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Rocket report



Sounding Rockets Program Office

Poker campaign starts the year with four launches.

In Brief...



It's time to sign up for WRATS! The Wallops Rocket Academy for Teachers and Students (WRATS) provides **high school educators** with a technical flight experience that will reinforce science, technology, engineering and mathematics (STEM) concepts. WRATS offers an authentic, hands-on rocketry experience based on NASA's sounding rocket engineering and science data collection. WRATS will be held at NASA GSFC Wallops Flight Facility, June 18 – 22, 2018. Teachers interested in attending WRATS should contact Linda Sherman, by email at Linda.A.Sherman@nasa.gov.

36.329 UH Galeazzi - Diffuse X-Ray emission from the Local galaxy (DXL) 3, launched January 19, 2018

The DXL-3 experiment was designed to study what proportion of X-rays are emitted from the Local Hot Bubble (LHB) versus the Solar Wind Charge eXchange (SWCX). DXL-3 specifically focused on the geocoronal SWCX and X-rays created through interactions with hydrogen. Data

from DXL enhances our understanding of the area of our galaxy close to the Sun, and can be used as a foundation for future models of the galaxy structure.

The DXL missions were designed to take place over several years with a total of three sounding rocket flights. The first flight, evaluating the scientific potential of the mission, was launched from White Sands Missile Range (WSMR), NM in December 2012, the second mission, also from WSMR, was launched in December 2015. The purpose of the second flight was to investigate X-rays created through SWCX interactions with helium, and flight three investigated interactions with hydrogen.

Data from DXL-3 is being evaluated.

The Principal Investigator was Dr. Massimiliano Galeazzi from University of Miami.



Image Credit: Allison Stancil/Wallops Imaging Lab

DXL-3 takes off from Poker Flat Research Range, AK.

Rocket Report

41.119, 120, & 122 UE Azeem - SuperSoaker, launched January 26, 2018

Three Terrier-Orion sounding rockets were launched from Poker Flat Research Range in Alaska on January, 26 2018, as part of the Transport, Chemistry, and Energetics of Water in the Mesosphere and Lower Thermosphere and Implications for Polar Mesospheric Cloud Occurrence mission, also referred to as the Super Soaker mission.



All Super Soaker images by Dr. Mark Conde

Three Super Soaker rockets take off from Poker Polar Mesospheric Clouds (PMC), also called Noctilucent Clouds (NLC) are thin ice clouds that form at altitudes of near 85 km at high latitudes in the summer. For these clouds to form three constituents are needed: cold temperatures, water vapor, and particles for condensation. The sounding rocket mission studied the dynamics of the Mesosphere and Lower Thermosphere (MLT) regions and specifically how release of water in this region impacts local temperature and PMC formation.

PMC frequency, brightness, and occurrence at lower latitudes have increased with time, leading scientists to study them as indica-

tors of global change. In the late 20th century it was discovered that PMCs could form in the arctic polar region less than a day after a Space Shuttle launch. The exhaust product from the Shuttle's main engine was water vapor and circulation patterns in our atmosphere transported the exhaust products to the polar region, where they enabled PMC formation. The overall goal of the Super Soaker sounding rocket mission was to study the time dependent neutral chemistry, energetics and transport of water in the MLT and to determine the resultant impact on the local temperature and PMC formation.

The first two Super Soaker rockets released vapor trails and measured the background winds. The third rocket dispersed a large payload of water in the MLT.

Ground based instrumentation, such as lidar, Advanced Mesospheric Temperature Mapper (AMTM), and infrared and visible imaging equipment, were also used as part of the Super Soaker mission.



TMA tracer

The Principal Investigator was Dr. Irfan Azeem/ASTRA.

