

National Aeronautics and Space Administration

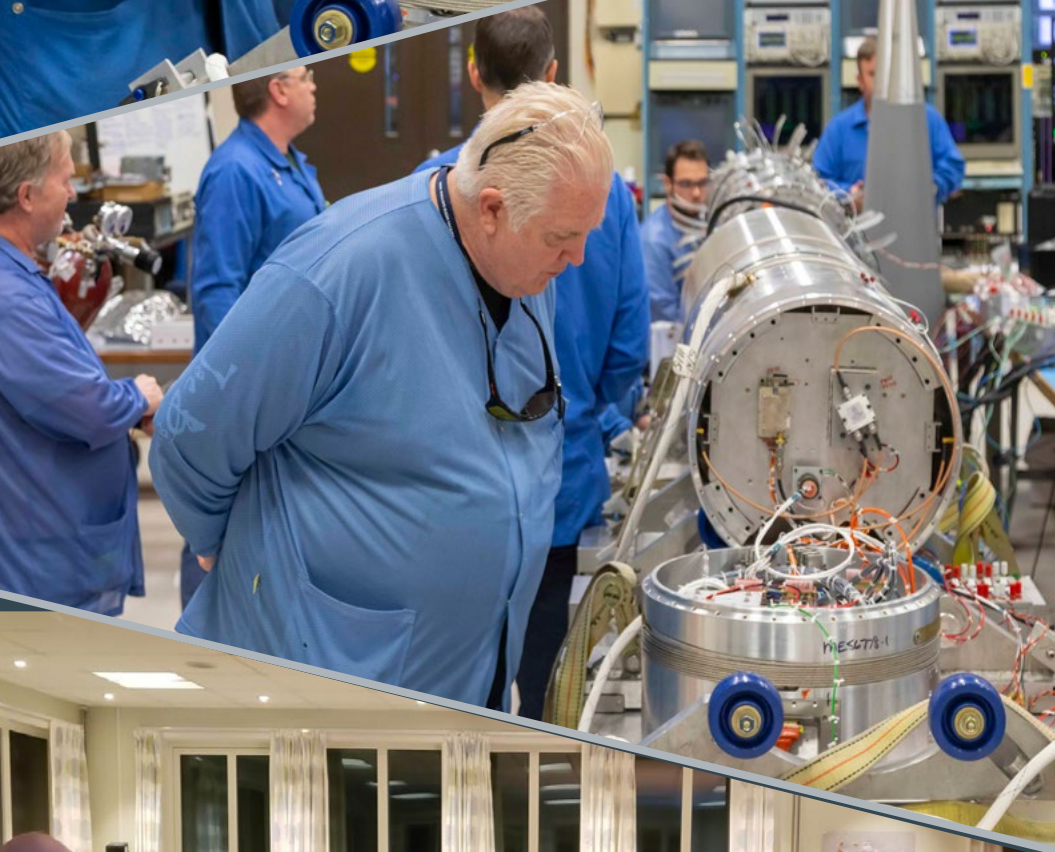


Sounding Rockets Program Office Quarterly Newsletter

ROCKET REPORT

 2022

The icon is a circle divided into four quadrants containing the numbers 4, 1, 3, and 2 in a clockwise sequence starting from the top-left.



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Cover photo:
Composite image of Bounds 36.357 &
36.358 launching from Andoya, Norway.
Credit: NASA Photo/Lee Wingfield

Top & Middle photo: VortEx integration.
Bottom: Thanksgiving feast at Andoya
Space, Andenes, Norway.

Aurora over Andoya Space, Andenes, Nor-
way with the Bounds vehicles on the pad.
Credit: NASA Photo/Lee Wingfield

PICTURE OF THE QUARTER



Program News

The Aurora Current and Electrodynamics Structures II (ACES II) mission, with two Terrier–Black Brant vehicles and payloads, was launched from Andoya Space, Andenes, Norway. Dr. Scott Bounds, University of Iowa, was the Principal Investigator.

A total of 17 rockets, from five different launch sites and covering six disciplines, were launched Calendar Year (CY) 2022.

Thirty (30) launches are currently on schedule for CY 2023, and we're looking at a busy year!

Among next year's launches are two mesospheric vehicle development flights using single stage Orion motors with small payloads.

The Sub–TEC 9 flight is scheduled for March 2023 and will test technologies developed in–house, as well as, external piggy–back experiments.

Dr. Lemacher, Clemson University, will fly two dual rocket salvos from Norway to study nonlinear gravity wave (GW) interactions in the upper mesosphere and lower thermosphere (MLT), and the formation of vortices and stratified turbulence (ST). The salvos, each with one Black Brant IX and one Terrier–Improve Orion, will be launched from Andoya Space in February.

