WALLOPS RANGE

2023 Annual Report

WALLOPS

RANGE

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INTRODUCTION

In 2023, Wallops Test and Launch Range continued its long history of supporting space exploration, research, and science missions. Our facility is one of NASA's key launch sites for sounding rockets, small satellites, and suborbital flights. This year marked significant milestones for the facility, showcasing its growing capabilities, expanding missions, and contributions to both national and international space endeavors.

For almost 80 years now, the Range has supported the sounding rocket program, which are used for scientific studies of Earth's atmosphere and space weather. These missions often provide important data for studying phenomena such as auroras, thunderstorms, and other atmospheric and space weather events. The sounding rockets launched from Wallops and around the world are important tools for NASA's heliophysics and aeronomy research, which studies the influence of space weather on Earth's environment.

The continuation of the Antares rocket series for NASA's Commercial Resupply Services (CRS) program marked the 10th year of our dedicated support. In March 2023, an Antares rocket launched from Wallops, delivering vital supplies to the ISS. Antares is designed to carry heavy payloads and provides critical support for NASA's space station missions, highlighting Wallops' capability to handle high-profile launches. The station's ongoing cargo resupply missions are essential for maintaining operations and advancing scientific research in space.

A key highlight of NASA's operations at Wallops in 2023 was the continued partnership with private commercial space companies. This collaboration aligns with NASA's goal of fostering a growing commercial space industry. Wallops provided crucial launch services for small satellite providers, enabling them to place their payloads into orbit. The spaceport's capabilities have become integral to the success of many new commercial ventures in low-Earth orbit (LEO). These include rockets designed to carry CubeSats and other small payloads for various government and private customers. This trend is expected to continue in the future as demand for small satellite launches increases, driven by the rapid growth of satellite constellations for communications, Earth observation, and space-based research. One noteworthy example was the inaugural launch of the Rocket Lab Electron vehicle from Wallops, marking a milestone for the spaceport's growing importance to commercial satellite operations. Rocket Lab's Electron rocket, which is optimized for small satellite payloads, demonstrated the ability of Wallops to support smaller, more flexible launch systems.

The Wallops Airfield continued its legacy of supporting NASA, Commercial and DoD. Our partnership with the Navy Field Carrier Landing Practice program gives the Navy the facility and tools required to train their pilots, keeping their proficiency intact and ensuring their mission readiness. This marked the 33rd Detachment to be completed at Wallops since its inception in 2013. The Airfield again assisted the Ocean City Maryland annual Air Show by hosting the United States Air Force Thunderbird Team, The Maryland Air National Guard A-10 Thunderbolts, and US Navy F-18 Demo Team.

In addition to our piloted aircraft, Wallops has increased its support of Unmanned Aerial Vehicles (UAV) utilizing the Main Runways on the Wallops Mainbase and the UAV Runway on Wallops Island. The UAV missions is expanding exponentially worldwide, and Wallops is serving as a partner and catalyst in supporting the growth of that industry.

Wallops also played a key role in testing new technologies for future space exploration around the world and for our partners within the Department of Defense. In 2023, the facility hosted a number of test flights for experimental vehicles and technologies designed for deep space missions and for worldwide deployment. One such project involved the testing of re-entry vehicles and heat shields, which are essential for protecting spacecraft returning to Earth from the harsh conditions of space. Our range systems provide support for the Artemis Program, ensuring constant communications, data, and radar information for the program to utilize.

Moreover, Wallops continues to serve as a hub for Earth science missions, which often involve collecting data on atmospheric composition, sea-level rise, and climate change. The facility provided launch support for several Earth-focused experiments, including satellites designed to measure greenhouse gases, aerosols, and other climate-related factors. These missions are vital in NASA's effort to understand and mitigate the impacts of climate change.

The most important part for all of these successes starts with the people of Wallops and our surrounding community. Our employees, both civilian and contractors, are the heartbeat of this facility and prove their love for this range daily. The communities around Wallops are great shareholders that support our mission, and we again proved our commitment to their safety and wellbeing. In 2023, Wallops invested in improving its infrastructure and range operations. The facility is known for its robust safety protocols and its ability to conduct complex launches under various conditions. In 2023, Wallops continued to enhance its operational safety measures, ensuring that launches were conducted safely and efficiently. This included improvements in telemetry, tracking, and flight safety systems, which are essential for monitoring rocket launches and managing the safety of ground and flight crew members and nearby communities.

Looking Ahead

The success of Wallops in 2023 is part of a broader trend of increasing activity at the site. As NASA's space exploration efforts continue to grow, Wallops will remain a critical asset in supporting a range of activities, including space science, Earth observation, and commercial space operations. The facility's expanding launch capabilities, continued investment in infrastructure, and growing role in supporting commercial ventures position Wallops for an even more dynamic future in the space industry.

In addition to its existing functions, Wallops is expected to play a central role in NASA Goddard's 2040 Vision, which aim to return humans to the Moon and ultimately enable human missions to Mars. The facility's ability to support both large and small missions will be integral to these goals, ensuring that the agency can carry out a wide range of launches, from crewed lunar landings to robotic exploration missions.

The Wallops Range has proven itself to be an indispensable asset to the United States' space operations and will strive to be the most dynamic and reliable launch range in the World. We want to thank you, all, for your support. Have a great 2024, and God Bless the United States of America.

-Jeffrey A. Reddish

Chief, Range and Mission Management Office

PORTFOLIO MANAGEMENT

Wallops Island, VA –

The Range and Mission Management Office (RMMO) is a team of highly skilled project management professionals who are charged with the responsibility of marrying the skills of scientists, engineers, NASA test directors, resource advisors, airfield managers, technicians, and other personnel into one cohesive team whose objective is to conduct operations for data collection from many different flight platforms around the globe.

Working as a team and implementing sound project management strategies, we narrow our focus, reach desired goals, and achieve those goals within specific time and cost parameters. As a result, everybody wins – which just may be project management's best benefit of all.

Project Management provides the Wallops Range and its customers with:

RELATIONSHIPS: Building relationships with all our stakeholders is an important part of our overall program management philosophy.

