

TROY TECHNICAL

# SPACE INDUSTRY WEEKLY REPORT

October 10 - October 16, 2026 | Issue 2026-W41

**Mission evidence, launch economics, resilient  
supply and regulatory access**

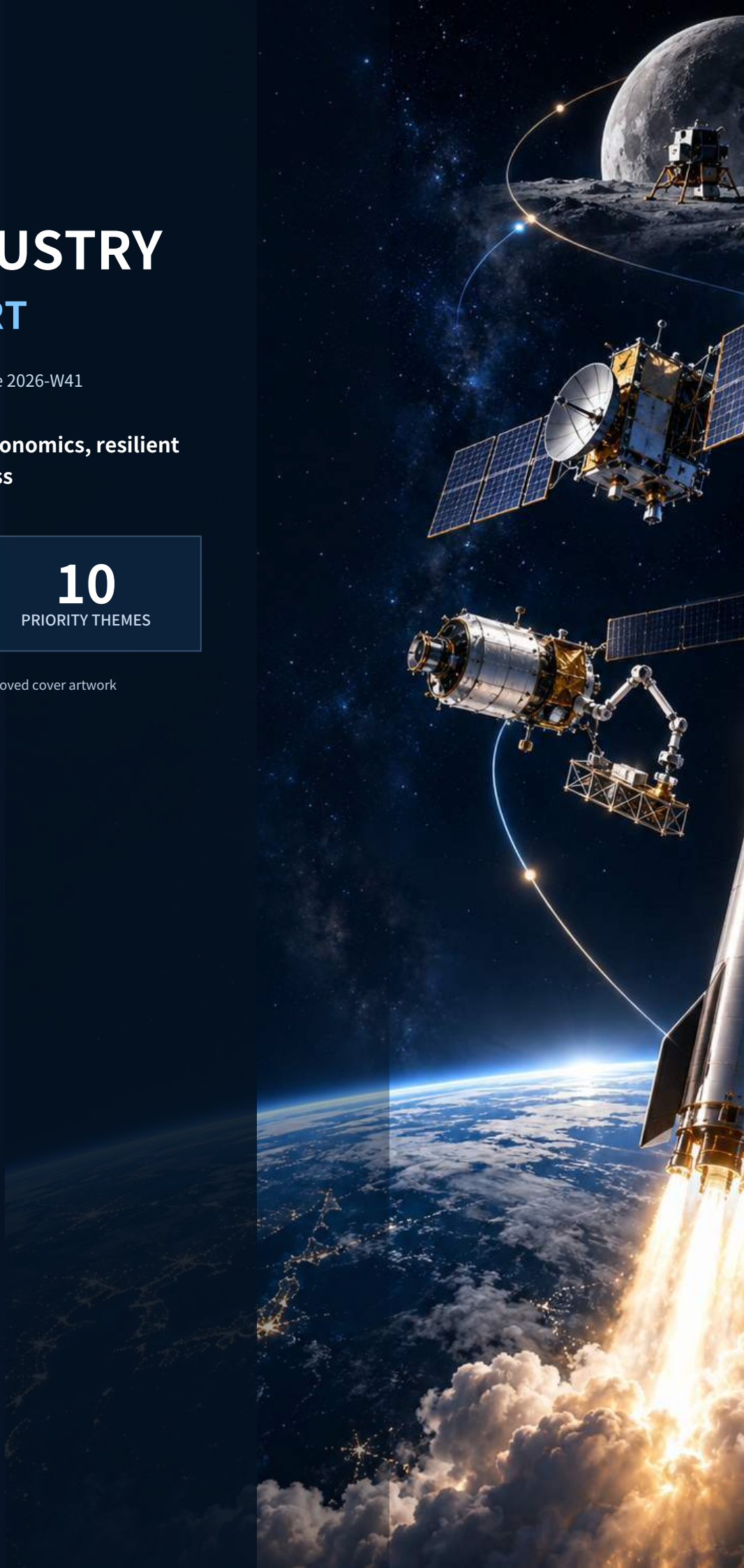
**10**

ANALYZED ARTICLES

**10**

PRIORITY THEMES

Issued 2026-10-16 | English edition | fixed approved cover artwork



# Space Industry: the boundary moved from isolated claims to qualification evidence

10 English articles were reviewed independently from the Japanese edition. Ten themes are retained for management decisions.

SIGNAL 01 | TECH / PROCESS

**KREPE-3: NASA's Next-Gen Heat Shield Material Testing Specs**

Primary-source report: NASA is testing 12 experimental capsules to evaluate next-generation thermal protection materials during atmospheric re-entry.

SIGNAL 02 | SYSTEM / ADOPTION

**Orion Heat Shield: Artemis II Performance Analysis and Specs**

Primary-source report: NASA's rigorous post-flight analysis of the Artemis II Orion spacecraft confirms the heat shield performed as expected, with char loss reduced by a factor of ten compared to Artemis I.

SIGNAL 03 | TECH / PROCESS

**Perseverance Rover: Off-World Distance Record and AutoNav Specs**

Primary-source report: NASA's Perseverance Mars rover set a new off-world distance record on October 11, 2026, reaching 28.10 miles (45.22 kilometers).

SIGNAL 04 | BUSINESS / RULES

**IROSAs: ISS power upgrade specs and 160kW capacity roadmap**

Primary-source report: NASA has augmented the International Space Station's power supply by installing eight International Space Station Roll Out Solar Arrays (IROSAs).

DECISION

**Focus this week's management attention on mission evidence, launch economics, resilient supply and regulatory access. Move only when the linked evidence can be reproduced under your own operating conditions.**

THREE MANAGEMENT MOVES

1. Buyers: separate announced missions from funded, licensed, launched and operational capability.
2. Suppliers: qualify components and services against mission environment, traceability and cadence.
3. Executives: track funding, licensing, launch date, on-orbit performance, capacity and insurance.

EVIDENCE DISCIPLINE

FACT states what the collected English source reports. BUSINESS READ and ACTION are editorial interpretations. UNKNOWN lists information that the source file does not establish. A linked article is not treated as independent confirmation of every claim.

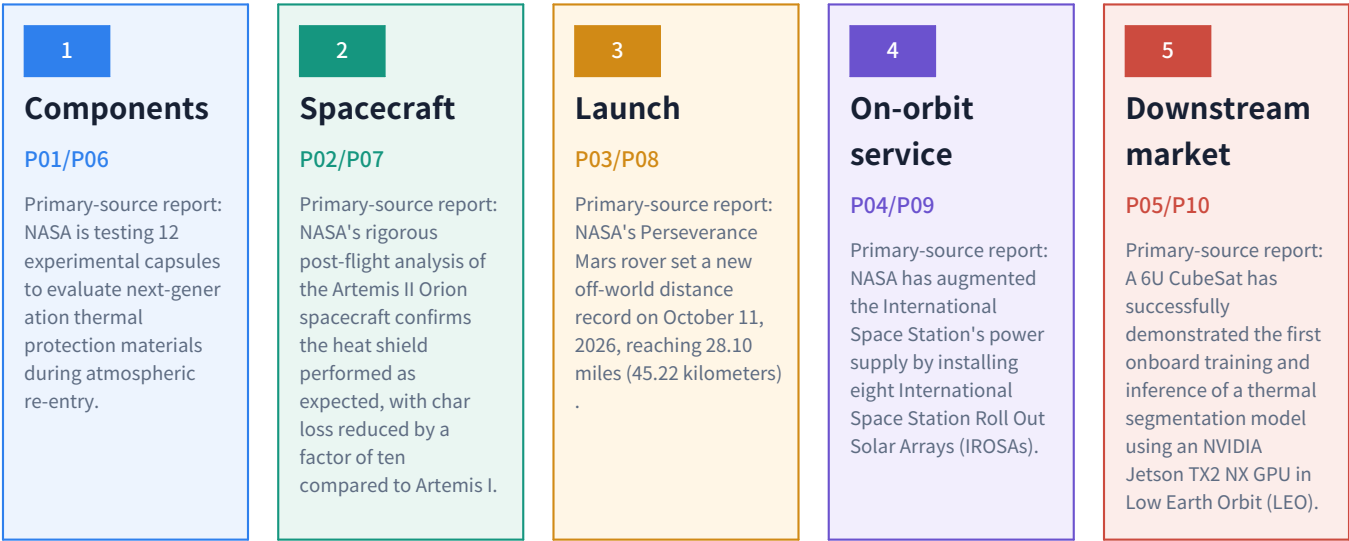
Five numbers or evidence anchors that require conditions

