



Resource Prospector (RP)

Mission Overview and Current Activities

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<http://www.nasa.gov/resource-prospector> @NASAexplores

No Export Controlled materials (ITAR/EAR)

RP Storyboard



03:31



EVOLVABLE MARS CAMPAIGN

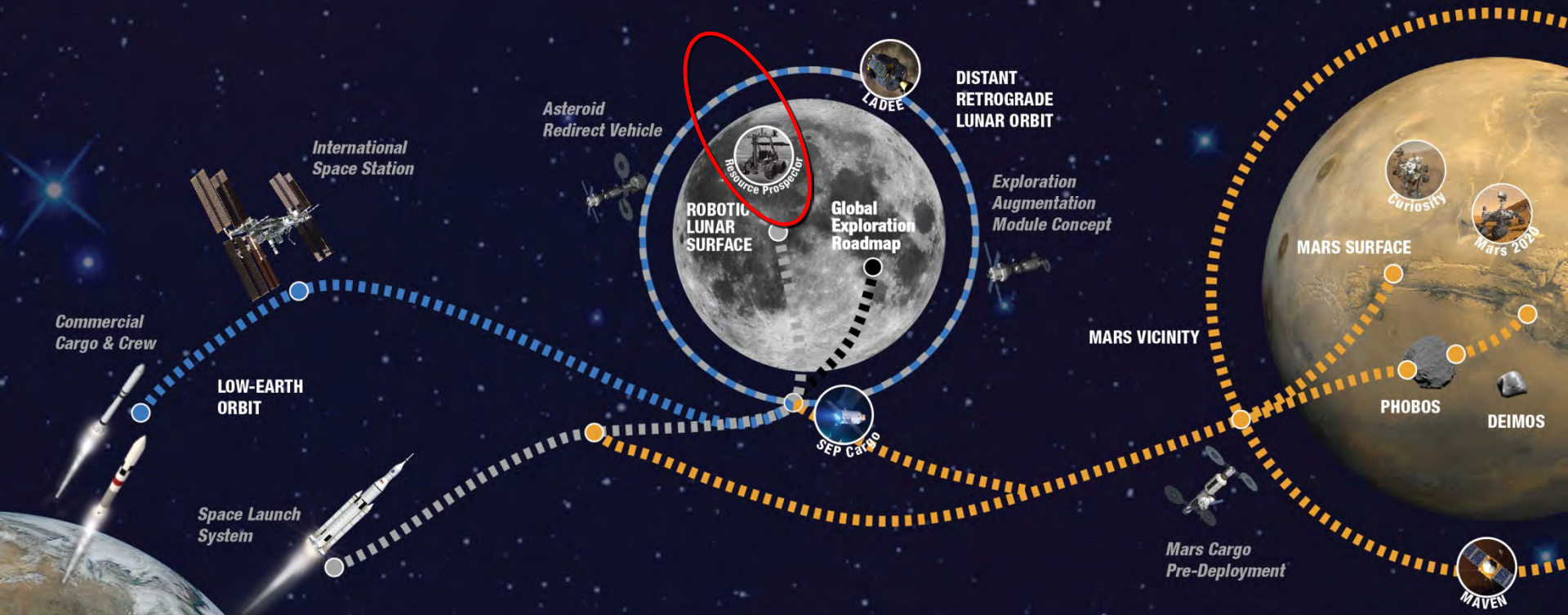
A Pioneering Approach to Exploration



EARTH RELIANT

PROVING GROUND

EARTH INDEPENDENT



THE TRADE SPACE

Across the Board

Solar Electric Propulsion • In-Situ Resource Utilization (ISRU) • Robotic Precursors • Human/Robotic Interactions • Partnership Coordination • Exploration and Science Activities

Cis-lunar Trades

- Deep-space testing and autonomous operations
- Extensibility to Mars
- Mars system staging/refurbishment point and trajectory analyses

Mars Vicinity Trades

- Split versus monolithic habitat
- Cargo pre-deployment
- Mars Phobos/Deimos activities
- Entry descent and landing concepts
- Transportation technologies/trajectory analyses

2015 Activities



RP pursued three simultaneous tracks in FY15!



