

National Aeronautics and Space Administration



Sounding Rockets Program Office Quarterly Newsletter

# ROCKET REPORT

 2020

The icon is a circle divided into four quadrants. The top-left quadrant contains the number 4, the top-right contains 1, the bottom-left contains 3, and the bottom-right contains 2. The top-right quadrant is highlighted in red.

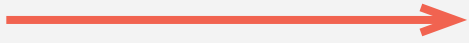


## INSIDE

- 3 Picture of the Quarter
- 4 Missions Flown
- 5 Picture Place
- 6 Integration and Testing
- 8 Education
- 9 From the Archives
- 10 Schedule & Miscellanea

Cover photo:  
36.356 UE Bailey launch from  
Poker Flat Research Range, AK.  
Photo by: Chris Perry/NASA

Sounding Rocket Office Chief, Giovanni Rosanova, showing his lassoing skills during an international conference on sub-orbital flight, at Esrange, Sweden in February. No reindeer were harmed during this team building exercise.





## Missions Flown

---

### 36.356 UE Bailey - PolarNOx January 27, 2020

The Aurora contributes to a process that has an adverse impact on the Earth's ozone as nitric oxide (NO) is created during the auroral light show.

The aurora creates NO, but in the polar night, unlike the sunlit atmosphere, there is no significant process for destroying the NO, and it may build up to large concentrations. The purpose of PolarNOx is to measure the abundance and especially the altitude of peak abundance for the NO.

NO under appropriate conditions can be transported to the stratosphere where it will catalytically destroy ozone. Those changes in ozone can lead to changes in stratospheric temperature and wind and may even impact the circulation near Earth's surface.

Data from PolarNOx will aid in the understanding of the abundance of NO in the polar atmosphere, and its impact on ozone.

PolarNOx observed starlight with a high spectral resolution UV spectrograph operating near 215 nanometers. Attenuation of the starlight by NO is used to obtain an NO altitude profile.



Image Credit: Chris Perry/NASA  
Payload pre-flight testing at Poker.

