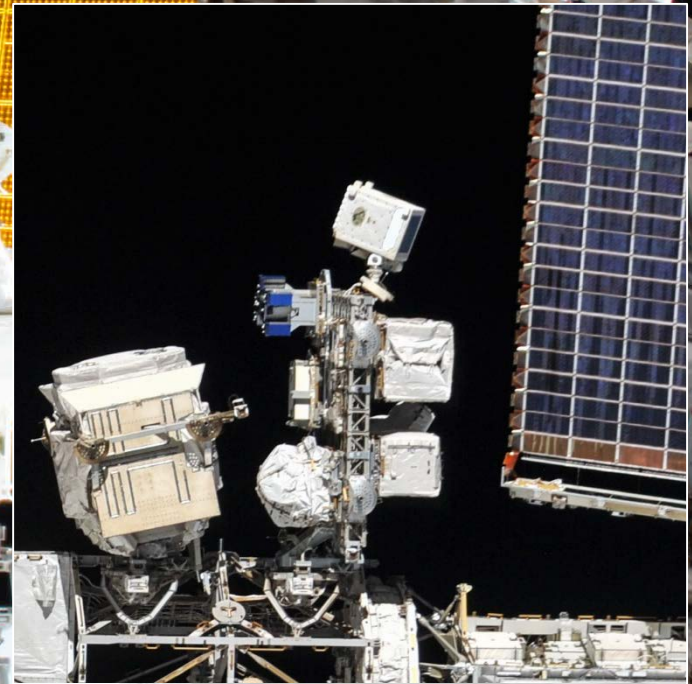


MISSE

The Easiest Way to Conduct Materials Testing & Research in Space

Mark M. Gittleman, P.E.
President & CEO



Alpha Space Test & Research Alliance, LLC

- Own and operate MISSE on the ISS under agreements with NASA & the ISS National Lab
- ISSNL Implementation Partner & Commercialization Partner
 - Two launch/return cycles per year
 - Two ISS airlock cycles per year
 - Crew time, robot time, utilities
- Small, minority woman-owned business



AS9100 & ISO 9001 Certified

Micro Environments on MISSE

MISSE provides four faces to space, enabling the integrated/simultaneous testing of the effects of:

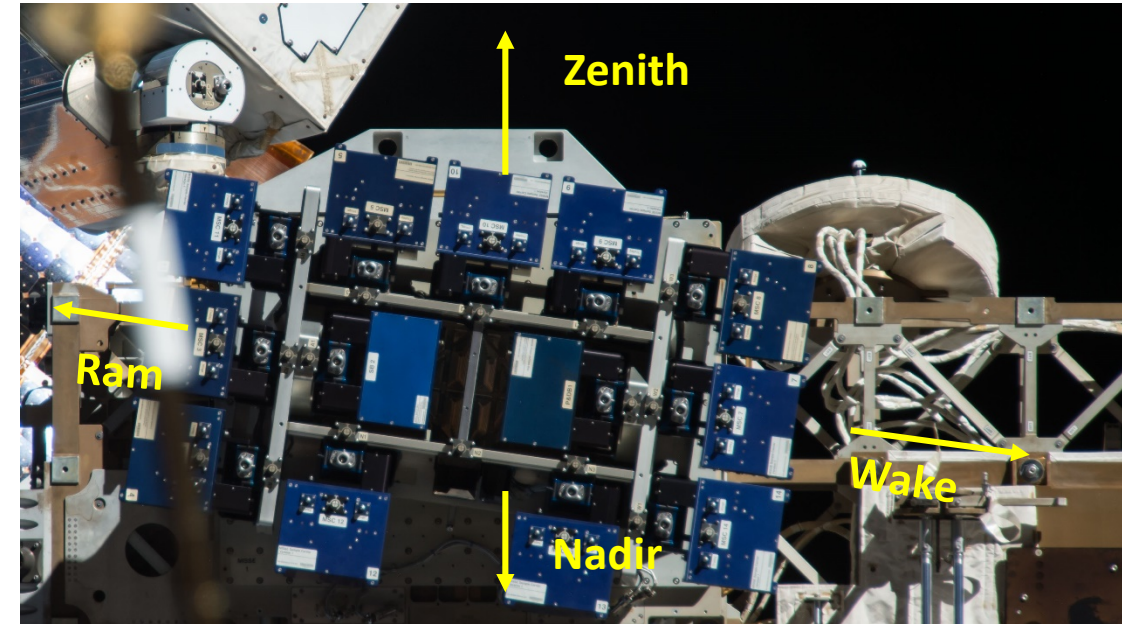
Zenith Face: unfiltered ultraviolet radiation (UV)

