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# Rocket report

4 1 2009  
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Sounding Rockets Program Office

## Poker Flat 2009

### In Brief...

All Poker Flat missions were successfully launched. Congratulations to all involved!

Hands-On Project Experience (HOPE) program proposals are under review. Selection is planned for April/May 2009.

The Critical Design Review (CDR) was held for NASA Langley's Inflatable Reentry Vehicle Experiment (IRVE) II. IRVE II is scheduled for launch in August 2009.

New ROSES Announcement of Opportunity (AO) is available at the NASA NSPIRES website. See: <http://nspires.nasaprs.com/external/>

A new technology development initiative, in collaboration with the Applied Engineering and Technology Directorate (AETD), has been initiated.

The RockOn! 2009 mission design review has been completed. Approximately 120 participants are expected in this year's mission. See: [http://spacegrant.colorado.edu/rockon/2009/index\\_2009.html](http://spacegrant.colorado.edu/rockon/2009/index_2009.html)



Lehmacher launch from Poker.

Photo by Wallops Imaging Lab /Lee Wingfield

Frigid cold, snow, and the perpetual darkness of the arctic winter didn't stop sounding rockets from flying in pursuit of unique scientific measurements from Poker Flat Research Range (PFRR), Alaska.

Eight launches were successfully conducted to study various aspects of the Aurora Borealis, including electric fields and current structure within an aurora (Bounds 21.139 & 36.242) and studies of the turbopause to aid the modeling and understanding of the ionosphere-thermosphere system (Lehmachner 41.076 – 41.079). Additionally, one student mission, a single stage Orion 30.073 Thorsen, was flown as the first mission of the campaign. Lynch 40.023 UE was the last off the pad on March 20, 2009.

Read more in article by Nancy Atkinson on page 2.

## Bock 36.226 UG

A new telescope, Cosmic Infrared Background Experiment (CIBER) from Caltech was successfully flown from White Sands Missile Range on February 25, 2009.

CIBER's high sensitivity observations in a short sounding rocket flight eliminates the atmospheric airglow emission that makes absolute spectroscopy and high-fidelity degree-scale imaging virtually impossible from a ground based or balloon-borne platform. The complex Attitude Control System (ACS) mission profile required pointing at seven different targets!

Bock team on launch pad at White Sands Missile Range.



Photo by Visual Information Branch, White Sands, NM

## ACES Flights by Nancy Atkinson

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Originally published at <http://www.universetoday.com>

On January 29, two sounding rockets simultaneously flew through the veil of an aurora to collect data from both the top and bottom edges of the arc. Dr. Scott Bounds, the principal investigator for the Auroral Current and Electrodynamic Structure (ACES) mission, provided Universe Today with images from the flight, showing the rockets flying through the aurora, near Poker Flats, Alaska.



Photo by Dr. Craig Heinselman

ACES Flight from Jan. 29, 2009.

The above image shows a single-stage Black Brant V rocket that flew through the lower portion of the aurora. It reached an altitude of nearly 83 vertical miles, flying for roughly eight minutes.

Other rockets have flown through aurora previously, but this is the first time two rockets were used together. These two flights for the ACES mission will provide insight on the structural subtleties of the aurora, finding details that researchers may have missed when previous measurements were done using only a single vehicle (see our original article on the flights).



Photo by Dr. Craig Heinselman

ACES rocket reaches for the top of the aurora.

The image here shows a two-stage Black Brant IX rocket launched at 12:49 a.m. on January 29 that reached an altitude of more than 226 miles and flew for just under 10 minutes.

Dr. Bounds of the University of Iowa said the payloads of each ACES rocket performed well during flight, and the ACES team will begin to analyze all of the data collected, which should keep them busy for the next year. Bounds said this information will help refine current models of aurora structure, and provide insight on the high-frequency waves and turbulence generated by aurora.

Thanks to Dr. Bounds for sharing these images with Universe Today, and to Dr. Craig Heinselman the photographer. Below is an image taken by Dr. Bounds of an aurora in 2002, taken where the ACES flights originate at the Poker Flat Research Range near Fairbanks, Alaska.



Photo by Dr. Scott Bounds

Aurora from 2002 in Poker Flats, Alaska.