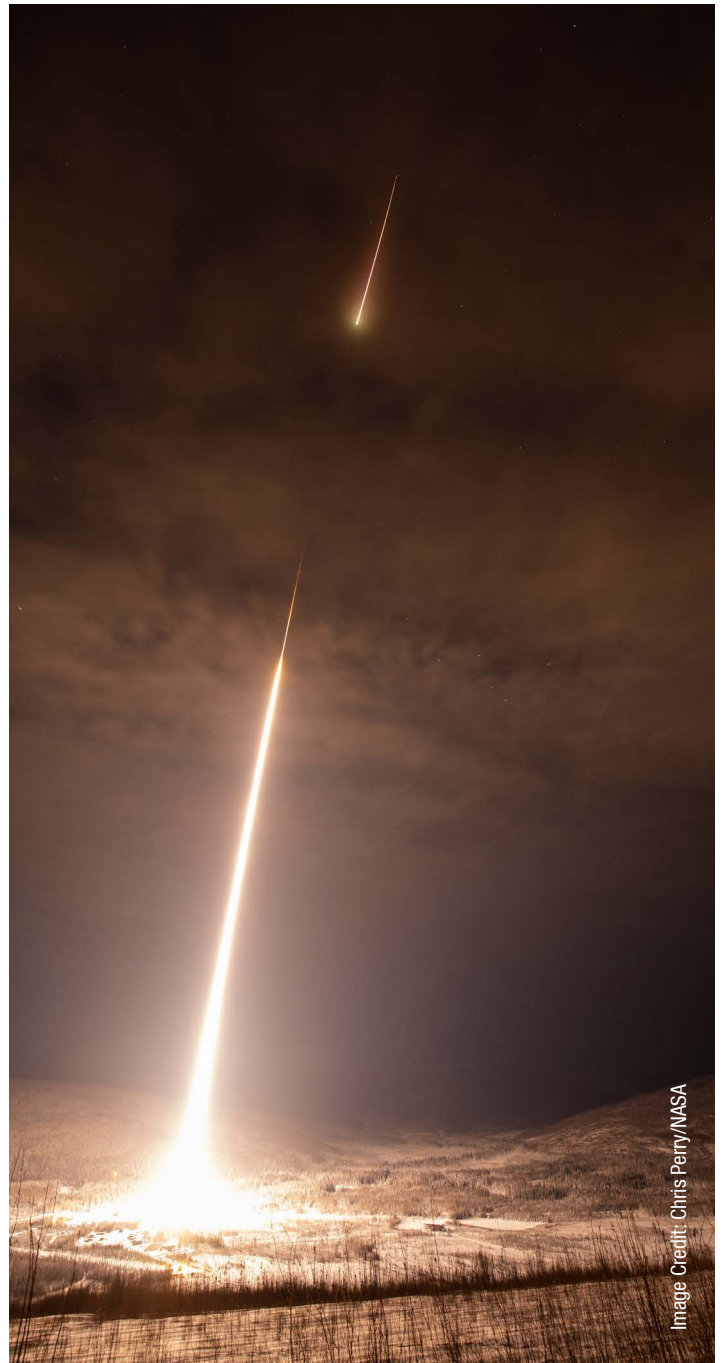
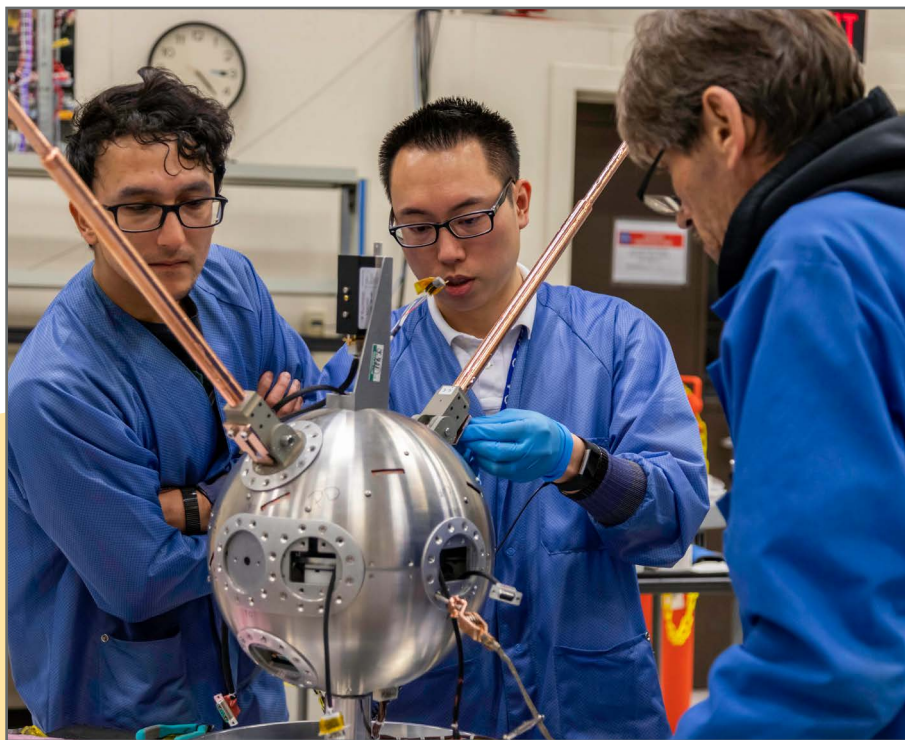
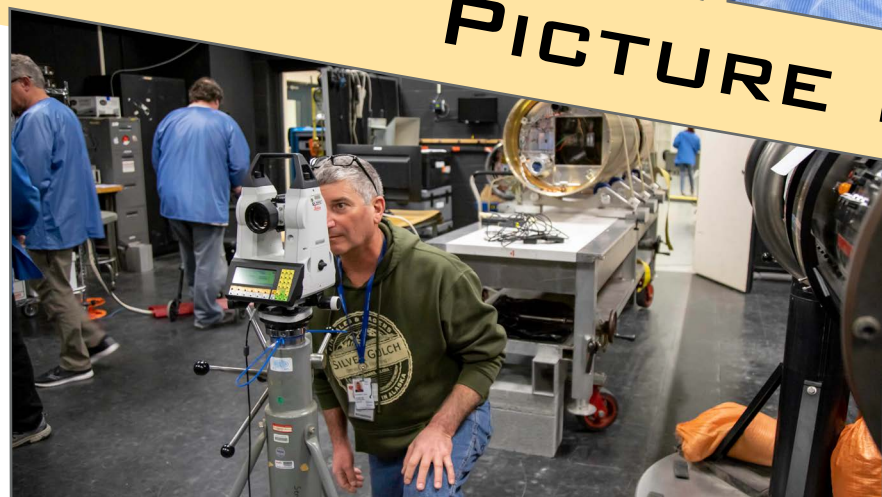


Image Credit: Chris Perry/NASA  
PolarNOx launches from Poker Flat Research Range, AK.