GOVERNANCE: The structure, process, and procedure to control operations and changes to performance objectives. This includes metrics to indicate the health and progress of the project.

ASSURANCE: All projects must verify and validate the program, ensuring adherence to standards and alignment with the vision.

MANAGEMENT: Project Managers must ensure there are thorough reviews, everyone is held accountable, and that management of projects, stakeholders, and suppliers are in place.

INTEGRATION: All projects ensure that component parts fit together properly to make the intended whole. Each project must optimize performance across the program value-chain, functionally and technically.

FINANCES: Projects must conform to budgets and track costs.

INFRASTRUCTURE: Project Managers are charged with gathering a project team to ensure the Range's infrastructure can support the requirements of any mission.

PLANNING: Project Managers must develop an overall plan and manage subsets that include resources, timescales, monitoring and control, lessons learned, and other areas.

IMPROVEMENT: Not only do NASA Project Managers ensure mission success, but they also take the time to develop and research new capabilities and systemically apply learning and knowledge to the project.

As part of RMMO, Research Range Services (RRS) supports NASA Project Managers and their missions by providing a myriad of services such as radar and optical tracking, telemetry down link, meteorological services, command and control, surveillance and recovery, financial analysis, and engineering services to allow these missions to take place in a safe, ready environment.

The RRS team consists of many highly experienced Range Service Managers (RSM) who work arm-in-arm with their NASA counterparts. In tandem, the Project Manager (PM) and RSM build, coordinate, and manage cohesive teams that combine the efforts of engineers and technicians to configure a mobile and fixed range to provide launch range services around the globe.

From the initial thoughts of a principal investigator through the completion of data analysis, the RMMO PM in coordination with the RRS RSM is the glue that bonds the talents and efforts of the extended team of professionals needed to ensure successful completion of every mission.

All operations conducted at the Wallops Range and other remote launch ranges, such as Poker Flats Research Range, Alaska, Kwajalein, and Andøya Space Center in Norway, require state-of-the-art technologies and multi-million-dollar systems to support unmanned aerial vehicles, sounding rockets, expendable launch vehicles, and many other types of flight platforms.

In 2023, Project Managers were responsible for Range instrumentation support for NASA orbital and sub-orbital programs as well as programs for other government and civilian agencies. They assured near 100% success for a multitude of programs executed at the Wallops Range while simultaneously managing a remote maintenance campaign at tracking and command sites in Norway and Bermuda.

RANGE OPERATIONS CONTRACT (ROC) II

Mission Planning

Demonstration of superior ROC (Range Operations Contract) II technical backing was in display with the successful support of SubTec-9, which is a testament of the team's diligent planning and coordination across multiple different agencies. For example, the data rates exceeded design of Tracking Station's current configuration, requiring real-time fixes and updates. Furthermore, the ROC II team had to resolve issues with sending packetized Telemetry (TM) data real-time via TMoIP (TM over Internet Protocol) around the Wallops Flight Facility (WFF). In the end, support for all links and data distribution was successful and several new payload technologies were verified during the support of the SubTec-9 mission.

- *Proof of concept supporting C-Band payloads*
- *Proof of concept testing 38-40Mbps data rates via WFF Ground Support Equipment (GSE)*

The Wallops Range coordinated and supported testing for a true salvo mission in preparation of RockOn! and RockSat-X sounding rockets. The Range's capabilities were successfully demonstrated by launching two vehicles within a 5-minute launch window and tracking both in the air to splash.

Additionally, ROC II supported two extremely challenging campaigns at Poker Flats Research Range (PFRR) in Fairbanks, Alaska. The team overcame numerous obstacles, leading to successful campaigns in April and November. Upon arrival for the Spring campaign, the team found that a Poker Flats snowplow ran over the TM 8-Meter cabling, rendering it inoperable for either mission. Nonetheless, the team was able to build a new support plan on the fly, reconfigure the range, and conduct testing, subsequently enabling successful support for the November campaign. Upon return to WFF, the ROC II team immediately began working on a potential course of action to offer the best chance for a successful mission, knowing the degraded state of numerous Poker assets. A short, medium, and long-term course of action was presented to the PM and Sustainment Manager and a team was assembled to deploy early in order to work major discrepancy reports (DRs). During the actual mission deployment, the team received several kudos for the outstanding and innovative support provided that warranted mission success. Their hard work and determination resulted in near-flawless range support from a site that presented several different challenges due to the site's remote location and inclement weather damaging range assets.

Weather & MetOps

Weather Office

The ROC II Weather Office team worked with the Goddard Digital Lead to develop a Weather Office Website on the newly designed NASA RMMO webpage. This initiative has streamlined the process of getting daily operational forecasts to Range customers due to circumventing the process of creating email distributions for every new team member that needs one. In addition to the daily operational and hazardous weather forecasts that are uploaded to the website, detailed climatology is available that provides current and future launch customers the key data needed for determining optimal launch times.

LiDAR

ROC II MetOps personnel conducted proof of concept testing during the PFRR Spring campaign to merge the 150' mobile wind tower and a legacy version of the ZX300 LiDAR to appear as a single "Digital Tower". Preliminary wind weighting analysis during the mission revealed an increase in launch availability due to the increased height and data input from the "Digital Tower". This testing indicates that LiDARs like the one used as a proof of concept during the Spring PFRR campaign could provide additional launch availability in future campaigns if used operationally.

Meteorology Operations

ROC II provided a Met Systems Overview to Code 840 for the benefit of familiarizing mission personnel with a high-level understanding of the various meteorological systems that support operations, including capability and location information, and use-case scenarios for radiosondes, pilot sondes, and balloons. In addition to being used as a reference for current Code 840 staff, it will also double as a user's guide for new employees to the range that are unfamiliar with ROC II meteorology support. Kudos were received from the RMMO senior staff along with a request for future training sessions.

Goddard Ocean Ecology Branch Support

RMMO received an urgent request for support in the installation of a spectroradiometer on a 30-meter tower operating in the Chesapeake Bay from the Goddard Ocean Ecology Branch. The installation was needed as soon as possible to enable the mission and begin collecting critical data. ROC II quickly established a team and deployed. The result was correspondence from Dr. Kevin Turpie stating he "was very happy with the last-minute support" and asked for additional support from the MetOps team for next year.