Link to the article on the web:  
<http://www.universetoday.com/2009/02/06/more-images-from-aurora-flights/>  
See also: <http://www.universetoday.com/>

## 40.023 UE Lynch launches

CASCADES 2 (Changing Aurora: in-situ and Camera Analyses of Dynamic Electron Precipitation Structure) is off the pad! On March 20th the last of this year's Poker rockets launched into the northern lights. The Principal Investigator is Dr. Kristina Lynch from Dartmouth College.

The purpose of the CASCADES 2 mission is the investigation of motions and structure of electron precipitation in pre-midnight pole-ward edge discrete aurora. The main scientific objective is the investigation of spatial and temporal structures within electron precipitation and low frequency electric field activity in the topside ionosphere.

CASCADES 2 had a very complex mission profile with one main payload, two sub-payloads and two Particle Free Flyers (PFF), all with dedicated telemetry links.

Ground based systems included a dedicated narrow-field auroral camera at Kaktovik or Toolik Lake. These images together with those from all-sky cameras and from an onboard, downward-looking camera will provide the auroral context for the in situ plasma measurements.

The Cascades mission is providing a test flight opportunity for the KTH SMILE magnetometer, a new small science magnetometer with potential use for future low-resource small science payloads.



Photo by Berit Bland

40.023 in the deployment bay at Wallops.

References: 40.023 Design Review Data Package

## In Integration...

### Murbach 41.080 NR – Sub-Orbital Aerodynamic Re-entry EXperiments (SOAREX) VII

The SOAREX VII flight experiment will study the NASA Ames Research Center's (ARC) deployable SCRAMP (Slotted Compression RAM Probe) design in an airborne environment.

The flight experiment will study the flare deployment design, the bodies' stability at atmospheric interface and thermal/heating characteristics with the flare. The mission will also investigate ARC's super/hypersonic decelerator concepts with respect to deployment issues and the heating environments.

The development of new entry probes and decelerators could have a large impact on the Mars program

A secondary mission will test an MDA sponsored, Systima Technology designed, exoatmospheric small body restraint and dispense system.

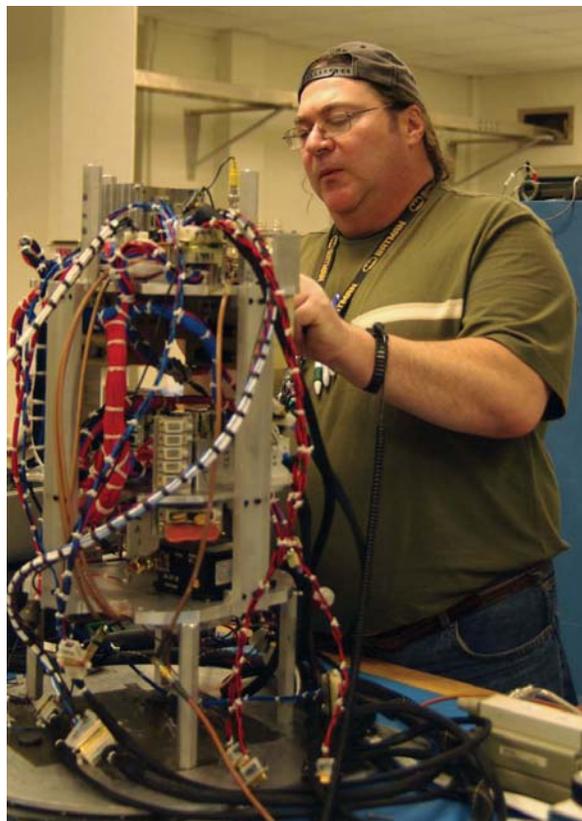


Photo by Berit Bland

Brian Rose with 41.080 Murbach.



### Green 36.244 UG – Diffuse Interstellar Cloud Experiment (DICE)



Photo by Berit Bland

Larry Mannell and Belinda Serabian with 36.244 Green.

( $R \sim 60,000$ ) of O VI (Oxygen five times ionized) in absorption. Two stars on either side of the interface will be observed. The goal is to see whether the OVI gas is flowing into the local cavity or away from it. The targets are  $\delta$  and  $\mu$  Sco, two bright B stars of 2nd and 3rd magnitude, respectively.