|                                       |                                                                                                                                                                                                                  |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div>12 capsules</div> <div>A01</div> | <div>SOURCE-BOUND CONDITION</div> <div>KREPE-3 thermal-protection flight tests</div>                                                                                                                             |
| <div>10x less</div> <div>A02</div>    | <div>SOURCE-BOUND CONDITION</div> <div>Artemis II char loss relative to Artemis I</div>                                                                                                                          |
| <div>45.22 km</div> <div>A10</div>    | <div>SOURCE-BOUND CONDITION</div> <div>Perseverance distance as of Oct 11, 2026</div>                                                                                                                            |
| <div>&gt;160 kW</div> <div>A08</div>  | <div>SOURCE-BOUND CONDITION</div> <div>ISS additional power from new arrays</div>                                                                                                                                |
| <div>OPEN</div> <div>A01</div>        | <div>SOURCE-BOUND CONDITION</div> <div>Application-specific remaining thickness and damage, reproducibility and deployment terms remain unproven. Published claims are not customer-qualified performance.</div> |

HOW TO USE THESE NUMBERS  
Each value is shown with the condition stated in the collected English article. Do not compare values across different test methods, device sizes, operating temperatures or commercial stages without normalizing those conditions.

## Where the value chain moved

Each stage combines one leading theme and one supporting theme. The report treats handoffs as evidence transfers, not decorative arrows.



### EVIDENCE REQUIRED AT EACH HANDOFF

|                                       |                                                                                                                                                                                 |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Components to Spacecraft              | Transfer test conditions, acceptance criteria, failure data, owner and decision date.<br>Recheck funding, licensing, launch date, on-orbit performance, capacity and insurance. |
| Spacecraft to Launch                  | Transfer test conditions, acceptance criteria, failure data, owner and decision date.<br>Recheck funding, licensing, launch date, on-orbit performance, capacity and insurance. |
| Launch to On-orbit service            | Transfer test conditions, acceptance criteria, failure data, owner and decision date.<br>Recheck funding, licensing, launch date, on-orbit performance, capacity and insurance. |
| On-orbit service to Downstream market | Transfer test conditions, acceptance criteria, failure data, owner and decision date.<br>Recheck funding, licensing, launch date, on-orbit performance, capacity and insurance. |

### COMMON CONTROL POINT

**No theme moves to a commercial commitment until a named owner has reproduced the relevant evidence and documented funding, licensing, launch date, on-orbit performance, capacity and insurance.**

Priority map: maturity and next decision locus



**REPRODUCIBLE POSITIONING RULE**  
Horizontal position uses five discrete stages: Research, Prototype, Joint evaluation, Product adoption and Scale. The vertical bands classify the next decision locus: Tech / process, System / adoption, or Business / rules (including supply systems). Article-title cues take precedence; the overview is used only when the title is silent. These are categories, not impact ranks. Bubble diameter reflects the editorial score.

For legibility, scores of 18 or below use an 18-pt bubble diameter; underlying scores are unchanged.

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P01

KREPE-3: NASA's Next-Gen Heat Shield Material Testing Specs

A01 | Tech / process | Prototype

2026-10-09

FACT

Primary-source report: NASA is testing 12 experimental capsules to evaluate next-generation thermal protection materials during atmospheric re-entry. By utilizing the disposal phase of a Northrop Grumman cargo resupply mission, the project gathers flight data on 3D-printed and flexible materials to enable future Moon and Mars missions.

WHY IT MATTERS

In practical terms, KREPE-3 needs separate tests of flight thermal response and remaining thickness and damage before the result becomes an adoption case.

BUSINESS READ

For KREPE-3, compare flight thermal response and remaining thickness and damage under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare KREPE-3 on flight thermal response against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific remaining thickness and damage, reproducibility and deployment terms remain unproven. Published claims are not customer-qualified performance.

EDITORIAL SCORE 17/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

P02

Orion Heat Shield: Artemis II Performance Analysis and Specs

A02 | System / adoption | Research

2026-10-15

FACT

Primary-source report: NASA's rigorous post-flight analysis of the Artemis II Orion spacecraft confirms the heat shield performed as expected, with char loss reduced by a factor of ten compared to Artemis I. This validation proves the effectiveness of trajectory modifications and ensures the system's robustness for future crewed lunar missions.

WHY IT MATTERS

In practical terms, Orion Heat Shield needs separate tests of flight thermal response and remaining thickness and damage before the result becomes an adoption case.

BUSINESS READ

For Orion Heat Shield, compare flight thermal response and remaining thickness and damage under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Orion Heat Shield on flight thermal response against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific remaining thickness and damage, reproducibility and deployment terms remain unproven. Published claims are not customer-qualified performance.

EDITORIAL SCORE 17/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P03

Perseverance Rover: Off-World Distance Record and AutoNav Specs

A10 | Tech / process | Research

2026-10-12

FACT

Primary-source report: NASA's Perseverance Mars rover set a new off-world distance record on October 11, 2026, reaching 28.10 miles (45.22 kilometers). This achievement was driven by advanced autonomous navigation (AutoNav), allowing the rover to explore ancient terrains more efficiently than previous missions.

WHY IT MATTERS

In practical terms, Perseverance Rover needs separate tests of thermal protection and radiation before the result becomes an adoption case.

BUSINESS READ

For Perseverance Rover, compare thermal protection and radiation under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Perseverance Rover on thermal protection against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific radiation, reproducibility and deployment terms remain unproven. Published claims are not customer-qualified performance.

EDITORIAL SCORE 17/25 | MATURITY 1/5 | DECISION LOCUS: TECH / PROCESS

P04

IROSAs: ISS power upgrade specs and 160kW capacity roadmap

A08 | Business / rules | Product adoption

2026-10-15

FACT

Primary-source report: NASA has augmented the International Space Station's power supply by installing eight International Space Station Roll Out Solar Arrays (IROSAs). These arrays increase total power by more than 160kW to support life support, daily operations, and deep space exploration research.

WHY IT MATTERS

In practical terms, IROSAs needs separate tests of thermal protection and radiation before the result becomes an adoption case.

BUSINESS READ

For IROSAs, compare thermal protection and radiation under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare IROSAs on thermal protection against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific radiation, reproducibility and deployment terms remain unproven. Published claims are not customer-qualified performance.

EDITORIAL SCORE 19/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P05

NVIDIA Jetson TX2 NX: Onboard GPU Training for CubeSat Control

A05 | System / adoption | Research

2026-10-13

FACT

Primary-source report: A 6U CubeSat has successfully demonstrated the first onboard training and inference of a thermal segmentation model using an NVIDIA Jetson TX2 NX GPU in Low Earth Orbit (LEO). The system achieved closed-loop attitude control to track the Moon, proving that COTS hardware and open-source software can enable autonomous spacecraft perception and action.

WHY IT MATTERS

In practical terms, NVIDIA Jetson TX2 NX needs separate tests of thermal protection and radiation before the result becomes an adoption case.

BUSINESS READ

For NVIDIA Jetson TX2 NX, compare thermal protection and radiation under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare NVIDIA Jetson TX2 NX on thermal protection against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific radiation, reproducibility and deployment terms remain unproven. Published claims are not customer-qualified performance.

EDITORIAL SCORE 17/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

P06

SwRI Solar Mapping: Improved SFT Model for Far-Side Activity

A03 | Tech / process | Prototype

2026-10-13

FACT

Collected report (not independently verified): A Southwest Research Institute (SwRI)-led team has developed an improved surface flux transport (SFT) model that incorporates probabilistic data from the far side of the Sun. By filtering out "ghost active regions" from helioseismic data, the framework provides a more accurate map of solar magnetic fields to improve space weather forecasting.

WHY IT MATTERS

In practical terms, SwRI Solar Mapping needs separate tests of thermal protection and radiation before the result becomes an adoption case.