Ram Face: Atomic Oxygen (AO)

Wake Face: ultrahigh vacuum (UHV)

Nadir Face: Partial Earth view

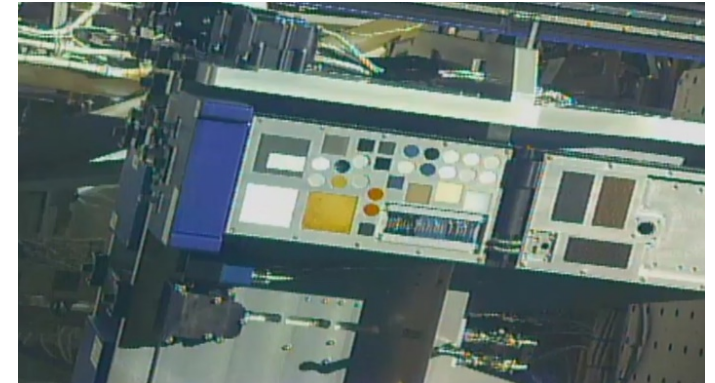
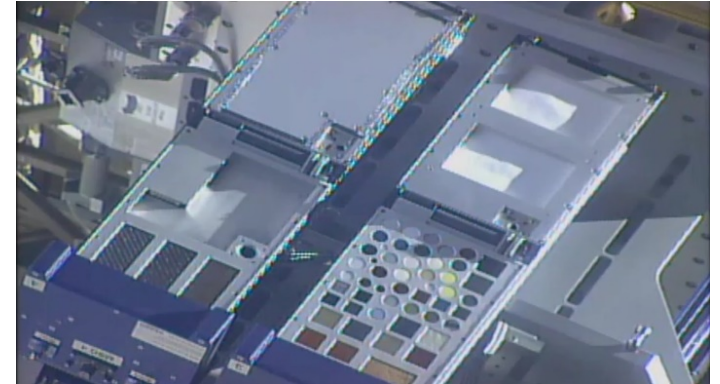
All Faces: vacuum, ionizing radiation, charged particles, thermal cycles, electromagnetic radiation, and micro-meteoroids.



How it Works

How it Works

- Turn-key service...
- You deliver your experiment, Alpha Space does the rest, including:
 - Experiment preparation & integration
 - NASA safety & other NASA reviews
 - Flight certification
 - Launch, operations, on-orbit data collection & photos
 - Post-flight return
 - Optional data & services available
- Commercial & Government contracting



We Make it Easy to Test in Space

We Make It Easy



~2
months

Return

Your property is returned to you as soon as possible, depending on return vehicle.

6+
months

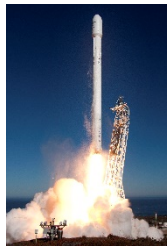
On Orbit

On orbit, your sample or experiment will be robotically installed in its location on MISSE, receiving standard services and selected optional services.



Launch

We have liftoff! Your sample or experiment makes its journey to the MISSE on the ISS.



Make Contact

Call us. Email us. Contact us through our website.



2 - 4
weeks

Complete Paperwork

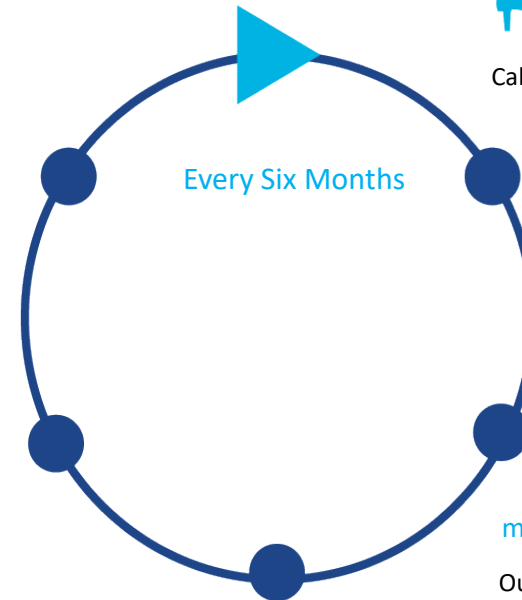
We will work with you to complete all needed paperwork. This includes an NDA, Tech Info Exchange, Quote, and Standard Contract.