Our solar system is currently located in the Local Bubble, a low density region in the Interstellar Medium (ISM), bounded by a wall of cold dense material. DICE will obtain high resolution far ultraviolet spectra of gas inside the Local Bubble. The instrument will be used to observe two stars on opposing sides of the Local Bubble wall.

DICE will sample the interface at the local cavity wall by obtaining high resolution spectra

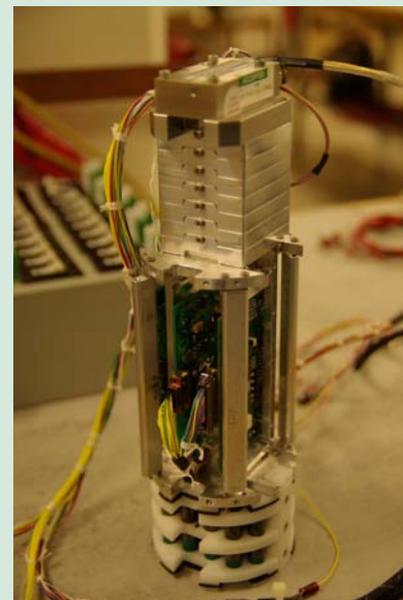
## Rocket Report

### Mesquito...



Charlie Lankford with the Mesquito avionics suite.

Four Mesquito test flights, 12.068 – 12.071, are scheduled for this spring. The miniature avionics suite is developed specifically for the Mesquito missions and includes 3-axis sensing accelerometers for monitoring vehicle performance. Payload attitude is determined by a 3-axis magnetometer chip mounted with the accelerometers.



Mesquito avionics suite.

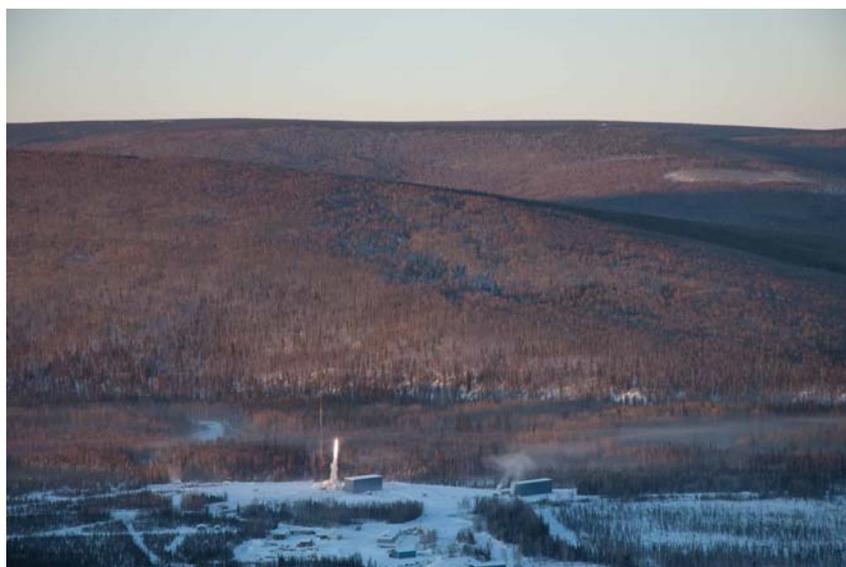
## Picture Place...

### Photos by Scott Hesh

Scott was at Poker with the Thorsen and Bounds missions, and took these great photos during his stay in the arctic.

Thanks for sharing, Scott!

Group photo of Bounds team taken by the Wallops Imaging Lab.



# Rocket Report

## Want to contribute?

Working on something interesting, or have an idea for a story? Please let us know, we'd love to put it in print!

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Evidence of spring!

