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# Rocket report

4 1 2015  
3 2

Sounding Rockets Program Office

## In Brief...

A kick-off meeting for the potential 2016 Australia southern hemisphere remote campaign was held in March. Several interested Principal Investigators were in attendance.

White Sands NSROC employees received Operational Safety Supervisor and Pressure systems training.

Wallops Safety Office and White Sands Missile Flight Safety have both accepted the qualification report for the new Flight Termination System paddle ordnance.

The NSROC Launcher Group has begun disassembly of the 50K launcher located on Wallops Island for its refurbishment and relocation to Pad 2 later this year.

Program representatives were in attendance at the Annual NASA Export Control Program Review conducted at Armstrong Flight Research Center.

## Five missions successfully flown from Poker Flat, Alaska

First off the rail were the two Mesosphere-Lower Thermosphere Turbulence Experiment (M-TeX) and two Mesospheric Inversion-layer Stratified Turbulence (MIST) rockets. All rockets were launched within a 33-minute time period on January 26th, 2015.

The scientific goals for the M-TEX launches were to investigate and enhance our understanding of how meteorological processes control the impact of solar processes on the Earth's atmosphere, i.e. how does the atmosphere respond to auroral, radiation belt, and solar energetic

particles, and what are the effects on nitric oxides (NO<sub>x</sub>) and ozone. The results from this investigation will add data to current computer models to allow better prediction and understanding of atmospheric circulation.

MIST studied the characteristics of atmospheric turbulence in the atmosphere/space transition region, and the way atmospheric properties are mixed vertically. Each MIST payload deployed trimethyl aluminum (TMA) vapor trails between 50 and 87 miles above the Earth. The whitish clouds that are formed were photographed from several ground stations. Analysis of the data will enable the detection of turbulence.

For more information, see:

<http://www.nasa.gov/content/assp-sounding-rocket-launches-successfully-from-alaska/>

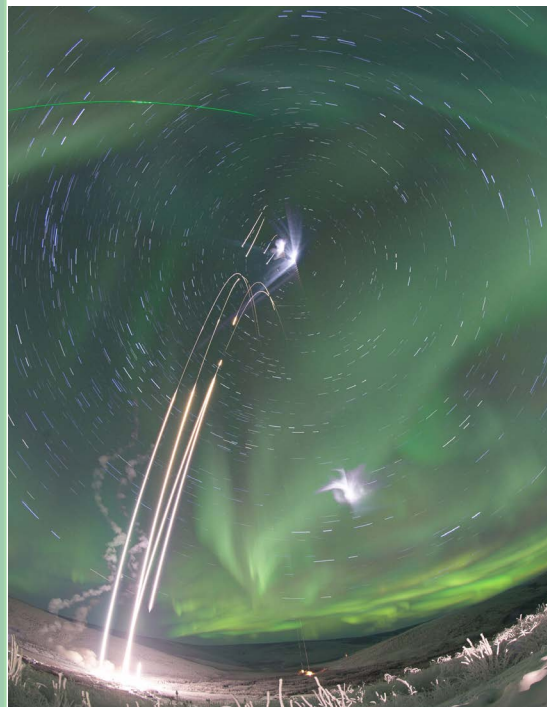


Image Credit: NASA/Jamie Adkins

Composite image of the four rockets airborne. The four rockets were launched within a 33-minute timeframe.