3 - 6
months

Integration & Flight Certification

Our team will use the in-house clean room and thermal-vacuum chamber to prepare your experiment for launch.



Next Flight Opportunities: April '20 & Nov '20

How it Works: On The Ground



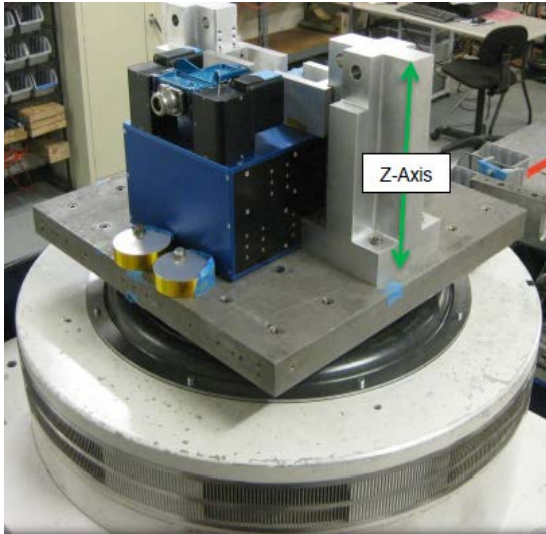
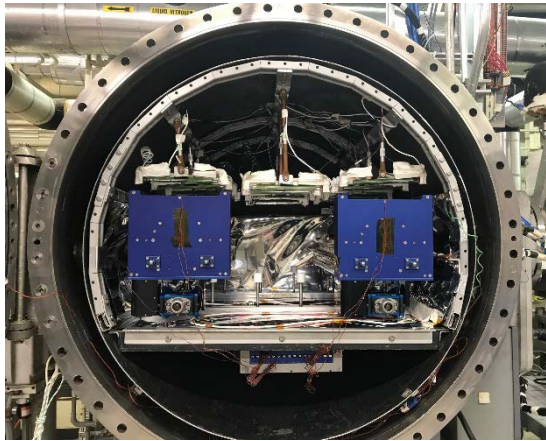
Integration in Alpha Space 10K Cleanroom



Final Bakeout in Alpha Space Thermal-Vacuum Chamber



Installed in Standard Carrier

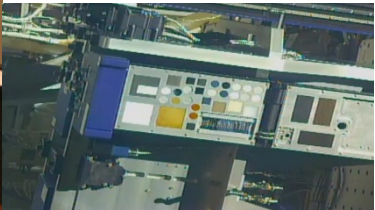
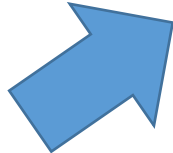