Optical Systems Group

The ROC II Optical Systems Group (OSG) continued to shine, receiving multiple kudos for their ability to quickly react to "hot" taskings to include tour supports, auditorium supports, and design and publishing requests.

- *Range User's Handbook – Design work completed*
- *2024 Coffee Table Book – Design work completed*
- *Campaign Logo for Goddard 2024 – Completed*
- Updates to Aircraft Office Branding/Logo – In progress

In addition to supporting these tasks and all local and deployed missions, the OSG completed several key engineering tasks to include:

- ***Tracking System Upgrade –*** The Kineto Tracking Mount (KTM) project received a successful upgrade from analog to digital control system and a successful Ethernet Launch Trajectory Acquisition System (eLTAS) sync demonstration was performed.
- ***Surveillance Project –*** Camera installations were completed in H100 and the Horizontal Integration Facility (HIF). The V-55 fueling bay work is currently underway.
- ***Open-Site Tracking Station Improvements –*** The OSG replaced damaged reticle bore-sighting light with a variable LED light source leveraging SolidWorks software and 3D printing to maintain functionality of tracking hardware that is over 60 years old.
- ***High-Speed Video Acquisition –*** Three new cameras were received, doubling launch capacity and test support coverage in high-definition, 1K+ frame-per-second coverage.

MISSION ACCOMPLISHMENTS

The Wallops Range supports a variety of NASA missions by providing Range support services using the funding received from our core budget as well as supplemental funding from within the Agency. The Range constantly strives to ensure it is prepared to accommodate the current and future needs of its' customers and has consistently operated in a fast-paced and steadily changing environment, requiring innovative solutions to ensure mission readiness. All components of the Wallops Range work with Wallops Flight Facility in cooperation with other NASA centers to conduct Range support services to meet NASA's mission needs.

The Wallops Range and Mission Management Office (RMMO) achieved notable milestones this year, supporting various operations from around the world. The RMMO operated as the lead range for 6 out of 6 successful Sounding Rocket missions and supported four Expendable Launch Vehicle (ELV) launches from Wallops, including the successful launch of Northrop Grumman's Antares NG-19 rocket. This mission not only delivered essential supplies to the International Space Station, but it also demonstrated the capabilities and expertise of the RMMO in managing intricate space operations.

In 2023, the RMMO supported four off-site Sounding Rocket Campaigns: two at Poker Flats Research Range in Fairbanks, Alaska and two at Andenes Space Center in Andøya, Norway. Moreover, their support extended to other NASA centers, particularly in contributing with the Artemis program, in which Wallops played a crucial role in the testing and validation of critical technologies for lunar exploration missions. This collaborative effort highlighted Wallops' role as a key facilitator in advancing NASA's ambitious goals for deep space exploration.

Airfield Operations

NASA's Wallops Flight Facility Airfield (KWAL) is a NASA owned and operated research airfield and provides for UAS RDT&E Operations for NASA, Department of Defense (DoD), and commercial partners. KWAL consists of three runways, Federal Aviation Authority (FAA) certified ATC services, range radar surveillance, two hangars, full Aircraft Rescue & Fire Fighting (ARFF) services, and over 400 square nautical miles of restricted airspace.

Field Carrier Landing Practice (FCLP)

Through an Inter-Agency Agreement (IAA) with the United States Navy Fleet Forces, WFF proudly supports Field Carrier Landing Practice (FCLP) aboard the Wallops Airfield. This support entails project management, schedule deconfliction, airfield services to include hangars, fueling, and Air Traffic Control provided by RMMO, Wildlife Management provided by USDA Wildlife Biologists, lodging and food services provided by WEMA, and security and emergency services provided by ARFF.

Since inception in 2013, Wallops has supported 33 detachments (DET), four on station in 2023 with DET 31 wrapping up at the end of the year. WFF also supports In/Out operations throughout the year with the Fleet Replacement Squadron (FRS) VAW-120 as well as four other fleet squadrons. In 2023, the U.S. Navy completed 15,493 passes on our simulated carrier decks and Improved Fresnel Lens Optical System (IFLOS) located on Runway 10-28 in just 349 training hours. The Wallops Airfield has supported 151,392 FCLP training passes in its partnership with the US Navy over the last ten years. This aviation training is essential for national security interests and wartime readiness around the world, as the primary mission of VAW-120 is to fly and train Naval Aviators, Naval Flight Officers, and Naval Aircrewmen to safely and effectively operate E-2C/D Hawkeye Airborne Early Warning and C-2 Greyhound carrier-based aircraft, preparing them to join the fleet.

As we look into the future, the Range and Mission Management Office in collaboration with the Advanced Projects Office and our U.S. Navy partners developed and signed a follow-on IAA, carrying this partnership at WFF for ten more years. The crucial operational and maintenance funding received through this partnership (along with fuel sales) are key to the sustainment and continued operation of our Wallops Research Airfield.

Ocean City Air Show (OCAS)

NASA's Wallops Flight Facility Airfield (KWAL) supported the 2023 Ocean City Air Show (OCAS) to include the U.S. Air Force (USAF) Thunderbirds, the Maryland ANG A-10s, and the USN FA-18 demo teams, along with the return of the "Wallops Tailgate Party" where WFF personnel, friends, and family get to experience a live and up-close look into aircraft operations. Wallops Flight Facility has supported US military and international civilian demonstration teams aboard our Airfield since its inception in 2008 as an essential staging point for aircraft and their support teams.

The NASA Wallops Airfield Team provides extensive coordination and support through the RMMO to include FAA Special Use Airspace reservations for Hometown Hero/Media flights, Airfield Operations Management, Air Traffic Control and Aviation Safety oversight, 24/7 ramp and perimeter security while performance aircraft are staged at KWAL, and an Airfield Engineering review of all runways, taxiways, and ramps in order to implement a taxi and parking plan to ensure no damage is done to the pavement. The Team also provides our own Ground Support Equipment (GSE) along with logistical coordination for shipping of required GSE from Department of Defense (DoD) facilities on the East Coast for staging at KWAL in support of the performance teams. KWAL also procures and pumps over 600,000 gallons of jet fuel during each show.