# Rocket Report

## 49.002 UE Swenson - Auroral Spatial Structures Probe (ASSP) was successfully launched on January 28, 2015

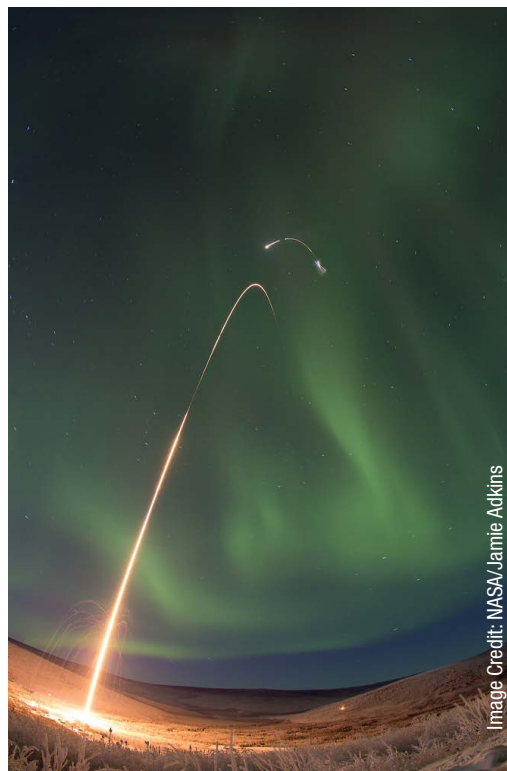
After significant development effort by the science team and the NSROC team, ASSP was launched on January 28, 2015. This very complex mission included six subpayloads ejected at high velocities, up to 50 meters/second, and seven separate TM links. The vehicle, a four stage Oriole IV, carried the payload to an altitude of approximately 600 km. The first subpayload was deployed at about 260 km and the last at 340 km, after which the booms on the main payload were deployed.

ASSP measured both the spatial and temporal variation of the energy flow into the upper atmosphere in and around the aurora. Electromagnetic energy is generated when the solar wind interacts with the Earth's magnetosphere and flows into the Earth's upper atmosphere.

Each of the six sub-payloads plus the main payload carries a crossed pair of double-probe sensors to measure in-situ electric fields, a 3-axis magnetometer, a Langmuir probe, and a GPS receiver. The data obtained at the different spatial locations and baselines will be used to develop models for the spatial and temporal distribution of E-fields and their correlations in space and time.

These measurements will aid in the understanding of when and where the Earth's thermosphere will heat and expand due to the Joule heating process. Satellite drag is difficult to predict without a precise understanding of the state of the thermosphere which limits the ability to forecast satellite trajectories. This is especially true during geomagnetic storms when large amounts of electromagnetic energy are dumped into the thermosphere and dissipated through the Joule heating process.

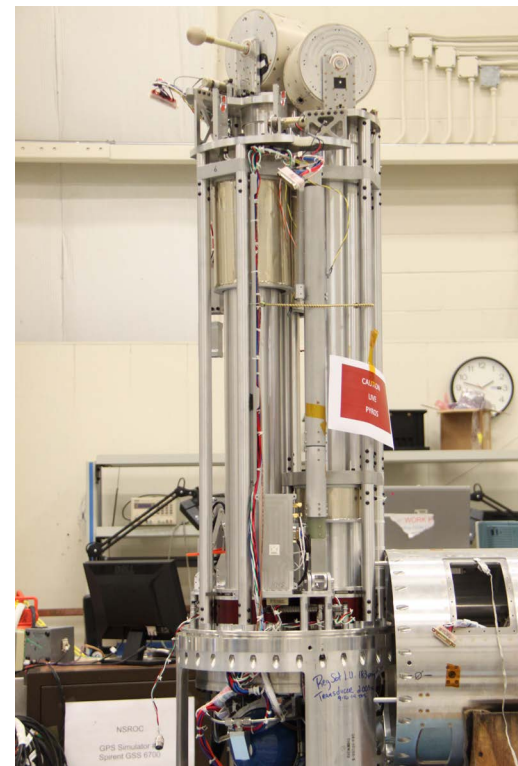
For more on ASSP, see:  
<http://www.usu.edu/ust/index.cfm?article=54436>



ASSP launches from Poker



ASSP boom deployment testing.



ASSP subpayloads installed on airsprings during integration and testing at Wallops.

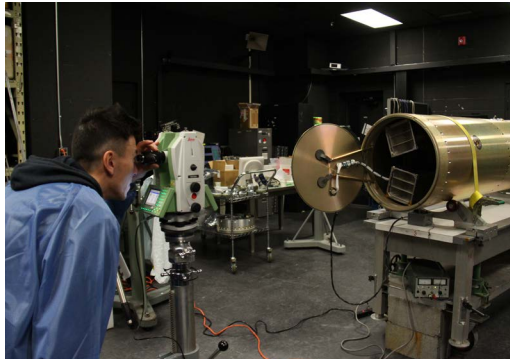
## 36.299 DS Pedersen/AFRL - Ionospheric Control Experiment launched on February 25, 2015

The Department of Defense's Space Test Program, based at Kirtland Air Force Base sponsored this mission which carried a payload designed by scientists and engineers from the Air Force Research Laboratory's (AFRL) Space Vehicles Directorate also at Kirtland Air Force Base. The launch vehicle which is designed to reach an altitude of over 100 miles provided an opportunity for the payload to release small amounts of Samarium vapor to create clouds of plasma, or ionized gas into the near-vacuum of space to study processes responsible for formation of the Earth's ionosphere.

