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Rocket report

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Sounding Rockets Program Office

In Brief...

Grand Challenge mission integration and testing have been completed. The VISIONS-2 payloads are on their way to Norway. TRICE-2, RockSat-XN and CAPER-2 await shipment.

The launcher team completed the launcher installation in Svalbard and the certification of the Athena launcher at Andoya Space Center.

A design review for a new iteration of the Peregrine motor was held at NASA Marshall Space Flight Center.

Remote campaign planning for Kwajalein 2019, Norway 2019, and Australia 2020 is underway.

SRPO supported the NASA 60th anniversary event held at the Wallops Visitor Center.

A total of 19 launches, covering six disciplines, were conducted in Fiscal Year 2018.

Fiscal Year 2018 ends with four launches.

36.245 UH Figueroa - Micro-X launched July 22, 2018

Micro-X combines a high-energy-resolution X-ray microcalorimeter with an imaging mirror to obtain the first imaging X-ray microcalorimeter spectra from an astronomical source. As a photon is absorbed in a microcalorimeter and its energy converted to heat, the resulting temperature rise can be measured by the resistance change of a Transition Edge Sensor (TES). These microcalorimeters need to be cooled to temperatures of about a hundredth of a degree above absolute zero to function properly.



Micro-X at Wallops for integration and testing.

This flight, the first of Micro-X, was designed to investigate the plasma conditions (such as temperature, electron density and ionization) and the velocity structure of the Cassiopeia A Supernova remnant (SNR). The high-resolution X-ray spectra (14,000 counts collected in 326 seconds at 6-10 eV resolution across the 0.2 - 2.5 keV band) that Micro-X is developed to measure, will help to ascertain the temperature and ionization state of the X-ray emitting gas in Cas A, as well as study individual bright plasma knots within the remnant.

Due to an Attitude Control System anomaly, data from the target SNR was not received. However, the Micro-X instrument did perform as expected.

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46.021UO Koehler - RockSat-X launched August 14, 2018

RockSat-X was successfully launched from Wallops Island, VA on August 14, 2018. RockSat-X carried student developed experiments and is the third, and most advanced, student flight opportunity. RockSat-X experiments are fully exposed to the space environment above the atmosphere. Power and telemetry were provided to each experiment deck. Additionally, this payload included an Attitude Control System (ACS) for alignment. These amenities allow experimenters to spend more time on experiment design and less on power and data storage systems.

The following experiments were flown on RockSat-X in 2018:

Community Colleges of Colorado

The Orbital Scrap Capture and Reclamation (OSCAR) project is a collaboration between three community colleges in Colorado -- Arapahoe Community College in Littleton, Community College of Aurora, and Red Rocks Community College in Lakewood. The purpose of this experiment is to develop a cost effective method to alter the trajectory of space debris in suborbital flight.

Capitol Technology University

The goal of Project Janus is to demonstrate the use of a laser distancing system to measure the speed of CubeSats within constellation during flight.

Temple University

Temple University's mission is to detect flux and angular distribution of cosmic radiation as a function of altitude.

University of Colorado Boulder

The purpose of the Measuring Emitting Ground stations using Antennas Listening for Oscillating Doppler Outputs from NEXRAD (MEGALODON) experiment is to use passive RF technology to characterize the local NexRad Doppler Radar network.

University of Maryland

This payload includes two different experiments from the University of Maryland. The Stratification and Tribocharging Analysis of Regolith (STAR) experiment will study the effects of tribocharging on extra-terrestrial regolith simulant. The Space Characterization and Assessment of Manipulator Performance (SCAMP) project will fly a functional robotic manipulator component in a microgravity environment to test contact stability on both hard and soft contacts.

University of Puerto Rico

The University of Puerto Rico's mission is to collect micrometeorites in the Meteor Trail at altitudes of 49 – 68 miles (80-110 km) in order to gather organic molecules for complete DNA, RNA, and Nucleic Acids.

Virginia Tech

Virginia Tech's mission is to support STEM education and outreach by utilizing the ThinSat platform that allows high school and university students to test their own experiment in a space environment.