BUSINESS READ

For SwRI Solar Mapping, compare thermal protection and radiation under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare SwRI Solar Mapping on thermal protection against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific radiation, reproducibility and deployment terms remain unproven. Confirm the original primary record.

EDITORIAL SCORE 15/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P07

Arabidopsis Spaceflight Study: Plant Biological Adaptation in 2024

A06 | System / adoption | Prototype

2026-10-15

FACT

Primary-source report: University of Florida researchers found that plants respond almost immediately to spaceflight, identifying over 1,200 genes that change activity during the transition from Earth to space. The study demonstrates that biological acclimation is a progressive process occurring across launch, microgravity, descent, and return.

WHY IT MATTERS

In practical terms, Arabidopsis Spaceflight Study needs separate tests of thermal protection and radiation before the result becomes an adoption case.

BUSINESS READ

For Arabidopsis Spaceflight Study, compare thermal protection and radiation under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Arabidopsis Spaceflight Study on thermal protection against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific radiation, reproducibility and deployment terms remain unproven. Published claims are not customer-qualified performance.

EDITORIAL SCORE 17/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

P08

Neuromorphic Satellite Intelligence: Energy-Accuracy Trade-offs

A07 | Tech / process | Research

2026-10-14

FACT

Primary-source report: A new formal framework for neuromorphic satellite computing demonstrates energy reductions of 8-47× compared to GPU baselines while maintaining inference accuracy within 2.1%. The research introduces spike-based algorithms and a quantitative Energy-Accuracy-Latency (EAL) trade-off surface to optimize onboard intelligence under strict power and radiation constraints.

WHY IT MATTERS

In practical terms, Neuromorphic Satellite Intelligence needs separate tests of thermal protection and radiation before the result becomes an adoption case.

BUSINESS READ

For Neuromorphic Satellite Intelligence, compare thermal protection and radiation under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Neuromorphic Satellite Intelligence on thermal protection against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific radiation, reproducibility and deployment terms remain unproven. Published claims are not customer-qualified performance.

EDITORIAL SCORE 17/25 | MATURITY 1/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P09

MMX Mission: Phobos Sample Return Timeline and PlanetVac Specs

A09 | System / adoption | Research

2026-10-14

FACT

Collected report (not independently verified): The Japan Aerospace Exploration Agency (JAXA) is scheduled to launch the Martian Moons eXploration (MMX) mission on October 19, 2026, to retrieve the first samples from Phobos. The spacecraft utilizes PlanetVac, a nitrogen-gas-based sampling technology funded by The Planetary Society, to enable low-cost and efficient material collection.

WHY IT MATTERS

In practical terms, MMX Mission needs separate tests of certified efficiency and area and damp-heat and light stability before the result becomes an adoption case.

BUSINESS READ

For MMX Mission, compare certified efficiency and area and damp-heat and light stability under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare MMX Mission on certified efficiency and area against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific damp-heat and light stability, reproducibility and deployment terms remain unproven. Confirm the original primary record.

EDITORIAL SCORE 15/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

P10

NASA SPEARS: Solid-State Lunar Battery Specs and Thermal Tests

A04 | Tech / process | Joint evaluation

2026-10-14

FACT

Collected report (not independently verified): NASA is developing solid-state batteries under the SPEARS project to withstand lunar temperature extremes, with prototypes operating down to -80°C. Testing confirms the cells sustain no damage across a range from 100°C to -170°C. This technology aims to reduce the need for heavy insulation and heaters in future lunar rovers and scientific instruments.

WHY IT MATTERS

In practical terms, NASA SPEARS needs separate tests of operating temperature and post-exposure recovery and heating before the result becomes an adoption case.

BUSINESS READ

For NASA SPEARS, compare operating temperature and post-exposure recovery and heating under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare NASA SPEARS on operating temperature against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific post-exposure recovery and heating, reproducibility and deployment terms remain unproven. Confirm the original primary record.

EDITORIAL SCORE 16/25 | MATURITY 3/5 | DECISION LOCUS: TECH / PROCESS

## Playbook and 0-5 year roadmap

| STAKEHOLDER                                   | NOW   0-30 DAYS                                                                        | NEXT   1-12 MONTHS                                                                  | LATER   1-5 YEARS                                                                   |
|-----------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Operating companies                           | separate announced missions from funded, licensed, launched and operational capability | Run production-like qualification with explicit acceptance and stop criteria.       | Build a portfolio and architecture that can absorb technology and supplier changes. |
| Materials, equipment and technology suppliers | qualify components and services against mission environment, traceability and cadence  | Create shared reliability, process-window and failure-analysis data with customers. | Standardize interfaces, traceability, lifecycle support and recovery services.      |
| Trading, investment and legal teams           | Map funding, licensing, launch date, on-orbit performance, capacity and insurance.     | Contract for capacity, quality, change notice, liability, alternatives and exit.    | Diversify regional, technical and customer concentration risk.                      |

### ROADMAP

|                                                                                                                               |                                                                                                                               |                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>NOW   0-30 DAYS</b><br><b>Evidence ledger</b><br>Owner: Strategy + quality<br>Deliverable: claim, source, condition, owner | <b>NOW   0-30 DAYS</b><br><b>Risk screen</b><br>Owner: Procurement + legal<br>Deliverable: unknowns, alternatives, stop       | <b>NEXT   1-12 MONTHS</b><br><b>Joint qualification</b><br>Owner: R&D + supplier<br>Deliverable: process window and failure data     |
| <b>NEXT   1-12 MONTHS</b><br><b>Commercial gate</b><br>Owner: Business + finance<br>Deliverable: unit economics and capacity  | <b>LATER   1-5 YEARS</b><br><b>Platform strategy</b><br>Owner: Executive team<br>Deliverable: portfolio and interface roadmap | <b>LATER   1-5 YEARS</b><br><b>Service layer</b><br>Owner: Operations + channel<br>Deliverable: monitoring, maintenance and recovery |

### GO / NO-GO GATES

| GATE           | OWNER      | REQUIRED EVIDENCE                               | NO-GO CONDITION                         |
|----------------|------------|-------------------------------------------------|-----------------------------------------|
| G1 Evidence    | Quality    | Source, test conditions and reproducibility     | No traceable evidence                   |
| G2 Integration | R&D        | Interface, process window and failure analysis  | Cannot meet system conditions           |
| G3 Commercial  | Business   | Capacity, total cost, contract and alternatives | Economics or supply cannot be supported |
| G4 Lifecycle   | Operations | Monitoring, maintenance, change notice and exit | No accountable operating plan           |

ANALYZED ARTICLES | ITEMS 01-10

Every title and URL is displayed in full. URLs wrap without shortening and remain clickable. A verified-reference label means the translated HTML did not retain its original source URL.