# Integration and Testing

## 36.292 UH McEntaffer – Off-plane Grating Rocket for Extended Source Spectroscopy (OGRESS)

The purpose of the Off-plane Grating Rocket for Extended Source Spectroscopy (OGRESS) is to provide high spectral resolving power for large diffuse X-ray sources. The intended target is the Cygnus Loop supernova remnant which is one of the brightest and largest soft X-ray emitters in the sky. The payload also contains a critical NASA X-ray technology – off-plane reflection grating arrays. Combined with parallel technology development efforts, this mission will provide a flight proving platform for future X-ray missions. The Principal Investigator is Dr. Randall McEntaffer/University of Iowa.



Instrument alignment checks in the Attitude Control Systems (ACS) lab.



Closing the shutter door.

## 46.007 UO Koehler – RockSat-X

This is the fourth RockSat-X mission, the most advanced of the University student sounding rocket missions. The instruments/experiments on RockSat-X are exposed to the space environment, the skin and nose cone are ejected, and include standard sounding rocket support systems such as telemetry, power and attitude control. This flight includes experiments from five institutions: University of Colorado Boulder (CUB), Northwest Nazarene University (NNU), University of Puerto Rico, University of Nebraska Lincoln (UNL), and Virginia Tech (VT). Additionally, the University of Colorado Boulder has designed a video payload to capture HD video of the experiments during flight operations. This is done using eight HD video cameras, four of which are deployed to obtain a better view of the experiment section before being retracted for re-entry. The Principal Investigator is Mr. Chris Koehler/Colorado Space Grant.



Northwest Nazarene University (NNU) posing with their deployable instruments.



Safety inspection, Chris Koehler (PI Colorado Space Grant) left, Logan Wright (NSROC) center, and Jesse Austin (Colorado Space Grant) right.



OGRESS team.



Randy and Brian installing experiments on RockSat-X.

## Other news...



Launch rail load test.

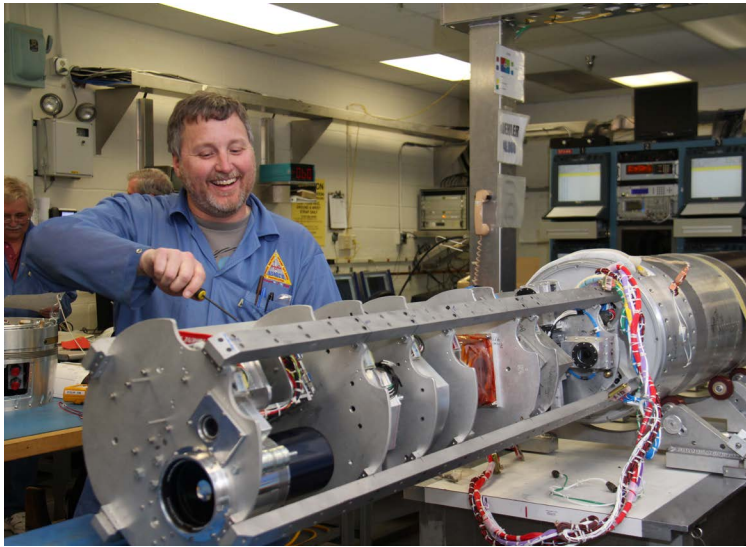
The NSROC launcher team travelled to White Sands Missile Range to maintain and re-configure launchers. The Athena launcher was equipped with a new extruded launch rail to accommodate the 36.292 UH McEntaffer - OGRESS mission. The OGRESS payload is the longest to date, 324.8 inches. An extended umbilical truss for rigging the umbilicals was also added to the Athena launcher.



Launcher operational checks to verify the general operation of the launcher and its limit switches.



Launcher boom load test.



Things are going well on RockSat-X.

# Rocket Report

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## Picture Place



Focus!



Installing a StarTracker requires a firm footing.



This is where it starts. Tom making parts.



