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Rocket report

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Sounding Rockets Program Office

In Brief...

Plans are underway for the 2014 WRATS High School teacher workshop. The workshop is held at Wallops, June 23 – 27, 2014. Contact Linda Sherman (Linda.A.Sherman@nasa.gov) for more information.



RockON! registration is open through May 2, 2014. University and College students and faculty interested in participating should register at: <http://spacegrant.colorado.edu/national-programs/rockon-2014-home>

36.287 UE Samara Ground-to-Rocket Electrodynamics-Electrons Correlative Experiment (GREECE) - by Karen Fox, GSFC



Photo by Chris Perry Wallops Imaging Lab

36.287 Samara launches from Poker Flat.

On March 3, 2014, at 6:09 a.m. EST, 36.287 UE GREECE launched straight into an aurora over Venetie, Alaska. The Ground-to-Rocket Electrodynamics – Electron Correlative Experiment (GREECE), sounding rocket mission studied classic curls in the aurora in the night sky. Principal Investigator, Dr. Marilia Samara from the South West Research Institute (SWRI) and her science team were at the Poker Flat Research Range in Poker Flat, Alaska, looking for these classic curls. The curls look like cream swirling in a cup of coffee. When they spotted the appropriate conditions, the team launched the Terrier-Brant sounding rocket for a 10-minute flight right into the heart of the aurora. GREECE seeks to understand what combination of events sets up these auroral curls in the charged, heated gas – or

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GREECE - continued from page 1

plasma – where aurorae form. This is a piece of information, which in turn, helps paint a picture of the Sun-Earth connection and how energy and particles from the Sun interact with Earth's own magnetic system, the magnetosphere.

“Our overarching goal is to study the transfer of energy from the Sun to Earth,” said Samara. “We target a particular manifestation of that connection: the aurora.”

At their simplest, aurorae are caused when particles from the Sun funnel over to Earth's night side, generate electric currents, and trigger a shower of particles that strike oxygen and nitrogen some 60 to 200 miles up in Earth's atmosphere, releasing a flash of light. But the details are always more complicated, of course. Researchers wish to understand the aurora, and movement of plasma in general, at much smaller scales including such things as how different structures are formed there.

To study the structures, GREECE consists of two parts: ground-based imagers to track the aurora from the ground and the rocket to take measurements from the middle of the aurora itself. The rocket flew for about 600 seconds, reaching its zenith near the native village of Venetie, Alaska. State-of-the-art imagers were placed in Venetie to watch the development of the curls and help the team decide when to launch. Instruments on the rocket

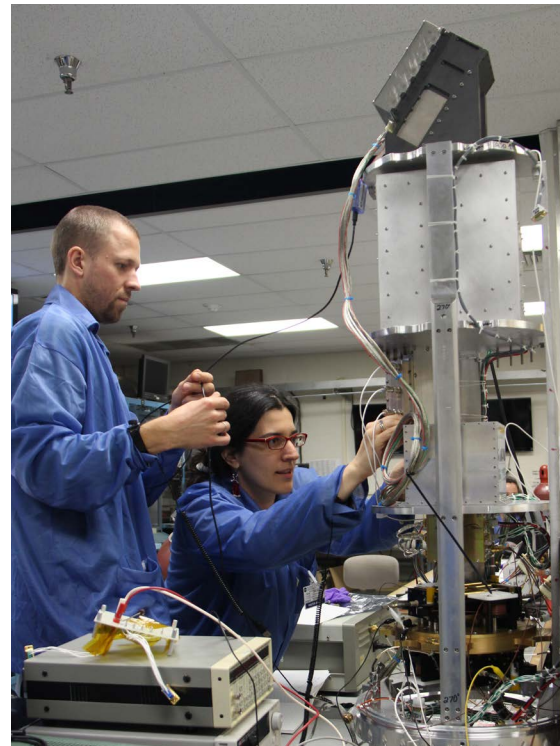
gathered information on the particles and electric fields within the aurora, which can be compared to the images gathered from the ground.

“Auroral curls are visible from the ground with high-resolution imaging,” said Samara. “And we can infer from those observations what's happening farther out. But to truly understand the physics we need to take measurements in the aurora itself.”

Different combinations of information on the particles and fields observed in the aurora, would point to a different cause for these swirls in the sky. Auroral curls might, perhaps, be caused by what's called a Kelvin-Helmholtz instability, the same combination of low and high speed flows that lead to surfer waves near the beach. Or they could be caused by something called Alfvén waves – a type of electromagnetic wave present only in plasmas. Or they could be caused by something else altogether.