| ID  | FULL ARTICLE TITLE                                                 | FULL SOURCE / VERIFIED REFERENCE URL - CLICKABLE                                                                                                                                                                                                                                          |
|-----|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A01 | KREPE-3: NASA's Next-Gen Heat Shield Material Testing Specs        | <a href="https://www.nasa.gov/centers-and-facilities/ames/nasa-demonstrates-next-generation-heat-shield-technologies/">https://www.nasa.gov/centers-and-facilities/ames/nasa-demonstrates-next-generation-heat-shield-technologies/</a>                                                   |
| A02 | Orion Heat Shield: Artemis II Performance Analysis and Specs       | <a href="https://www.nasa.gov/missions/artemis/artemis-2/rigorous-analysis-confirms-nasas-artemis-ii-heat-shield-performance/">https://www.nasa.gov/missions/artemis/artemis-2/rigorous-analysis-confirms-nasas-artemis-ii-heat-shield-performance/</a>                                   |
| A03 | SwRI Solar Mapping: Improved SFT Model for Far-Side Activity       | <a href="https://www.swri.org/newsroom/press-releases/swri-led-team-develops-improved-model-mapping-the-sun">https://www.swri.org/newsroom/press-releases/swri-led-team-develops-improved-model-mapping-the-sun</a>                                                                       |
| A04 | NASA SPEARS: Solid-State Lunar Battery Specs and Thermal Tests     | <a href="https://www.itechpost.com/articles/237568/20261015/nasa-develops-solid-state-lunar-batteries-survive-moons-extreme-temperatures.htm">https://www.itechpost.com/articles/237568/20261015/nasa-develops-solid-state-lunar-batteries-survive-moons-extreme-temperatures.htm</a>     |
| A05 | NVIDIA Jetson TX2 NX: Onboard GPU Training for CubeSat Control     | <a href="https://arxiv.org/html/2610.19122v1">https://arxiv.org/html/2610.19122v1</a>                                                                                                                                                                                                     |
| A06 | Arabidopsis Spaceflight Study: Plant Biological Adaptation in 2024 | <a href="https://news.ufl.edu/2026/10/plant-response-microgravity/">https://news.ufl.edu/2026/10/plant-response-microgravity/</a>                                                                                                                                                         |
| A07 | Neuromorphic Satellite Intelligence: Energy-Accuracy Trade-offs    | <a href="https://arxiv.org/html/2610.12471v2">https://arxiv.org/html/2610.12471v2</a>                                                                                                                                                                                                     |
| A08 | IROSAs: ISS power upgrade specs and 160kW capacity roadmap         | <a href="https://www.nasa.gov/missions/station/iss-research/power-up-roll-out-solar-arrays-boost-space-station-power-supply/">https://www.nasa.gov/missions/station/iss-research/power-up-roll-out-solar-arrays-boost-space-station-power-supply/</a>                                     |
| A09 | MMX Mission: Phobos Sample Return Timeline and PlanetVac Specs     | <a href="https://www.planetary.org/articles/mars-moon-mission-set-to-launch-with-tech-funded-by-planetary-society-onboard">https://www.planetary.org/articles/mars-moon-mission-set-to-launch-with-tech-funded-by-planetary-society-onboard</a>                                           |
| A10 | Perseverance Rover: Off-World Distance Record and AutoNav Specs    | <a href="https://science.nasa.gov/blogs/perseverance-mars-rover/2026/10/12/nasas-perseverance-sets-off-world-record-for-total-distance-driven/">https://science.nasa.gov/blogs/perseverance-mars-rover/2026/10/12/nasas-perseverance-sets-off-world-record-for-total-distance-driven/</a> |

Scope: retrieving a source does not independently validate performance, cost or clinical utility. The claim ledger distinguishes announcements, papers and secondary reporting. Material published before the reporting week is continuing context, not a new event. Editorial inferences and actions are not investment or medical advice.

# SpaceIndustry — Selected Articles

Date: 2026-10-18

Articles: 10

# Table of Contents

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- #05 NVIDIA Jetson TX2 NX: Onboard GPU Training for CubeSat Control
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- #07 Neuromorphic Satellite Intelligence: Energy-Accuracy Trade-offs
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- #09 MMX Mission: Phobos Sample Return Timeline and PlanetVac Specs
- #10 Perseverance Rover: Off-World Distance Record and AutoNav Specs

# #01 KREPE-3: NASA's Next-Gen Heat Shield Material Testing Specs

Published October 09, 2026   NASA   USA



## OVERVIEW

NASA is testing 12 experimental capsules to evaluate next-generation thermal protection materials during atmospheric re-entry. By utilizing the disposal phase of a Northrop Grumman cargo resupply mission, the project gathers flight data on 3D-printed and flexible materials to enable future Moon and Mars missions.

### Key Findings

NASA has demonstrated a low-cost method for gathering flight data on thermal protection systems by deploying 12 small experimental capsules via a Northrop Grumman cargo resupply vehicle. The Kentucky Reentry Probe Experiment (KREPE-3) utilizes the final moments of a spacecraft's lifespan—specifically as it breaks apart in Earth's atmosphere—to test how various heat shield materials perform under real-world re-entry conditions.

### Technical Details

The capsules, designed by University of Kentucky students, are equipped with sensors to measure light, magnetic fields, motion, pressure, and temperature. The materials under evaluation include:

- **MERINO (Materials Engineered for Re-entry using Innovative Needling Operations):** A flexible, cost-effective material made of stitched carbon and phenolic fibers, optimized for the lower heat loads of Mars' thinner atmosphere.
- **3D-Printed Shields:** Developed via the Additive Manufacturing of Thermal Protective Systems project at NASA Johnson and Oak Ridge National Laboratory.
- **PICA (Phenolic Impregnated Carbon Ablator):** Tested on a capsule shaped like the Dragonfly mission's aeroshell for Titan.
- **Adaptable Deployable Entry and Placement Technology:** An umbrella-shaped deployable shield designed to increase surface area and slow descent for payloads larger than their launch rockets.
- **Dual-Cone Design:** The Kentucky Instrumented Conical Hypersonic Experiment combines a tungsten tip with carbon and heat-resistant plastic fibers and a MERINO-wrapped aft cone.

Additionally, a heat flux sensor from the University of Stuttgart is being used to measure heat movement across surfaces.

## Background & Context

KREPE-3 is a collaboration between the University of Kentucky, the state of Kentucky, NASA's Established Program to Stimulate Competitive Research (EPSCoR), and various federal and commercial partners. The experiment leverages the Cygnus XL spacecraft, which astronauts packed with waste before undocking from the International Space Station.

## Significance & Outlook

This "hitchhiking" approach allows NASA to validate computer models against real-world data rapidly and affordably. The results will inform the design of larger heat shields required to protect future crew and cargo missions to the Moon and Mars.

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Source: <https://www.nasa.gov/centers-and-facilities/ames/nasa-demonstrates-next-generation-heat-shield-technologies/>

Collected: October 17, 2026 | Automated Research System (AI)

# #02 Orion Heat Shield: Artemis II Performance Analysis and Specs

Published October 15, 2026   NASA   USA



## OVERVIEW

NASA's rigorous post-flight analysis of the Artemis II Orion spacecraft confirms the heat shield performed as expected, with char loss reduced by a factor of ten compared to Artemis I. This validation proves the effectiveness of trajectory modifications and ensures the system's robustness for future crewed lunar missions.

### Key Findings

Post-flight assessments of the Artemis II mission confirm that the Orion spacecraft's thermal protection system (TPS) functioned according to engineering predictions. Most notably, the number of char loss spots on the heat shield dish was reduced to nine, compared to 103 observed during Artemis I. This represents a ten-fold reduction in char loss and cracking, validating the agency's strategic trajectory modifications.

### Technical Details

The heat shield consists of 186 unique blocks of Avcoat, an ablative material. During reentry, Orion reached a maximum velocity of 39 times the speed of sound, with external temperatures exceeding 4,000 degrees Fahrenheit; however, internal cabin temperatures remained in the mid-70 degree Fahrenheit range. The spacecraft entered within 192 feet of its targeted entry interface and splashed down 0.59 miles from the predicted site off the coast of San Diego.

To mitigate the phenomena observed during Artemis I, NASA shortened the maximum downrange distance between atmospheric entry and splashdown. This limited the duration the heat shield spent in the critical temperature range. Additionally, the backshell—comprising 1,300 ceramic tiles—showed expected performance, with no signs of overheating at windows, vents, thrusters, or the side hatch.

### Background and Context

The analysis involved diver imagery, recovery ship inspections, and subsequent examinations at the Kennedy Space Center and Marshall Space Flight Center. Engineers utilized internal x-ray scans, sample extraction, and post-flight laser scans to determine material recession. These efforts were informed by prior arc jet material testing at the Ames Research Center.

## Significance and Outlook

The Artemis II data has led to design upgrades for Artemis III to ensure uniformity and consistent permeability of the Avcoat blocks. The Artemis III Orion crew module's heat shield was attached in early July, and the crew and service modules were joined by the end of July. NASA is now preparing for a mission in low Earth orbit featuring astronauts Randy Bresnik, Frank Rubio, Andre Douglas, and Luca Parmitano to demonstrate systems for future landings, starting with Artemis IV in 2028.