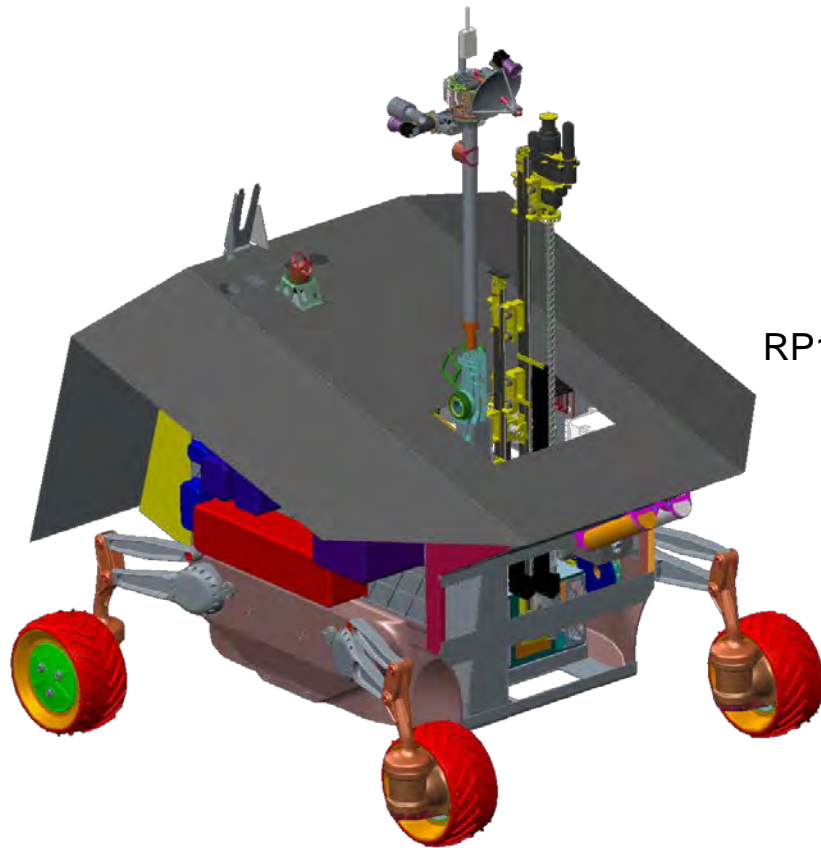
JAXA President Okumura driving the KREX rover at NASA-ARC (2014-10)



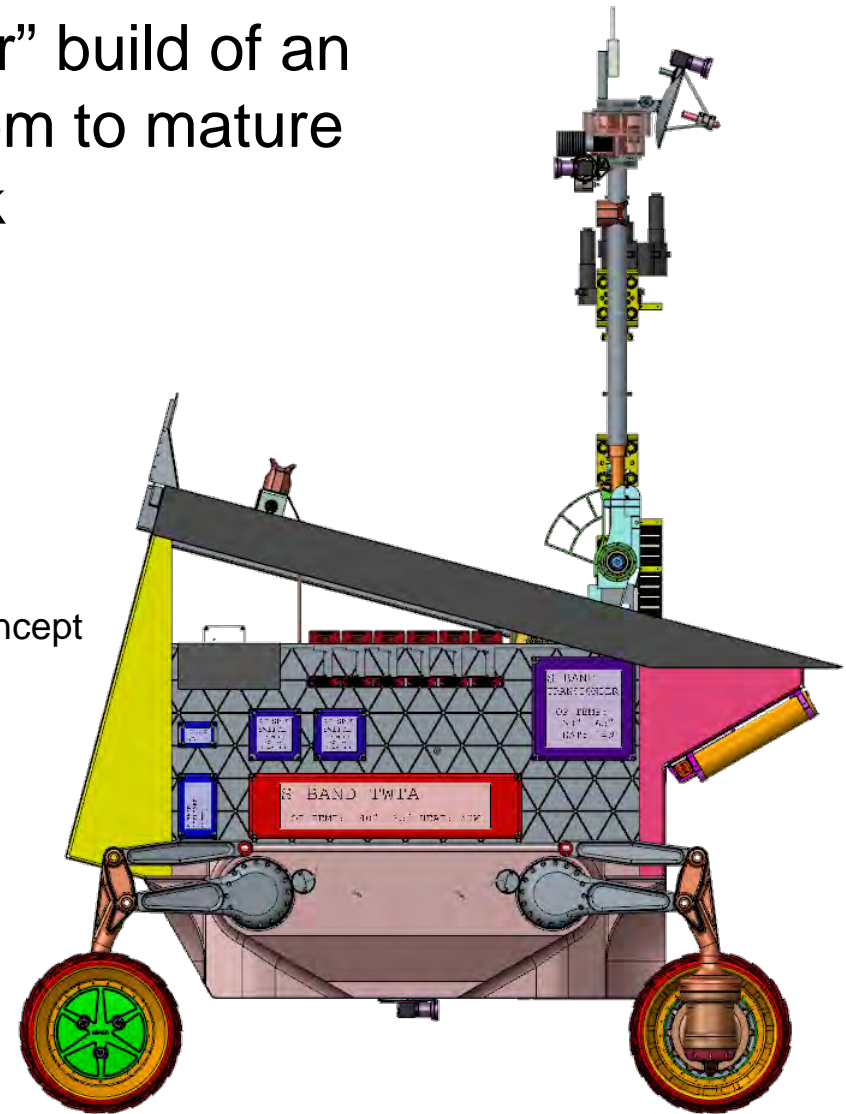
NASA delegation to Taiwan (2015-07)