Sounding rockets are a perfect tool for tackling the answer. For one thing, sounding rockets are one of the few space-faring vehicles capable of being sent directly through the heights at which auroras exist. Second, sounding rockets can provide a robust set of observations, even in a ten-minute trip, at relatively low-cost.

GREECE is a collaborative effort between SwRI, which developed particle instruments and the ground-based imaging, and the University of California, Berkeley, measuring the electric and magnetic fields.

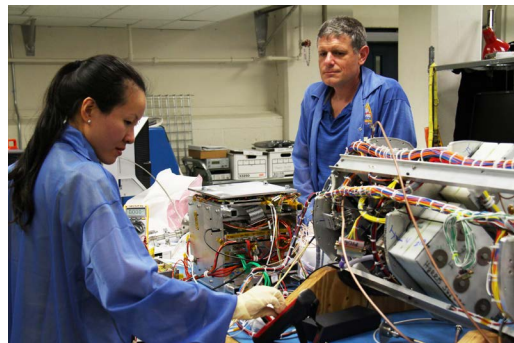


Images above were taken during integration activities at Wallops Flight Facility.

Integration and Testing

36.235 US Harris – Hydrogen Polarimetric Explorer

The Hydrogen Polarimetric Explorer (HYPE) mission is designed to measure Hydrogen Lyman- α light reflected by interplanetary hydrogen (IPH) and Jupiter. IPH is an important transitional medium that flows from its origin in the local interstellar cloud (LIC) through the LIC-solar wind boundary zones into the inner heliosphere, where it interacts with the solar wind, and radiation pressure. HYPE will measure the line shape of the IPH, yielding information about the thermal structure of the interplanetary medium, the shape and location of the LIC-solar wind boundary areas, and the ionization state of the ILC.



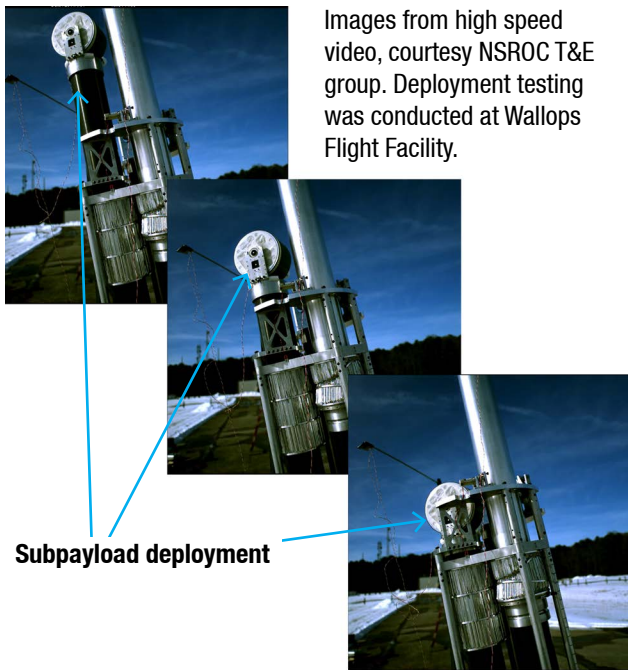
36.235 science team working at Wallops during payload integration.



36.235 and Nate on the Spin/Balancing table.

49.002 UE Swenson – Auroral Spatial Structures Probe (ASSP)

The 49.002 UE Swenson Auroral Spatial Structures Probe (ASSP), is intended to launch into a diffuse aurora in geomagnetically active conditions following the recovery of an auroral substorm. The rocket and the ASSP payload will be launched along a magnetic field line and carry six subpayloads which will be ejected from the main payload at high velocity. The subpayloads will be launched both along the flight path and normal to it so that spatial features and temporal-spatial ambiguities can be explored. Of the six subpayloads, four are deployed at 38 m/s (85 mph), and two at 19 m/s (43 mph), all spin at 2 Hz on deployment.



Images from high speed video, courtesy NSROC T&E group. Deployment testing was conducted at Wallops Flight Facility.

Subpayload deployment

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Education & Outreach

NSROC engineers from Wallops Flight Facility traveled to Virginia Tech to host a model rocket design challenge for the inVenTs Residential Community. inVenTs provides an interdisciplinary living and learning space where students majoring in engineering and the sciences can interact and innovate in and outside the classroom. Four teams of students built model rockets with microprocessors and instrumentation inside and competed to see which rocket would fly the most stable and which rocket could record data as intended. The teams had varying success with flight dynamics and with data reduction and acquisition, in close similarity to the challenges faced by our engineers at WFF.



