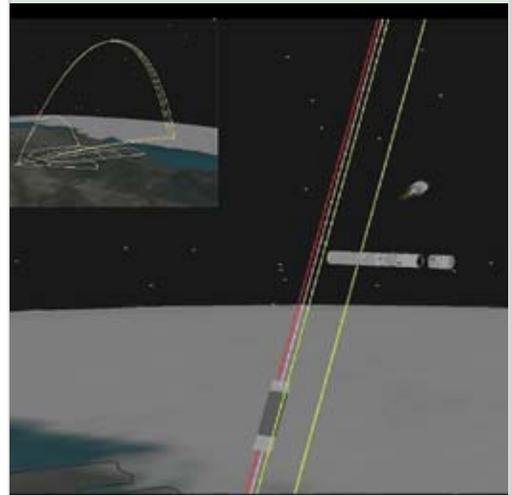
## Elsewhere at Wallops...

A new software suite, the Mission Planning Lab (MPL), developed by Code 589, aids Mission Managers, Principal Investigators, Performance Analysts and others in visualizing Sounding Rocket flight trajectories and payload events such as deployments and attitude changes.



Photo by Berit Bland

Ben Cervantes/589 demonstrates the Mission Planning Lab with a simulation of the Kletzing missions.



Screen shot of the Lessard 40.020 simulation.

The Mission Planning Lab is based on the Satellite Tool Kit (STK) software and integrates input on vehicle capabilities and mission objectives from performance analysis and modeling applications.

For more information about the MPL, visit the MPL web site at <http://sites.wff.nasa.gov/mpl/> or contact Project Manager, Sandy Kleckner by email at: [Sandra.M.Kleckner@nasa.gov](mailto:Sandra.M.Kleckner@nasa.gov) or by phone at: (757) 824-1929.

## Picture Place...

**Personal Protective Equipment (PPE)** is one aspect of Safety in the workplace. This quarter's Picture Place features people at work using PPE. Note that this is not an all-inclusive display of PPE.

① Bob Wiand and Ed White wear prescription safety glasses in the machine shop.

② ③ Clay Merscham works with machinery and Harold Cherrix reviews prints. Both wear standard safety glasses available in specially marked boxes in F-10. Remember to wear eye protection anytime when visiting the machine shop, even if you are just walking through.

④ ⑤ ⑥ Charlie Cathell and Rob Marshall and the visiting Hy-Bolt team members Steve Syrett/NASA LaRC and Greg Wurst/ATK wear hard hats. Hard hats are available in areas where operations frequently require head protection, e.g. hard hats are required when a crane is used.

⑦ ⑧ Terri Snyder is wearing ear muffs for hearing protection while testing Attitude Control System jets. Scott Knappmiller/University of Colorado wears ear plugs during vibration testing of the Robertson 41.069 payload. Ear plugs and muffs are available in areas where operations require hearing protection.



## Safety Corner...

### Slips, trips and falls – prevention.

There are many reasons slips, trips and falls occur in the workplace, but most accidents of this type are attributed to one or more of the following:

- wet or slippery surfaces;**
- obstacles in walkways;**
- lighting;**
- footwear;**
- housekeeping and, individual behavior**

Slips and trips on **wet and slippery** walking surfaces are a significant portion of injuries. Most often they occur in/on:

- parking lots;
- sidewalks (or lack of);
- food preparation areas and shower stalls in residential dorms;
- and, floors in general

Remember that traction can change dramatically in rainy or snowy conditions.

**Obstacles in walkways** also cause trips and falls leading to injury. Remember to:

- close file drawers
- avoid stringing power cords in walking areas
- pick up and store loose items
- Keep work areas well **lit** and free of clutter. When entering a darkened room, always turn on the light first, even if you stay only for a minute.

**Falls are preventable.** All we have to do is watch where we are going! Walking is such a common activity that most of us pay little attention to potential hazards, such as, hidden steps; loose, irregular surfaces; smooth surfaces; wet spots; and, oil and grease.

**Everyone can contribute to housekeeping, i.e. keeping work areas clutter and obstacle free.**

Frequently, the cause of a mishap turns out to be a **brief moment of inattention**, not the willful neglect of procedures. By not staying alert, individuals lose sight of what they are doing and are not aware of hazards in their surroundings. Read article by John Brinton about Mindfulness.

This information compiled from <http://www.sorm.state.tx.us/training2/SlipsTripsFalls/samelevel.htm>



## Upcoming Launches – FY '08

### January

- 40.021 UE KINTNER/CORNELL UNIVERSITY NOR
- 36.223 UH MCCAMMON/UNIV OF WISCONSIN WS
- 12.065 NP SMITH/NASA WI
- 12.066 NP SMITH/NASA WI
- 36.243 UG MCCANDLISS/JHU WS

### February

- 39.008 DR LECLAIR/MDS WI
- 41.075 NP SMITH/NASA WI

### March

- 36.225 UG CHAKRABARTI/BOSTON UNIVERSITY WS

### April

- 36.221 DS MOSES/NRL WS
- 36.240 UE WOODS/UNIVERSITY OF COLORADO WS

### May

- 36.226 UG BOCK/CAL TECH WS

### June

- 36.213 NS DAVIS/MSFC WS
- 36.219 US HASSLER/SWRI WS

### July

- 36.235 HARRIS/UNIVERSITY OF WASHINGTON WS

### September

- 36.239 DS KORENDYKE/NRL WS

### TBD

- 30.068 DR WINSTEAD/NAWC WS
- 30.069 DR WINSTEAD/NAWC WS

## The Value of Mindfulness



By John C. Brinton

Mindfulness is an ancient practice of quieting and clearing the mind. More scientists have been investigating the practice of “mindfulness” and how it improves health and well-being. Its many benefits have attracted people from all walks of life.

Mindfulness is simply a matter of **focusing on what you are doing**. You may have heard the term “being in the moment.” When you are mindful, you value each moment of life as if it were the only moment. It requires no thought, only observation. Awareness is what matters.

When you are mindful, you are focused at the task at hand, and not worried about the overall goal. Mindfulness notices everything and your attention flows. It allows you to devote your attention to any project that is worthwhile. You remain in control and benefit from a job done well by taking one moment at a time. You actually use your mind in a meditative manner which improves performance.

Mindfulness takes discipline. It does not improve by force or mere determination. You can begin by focusing inward on your breathing and thus allow your mind and body to relax. Martial arts like T'ai Chi Chuan and Qigong exercise, which enhance breathing and relaxation through meditative movements, help to improve mindfulness.

A T'ai Chi master gave me the following advice about mindfulness and living better: Awareness is the first step.