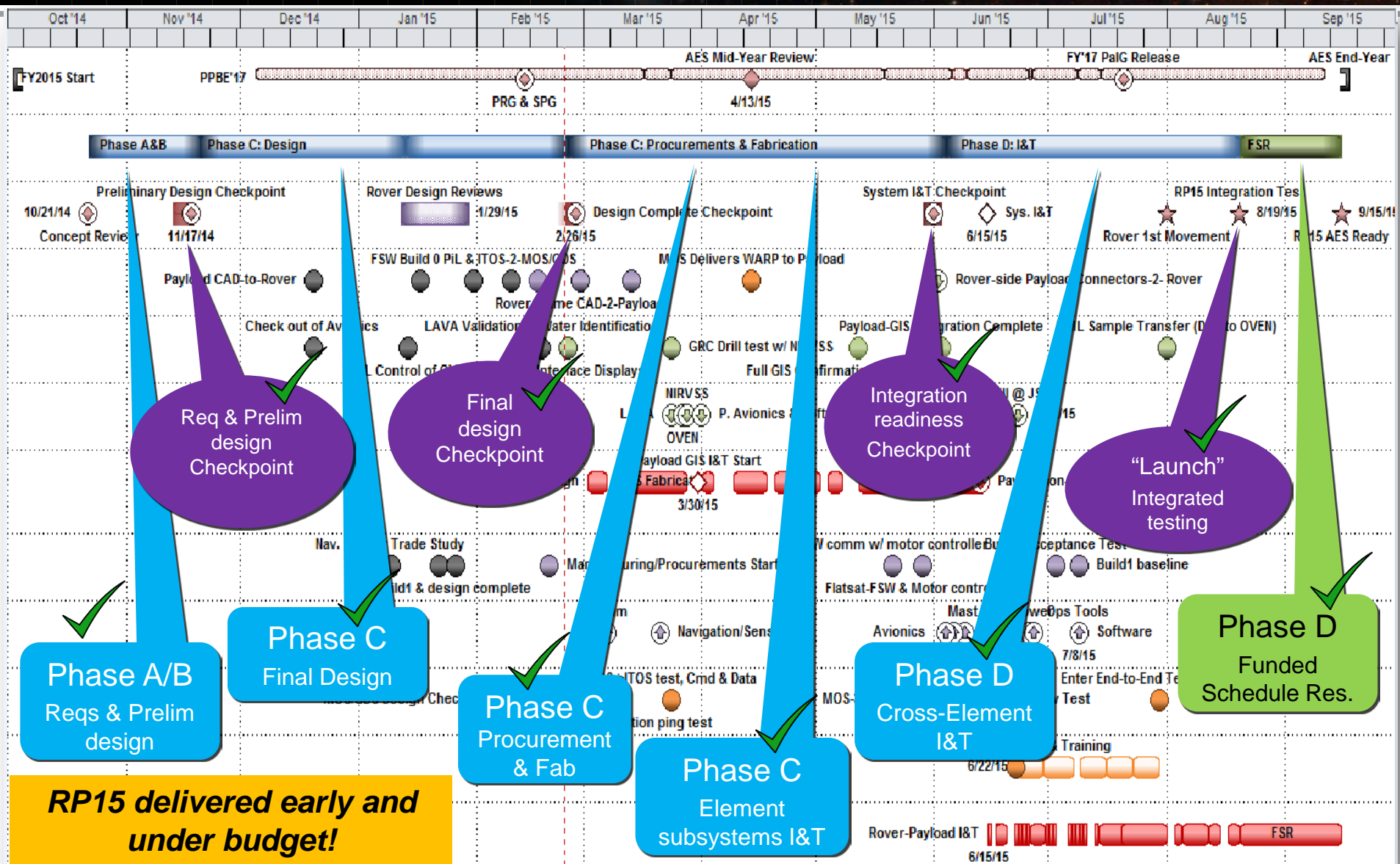
- “RP15” is a “Mission-in-a-year” build of an integrated rover/payload system to mature designs and retire mission risk