46.019 UO Vieira - University Student Instrument Program (USIP) launched March 25, 2018

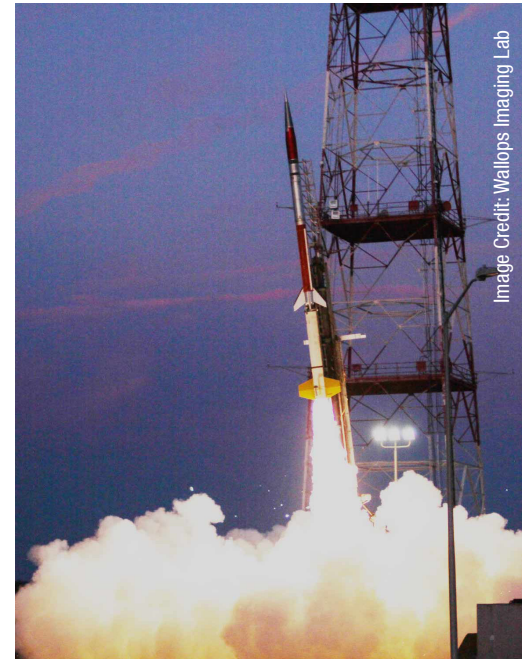
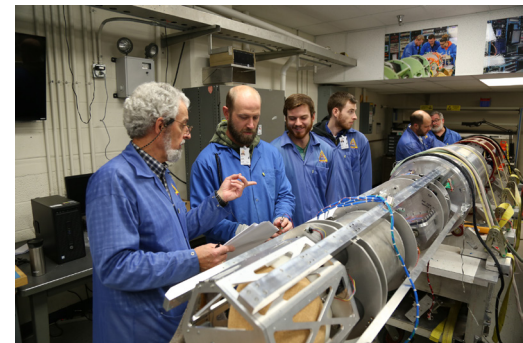


Image Credit: Wallops Imaging Lab

Four universities were selected in 2016 to participate in the NASA Undergraduate Student Instrument Project or USIP.

Participating universities and their projects included:

Florida Institute of Technology, Melbourne: The flight tested a new wire insulation repair material in near microgravity and near vacuum environment. The test samples were subjected to a series of tests after retrieval to inspect the material and verify effectiveness in the space environment.



University of Kentucky, Lexington: A small entry spacecraft was deployed during flight to test and demonstrate a communications system, release mechanism and thermal protection system design for application in future research.



Utah State University, Logan: The flight tested an arc-ignition, green propellant Cube-Sat thruster system. During the flight test, measurements were gathered in order to assess the potentially harmful effects of plume contamination on spacecraft optical sensors, external electronics and solar panels.



University of Nebraska - Lincoln: Partnering with NASA's Langley Research Center in Hampton, Virginia the team tested a deployable and retractable boom and solar blanket for space applications, including sounding rockets, CubeSats and small satellites.



36.327 NR Clark - Advanced Supersonic Parachute Inflation Research and Experiments (ASPIRE) March 31, 2018



Image Credit: Wallops Imaging Lab

The second ASPIRE mission was successfully conducted on March 31, 2018. Five ASPIRE missions are planned to investigate the physics of supersonic Disk Gap Band (DGB) parachute inflation to enable the development of the parachute required for the Mars Sample Return Sample Retrieval Lander. The ASPIRE-3 mission is currently scheduled for July 10, 2018.



ARPIRE-2 integration and testing



Rocket Report

Valiant team effort in Norway.

The Auroral Zone Upwelling Rocket Experiment (AZURE) teams spent several weeks in Norway fighting adverse conditions every step of the way.

During disturbed conditions, the vertical circulation in the auroral zone is a key element in the re-distribution of energy, momentum, and chemical constituents in response to forcing. But few direct measurements of the vertical winds in such conditions exist. Principal Investigator Dr. Miguel Larsen/Clemson University wants to change that by launching two rockets to study these conditions. Weather and science conditions did not align this year to facilitate launching the two Black Brant XI-A (Talos-Terrier-Black Brant) vehicles. This mission is part of the Grand Challenge - CUSP international collaboration and an early CY2019 launch opportunity is being evaluated

When in Norway...