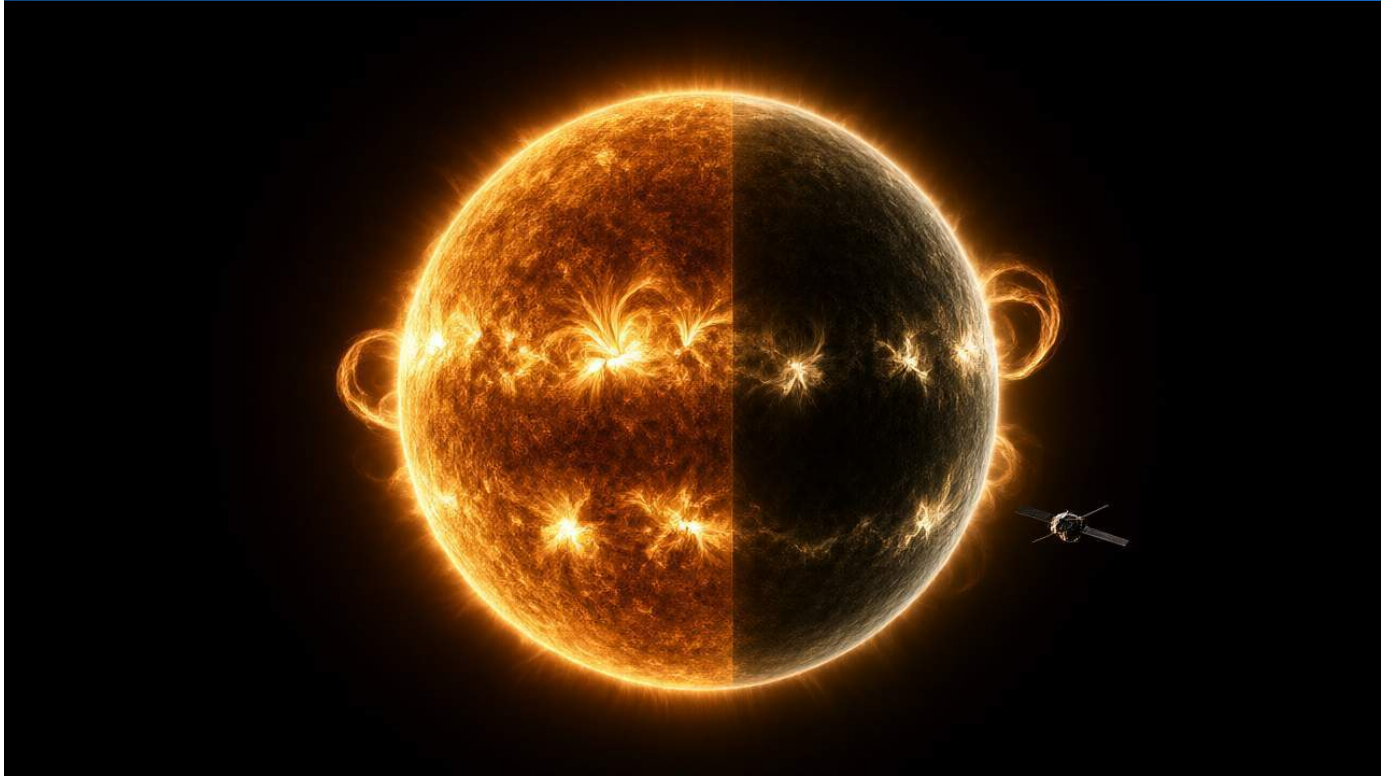
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Source: <https://www.nasa.gov/missions/artemis/artemis-2/rigorous-analysis-confirms-nasas-artemis-ii-heat-shield-performance/>

Collected: October 17, 2026 | Automated Research System (AI)

# #03 SwRI Solar Mapping: Improved SFT Model for Far-Side Activity

Published October 13, 2026    Southwest Research Institute (SwRI) / Innovation News Network  
USA



## OVERVIEW

A Southwest Research Institute (SwRI)-led team has developed an improved surface flux transport (SFT) model that incorporates probabilistic data from the far side of the Sun. By filtering out "ghost active regions" from helioseismic data, the framework provides a more accurate map of solar magnetic fields to improve space weather forecasting.

### Key Findings

A research team led by the Southwest Research Institute (SwRI) has created an improved model for predicting solar events by integrating activity from the far side of the Sun. The resulting framework constructs surface flux transport (SFT) models that are more complete and accurate than previous iterations. This model allows scientists to better monitor the Sun's magnetic field behavior and plot future solar cycles.

### Technical Details

The team developed the model by studying near-simultaneous maps of the entire solar surface from 2010 to 2014, combining Earth-based observations with data from space-based assets. A critical component of the new framework is the systematic evaluation of active regions identified via helioseismology—the use of acoustic waves to detect activity beneath the surface or on the far side.

To improve accuracy, the team implemented a probabilistic model to address "ghost active regions," which are false positives where acoustic data indicates activity that does not appear when the region rotates into view. By associating a probability with each far-side active region based on its properties, the model weeds out these errors before incorporating the data into the SFT models.

### Background & Context

Because the Sun rotates on its axis approximately every 27 days, half of its surface remains hidden from Earth at any given time. Previous SFT models were hampered by this lack of simultaneous far-side data; for example, sunspots would occasionally emerge unexpectedly from the far side, necessitating rapid recalculations. While helioseismology was introduced in the 1970s to mitigate this, the prevalence of ghost active regions continued to limit forecasting precision.

## Significance & Outlook

The new probabilistic framework provides a practical pathway for incorporating helioseismic data into SFT models, leading to more realistic modeling of both visible and invisible hemispheres. This advancement enhances the ability to forecast space weather that can impact Earth. The study, titled “A Probabilistic Framework for Incorporating Helioseismic Far-Side Active Regions into SFT Models,” was published in The Astrophysical Journal Supplement Series.

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Source: <https://www.swri.org/newsroom/press-releases/swri-led-team-develops-improved-model-mapping-the-sun>

Collected: October 17, 2026 | Automated Research System (AI)

## #04 NASA SPEARS: Solid-State Lunar Battery Specs and Thermal Tests

Published October 14, 2026   NASA / Phys.org / Facebook (NASA - Cosmos group)   USA



### OVERVIEW

NASA is developing solid-state batteries under the SPEARS project to withstand lunar temperature extremes, with prototypes operating down to  $-80^{\circ}\text{C}$ . Testing confirms the cells sustain no damage across a range from  $100^{\circ}\text{C}$  to  $-170^{\circ}\text{C}$ . This technology aims to reduce the need for heavy insulation and heaters in future lunar rovers and scientific instruments.

### Key Findings

NASA's Solid Power for Extreme Environment Adaptability and Resilience in Space (SPEARS) project has successfully demonstrated prototype battery cells that operate at temperatures as low as  $-80^{\circ}\text{C}$ . Thermal vacuum testing conducted at the Langley Research Center showed that while performance is reduced at  $-80^{\circ}\text{C}$ , the cells remain functional. Furthermore, the batteries sustained no physical damage when exposed to extreme temperature fluctuations ranging from  $100^{\circ}\text{C}$  to  $-170^{\circ}\text{C}$ .

### Technical Details

The SPEARS technology replaces conventional liquid electrolytes with solid materials, such as ceramic-based compounds, to transport ions between electrodes. This architecture addresses several failure points of standard lithium-ion batteries:

- **Cold Resistance:** Unlike liquid electrolytes that become less effective and slow electrochemical reactions in severe cold, solid materials do not freeze.
- **Heat Stability:** Solid-state designs mitigate unwanted chemical reactions and evaporation risks associated with volatile liquid components in a vacuum.
- **System Integration:** NASA is evaluating the entire cell design, including electrode materials and interfaces, as the electrolyte alone does not guarantee operation across all temperatures.

### Background and Context

Lunar environments present extreme thermal challenges, particularly at the South Pole where temperatures can drop to  $-200^{\circ}\text{C}$  at night and reach  $100^{\circ}\text{C}$  in sunlit areas. Conventional batteries struggle with these variations, often requiring bulky thermal management systems to maintain operating temperatures.

## Significance and Outlook

The development of these batteries is critical for equipment operating far from habitats or spacecraft. Potential applications include lunar rovers, astronaut emergency equipment, drills, and scientific instruments. By reducing the reliance on heaters and insulation, NASA can optimize the power and mass budgets of future lunar missions. Research continues at the Glenn Research Center and Langley Research Center to improve performance and extend the operational range of the cells.