Environmental Testing



Launched to ISS on Vehicle of Opportunity

How it Works: In Space

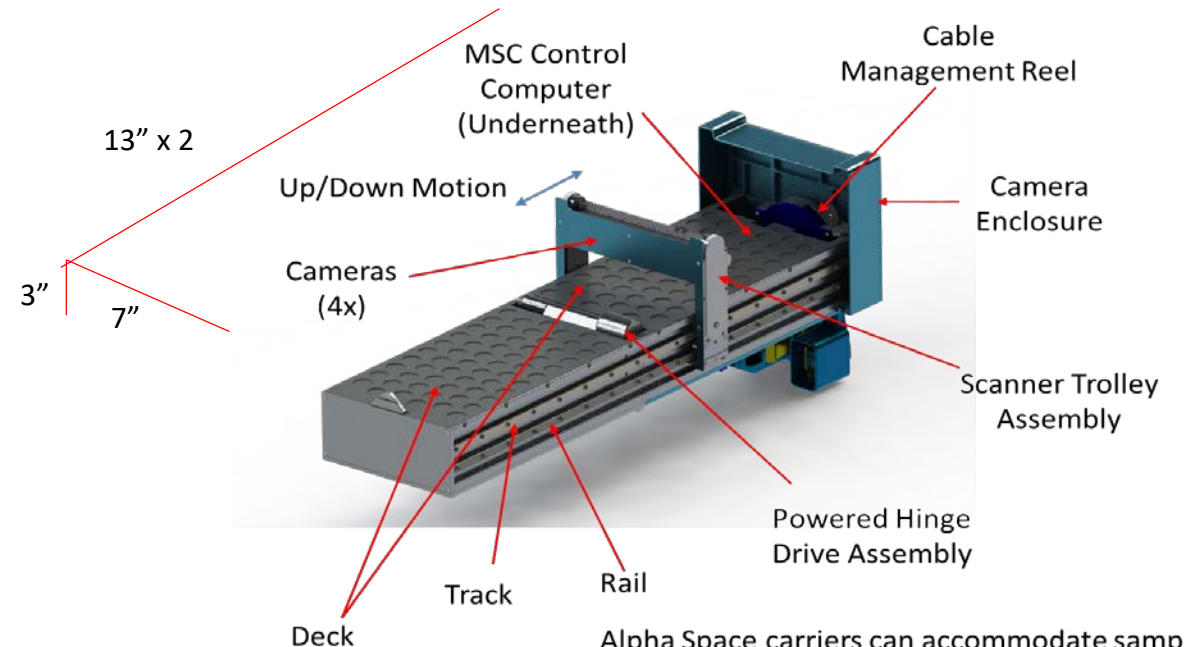


Photos, Data Collection, & Operations



Architecture

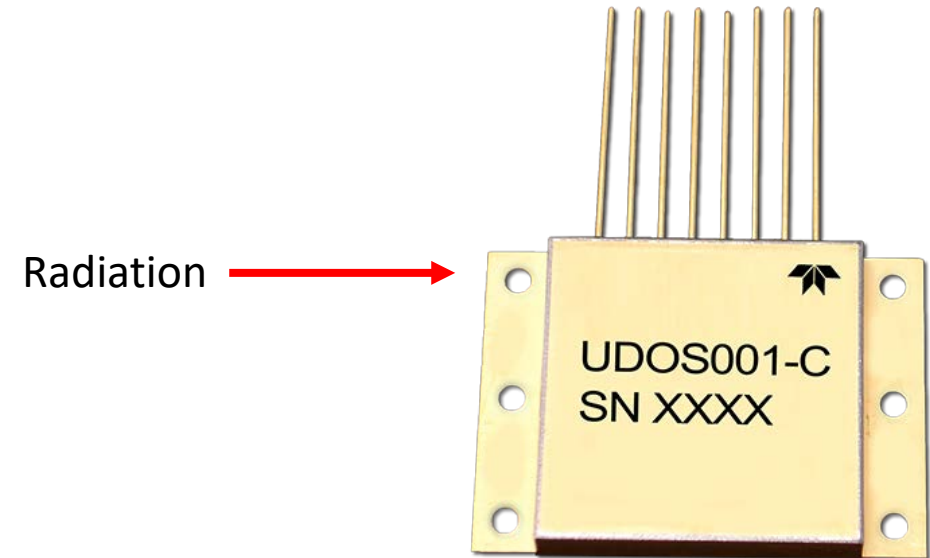
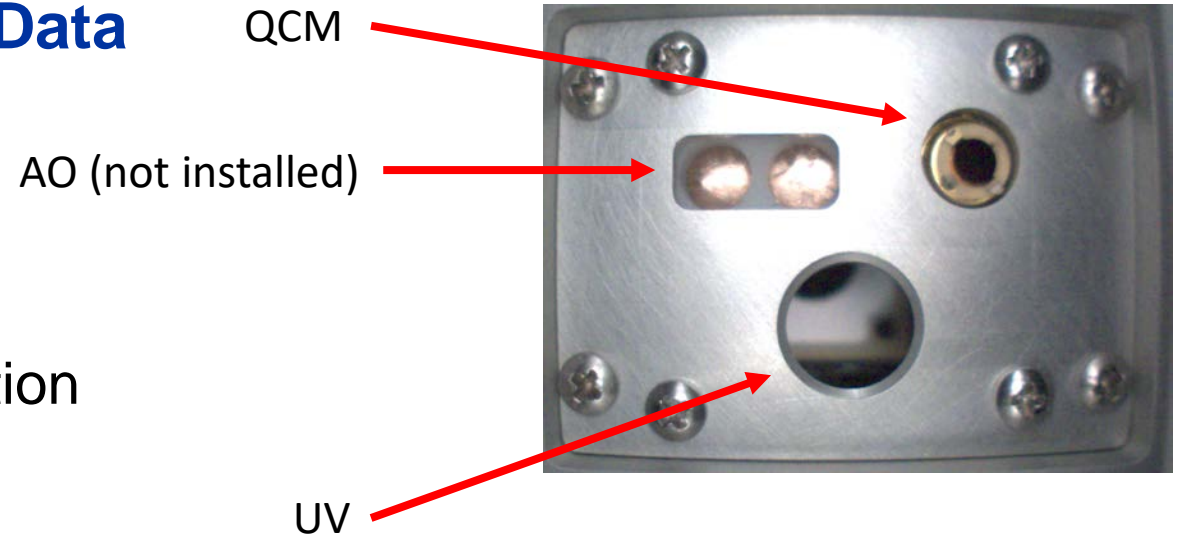
- Carrier approach accommodates a wide variety of experiments to Test, Demonstrate, & Characterize
 - New materials, layups, coatings, and treatments
 - Electronics, sensors, antennae, cameras
 - Mechanisms, thrusters, controls
 - Biological & radiation experiments
 - Active (powered) experiments
 - Passive experiments
 - Technology development & demonstration
- Solar Cell Test Bed now available