West Virginia Collaboration

The Hobart and William Smith Colleges are attempting to measure the temperature and vibration of their payload throughout the rocket's flight. Marshall University's experiment uses an automated target acquisition system to take pictures of target stars and assess the effectiveness of astronomy.net for target acquisition during flight. West Virginia State University is preparing for future CubeSat missions by comparing different equipment designs and testing the feasibility of a Michelson Interferometer. West Virginia University is evaluating the capabilities of a jettisoned capsule to project individual experiments in future missions and design an ultra-compact plasma spectrometer with reduced mass, volume, and high voltage requirements and comparing it to identical instruments. West Virginia Wesleyan College's experiment is to compare the effectiveness of a thermionic converter to a solar panel in space and to prove NOAA magnetometer data.



36.328 NR Clark - Advanced Supersonic Parachute Inflation Research and Experiments (ASPIRE) launched September 7, 2018



This was the third flight of ASPIRE. The project investigated the supersonic deployment, inflation, and aerodynamics of Disk-Gap-Band (DGB) parachutes in the wake of a slender body. All three missions carried parachutes that were full-scale versions of the DGBs used by the Mars Science Laboratory in 2012.

For this mission, the launch vehicle, test platform, instrumentation, mission operations, and test methodologies were nearly identical to the first two flights. However, the test article was further strengthened from the second configuration and included bridle lines with increased material. The target load for this flight was approximately 70 klbf, which is about 1.4 times the highest possible load expected on Mars.

The flight data from the sounding rocket missions will aid in the development of models to predict parachute performance on Mars.



36.325 US Glesener - Focusing Optics X-ray Solar Imager (FOXSI) launched September 7, 2018



Image Credit: White Sands Missile Range

The outer layer of the Sun (known as the corona) has a temperature over one million degrees Kelvin (K) while the visible surface of the Sun, the photosphere, is a mere 6,000 deg K. This is contrary to intuition because temperature usually decreases as the distance from the heat source increases. This phenomena is known as the “coronal heating problem”. The mechanisms that heat up the corona are not understood and unlocking the secrets will tell scientists a lot about the dynamics of the sun. The Focusing Optics X-ray Imager (FOXSI) is designed to look at barely visible nanoflares, which are much smaller, but more frequent than the large solar flares. These nanoflares may serve as the seeds for the cascade that cause much larger flares, and may be connected to the physics that causes the Sun’s corona to be hotter than its surface.

This, the third flight of FOXSI, observed the non-flaring “quiet” Sun and searched for non-thermal X-rays from these regions.

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FOXSI images



Credit: White Sands Missile Range



Credit: White Sands Missile Range

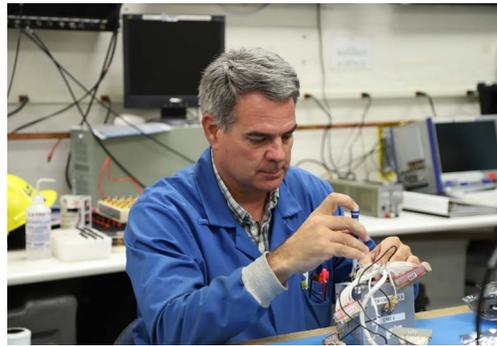


Credit: White Sands Missile Range

Integration & Testing

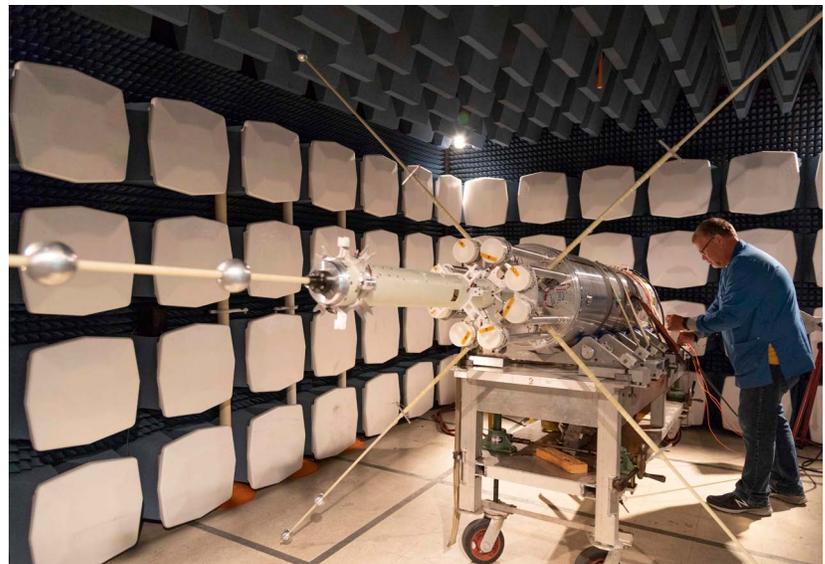
52.003 & 52.004 UE Kletzing – Twin Rockets to Investigate Cusp Electrodynamics (TRICE) 2