RP15 concept



RP15 "Mission in a year"

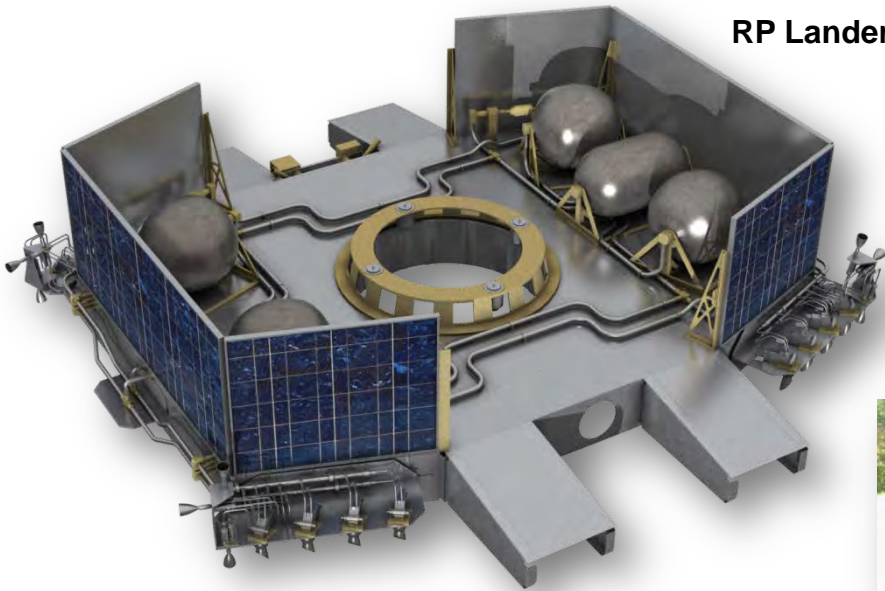


RP Partnering Lander Concept

2014-05



RP Lander Design

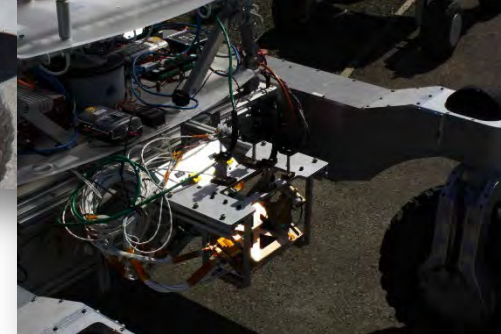
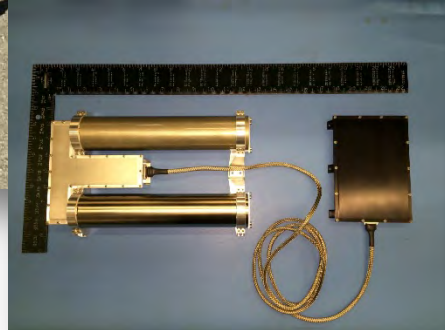


Lander Prototype & Propulsion testbed

- Prototyped a cost-efficient lander
 - Novel aluminum riveted structure concept reduces complexity and cost
 - NASA looking for international partner to provide the lander



RP Neutron Spectrometer (NSS) & NIR Spectrometer (NIRVSS) field tests (2014-08)