Additionally, Astrophysics, Solar Physics, several Geospace Science flights, and Student Outreach missions are on schedule for 2023.

For students interested in sounding rocket flight opportunities, please see: <https://www.nasa.gov/sounding-rockets/rocksat-programs>.

The RockOn applications open on January 23, 2023. To apply go to: <https://www.nasa.gov/sounding-rockets/rocksat-programs/rockon>



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36.359 & 36.364 UE Bounds/University of Iowa - Aurora
Current and Electrodynamics Structures- II (ACES II) -
launched November 20, 2022

Missions Flown

The purpose of the Aurora Current and Electrodynamics Structures II (ACES II) mission was to:

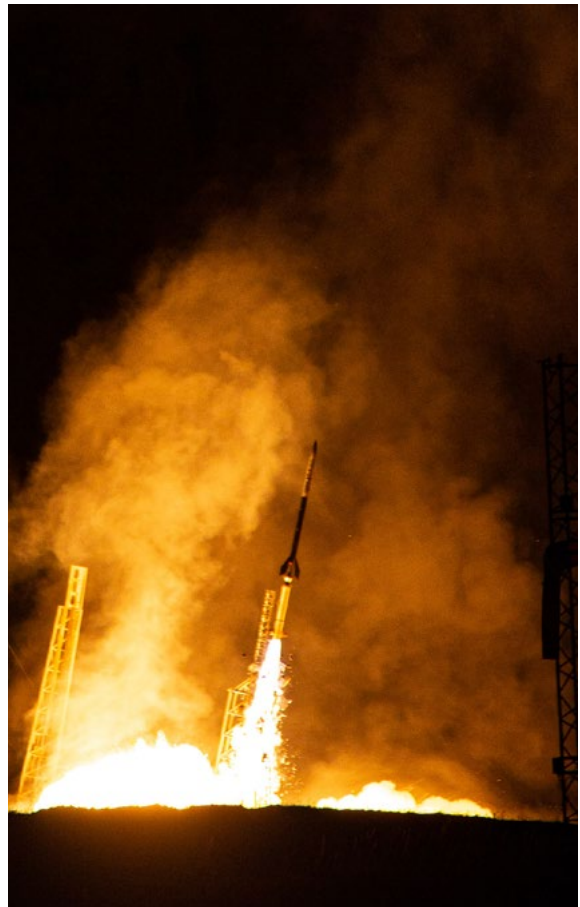
- Determine the distribution of the ionospheric currents and the associated energy dissipation in a stable arc.
- Determine the role of the Alfvén resonator in governing the structuring of current closure.

ACES II was designed to take a “snapshot” of the complete auroral current at one moment in time. ACES II included two Terrier–Black Brant rockets and payloads; a “high–flyer” that measured particles flowing in and out of our atmosphere, and a “low–flyer” that, at the same time, measured the dynamic exchange in the ionosphere that keeps the auroral current flowing.

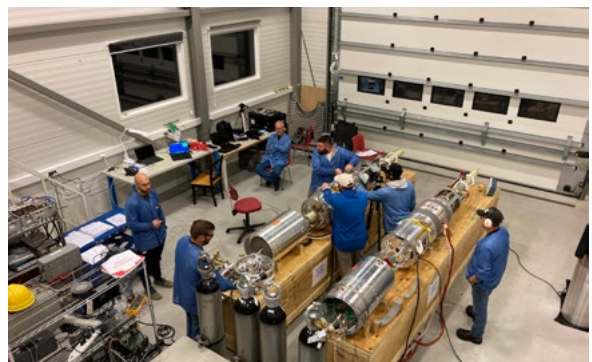
The high–flyer, 36.359, was launched first and reached an altitude of about 406 km, followed by the low–flyer, 36.364, about two minutes later, reaching an altitude of about 108 km.



One of the ACES payloads on the spin–balance table at Wallops.
Credit: NASA Photo/Berit Bland



36.364 UE Bounds/ACES 2 launching from Andoya Space, Norway.
Credit: NASA Photo/Lee Wingfield



ACES–2, 36.359 Sequence testing at Andoya.
Credit: NASA Photo/Lee Wingfield.



PICTURE PLACE



Integration and Testing

36.383 UG Zemcov/RIT - Cosmic Infrared Background Experiment (CIBER) 2

CIBER-2 is specifically designed to help disentangle the reionization signal from emission from sources at lower wavelength. One of the primary CIBER results has been unexpectedly bright large-angle fluctuations at wavelengths of 1.1 and 1.6 microns, which may be identified with stars flung outside of galaxies or other new populations that result from large-scale structure formation. The CIBER-2 data set will give us our most complete view of the near-IR background to date.