## FY '09 Launch Schedule

### April

36.213 NS DAVIS/MSFC WS  
12.068 GT HICKMAN/NASA-WFF WI  
12.069 GT HICKMAN/NASA-WFF WI  
36.221 DS MOSES/NRL WS  
41.080 NR MURBACH/NASA AMES WI

### May

36.244 UG GREEN/UNIVERSITY OF COLORADO WS  
12.067 GT HALL/NASA-WFF WI  
12.070 GT HICKMAN/NASA-WFF WI  
12.071 GT HICKMAN/NASA-WFF WI

### June

41.083 UO KOEHLER/UNIVERSITY OF COLORADO WI  
36.252 UH CASH/UNIV. OF COLORADO  
41.082 NP BULL/NASA-WFF WI

### July

41.086 UE ERDMAN/EMBRY-RIDDLE UNIV WS

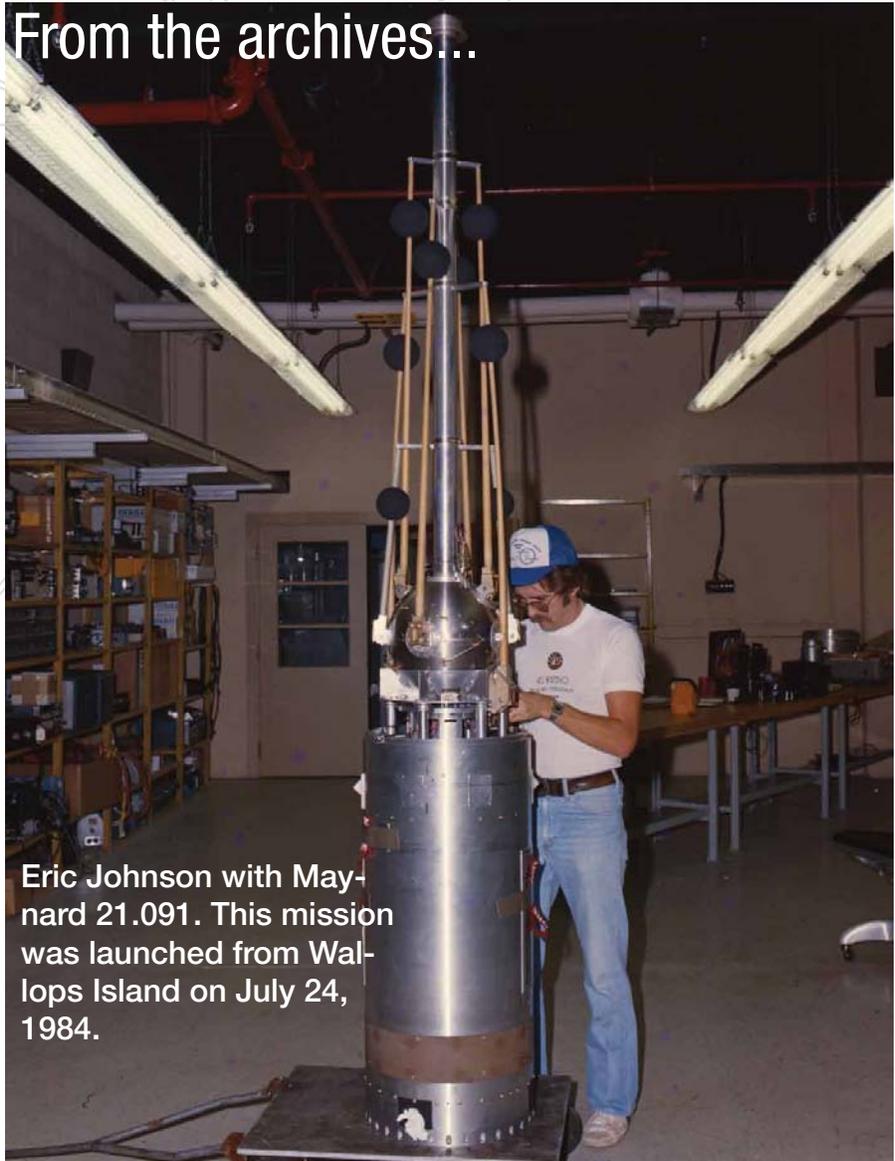
### September

36.239 DS KORENDYKE/NRL WS  
36.219 US HASSLER/SWRI WS

### TBD

36.225 UG CHAKRABARTI/BOSTON UNIVERSITY WS TBD

## From the archives...



Eric Johnson with Maynard 21.091. This mission was launched from Wallops Island on July 24, 1984.