# PICTURE PLACE



COVID-19 has affected our operational status and all near-term launch dates are TBD.

## Integration and Testing



CIBER-2 in the cleanroom at Wallops during integration.

### 36.281 UG Zemcov/Rochester Institute of Technology - Cosmic Infrared Background Experiment (CIBER) 2

CIBER-2 is a near-infrared rocket-borne instrument designed to conduct comprehensive multi-band measurements of extragalactic background light (EBL) anisotropy on arcsecond to degree angular scales. CIBER-2 builds on the successful measurements and proven methodology of the predecessor, CIBER-1 instrument.

CIBER-2 will launch from White Sands Missile Range, NM. Date is TBD.

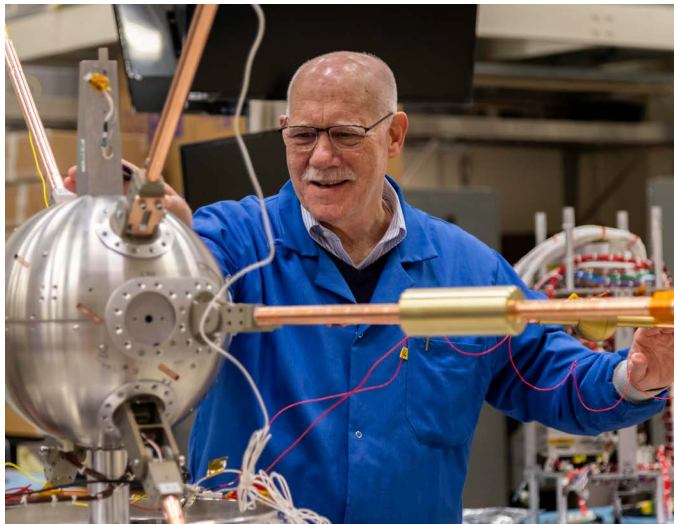
### 36.324 US Harris/University Of Arizona Tucson - Spatial Heterodyne Interferometric Emission Line Dynamics Spectrometer (SHIELDS)

The purpose of this mission is obtain a spatial map of scattered solar ultraviolet (UV) emission from interplanetary hydrogen (IPH) that has crossed, and been modified by, the ion pile-up along the outer edge of the heliosphere. The map will be constructed along multiple lines of sight over a  $30^\circ$  diameter region of the sky located near the location corresponding to the relative velocity vector between the Sun and the local interstellar medium (LISM).

SHIELDS will be launched from White Sands Missile Range, NM. Date is TBD.



SHIELDS team with experiment getting ready for Attitude Control System (ACS) testing at Wallops.



Dr. Pfaff, Principal Investigator, inspecting booms on one of the Goddard spheres that are part of the Daytime Dynamo payloads. Each payload carries a sphere sub-payload.

## 36.357 & 358 UE Pfaff/NASA Goddard Space Flight Center - Daytime Dynamo 2

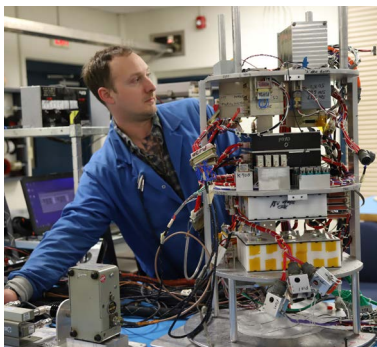
The mission, *Dynamos, Winds, and Electric Fields in the Daytime Lower Ionosphere*, will explore the ion-neutral coupling, winds, and electrodynamics that govern the global atmospheric dynamo which flows at the base of the daytime ionosphere during both quiet and disturbed conditions. Two *Terrier-Black Brant* vehicles carry identical payloads, one will be launched during quiet conditions, and the other during disturbed conditions.

The *Daytime Dynamo* mission is scheduled for launch from Wallops Island, VA. Date is TBD.