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Source: <https://www.itechpost.com/articles/237568/20261015/nasa-develops-solid-state-lunar-batteries-survive-moons-extreme-temperatures.htm>

Collected: October 17, 2026 | Automated Research System (AI)

# #05 NVIDIA Jetson TX2 NX: Onboard GPU Training for CubeSat Control

Published October 13, 2026   arXiv (cs.RO)   International



## OVERVIEW

A 6U CubeSat has successfully demonstrated the first onboard training and inference of a thermal segmentation model using an NVIDIA Jetson TX2 NX GPU in Low Earth Orbit (LEO). The system achieved closed-loop attitude control to track the Moon, proving that COTS hardware and open-source software can enable autonomous spacecraft perception and action.

### Key Findings

Researchers have demonstrated a flight deployment on a 6U CubeSat that enables onboard training and inference of a thermal segmentation model. This marks the first time machine learning models have been trained on a GPU on a free-flying spacecraft, as previous space-based training relied on low-power CPUs or VPUs. The system was used to implement closed-loop attitude control, allowing the spacecraft to autonomously track the Moon using a real-time thermal image feed.

### Technical Details

The onboard compute architecture centers on the NVIDIA Jetson TX2 NX GPU. To manage data transport between the segmentation module and the bus avionics, the team deployed the Foxy distribution of the Robot Operating System (ROS 2). Additionally, the system integrates an open-source file system designed for self-healing and strong data integrity. Over approximately one year, the team conducted 12 experiments to validate the reliability of this pipeline under the environmental and compute constraints of LEO.

### Background & Context

Deep space missions face significant communication delays and bandwidth limitations, making human-in-the-loop operations impractical. While terrestrial robotics—such as those from Waymo and Tesla—tightly integrate perception models with control, spacecraft have historically relied on classical algorithms due to compute limitations. For instance, the Perseverance rover uses a RAD750 processor operating at 200 MHz with 256 MB of RAM. Recent shifts toward Commercial Off-The-Shelf (COTS) hardware, such as the Qualcomm Snapdragon 801 used in the Mars Helicopter, have paved the way for more complex onboard AI.

## Significance & Outlook

This demonstration proves that modern learning-based pipelines and COTS hardware can operate reliably in space. By integrating a vision segmentation model directly with the Attitude Determination and Control System (ADCS), the mission shows a path toward spacecraft that can perceive, learn from, and adapt to their environments autonomously. This capability is essential for future robotic exploration of environments far from Earth.

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Source: <https://arxiv.org/html/2610.19122v1>

Collected: October 17, 2026 | Automated Research System (AI)

# #06 Arabidopsis Spaceflight Study: Plant Biological Adaptation in 2024

Published October 15, 2026    University of Florida    USA



## OVERVIEW

University of Florida researchers found that plants respond almost immediately to spaceflight, identifying over 1,200 genes that change activity during the transition from Earth to space. The study demonstrates that biological acclimation is a progressive process occurring across launch, microgravity, descent, and return.

### Key Findings

Research conducted during a commercial suborbital mission reveals that plants begin biological adaptation almost immediately upon leaving Earth. Analysis identified more than 1,200 genes whose activity changed during the flight, with responses varying between roots and leaves and shifting across different phases of the mission. The data indicates that acclimation to spaceflight is not a single adjustment but a progressive process involving distinct responses during launch, entry into microgravity, descent, and return to Earth.

### Technical Details

The experiment utilized Arabidopsis plants housed in Kennedy Space Center Fixation Tubes, which preserve biological material at the moment of activation. During Blue Origin's New Shepard NS-26 flight on August 29, 2024, UF astronaut Rob Ferl activated the tubes at four specific points: prior to launch, upon reaching microgravity, at the end of the weightless period during descent, and upon landing. To ensure a controlled comparison, Jordan B. Callaham activated a corresponding set of control tubes on the ground at the same times.

### Background & Context

While previous research has focused on organisms spending days or months in space, this study targeted the first minutes of spaceflight. The project was led by Rob Ferl, Ph.D., and Anna-Lisa Paul, Ph.D., and funded by NASA's Flight Opportunities program with supplemental support from NASA Biological and Physical Sciences. The team applied proven orbital research technology to a suborbital environment to capture rapid biological changes.

## Significance & Outlook

The mission demonstrated that commercial suborbital spacecraft can serve as viable research platforms. Notably, the study proved that an academic researcher can personally conduct experiments in a "shirtsleeve" environment. By having the researcher in the loop rather than relying on automation, the team could verify preservative coverage and adjust tube movement to ensure rapid preservation, providing insights that are difficult to achieve via remote monitoring.

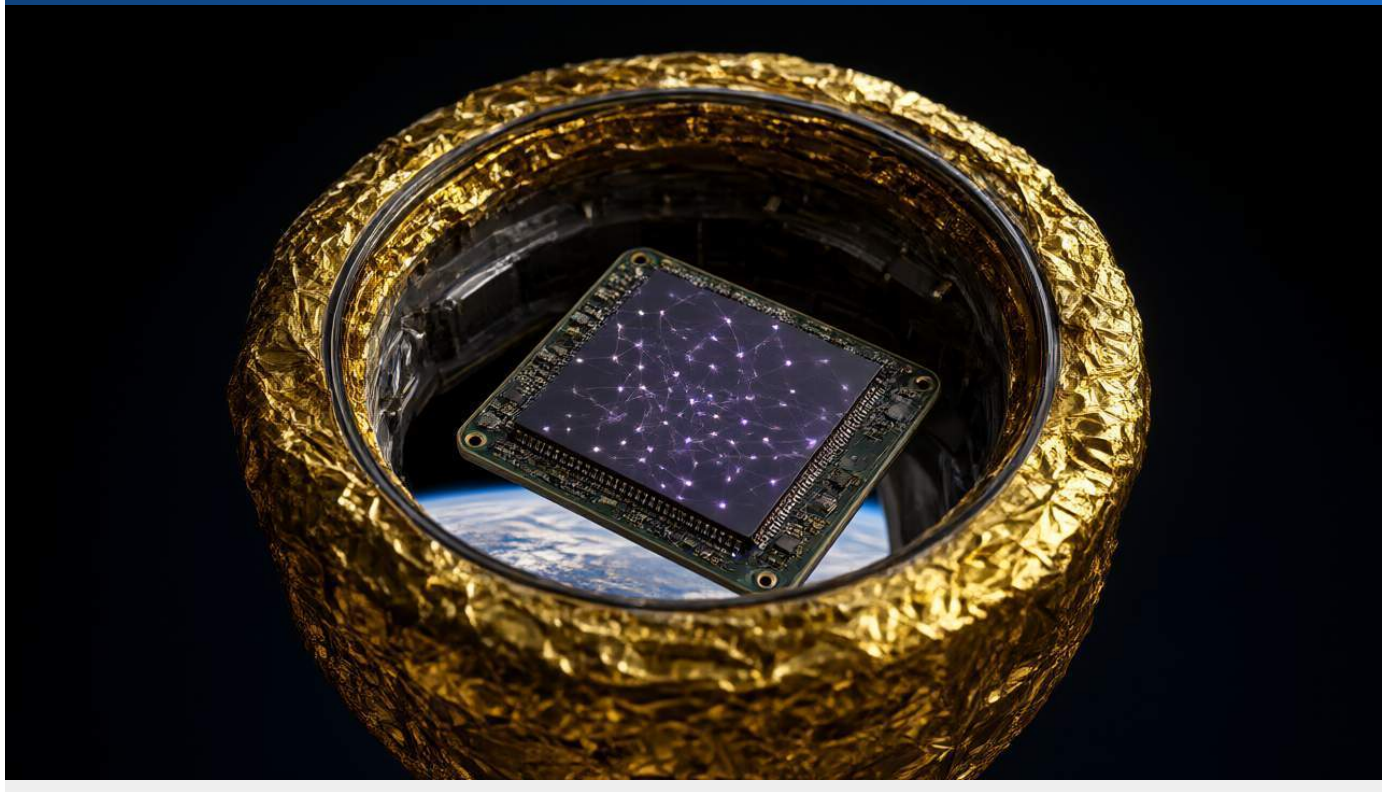
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Source: <https://news.ufl.edu/2026/10/plant-response-microgravity/>

Collected: October 17, 2026 | Automated Research System (AI)

# #07 Neuromorphic Satellite Intelligence: Energy-Accuracy Trade-offs

Published October 14, 2026   arXiv (cs.AR)   International



## OVERVIEW

A new formal framework for neuromorphic satellite computing demonstrates energy reductions of 8–47× compared to GPU baselines while maintaining inference accuracy within 2.1%. The research introduces spike-based algorithms and a quantitative Energy-Accuracy-Latency (EAL) trade-off surface to optimize onboard intelligence under strict power and radiation constraints.