CIBER-2 pre-integration at Wallops.
Photo by Berit Bland/NSROC



VortEx Integration at Wallops.
Photo by Berit Bland/NSROC

36.361, 36.362, 41.127 and 41.128 UE Lehmacher/Clemson University - Vorticity Experiment (VortEx)

Testing and Integration continued for the VortEx payloads. The purpose of the Vorticity Experiment (VortEx) is to characterize mesoscale dynamics (10–500 km) in the upper mesosphere and lower thermosphere (90–120 km), a region which also contains the Earth's turbopause. Rocket and ground-based measurements will be combined to distinguish between divergence in the horizontal flow field and divergent motions, such as gravity waves, and vorticity in the horizontal flow field and vortical motions, such as expected to occur in quasi-stratified mesoscale turbulence. These processes are crucial for a better description of subgrid processes and eddy diffusion in global atmospheric models. The complete experiment is comprised of two identical salvos, each with two rockets.



Project CENTAUR Cape Parry - 1981

Project CENTAUR Cape Parry, NWT, Canada – 1981

In 1981 NASA launched three sounding rockets from Cape Parry, Northwest Territories, Canada¹. Additionally, two Canadian rockets were launched. This was the second campaign from the site, the first included three Nike–Tomahawks in 1969. The launches were part of the Cleft Energetics Transport and Ultraviolet Radiation campaign, or CENTAUR.

Cape Parry was a Distant Early Warning (DEW) Line site along the DEW–Line in the Arctic². The North Warning System replaced the DEW–Line system in the late 1980's.

The NASA launches in 1981 included the first two operational Black Brant X vehicles (35.001 & 35.002), and one Terrier–Malemute. The Principal Investigators were Winningham/Southwest Research Institute, Black Brants and Christensen/Aerospace Corporation, Terrier Malemute. The National Research Council of Canada (NRCC) launched two Black Brant IVB rockets.

The Terrier Malemute scientific payload was instrumented with optical sensors to make spectrophotometric measurements of far and extreme ultraviolet radiations from very soft particle precipitation in the cleft.

The Black Brant X scientific payloads were instrumented with an array of sensors to measure magnetic fields, electric fields, electron densities, ion masses, soft particles, and high energy particles.



Two sounding rockets ready to launch at Cape Parry.

The Black Brant IVB scientific payloads were instrumented to measure energetic electron and ion distribution, electron/ion temperature, flux and spectrum of incoming electrons, electron and ion densities, and magnetic and field aligned currents.

In addition to the flight experiments, an extensive array of ground based instrumentation was installed near the launch site and near the Eskimo village of Sachs Harbour, Banks Island, about 130 miles to the north.

Past rocket campaigns, both by NASA and the NRCC, had left some infrastructure behind; a HAD launcher, a payload checkout building, and an operations center among them. Due to the larger rockets included in this campaign an additional launcher, MRL 7.5 and shelter, and a military canvas building for payload processing were installed. Other mobile support equipment



Vehicle shelters, Cape Parry.



Vehicle assembly building (left) and offices (right).

and facilities, such as, tracking and telemetry assets, and auxiliary generator were transported to the site for the campaign.

Personnel were housed in the existing DEW–Line facilities, as well as, temporary living quarters by converting three small storage buildings and a purchased wash trailer/lavatory.

Ref.

¹ Project Centaur report by W.A. Brence and James W. Hardin

² DEW–Line Adventures

SCHEDULE FOR NEXT
QUARTER

MISSION	DISCIPLINE	EXPERIMENTER	ORGANIZATION	PROJECT	RANGE	DATE
12.089 WT	TEST ROUND	EDWARDS	NASA/WFF	MesOrion	WI	02/09/23
12.090 WT	TEST ROUND	EDWARDS	NASA/WFF	MesOrion	WI	02/09/23
36.361 UE	GEOSPACE SCIENCES	LEMACHER	CLEMSON UNIV	VortEX	NOR	02/10/23
36.362 UE	GEOSPACE SCIENCES	LEMACHER	CLEMSON UNIV	VortEX	NOR	02/10/23
41.127 UE	GEOSPACE SCIENCES	LEMACHER	CLEMSON UNIV	VortEX	NOR	02/10/23
41.128 UE	GEOSPACE SCIENCES	LEMACHER	CLEMSON UNIV	VortEX	NOR	02/10/23
46.032 WT	TEST & SUPPORT	HESH	NASA WFF	SUBTEC 9	WI	03/13/23
36.391 DS	SOLAR & HELIOSPHERIC	TUN	NRL	HERSCHEL 2	WS	03/29/23

WI – Wallops Island, VA
 NOR – Andoya Space, Norway
 WS – White Sands Missile Range, NM

MISCELLANEA 

NSROC Halloween luncheon!