## 36.307 US Tun/Naval Research Laboratory - Helium Resonance Scatter in the Corona and Heliosphere (HERSCHEL) 2

The scientific objectives of the *HERSCHEL 2* mission are to:

- 1) Investigate the origin of the slow solar wind
- 2) Investigate the variation of helium abundance in the coronal structures (a) departures from primordial composition (b) fractionation region for helium in the solar atmosphere
- 3) Facilitate future investigation of Coronal Mass Ejections (CMEs), kinematics, and solar cycle evolution of the electron, proton, and helium corona



Rob with part of the *HERSCHEL* payload at Wallops.

*HERSCHEL* will be launched from White Sands Missile Range, NM. Date is TBD.

## 36.319 US Winebarger/NASA Marshall Space Flight Center - Marshall Grazing Incidence X-ray Spectrometer (MaGIXS)

The scientific goal of *MaGIXS* is to determine the frequency of heating in active region cores by making four critical observations.

1. The relative amount of high-temperature plasma in different solar structures
2. The elemental abundances in different solar structures
3. The temporal variability at high temperatures in different solar structures.
4. The likelihood of Maxwellian or non-Maxwellian distributions

*MaGIXS* will be launched from White Sands Missile Range, NM. Date is TBD.



John with part of the *MaGIXS* payload at Wallops.

COVID-19 has affected our operational status and all near-term launch dates are TBD.

# Student Flight Opportunities scheduled for 2020



Summertime means student flight opportunities will be in full swing at Wallops.

First off the pad will be the RockOn/RockSat-C payload, scheduled for launch from Wallops Island, VA. Date is TBD.

RockOn is a weeklong workshop for University students and faculty, offered by Colorado Space Grant in cooperation with the Sounding Rockets Program Office and Virginia Space Grant. RockOn serves as the basis for RockSat-C and RockSat-X and teaches the fundamentals of developing experiments for space flight.



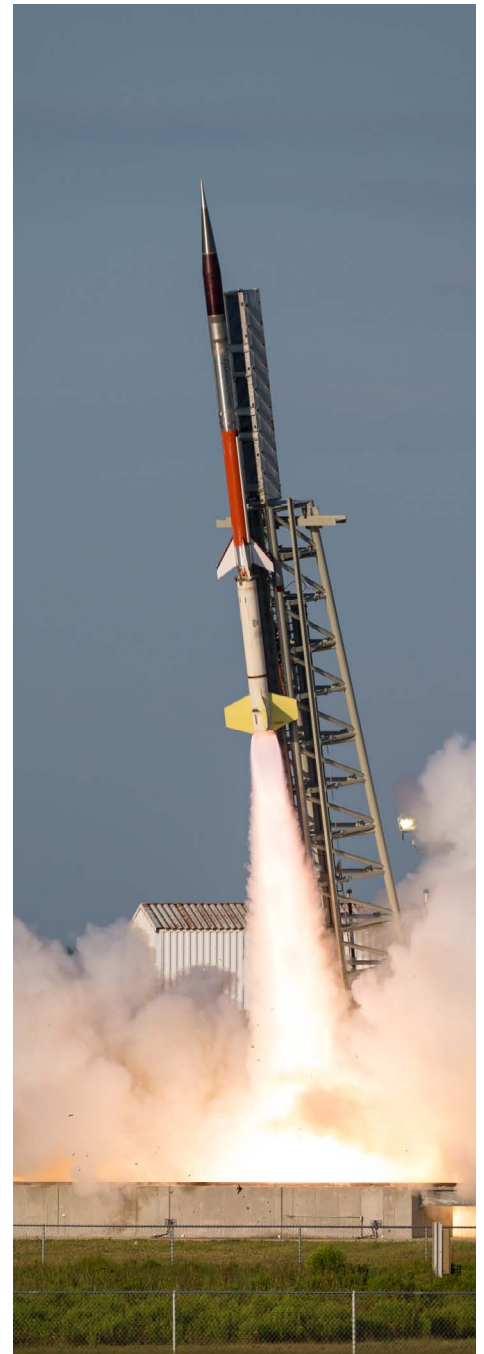
RockSat-X is the most advanced student flight opportunity. For this opportunity students conceive their own experiment, and are responsible for design and fabrication of both software and hardware. The payload has eight experiment sections and provides access to the space environment by deploying the skin. Additionally, telemetry, recovery, and attitude control are provided for the experiments. Launch date for RockSat-X is TBD.