Really Brian, are you sure it's in here?



Andrew operating the groundstation for RockSat-X.

# 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!

Contact:  
 Chuck Brodell  
 Phone: #1827  
 Email: Charles.L.Brodell@nasa.gov

or  
 Berit Bland  
 Phone: #2246  
 Email: Berit.H.Bland@nasa.gov

## Launch Schedule

WS - White Sands  
 WI - Wallops Island  
 NOR - Norway  
 FB - Fairbanks

MISSION	DISCIPLINE	EXPERIMENTER	ORGANIZATION	PROJECT	RANGEDATE	TIME
<b>April</b>						
46.008 UO	STUDENT OUTREACH	KOEHLER	UNIV. OF COLORADO	ROCKSAT-X IV	WI 18-Apr	DAY
<b>May</b>						
36.292 UH	HIGH ENERGY ASTROPHYSICS	MCCENTAFFER	UNIVERSITY OF IOWA	OGRESS	WS 2-May	NIGHT
36.300 UE	GEOSPACE SCIENCE	WOODS	UNIVERSITY OF COLORADO	EVE	WS 18-May	DAY
<b>June</b>						
41.113 UO	STUDENT OUTREACH	KOEHLER	UNIV. OF COLORADO	ROCKSAT-C	WI 25-Jun	DAY
30.077 GT	TEST & SUPPORT	HANLEY	GSFC-WFF		WI 27-Jun	DAY
<b>July</b>						
36.313 NP	SPECIAL PROJECTS	MILLINER	NASA-WFF		WI 7-Jul	DAY
<b>August</b>						
36.291 US	SOLAR & HELIOSPHERIC	WINEBARGER	U.OF ALABAMA/ HUNTSVILLE	CLASP	WS 4-Aug	DAY
46.012 UO	STUDENT OUTREACH	KOEHLER	UNIV. OF COLORADO	ROCKSAT-X	WI 11-Aug	DAY
36.282 US	SOLAR & HELIOSPHERIC	KANKELBORG	MONTANA STATE UNIV.	MOSES #2	WS 12-Aug	DAY
46.011 GP	SPECIAL PROJECTS	MILLINER	NASA-WFF	MUSIC	WI 13-Aug	DAY
<b>September</b>						
39.012 DR	DOD	BERNHARDT	NRL	CARE II	NOR 7-Sep	NIGHT
36.310 GT	TEST & SUPPORT	HESH	GSFC-WFF		WI 16-Sep	DAY
12.083 CR	INDUSTRIAL CORPORATION	GILBERT	NESC	SPRINT	WS 17-Sep	DAY
<b>October</b>						
36.312 UG	UV/OPTICAL ASTROPHYSICS	MCCANDLISS	JOHNS HOPKINS UNIVERSITY	FORTIS	WS 9-Oct	DAY
36.293 UG	UV/OPTICAL ASTROPHYSICS	CHAKRABARTI	UNIV OF MASS - LOWELL	PICTURE	WS 22-Oct	DAY
36.307 DS	SOLAR & HELIOSPHERIC	MOSES	NAVAL RESEARCH LAB	HERSCHEL	WS 31-Oct	DAY
<b>November</b>						
52.002 UE	GEOSPACE SCIENCE	LESSARD	UNIV. OF NEW HAMPSHIRE	RENU 2	NOR 10-Nov	NIGHT
49.003 UE	GEOSPACE SCIENCE	LABELLE	DARTMOUTH COLLEGE	CAPER	NOR 10-Nov	NIGHT
36.297 UG	UV/OPTICAL ASTROPHYSICS	FRANCE	UNIVERSITY OF COLORADO	CHESS-2	WS 17-Nov	DAY
<b>December</b>						
36.305 UH	HIGH ENERGY ASTROPHYSICS	GALEAZZI	UNIVERSITY OF MIAMI	DXL-2	WS 4-Dec	DAY
36.245 UH	HIGH ENERGY ASTROPHYSICS	FIGUEROA	MIT	MICRO-X	WS 11-Dec	NIGHT

## Robert H. Goddard Exceptional Achievement for Engineering Team

### Sounding Rockets FTS Recovery Team



*“For providing the creative, agile and dedicated support necessary to resolve the flight termination system issues and keep sounding rocket missions flying.”*