Over the years, the Wallops Airfield has supported many different types of aircraft during the Air Show, including the A-10, AV-8, F-18, F-16, F-22, and F-35 Demo Teams as well as the USAF Thunderbirds, USN Blue Angels, US Army Golden Knights, Royal Canadian Air Force Snow Birds (CT-114 Tutor) and the Breitling Jet Team (L39s), along with the mighty C-17 and C-130 support aircraft delivery essential personnel and ground support equipment.

"The Ocean City Air Show could not happen if not for the support received from NASA's Wallops Flight Facility."

-VP of OCAS Flight Operations


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79-016
DANGER
EJECTION SEAT
DANGER
DANGER
RESCUE
PILOT: LTCOL ERIC FONG
CC: TSGT RICHARD MILLER
ACC: SRA DYLAN PURKEY
WARNING
STAND CLEAR OF
LADDER PATH
DOOR AND LADDER
SPRING LOADED
CANOPY CONTROL, INTERCOM
AND LADDER RELEASE
RESCUE

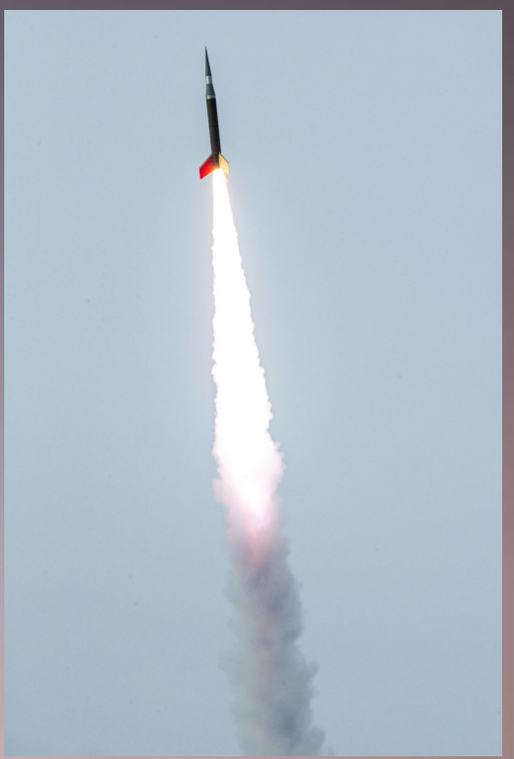
Unmanned Aerial System (UAS) Operations

In 2023, Wallops Flight Facility supported a total of four different Unmanned Aerial System (UAS) test events for a total of 14 UAS flight days. Throughout the course of 2023, WFF supported the ScanEagle Multi-Object Single Beam (MOSB) Test, the Reveal Farsight Phase 1.0 and 6.0 Tests, and the Maritime Vision Phase 1.0 Test. All test events were successful in achieving their purpose and objectives.

Collectively, there were seven different Unmanned Aerial Vehicles (UAVs) that flew from Wallops Flight Facility in 2023. These UAVs were comprised of:

- UTigerShark RQ-23A
- ScanEagle
- Puma II
- R80D SkyRaider
- Stalker XE25
- Black Hornet 3
- Skydio X2D

MesOrion



Two suborbital sounding rockets were launched approximately 30 minutes apart from Wallops Flight Facility on Thursday, February 16, 2023. The purpose of this mission was to test a new capability for supporting science research in the mesosphere, an area of atmosphere between 31- and 53-miles altitude, and to gain confidence in a high-cadence launch situation. The mesospheric apogee goals are between the altitudes of 70km and 125km. The two payloads from Wallops had a 4" and 9" payload diameter, and the mission goal was to launch both within the same 30-minute window. The two Terrier-Improved Sounding Rockets performed nominally with successful launches taking place at 7:00 a.m. and 7:29 a.m. EST.

On February 9, the team prepared for the first launch attempt. Although Radars successfully tracked both test rockets without flaw, this attempt was scrubbed due to high upper-level winds. Heading into the second attempt, radars again had good track of both test rockets, but the winds were still not ideal to attempt a successful launch. Following a hold at T-10, the second attempt was also scrubbed. A weather briefing was held later that day where it was determined that the third attempt that was scheduled for February 11th would also be scrubbed due to weather constraints.

The RMMO and Sounding Rocket Program Office (SRPO) made the decision to move into the following week with a launch window an hour earlier than previous attempts that would remain open an additional 30 minutes. On Thursday, February 16, 2023, at 0700L, the first vehicle 12.089 launched from the 50K launcher. All radars had a successful skin track of the vehicle and reported splash. After receiving data showing the first vehicle had ballistic impact, the teams proceeded with the count and hold to launch the second vehicle from the MRL launcher. At 0728L, vehicle 12.090 launched and all radars successfully tracked the vehicle until Loss of Signal (LOS).

MesOrion Facts

LAUNCH VEHICLE:

Terrier-Improved Orion 12.089/12.090

WALLOPS ID:

NRW-6234/6235

LOCATION:

WFF Pad 2, 50K & MRL Launcher

LAUNCH DATE:

February 16, 2023

GQM-163A Coyote

In March of 2023, NASA's Wallops Flight Facility played a pivotal role in supporting the U.S. Fleet Forces' training objectives by launching a GQM-163A (Coyote) target as part of a critical training event. This operation was essential to prepare naval warfighters for upcoming deployments, ensuring they are well-trained and equipped to handle complex scenarios.

The launch of the Coyote target from Wallops was not just a routine exercise, but a highly intricate operation involving multiple supporting assets and organizations. This year's mission faced a significant challenge when a crucial relay aircraft was unexpectedly unavailable due to maintenance issues. This setback called for swift action from the Wallops team to devise an alternative solution that would safely and effectively meet the test requirements of the customer. The outcome of the event was met with high praise from the Fleet Forces customer, underscoring the professionalism and capability of both the Wallops team and supporting organizations. This successful mission not only highlighted the critical role of NASA Wallops in supporting national defense initiatives, but also reaffirmed its reputation as a reliable partner in executing complex aerospace operations.