For more information about how to get involved, visit:

[RockOn – https://spacegrant.colorado.edu/national-programs/rockon-home](https://spacegrant.colorado.edu/national-programs/rockon-home)

[RockSat-C – https://spacegrant.colorado.edu/national-programs/rs-c-home](https://spacegrant.colorado.edu/national-programs/rs-c-home)

[RockSat-X – https://spacegrant.colorado.edu/national-programs/rs-x-home](https://spacegrant.colorado.edu/national-programs/rs-x-home)





## From the Archives: Solar Eclipse 1966

We received the following email from Gustavo Balbela in Brazil: *“My name is Gustavo Balbela, I’m a industrial designer and visual artist based in Porto Alegre, Brazil.*

*185 miles south of where I live is the small port city of Rio Grande, in an eclipse night in 1968 NASA conducted a Sounding Rockets’ program flight. The event had national attention, as near the apex of the space race hundreds of spectators watched the launch of 22 rockets in Cassino beach.*

*Today, my friend Marco Antonio Filho and I are developing an artistic research to explore the event that somehow put such a small town in the map of space exploration and that is - up until this day - deeply embedded in the collective memory of the town.*

*If you could help me to find material (technical drawings, schematics, photographs, videos) about that event, or about the Sounding Rockets program in general, it would be amazing.”*

Our launch history database did not show any launches matching Gustavo’s description for 1968, however, further investigation revealed that in 1966, NASA Sounding Rockets were part of a larger campaign to study the Solar Eclipse on November 12 of that year. Sounding Rockets Program Office records show that five Nike–Apache rockets were flown (14.077, 14.274, 14.302, 14.303, and 14.304) from Cassino, Brazil. Additional sounding rockets included five Nike–Javelins

for Defense Atomic Support Agency (DASA), two Nike–Tomahawks for Sandia, and three Nike–Hydacs for Air Force Cambridge Research Laboratory (AFCRL).

Over 400 scientists from 14 countries participated in the various aspects of the campaign. In addition to sounding rockets, three aircraft, provided by the United States Atomic Energy Commission, and NASA’s Convair 990A, the Nimbus satellite, and the Gemini 12 spacecraft, gathered data during the eclipse.

In a paper published in 1968 in the Journal of Atmospheric and Terrestrial Physics, L.G. Smith, GCA Corporation, the Principal Investigator for the Nike–Apache payloads, stated:

*“Flights in Brazil during and following the solar eclipse of 12 November 1966 show that the electron temperature below 150 km remained constant; at greater heights a change of temperature was found, amounting to 300°K at 190 km. This supports the view that solar radiation does not directly determine the electron temperature of the E-region. Electron temperatures are always found to be greater than the neutral gas temperature and, at a given altitude, the difference increases with increasing sunspot number.”*



COVID-19 has affected our operational status and all near-term launch dates are TBD.

MISSION	DISCIPLINE	EXPERIMENTER	ORGANIZATION	PROJECT	RANGE	DATE
36.322 GS	SOLAR & HELIOSPHERIC	DAW	NASA/GSFC	EUNIS	WS	TBD
36.319 NS	SOLAR & HELIOSPHERIC	WINEBARGER	NASA/MSFC	MaGIXS	WS	TBD
41.130 UO	STUDENT OUTREACH	KOEHLER	COLORADO SPACE GRANT	ROCKON	WI	TBD

MISCELLANEA

## For students

## **SOUNDING ROCKET'S WORD SEARCH!**

Find these words in the puzzle:

- TRAJECTORY
- SCIENTIST
- NOSECONE
- ENGINEER
- ALTITUDE
- PAYLOAD
- ECLIPSE
- WALLOPS
- ROCKET
- APOGEE
- AURORA
- MOTOR
- FIN
- SUN

```

M O T O R J X F P D E Q L E Q F V G
N K C N B M G N W J N K S S T T P B
E K T S X R R J P S G A C U C R A D
W C A R O C K E T J I K I N L A U W
G R L L P E T T H X N P E Z K J R A
U M A I T A U K V S E S N A P E O L
R S H N P I Y O M N E G T P E C R L
A A T B K S T L R D R R I O F T A O
K Q Y H Y K E U O X A G S G M O X P
R F I N P W I H D A W X T E F R Z S
U P R R G N C W P E D C O E U Y Z C
N C M I T F N O S E C O N E Q B Z V
    
```

Answers in the next issue of the Rocket Report!