### Key Findings

Neuromorphic implementations can achieve an 8–47× reduction in energy consumption over GPU baselines for representative satellite workloads, with a minimal impact on inference accuracy, which remains within 2.1%. The framework provides a closed-form energy model calibrated against silicon measurements from Loihi and SpiNNaker, enabling a quantitative comparison against FPGA and GPU architectures.

### Technical Details

The paper proposes three original neuromorphic algorithms designed for specific satellite functions: a Spiking Kalman-Complementary Filter (SKCF) for attitude estimation, a Temporal Contrast Anomaly Detector (TCAD) for spacecraft health monitoring, and a Spike-Based Adaptive Modulation and Coding (SAMC) scheme for cognitive satellite links. To address on-orbit learning, the authors formalize a constrained Spike-Timing Dependent Plasticity (STDP) rule that provably bounds weight drift.

The framework further introduces a radiation fault-rate model integrated into a taxonomy of four radiation-aware neuromorphic architecture classes. This is supported by a formal Energy-Accuracy-Latency (EAL) trade-off surface populated with numerical estimates from published silicon data.

### Background and Context

Conventional von Neumann architectures suffer from a data movement bottleneck, where 60–80% of total energy in a 10-layer convolutional network is spent transferring activations and weights between DRAM and compute units. For example, a ResNet-18 equivalent inference pass on a Jetson Nano costs roughly 400 mJ, which is untenable for a 3U CubeSat limited to 2 W total power. Neuromorphic computing mitigates this by co-locating memory and computation and using sparse binary spike events. Intel's Loihi 2, for instance, consumes 1–2 mW at biologically realistic firing rates.

## Significance and Outlook

The framework provides concrete design points for diverse mission classes, including 12U CubeSat Earth observation, GEO communications payloads, and autonomous deep-space probes. This is critical for platforms generating terabytes of imagery per orbit or probes operating beyond 2 AU, where round-trip light-times exceed 30 minutes and demand unsupervised hazard response.

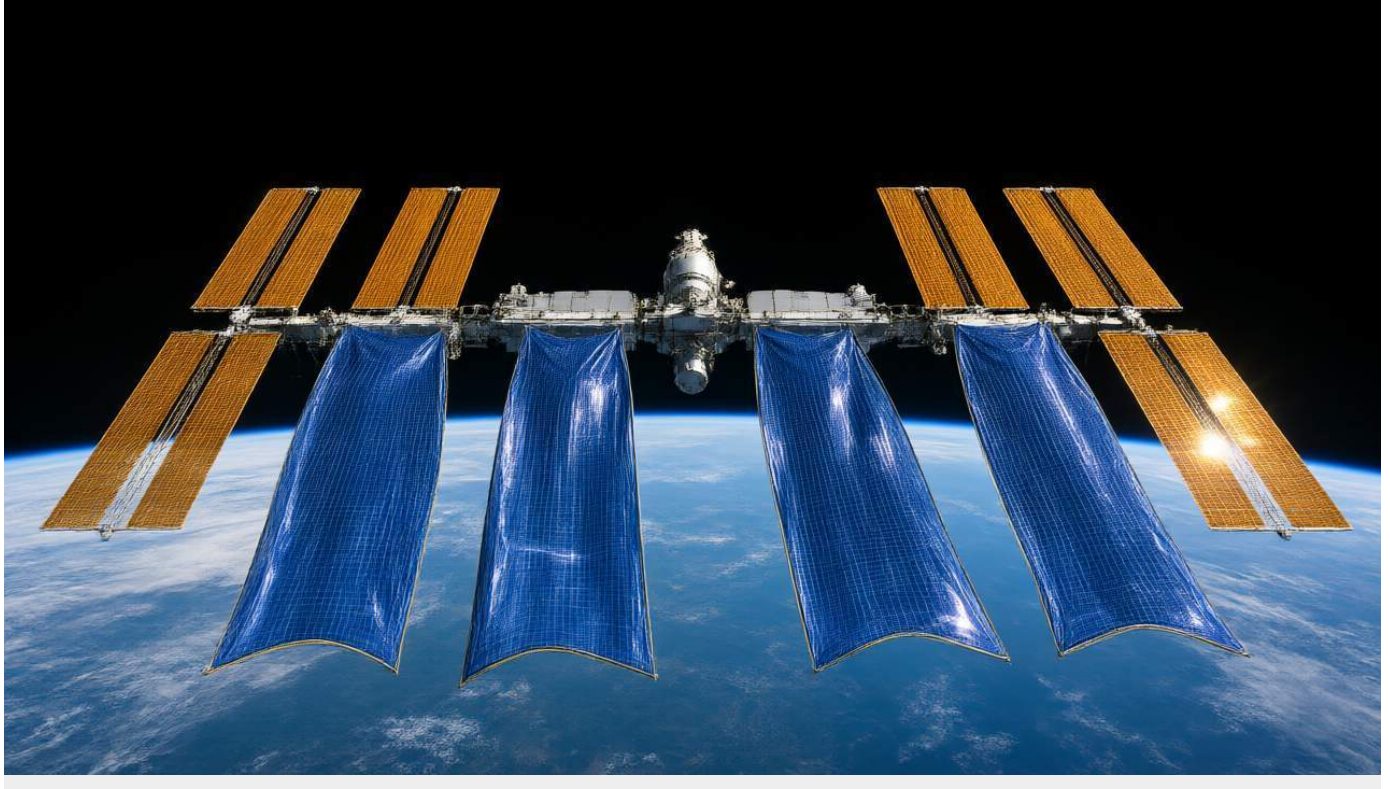
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Source: <https://arxiv.org/html/2610.12471v2>

Collected: October 17, 2026 | Automated Research System (AI)

# #08 IROSAs: ISS power upgrade specs and 160kW capacity roadmap

Published October 15, 2026   NASA   USA



## OVERVIEW

NASA has augmented the International Space Station's power supply by installing eight International Space Station Roll Out Solar Arrays (IROSAs). These arrays increase total power by more than 160kW to support life support, daily operations, and deep space exploration research.

### Key Findings

The installation of eight International Space Station Roll Out Solar Arrays (IROSAs) has increased the power available for research and operations on the International Space Station by more than 160kW. These next-generation arrays augment the station's existing power generation and distribution capabilities to support life support systems and hundreds of research investigations.

### Technical Details

Designed, manufactured, and tested by Redwire under a contract with Boeing, the IROSAs feature a lightweight, compact design. Key technical specifications include:

- **Deployment Mechanism:** The arrays launch as a cylinder and unfurl like a yoga mat using an autonomous, self-deploying system to minimize rollout risks.
- **Physical Footprint:** Each array is approximately half the size of the station's legacy arrays, reducing mass and volume during launch.
- **Power Output:** Despite their smaller size, the arrays are capable of producing approximately 28 kilowatts of additional power each.

### Background and Context

The deployment followed a technology demonstration conducted aboard the space station in 2017 to test effectiveness. Between 2021 and 2023, six IROSAs were installed. Due to power projections in 2023, a request was made for an additional set of arrays. These final units were launched in the trunk of a Dragon spacecraft during the SpaceX 35th commercial resupply services mission to the station for NASA.

### Significance and Outlook

The revitalized power system serves as a critical testbed for technologies required for expeditions beyond Earth's orbit. By supporting planetary defense demonstrations, such as the Double Asteroid Redirection Test, and future human exploration efforts, the IROSA upgrade extends the agency's reach into the solar system and advances technology for deep space exploration.

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Source: <https://www.nasa.gov/missions/station/iss-research/power-up-roll-out-solar-arrays-boost-space-station-power-supply/>

Collected: October 17, 2026 | Automated Research System (AI)

# #09 MMX Mission: Phobos Sample Return Timeline and PlanetVac Specs

Published October 14, 2026   The Planetary Society   USA



## OVERVIEW

The Japan Aerospace Exploration Agency (JAXA) is scheduled to launch the Martian Moons eXploration (MMX) mission on October 19, 2026, to retrieve the first samples from Phobos. The spacecraft utilizes PlanetVac, a nitrogen-gas-based sampling technology funded by The Planetary Society, to enable low-cost and efficient material collection.