Coyote Facts

LAUNCH VEHICLE:
GQM-163A

WALLOPS ID:
DOW-6206 (Port)

LOCATION:
WFF Pad 3B Coyote Launcher

LAUNCH DATE:
March 27, 2023

Wallops Flight Facility conducted operations of supersonic sea skimming targets (SSST) for the United States Navy from 1985 through 2001. During that time, U.S. Navy ships relied on the Vandal MQM-8G target at WFF and other ranges to replicate the threat posed by Anti-Ship Cruise Missiles (ASCM) in support of shipboard combat system testing and crew qualifications programs. In 2004, the Navy's supply of Vandal targets was depleted, and the USN began Engineering, Manufacturing, & Development (EMD) of the replacement for Vandal – the GQM-163A "Coyote". In the mid-2000s, the USN nearly activated WFF to continue SSST operations with the Coyote target but was cut short of program funding. Since then, the Coyote target has flown successfully numerous times between the Pt. Mugu Sea Test Range, Pacific Missile Range Facility, White Sands Missile Range, and the Isle du Levant. In 2019, WFF established an east coast launch capability for the Coyote target to support fleet training requirements.

SubTec-9

The purpose of the SubTec-9 launch was to allow a suborbital flight test opportunity for a variety of NASA Sounding Rocket Operations Contracts (NSROC), NASA ETD, and external piggyback experiments and systems. A Terrier-Improved Malemute sounding rocket carrying the SubTec-9 technology demonstration testing new star tracker technology and a faster telemetry link launched at 7:15 p.m. on April 25, 2023, from Wallops Flight Facility. This water-recovered 17.26" payload was the 9th such technology demonstration mission. One major key technology objective included the testing of a high data rate (~40Mbps) C-Band telemetry link to test both flight and ground components. The data included three links with two of the links being 40Mbps. One of the two 40Mbps links was also an EVTM link. The two 40Mbps links proved to be challenging to support, requiring direct connectivity to equipment while bypassing patch panels.

SubTec-9 Facts

LAUNCH VEHICLE:
Terrier-Improved Malemute

WALLOPS ID:
NRW-6106

LOCATION:
WFF Pad 2, 50K Launcher

LAUNCH DATE:
April 25, 2023

Antares NG-19

The NG missions are part of the Commercial Resupply Service (CRS) Program sponsored by NASA's Johnson Space Center (JSC) that provide cargo transport to the International Space Station (ISS). The purpose of the Antares NG missions is to successfully deliver the Cygnus spacecraft to the ISS for the transfer of cargo and off-load waste from the ISS by destructive re-entry. After an Antares mission delivers Cygnus into the agreed upon orbit, the spacecraft maneuvers itself to rendezvous with ISS, is captured by the ISS robotic arm, and then berthed to the ISS to deliver the cargo. Once berthed to ISS, Cygnus can stay attached up to 100 days. Once the spacecraft has completed any deployments and experiments, it will off-load waste from the ISS and end its mission through destructive re-entry over the Pacific Ocean.

Like previous NG resupply missions from Wallops, RMMO provided the support for Northrop Grumman's Antares NG-19 rocket with the Cygnus spacecraft onboard. The vehicle launched from the Mid-Atlantic Regional Spaceport (MARS) Launch Pad 0A on Wallops Island on August 1, 2023, and delivered over 3,700kg (8,300lbs) of research experiments, supplies, and vehicle hardware to the International Space Station. Antares NG-19 marked the 18th successful CRS-2 mission and the final flight of Northrop Grumman's Antares 230+ configuration vehicle.

Antares NG-19 Facts

LAUNCH VEHICLE:

Antares 230+ Configuration

WALLOPS ID:

CRW-6217

LOCATION:

WFF MARS Pad 0A

LAUNCH DATE:

August 1, 2023

The International Space Station using the Canadarm2 robotic arm to capture a Cygnus spacecraft

H4H C3 (MACH-TB)

The Sandia National Laboratories High Operational Tempo (HOT) for Hypersonics Campaign 3 (H4H C3 / Flights SST-1 & SST-2) intent was to launch two Sounding Rocket launch vehicles from NASA Wallops Flight Facility. The HOT launch concept was developed from existing sounding rocket designs and technologies and leverages the features of rail-launched, unguided atmospheric sounding rocket flight tests that had previously been executed.

H4H C3 was to consist of two rail-launched rockets to include one three-stage for a depressed trajectory and one two-stage for a lofted trajectory. Both launch vehicles were assembled from Terrier Mk70 Mod 1 ER and Improved Malemute rocket motors. The goal was to launch both vehicles within one 12-hour period off the two sounding rocket rails, with each launch being a separate, independent event.

On the day of the launch, the team reported on-console at 1530z and successfully completed End-to-End (ETE) Testing. There were a couple small issues identified and quickly corrected, to which the remainder of the countdown proceeded nominally, and SST-2 launched exactly on the T-0 of 2130Z off the MRL launcher. The countdown for the second launch (SST-1) did not go as smoothly due to variable winds, which caused multiple holds by the Wind Weighting Operator. After a total of five holds, the launch window was extended by 30 minutes for one last attempt. The SST-1 successfully launched at 0200Z off the ARC launcher.

H4H SST-2 Facts

LAUNCH VEHICLE:
Terrier Mk70 Improved Malemute

WALLOPS ID:
DRW-6277

LOCATION:
WFF Pad 2 MRL

LAUNCH DATE:
November 15, 2023

H4H SST-1 Facts

LAUNCH VEHICLE:
Terrier Mk70 Improved Malemute

WALLOPS ID:
DRW-6276

LOCATION:
WFF Pad 2 ARC

LAUNCH DATE:
November 15, 2023

The two Sounding Rockets launched from NASA's Wallops Flight Facility on November 15, 2023, to support a hypersonic test mission for the Department of Defense. The mission supported Navy Strategies Systems Programs (SSP) and the Missile Defense Agency (MDA) in coordination with Naval Surface Warfare Center, Crane Division (NSWC Crane), and the Office of the Secretary of Defense's Test Resource Management Center (TRMC) Multi-Service Advanced Capability Hypersonic Test Bed (MACH-TB). Data collected from this test was to be used to inform the development of the Navy's Conventional Prompt Strike (CPS) offensive hypersonic strike capability, MDA's hypersonic defense capability, and to mature other hypersonic technologies.