The Norwegian Nature

Norwegians proudly go outdoors in difficult weather conditions
They do not talk
The wind and rain makes it impossible
It gives Norwegians a great feeling
A feeling of accomplishment

Norwegians' relationship to nature is unique
« Det finnes ikke dårlig vær
Bare dårlige klær »*

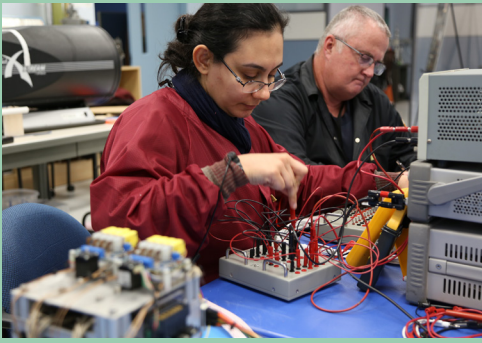
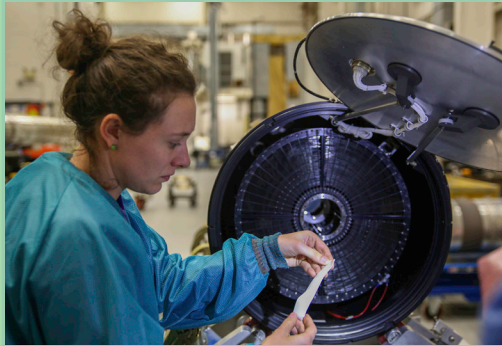
* There is no such thing as bad weather, only bad clothing