### Key Findings

The MMX mission is scheduled for launch on October 19, 2026, at 3:41 p.m. ET (October 20, 4:41 a.m. Japan time). The primary objective is to collect and return samples from the Martian moon Phobos to Earth by 2031, with the samples descending via parachute to a recovery site in Australia.

### Technical Details

To ensure redundancy, JAXA is employing two collection methods: a corer and the P-sampler. The P-sampler is based on PlanetVac technology, which operates by blasting pure nitrogen gas to stir dirt and rocks into a small tornado, subsequently sweeping the material into a collection chamber. This system is designed to be lightweight and low-cost.

The mission's operational sequence includes:

- One year of remote study using cameras, lidar, spectrometers, and a dust monitor.
- Deployment of IDEFIX, a four-wheeled rover developed by French and German national space agencies, to analyze surface texture and makeup.
- Landing to retrieve samples via P-sampler and a corer, with a potential second landing on the opposite side of the moon.
- A flyby of the moon Deimos upon leaving the Mars system in 2030.

### Background and Context

PlanetVac was developed by Honeybee Robotics (acquired by Blue Origin in 2022) with funding from The Planetary Society. Development milestones included a 2013 prototype and a 2018 test aboard a Xodiac rocket by Masten Space Systems, where it collected 332 grams of simulated Martian soil. In 2025, a version of the technology successfully collected samples on the Moon via Firefly Aerospace's Blue Ghost Mission 1, despite an uneven touchdown.

## Significance and Outlook

By returning Phobos samples, MMX seeks to determine if the Martian moons formed from captured asteroids or a collision between Mars and another world. These findings are expected to provide data on the early Solar System's history, specifically regarding giant impacts and asteroid migration.

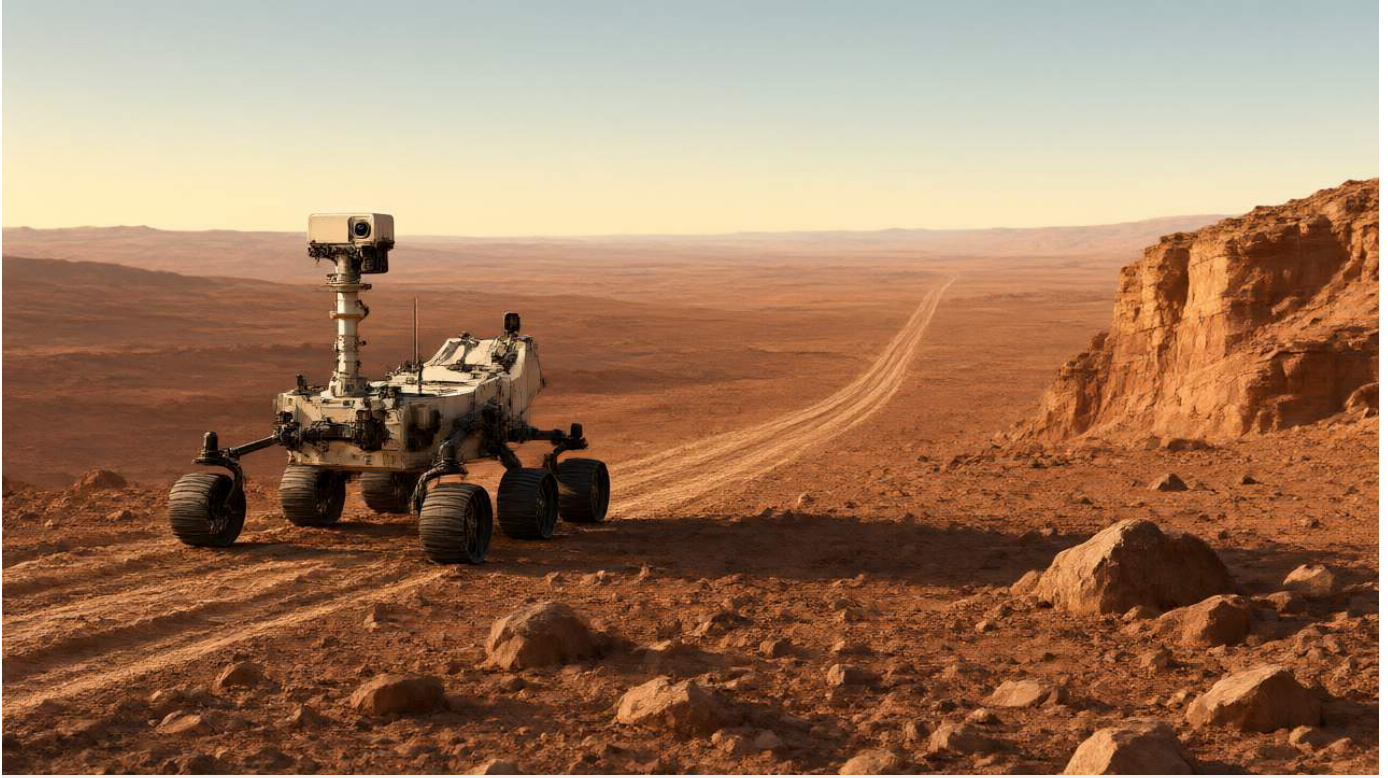
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Source: <https://www.planetary.org/articles/mars-moon-mission-set-to-launch-with-tech-funded-by-planetary-society-onboard>

Collected: October 17, 2026 | Automated Research System (AI)

# #10 Perseverance Rover: Off-World Distance Record and AutoNav Specs

Published October 12, 2026   NASA Science   USA



## OVERVIEW

NASA's Perseverance Mars rover set a new off-world distance record on October 11, 2026, reaching 28.10 miles (45.22 kilometers). This achievement was driven by advanced autonomous navigation (AutoNav), allowing the rover to explore ancient terrains more efficiently than previous missions.

### Key Findings

On October 11, 2026, the Perseverance Mars rover surpassed the previous off-world distance record of 28.06 miles (45.16 kilometers) set by the Opportunity rover.

Perseverance reached a total distance of 28.10 miles (45.22 kilometers) on the 2,006th Martian day (sol) of its mission. This milestone was achieved in five and a half years, significantly faster than the nearly 15 years it took Opportunity to reach its record.

### Technical Details

The record is largely attributed to the AutoNav autonomous navigation system, which enables "thinking while driving." Key technical capabilities include:

- **Processing Power:** Perseverance processes 600,000 measurement points per look, compared to 20 points used by the Sojourner rover.
- **Operational Efficiency:** Over 90% of Perseverance's total distance was covered using AutoNav, whereas Opportunity and Spirit used the system for approximately 5%.
- **Speed and Mapping:** The rover builds 3D hazard maps in real-time, allowing it to cover up to 1,351 feet (412 meters) in a single sol.
- **Software Evolution:** New software updates have reduced steering frequency and enabled the rover to verify its position against orbital maps during transit.

### Background & Context

Perseverance has surpassed several other extraterrestrial records, including the 22.2 miles (35.7 kilometers) covered by Apollo 17 astronauts in 1972 and the 24.2 miles (39 kilometers) driven by the Soviet Lunokhod 2 in 1973. Within Mars missions, it exceeds the distances of Sojourner (330 feet), Spirit (4.8 miles), and Curiosity (over 23.65 miles).

## Significance & Outlook

Increased mobility has allowed Perseverance to access diverse geologic sites, including the "Cheyava Falls" rock and the "Lac de Charmes" region, where it investigates 4-billion-year-old rocks. NASA has approved a mission extension through roughly the end of 2028. Future objectives include traveling south toward "Rainbow Falls," a 328-foot-wide block of ancient crust. Engineers are currently working to overcome navigation camera glare to extend the rover's daily working hours.

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Source: <https://science.nasa.gov/blogs/perseverance-mars-rover/2026/10/12/nasas-perseverance-sets-off-world-record-for-total-distance-driven/>

Collected: October 17, 2026 | Automated Research System (AI)