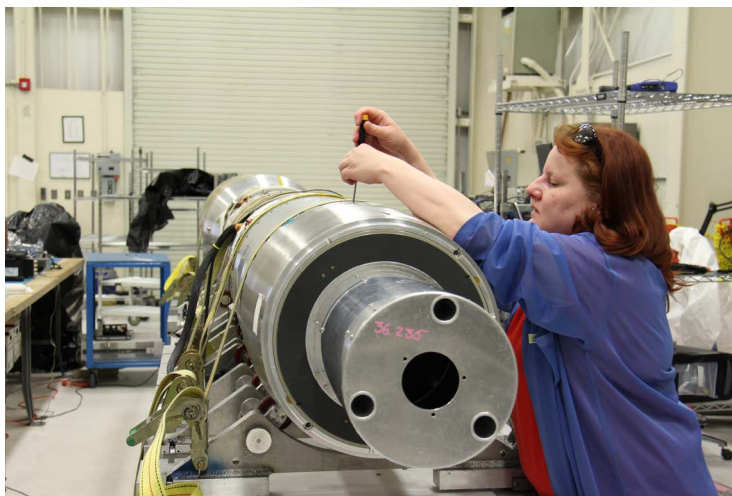
Rocket teams at Virginia Tech ready to go.

Photo by Max King

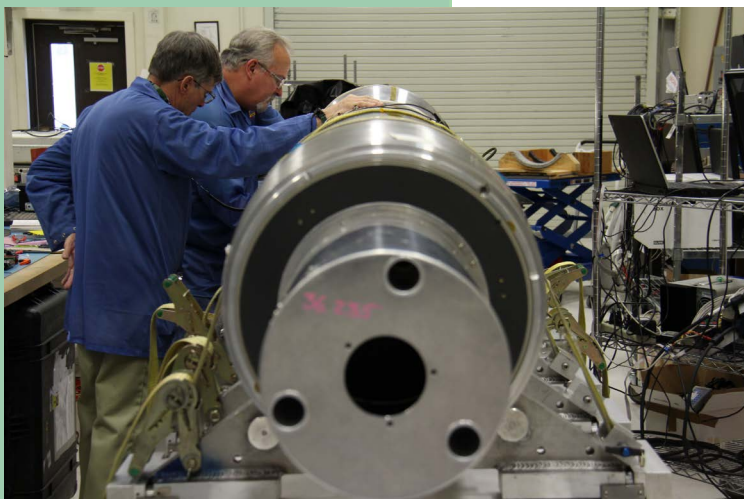
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Picture Place

36.235 US Harris integration



Belinda preparing the ORSA for vibration.



Larry and Gary buttoning up the payload.



Gary and Kyle after testing is completed.



Getting ready for vibration testing.

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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Launch Schedule

May

36.235 US HARRIS/UNIV. OF CALIFORNIA, DAVIS WS -May
36.285 UG FRANCE/UNIV. OF COLORADO WS 24-May
46.007 GP ROSANOVA/NASA-WFF WI 28-May

June

36.288 DS VOURLIDAS/NRL WS 4-Jun
36.253 US HASSLER/SWRI WS 20-Jun
41.110 UO KOEHLER/UNIV. OF COLORADO WI 26-Jun

July

36.289 US JUDGE/DIDKOVSKY/USC WS 14-Jul

August

36.282 US KANKELBORG/MONTANA STATE UNIV. WS 8-Aug
46.008 UO KOEHLER/UNIV. OF COLORADO WI 12-Aug

October

12.077 GT BRODELL/NASA-WFF WI 16-Oct
36.292 UH MCENTAFFER/UNIVERSITY OF IOWA WS 22-Oct
12.082 DR SPRINT WI 22-Oct

November

52.001UE CONDE/U. OF ALASKA/FAIRBANKS NOR 19-Nov
49.003 UE LABELLE/DARTMOUTH COLLEGE NOR 19-Nov
36.299 DR PEDERSEN/AFRL WS 20-Nov

December

36.245 UH FIGUEROA/MIT WS 1-Dec
36.293 UG CHAKRABARTI/U. OF MASS. -LOWELL WS 1-Dec
36.295 US KRUCKER/UNIV OF CA @ BERKELEY WS 2-Dec

WS - White Sands
WI - Wallops Island
NOR - Norway

Yvonne Nock retires after 42 years of service

Many of Yvonne's friends and colleagues participated in the luncheon to wish her the best for the next stage in her life.

Yvonne will be missed!