Alpha Space carriers can accommodate samples as small as a dime or as large as a shoe box

Available Utilities: Sensors, Power, & Data

- 28V DC Power
 - Isolated power bus for each MSC
 - 75W for experiment use on each MSC
- Data interface is a RS-422 direct connection
- Temperature: 1 per deck standard
- Contamination: Quartz crystal microbalance (QCM) provides contamination data
- UV: Measures irradiance on 190nm-400nm range
- Radiation: Teledyne's uDOS001 measures total ionizing dose over time
- Atomic Oxygen: Kapton H witness sample



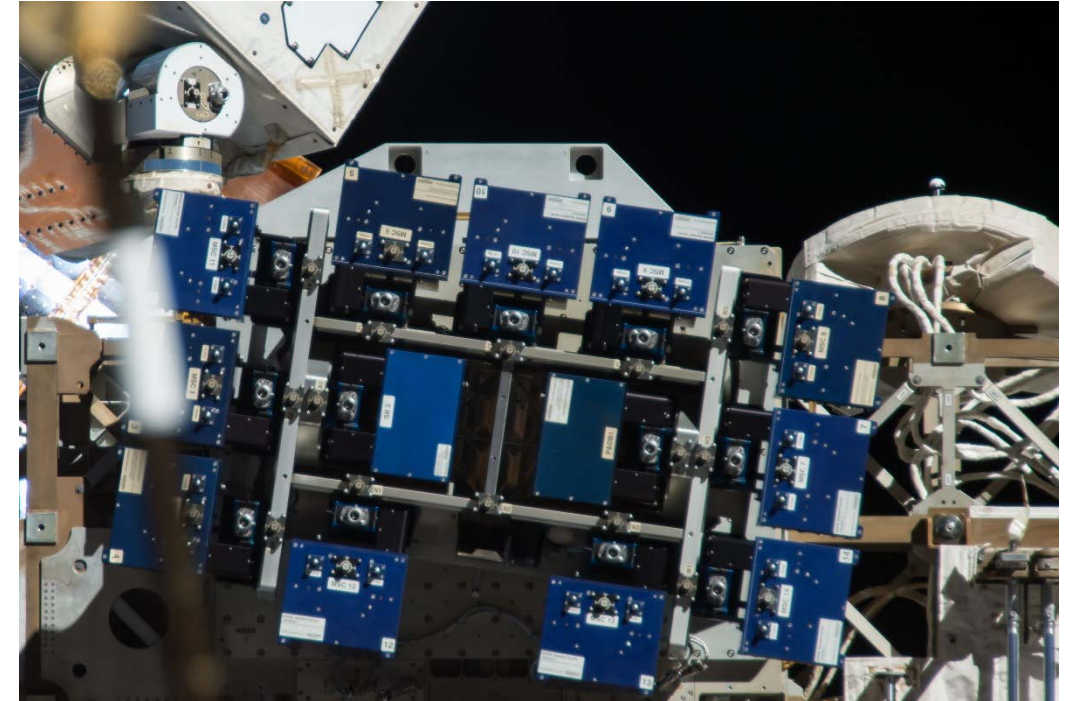
How it Works, cont.