Integration & Testing

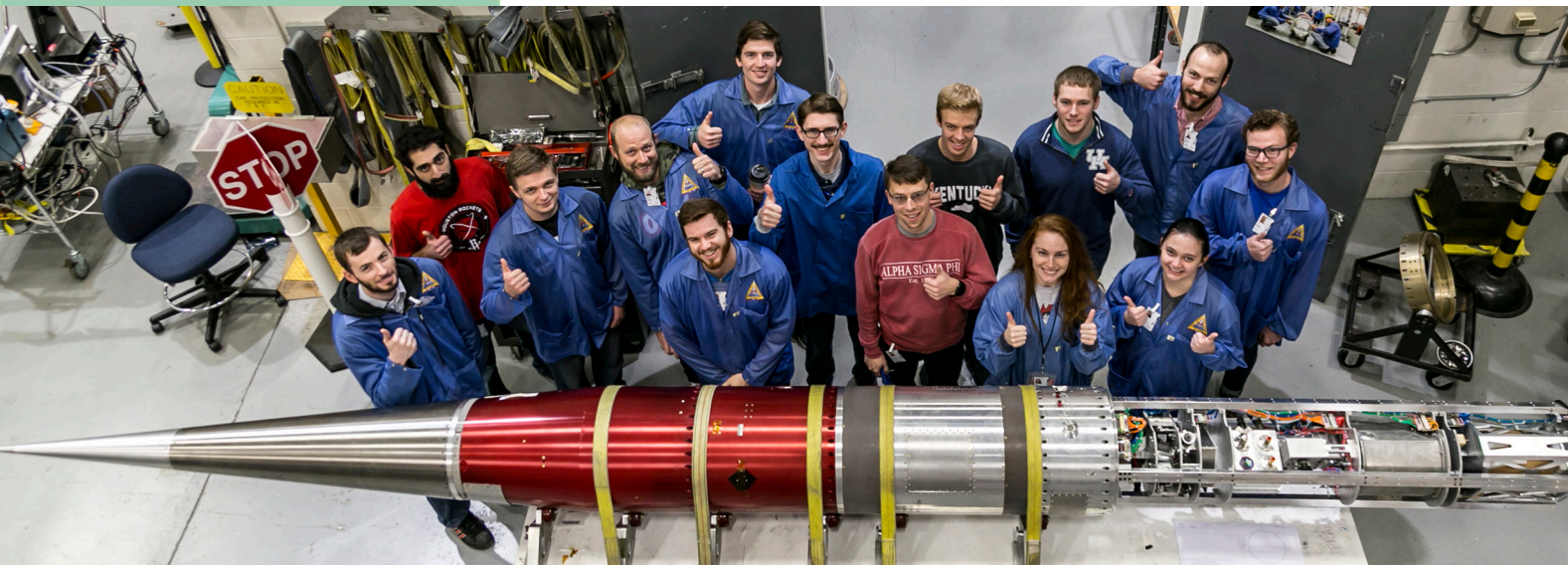
36.245 UH Figueroa – Micro-X

The Micro-X sounding rocket payload combines a high-energy-resolution X-ray microcalorimeter with an imaging mirror and will obtain the first imaging X-ray microcalorimeter spectra from an astronomical source. The first flight of Micro-X is slated for 2018 and will investigate the plasma conditions (such as temperature, electron density and ionization) and the velocity structure of the Bright Eastern Knot of the Puppis A Supernova remnant (SNR). The obtained high-resolution X-ray spectra will help to ascertain the temperature and ionization state of the X-ray emitting gas in Puppis A. Analysis of the data will allow the detection of the presence of supernova ejecta in this remnant. Additionally turbulent flows and bulk motions of the plasma will be measured. Micro-X is currently scheduled for launch from White Sands Missile Range in July 2018.



46.019 UO Vieira – University Student Instrument Program (USIP)

USIP student groups visited Wallops twice to integrate their experiments. The first integration in January included electrical and telemetry checks, sequence testing, payload vibration, and other Testing and Evaluation Laboratory acceptance tests. The second, and final, integration was completed in March and culminated in a successful flight and recovery of the payload.



Picture Place



Charlie and Eric preparing for USIP integration.



John during sequence testing of the USIP payload.



Norman with the USIP payload.



Joslyn Herold (center) met with Victoria Danna (left) and Joyce Winterton (right) to discuss educational opportunities at NASA.



Setting up the ground station for Figueroa.



Brian working on the USIP payload.



Image Credit: Wallops Imaging Lab

Baby it's cold outside! Team in Alaska.

| MISSION | DISCIPLINE | EXPERIMENTER | ORGANIZATION | PROJECT | RANGE | DATE |
|-----------|--------------------------|--------------|------------------------|---------|-------|----------|
| 36.330 UH | HIGH ENERGY ASTROPHYSICS | MCENTAFFER | PENN STATE UNIV | WRX-R | KWAJ | 04/04/18 |
| 36.333 UG | UV/OPTICAL ASTROPHYSICS | FRANCE | UNIVERSITY OF COLORADO | CHESS | KWAJ | 04/13/18 |
| 36.342 NS | SOLAR & HELIOSPHERIC | WINEBARGER | NASA/MSFC | HI-C | WS | 05/29/18 |
| 36.336 UE | GEOSPACE SCIENCES | WOODS | UNIVERSITY OF COLORADO | EVE | WS | 06/12/18 |
| 41.125 UO | STUDENT OUTREACH | KOEHLER | UNIVERSITY OF COLORADO | ROCKON | WI | 06/21/18 |
| 36.281 UG | UV/OPTICAL ASTROPHYSICS | BOCK | CAL TECH | CIBER-2 | WS | 07/08/18 |
| 36.245 UH | HIGH ENERGY ASTROPHYSICS | FIGUEROA | MIT | MICRO-X | WS | 07/24/18 |

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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WS - White Sands
 WI - Wallops Island
 NOR - Norway
 FB - Fairbanks
 Kwaj - Kwajalein, Marshall Islands

National Aeronautics and Space Administration



Come join us as Phil Eberspecker receives NASA's highest form of recognition—the Distinguished Service Medal

When: Friday, April 6, 2018 at 1 p.m.

Where: E-100 Auditorium

Reception with light fare to follow