Rocket Lab

In 2023, GSFC's Wallops Flight Facility was tasked with providing support for the first ever launch of the Rocket Lab Electron Small-Lift Launch Vehicle in the United States.

Supporting a new launch vehicle at a range is always challenging, but this mission was made even more difficult by added hurdles, including a limited commercial budget, an extremely compressed schedule, the pioneering of a new Flight Safety process with the FAA, and many "first use" flight items. Extensive cross-cutting initiatives were developed and employed to successfully meet mission milestones throughout the process.

With the inaugural launch of "Starling", GSFC established a new orbital launch capability for the United States and NASA, ushering in a game-changing launch capability for the missions that followed. The NASA Launch Team, led by the Range and Mission Management Office, has solidified Wallops' position as one of only four orbital launch sites in the U.S. to provide rapid, safe, responsive access to Space for the DoD and the commercial space launch industry.

Starling

The first ever launch of an Electron rocket from the United States took place out of Wallops Flight Facility around 6:00 p.m. on Tuesday, January 24, 2023.

STARLING FACTS

LAUNCH VEHICLE:
Electron Launch Vehicle

WALLOPS ID:
CRW-6249

LOCATION:
WFF Pad 0C

LAUNCH DATE:
January 24, 2023

Capella

On Thursday, March 16, 2023, Wallops Flight Facility supported the successful launch of a Rocket Lab Electron Launch Vehicle (ELV) from the Mid-Atlantic Regional Spaceport (MARS) on Wallops Island. The mission, “Stronger Together”, took off at 6:39 p.m., carrying two 100kg commercial satellites to low-Earth orbit for Capella Space.

Capella Facts

LAUNCH VEHICLE:

Electron Launch Vehicle (ELV)

WALLOPS ID:

CRW-6274

LOCATION:

WFF Pad 0C

LAUNCH DATE:

March 16, 2023

Dynamo

On Saturday, June 17, 2023, at 9:24 p.m., Rocket Lab launched its first ever Hypersonic Accelerator Suborbital Test Electron, or HASTE, launch vehicle from the company's Launch Complex-2 at Wallops Flight Facility.

Dynamo Facts

LAUNCH VEHICLE:
Electron Launch Vehicle (ELV)

WALLOPS ID:
CRW-6306

LOCATION:
WFF Pad 0C

LAUNCH DATE:
June 17, 2023

DEPLOYED MISSIONS

Andøya Space Center – Andenes, Norway

VortEx

The team deployed to Andenes, Norway in February 2023 for the setup and configuration of Range items at the Andøya Space Center in order to support the Vorticity Experiment (VortEx) Mission. While deployed, the team successfully supported two of four planned rocket launches on March 23, 2023, from the Andøya Space Center. As intended, VortEx 36.361 launched two minutes before 41.127. After investigation, it was concluded that 11 of the 16 ampules (sub payloads) produced the desired vapor tracers during the flight, thus meeting minimum success, in regard to the scientific aspects of the mission. On March 25, 2023, the final day of the launch window, the team prepared to launch the second pair of rockets; however, due to weather constraints, the launch attempt was scrubbed, and the team prepared for their return to Wallops.

The scientific objective of the VortEx missions is to better understand nonlinear gravity wave interactions in the upper mesosphere and lower thermosphere, the formation of vortices, and the importance of mesoscale stratified turbulence.