Basic Services

- Payload physical and analytical integration
- Certification for flight
- All technical interfacing with NASA
- Launch, installation
- On-orbit operations
- Temperature and contamination data (monthly delivery)
- High-resolution photos (monthly)
- Payload return to owner

Optional Services

- Additional sensor data (AO, UV, radiation)
- Custom payload mounting/interfaces
- Payload design assistance
- Additional photos
- Power
- Data connection
- TReK
- Special Handling

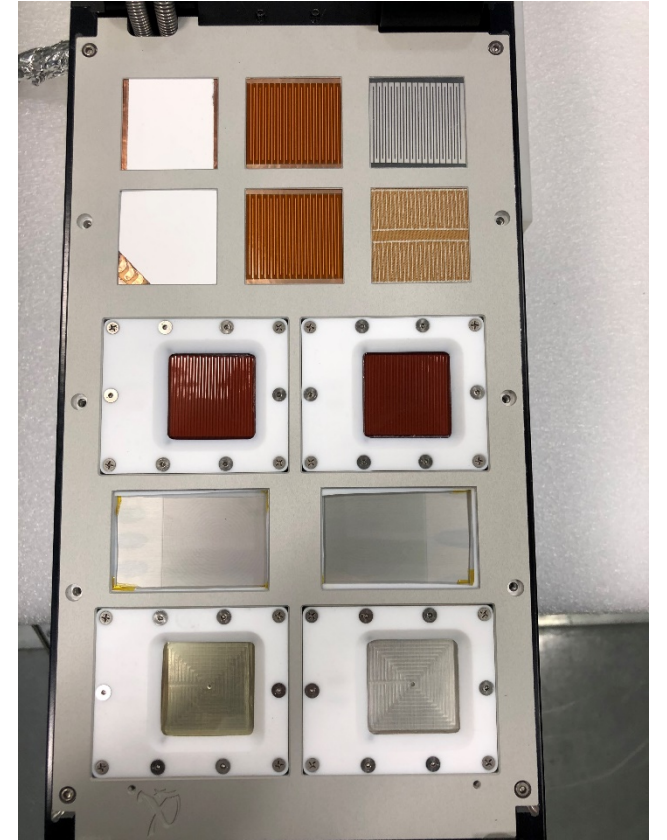


Current Configuration

Current Testing on MISSE

There are >300 experiments on MISSE today:

- Active materials: e.g. high-efficiency solar cells
- Active experiments: e.g. Electrodynamic Dust Shield
- Passive Materials, e.g.
 - Vantablack
 - Radiation protective & radiation detecting materials
 - Laminates & fabrics
 - Coatings
 - Polymetrics
 - Composites
 - 3-D printed polymers and metals (PEI, ESD PEKK, Inconel)
 - Structural ablative materials
 - High temperature polymer films and ceramics
 - Thermal management coatings
 - Materials incorporating ionic liquids, dielectric materials
 - Photonic devices for optical communications
 - Shear-Thickening Fluid (STF) and Self-Healing Polymers