The Twin Rockets to Investigate Cusp Electrodynamics II (TRICE-2) missions will measure cusp signatures of reconnection occurring at the magnetopause during steady IMF Bz southward conditions. This will be accomplished by launching two nearly identical instrumented payloads, flying at low and high altitudes, with a variety of separations in time and space. Launch times will be set such that both rockets reach apogee as near simultaneously as possible. The high flyer will reach an altitude of approximately 1,100 km and the low flyer will reach approximately 870 km.



52.005 UE Labelle – Cusp Alfvén and Plasma Electrodynamics Rocket (CAPER) 2

Cusp Alfvén and Plasma Electrodynamics Rocket (CAPER) is designed to investigate the interactions between electrical waves and charged particles in a region of space known as the “polar cusp.” The polar cusps are structures in the Earth’s magnetic field above the north and south poles, where the magnetic field lines converge in a funnel-shape. The cusps are significant because they are connected directly to the solar wind, a stream of charged particles coming out of the sun and striking the Earth’s environment, giving rise to space weather effects such as loading of the radiation belts, intense auroral activity known as substorms, and strong natural electrical currents lasting several days known as geomagnetic storms. These processes can have a significant impact on ground- and space-based technical systems. By probing the cusp regions, CAPER will measure particle and wave phenomena related to these processes.



46.018 UO Koehler – RockSat–XN

RockSat-XN is an international student mission to be launched from Andoya Space Center as part of the Grand Challenge - CUSP initiative. Student groups from the United States, Norway and Japan are providing experiments for the mission. Integration and testing occurred at Wallops in early August 2018, and the launch is scheduled for January 10, 2019.



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Picture Place



Lunch and Learn with Cody.



FOXSI launch.



Valerie giving a tour to VA Space Camp students.



Norway shipment and motor crew.



Jason, Wayne and Kevin with one of the TRICE payloads.



Mike and Mitch.



Jay, with Tom, Kevin and Eric in the back-ground, inspecting a TRICE payload.

Launch Schedule October – December 2018

MISSION	DISCIPLINE	EXPERIMENTER	INSTITUTION	PROJECT	RANGE	DATE
36.331 UG	UV/OPTICAL ASTRO	GREEN	UNIV OF COLORADO	DEUCE	WS	12/03/18
35.039 GE	GEOSPACE SCIENCE	ROWLAND	NASA GSFC	VISIONS 2	SVAL	12/04/18
35.040 GE	GEOSPACE SCIENCE	ROWLAND	NASA GSFC	VISIONS 2	SVAL	12/04/18
52.003 UE	GEOSPACE SCIENCE	KLETZING	UNIVERSITY OF IOWA	TRICE-2	NOR	12/05/18
52.004 UE	GEOSPACE SCIENCE	KLETZING	UNIVERSITY OF IOWA	TRICE-2	NOR	12/05/18

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!

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

or

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

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

NSROC & SRPO support NASA Community College Aerospace Scholars (NCAS)

NCAS is a national STEM focused program where community college students interested in NASA related careers participate in a five-week online learning experience. Top scoring scholars are invited to participate in a 3-day workshop. This year's workshop was held at Wallops and was lead by the Education Office. NSROC staff members, Eric Roper, Valerie Gsell, Meredith Danowski and Berit Bland served as mentors. Additionally, students toured the T&E Lab and Machine Shop in F-10. Office Chief, Giovanni Rosanova, gave a presentation about sounding rockets.

Part of the workshop experience was a simulated mission to Mars. The students built and programmed Lego robots, and then navigated a terrain to collect "minerals" and rescue Mars rovers.

For more on NCAS, visit:
<https://nas.okstate.edu/ncas/>