VortEx 41.127 Facts

LAUNCH VEHICLE:
Terrier-Orion

WALLOPS ID:
NRO-6003

LOCATION:
Andøya Space Center; Andenes, Norway

LAUNCH DATE:
March 23, 2023

VortEx 36.361 Facts

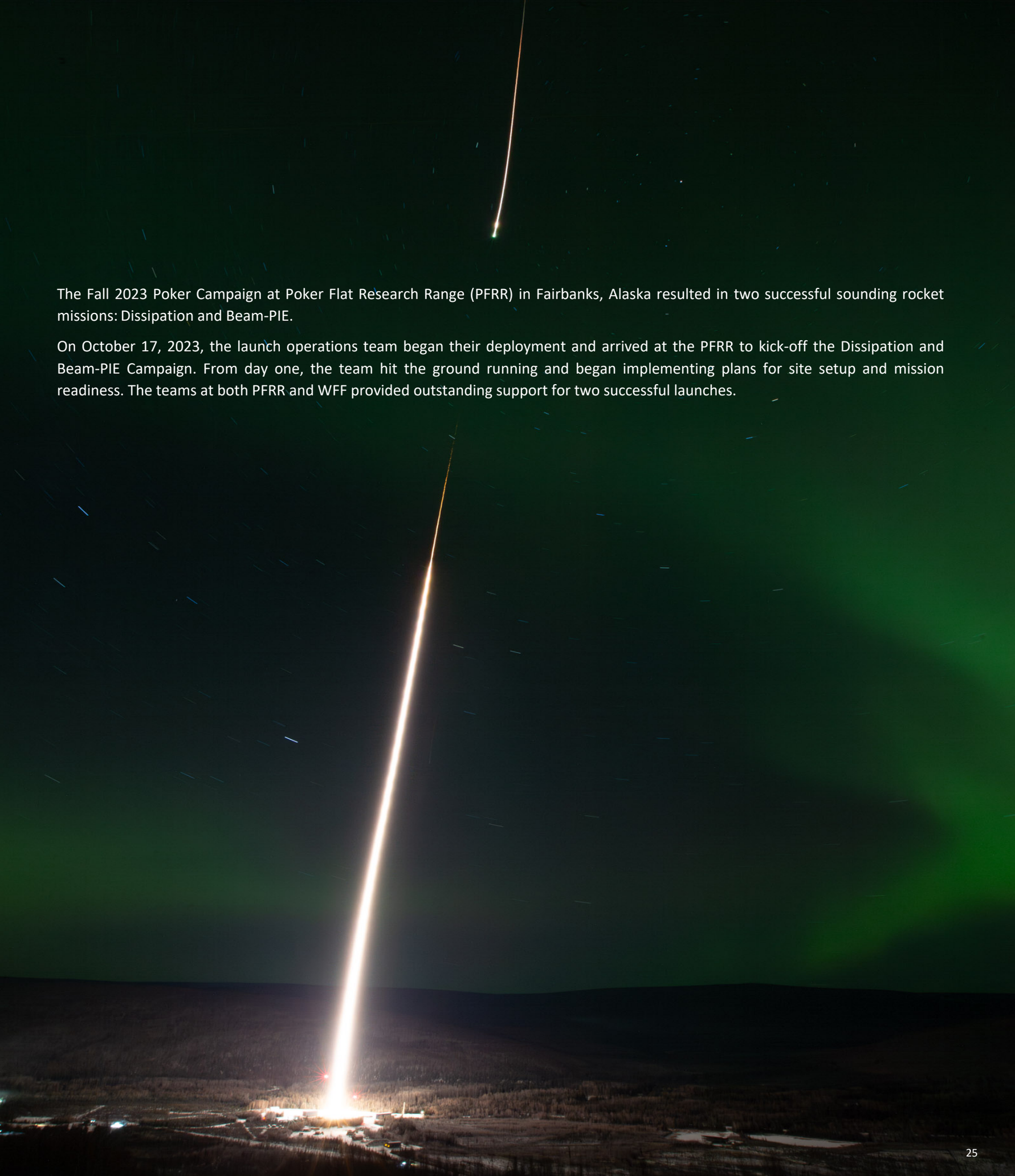
LAUNCH VEHICLE:
Black Brant IX

WALLOPS ID:
NRO-6006

LOCATION:
Andøya Space Center; Andenes, Norway

LAUNCH DATE:
March 23, 2023

Poker Flat Research Range – Fairbanks, Alaska



The Fall 2023 Poker Campaign at Poker Flat Research Range (PFRR) in Fairbanks, Alaska resulted in two successful sounding rocket missions: Dissipation and Beam-PIE.

On October 17, 2023, the launch operations team began their deployment and arrived at the PFRR to kick-off the Dissipation and Beam-PIE Campaign. From day one, the team hit the ground running and began implementing plans for site setup and mission readiness. The teams at both PFRR and WFF provided outstanding support for two successful launches.

Dissipation (Benna) 45.007

Dissipation/Benna launched a two-stage rocket into an aurora from Poker Flat Research Range in Fairbanks, Alaska on November 7, 2023. The experiment successfully captured data to help understand how auroras heat the atmosphere and cause high-altitude winds. The rocket carried instruments into the aurora to obtain the first direct and simultaneous measurements of factors influencing ionized particles: temperature, wind, and chemical composition. These instruments also measured parameters such as magnetic field strength and precipitating ions. Earlier similar experiments have only measured these quantities in isolation.

Dissipation (Benna) Facts

LAUNCH VEHICLE:

Terrier Black Brant – Orioles II

WALLOPS ID:

NRO-6107

LOCATION:

PFRR AML Pad 3

LAUNCH DATE:

November 7, 2023

Beam-PIE (Reeves) 52.009

Beam-PIE/Reeves launched a four-stage sounding rocket on November 8, 2023, carrying instruments for the Beam-Plasma Interactions Experiment (Beam-PIE), which involved generation of very low frequency (VLF) radio waves using a pulsed electron beam. The goal was to cause charged particles to rain down from Space along Earth's magnetic field lines and into the upper atmosphere. Such a process might someday help to remove charged particles from Space after a nuclear explosion.

The purpose of Beam-PIE was to use an electron beam to generate the VLF radio waves, detect the resulting radio waves using electric field antennas on a separate receiver payload, and to measure ambient plasma conditions and dependence of waves on those conditions. This mission also intended to measure any possible effects of the waves on local plasma electrons and detect the effects of the beam on the atmosphere using optical and radar measurements.

Beam-PIE (Reeves) Facts

LAUNCH VEHICLE:
Terrier Black Brant XIIA

WALLOPS ID:
NRO-6080

LOCATION:
PFRR Athena Pad 4

LAUNCH DATE:
November 8, 2023

STEM ENGAGEMENT & PUBLIC OUTREACH

Every year, the Range and Mission Management Office supports the NASA Sounding Rockets Program Office (SRPO) STEM Engagement and Public Outreach by providing Range services for multiple student-driven launches. RMMO supports SRPO and its students in STEM programs – Science, Technology, Engineering, and Math – with the idea that fostering this coursework and allowing them to launch their team-developed payloads into the near-space environment will give them insight into practical space science and perhaps inspire them to someday bring their talents to NASA.

Intern Test Rockets

Throughout 2023, WFF hosted five student interns from high schools and universities across the country, allowing them the opportunity to contribute to NASA's mission of advancing science, technology, aeronautics, and space exploration. NASA internships at Wallops provide students with training, mentoring, and career development opportunities while getting to work side-by-side with a NASA mentor.

During the summer intern session, RMMO conducted MK 40 MOD 3, or "Test Rocket", Launch Operations. The purpose of these launch events was to provide a low-cost and low-pressure training situation for our radar operators to maintain tracking proficiencies. The test rocket launches were assigned to be managed by an RMMO intern while allowing valuable shadowing opportunities for the RMMO Ground Operations interns, who were stationed in Blockhouse 2 with the Launch Pad Manager and Launch Control. This mission walked through the RMMO process, holding multiple reviews to include an Authority to Proceed with the Chief of the Range, Jeff Reddish. Documentation formulated as a part of this mission included an Operations Directive and Countdown. Team arrived at T-1 hour (1200L) on July 17, 2023, and successfully launched three Test Rockets during the launch window of 1200-1700L.