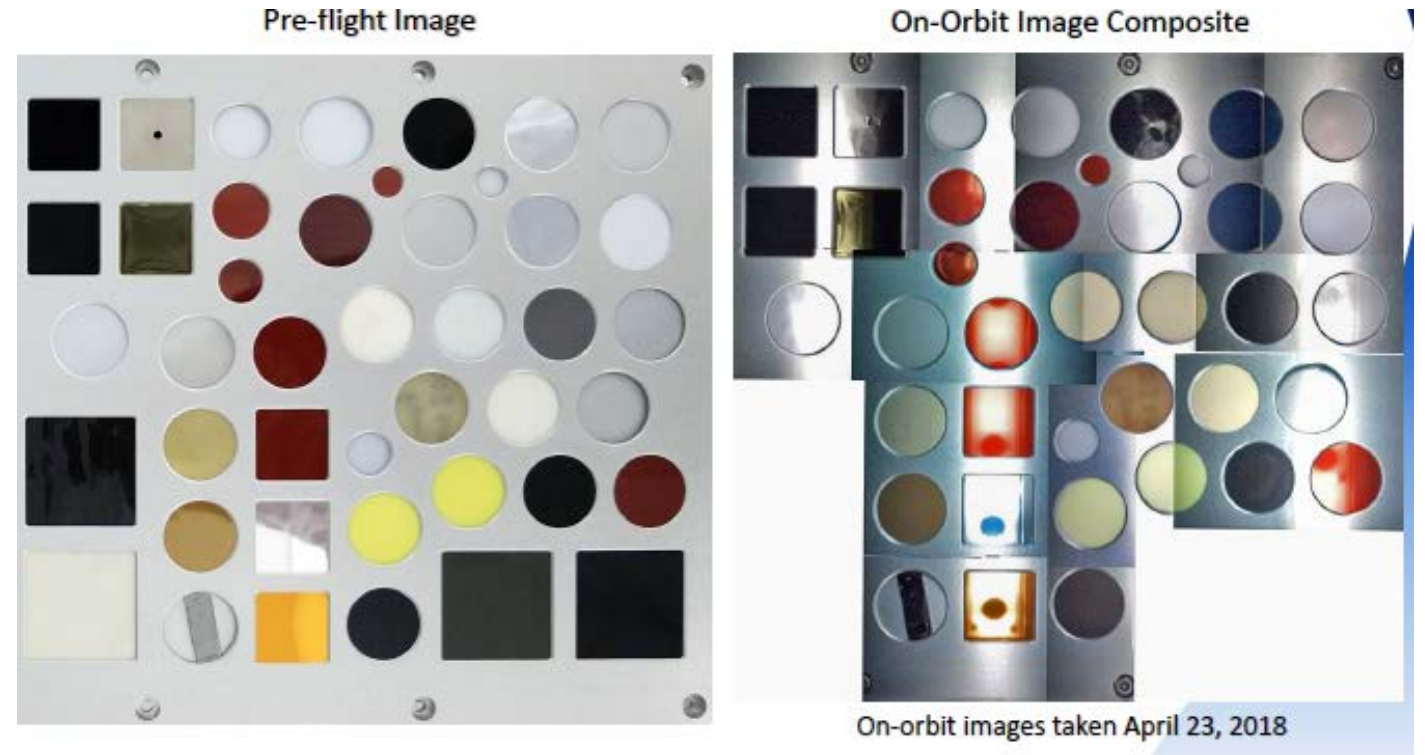
Current Testing on MISSE

Applications include:

- Spacecraft
- Habitation
- Spacesuits
- Medical
- Chemical processing
- Energy production

Customers include:

- Air Force Research Lab
- NASA
- A non-profit think tank
- Universities & High Schools
- A commercial space station company
- Domestic & International spacecraft & satellite component manufacturers
- Commercial materials & coatings companies



Wide Variety of Users & Uses

Why Test With MISSE & Alpha Space?

- Create Opportunity
 - Lower barrier to entry for new products & materials
 - Speed technology development, reducing costs and time to market
 - Open the supply chain to new companies and new ideas
- Hardware return means opportunities to learn and evolve quickly!
- We are fast and commercial.
 - We work with start ups, aerospace giants, product developers/manufacturers, government agencies, academia, etc.



Fastest, easiest way to increase TRL, demonstrate, evaluate, & flight-qualify new products and technology for external space applications

Thank You!

www.alphaspace.com

Come Visit Us Booth 14

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