Intern Test Rocket Facts

LAUNCH VEHICLE:
Test Rockets

WALLOPS ID:
NRW-6322/6323/6324/6325

LOCATION:
WFF

LAUNCH DATE:
July 17, 2023

RockOn! & RockSat-X

The 2023 RockOn! and RockSat-X Missions were a continuation of the successful Sounding Rocket Workshops held at Wallops every summer. These workshops represent the collaborative efforts between the Colorado Space Grant Consortium, Virginia Space Grant Consortium, and Wallops Flight Facility while exposing the next generation of scientists and engineers to the world of rocketry and space experimentation.

Participating students are presented with a rare and exciting opportunity to conduct work on a payload, then launch the payload into space. These student-based workshops aim to inspire young learners to one day become a part of the NASA workforce.

RockOn! is a hands-on team experience that teaches participants how to create a sounding rocket experiment from scratch over the course of five days that will be launched into space on day six. The purpose of the workshop is to present collegiate educators and students with an introductory-level space flight opportunity. RockSat-X, a follow-up experience to RockOn!, allows for a space flight opportunity of increased complexity and exposes the students to the design and mission project lifecycle.

As with similar sounding rocket campaigns out of Wallops, the Research Range Services and Range and Mission Management Office teams supplied the pad launcher, communications, data processing, radar, telemetry, timing, optical tracking, payload recovery, surveillance, crane, weather services, project management, and more.

RockOn! & RockSat-X Participants – 2023

Students from the following colleges and universities took part in the 2023 RockOn! And RockSat-X workshops:

- Virginia Tech
- Northwest Nazarene University
- Community Colleges of Colorado
- University of Puerto Rico
- University of Kentucky
- West Virginia Space Collaboration:
  - West Virginia State University
  - West Virginia Wesleyan College
  - Blue Ridge Community and Technical College
  - West Virginia Institute of Technology

RockSat-X 2023

The RockSat-X student-based project was developed with the goal of providing an enhanced opportunity to fly an experiment that is exposed to the space environment. Students obtained meaningful, hands-on experience through designing, building, testing, and flying their experiments on a sub-orbital space flight while also gaining exposure to the design and mission project lifecycle. The RockSat-X mission supplied a fixed experiment interface for power and telemetry resources as well as physical space allotment, enabling a cost-effective, low program impact means to deliver a high-quality mission lifecycle experience to participants.

RockSat-X had liftoff at a T-0 of 10:21:00 UTC, but an anomaly occurred resulting in a loss of acquisition off the pad. The payload only reached a max altitude of approximately 17km and landed on the southern tip of Assateague Island, VA. Although the flight was an anomaly, the vehicle landed entirely within the hazard area. Thanks to the preventative actions and calculations of the team, all safety parameters were met. The launch team then gathered to discuss the path forward for RockOn! where it was decided to scrub the mission and release all assets aside from the ground ops team, who assisted in the removal of the vessel from the beach once it was declared safe to handle. The decision was made to continue into the RockOn! launch window on August 17th.

RockSat-X Facts

LAUNCH VEHICLE:
Terrier Mk-12 Improved Malemute

WALLOPS ID:
NRW-6260

LOCATION:
WFF Pad 2, 50k

LAUNCH DATE:
August 16, 2023

RockOn! 2023

Due to inclement weather, the initial RockOn! launch attempts in June of 2023 were scrubbed. As a result, the task order for RockSat-X was modified to combine launch efforts and events for both vehicles. The goal was to first attempt the launch of RockSat-X followed by a five-minute T-0 for the RockOn! attempt. The Terrier-Improved Orion Sounding Rocket carrying experiments for the RockOn! Mission successfully launched from NASA's Wallops Flight Facility on August 17, 2023, at 6:00 a.m. EDT. The launch carried experiments for four different programs: Cubes in Space, RockOn!, RockSat-C, and RockSat-X. The sounding rocket reached an altitude of 116.7km before descending back down into the Atlantic Ocean via parachute.

ROCKON! FACTS

LAUNCH VEHICLE:

Terrier Mk-12 Improved Orion

WALLOPS ID:

NRW-6259

LOCATION:

WFF Pad 2, MRL

LAUNCH DATE:

August 17, 2023

International Asteroid Day

The Wallops Visitor Center provides an enriching experience with interactive exhibits, inviting visitors to delve into the realms of aeronautics, engineering, earth sciences, sounding rockets, science balloons, NASA missions, and the rich history of Wallops. In addition to the captivating views of rocket launches from Wallops Island, the Visitor Center also offers a variety of public programs, virtual tours, educational programming, homeschool workshops, group tours, special events, and more.

On June 30, 2023, the Wallops Visitor Center hosted their second annual public event for International Asteroid Day, showcasing the historical and substantial impacts of asteroid events on Earth as well as the pivotal role they play in the formation of our solar system. Attendees were engaged through hands-on activities, interactive demonstrations, educational programs, and enlightening discussions with subject-matter experts like David Powers – the renowned scientist who discovered the Chesapeake Bay Impact Crater.

Virginia Space Coast Scholars (VSCS)

The Virginia Space Coast Scholars (VSCS) program is a partnership between the Virginia Space Grant Consortium, Wallops Flight Facility, and the Commonwealth of Virginia and features a two-part, STEM-focused program for high school sophomores that is integral to current missions at Wallops and the Mid-Atlantic Regional Spaceport (MARS). Throughout the school year, scholars complete five interactive online modules consisting of curriculum connecting STEM topics relating to orbital and suborbital science missions. Upon completion of the online program, top-performing scholars may be invited to attend one of three residential summer academies at Wallops where they will learn firsthand from NASA professionals and their partners about the latest, cutting-edge technologies and missions.

In 2023, over 300 students at Wallops designed an Expendable Mission Vehicles (ELVs) Mission based on a known WFF platform. RMMO Project Managers and Project Support Managers shared subject-matter expert knowledge with each ELV team to answer the scholars' questions, discuss the feasibility of their ideas, and help them develop a mission plan. Each team presented their ELV mission to the Wallops community on the last day of their visit.

RMMO's participation and support of the VSCS every summer continues to be a valuable opportunity to inspire our future workforce.

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