NSS in the NASA-ARC Roverscape

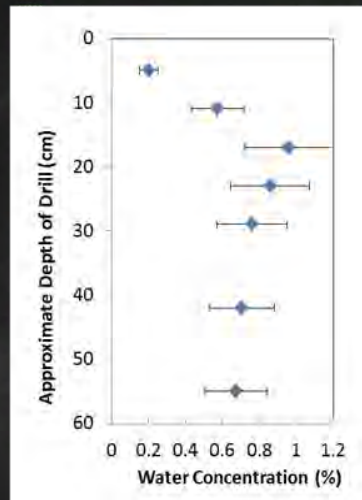
- The NSS is located on the rover and in front of that is a neutron source holder for Earth testing only (simulating lunar radiation activity)
- The team has driven across rock patches and an ice proxy for testing

NIRVSS in the NASA-ARC overscape

- The team drove across rock patches and an ice proxy for testing

RP Drill & NIRVSS testing

2013-09 & 2015-07

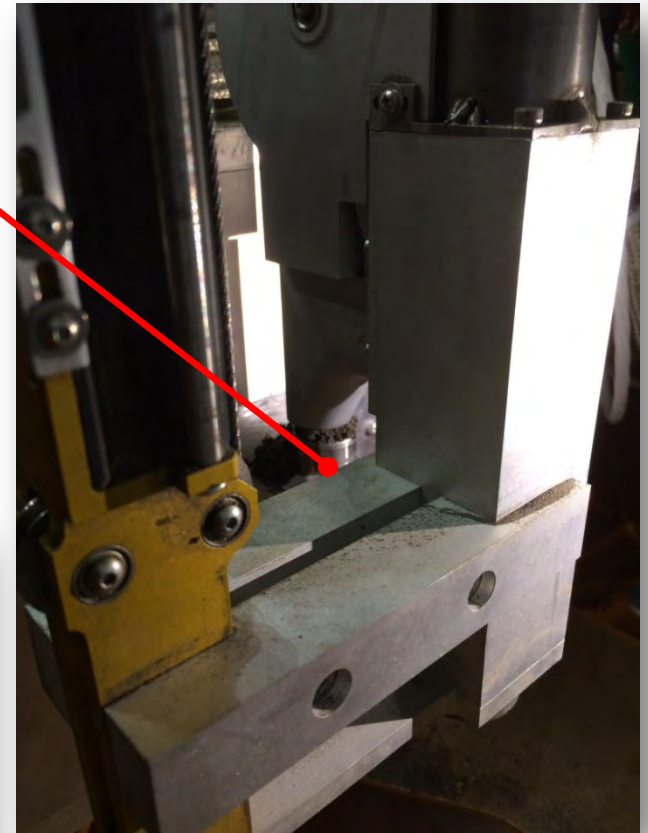


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Drill & NIRVSS testing
in TVAC chamber at
NASA-GRC (-80°C)



OVEN
Crucible



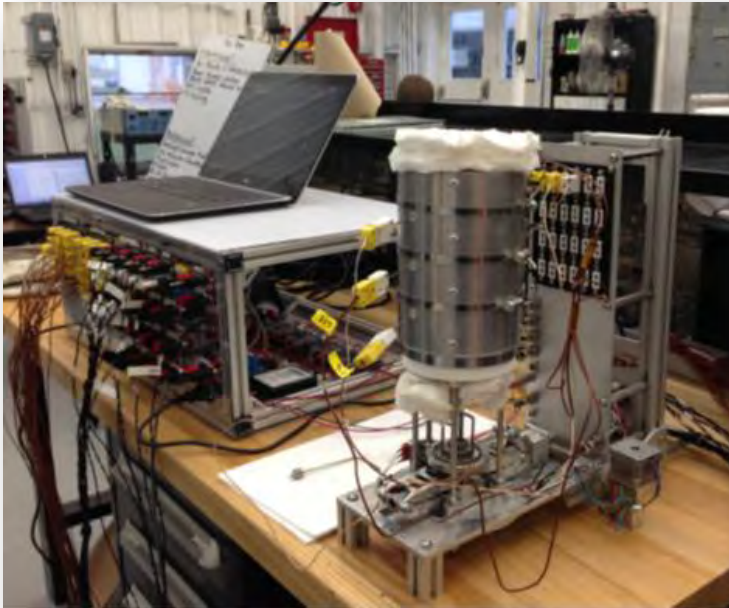
RP15 Rover-hosted Drill testing in
doped simulant tube at NASA-JSC

RP OVEN ETU testing

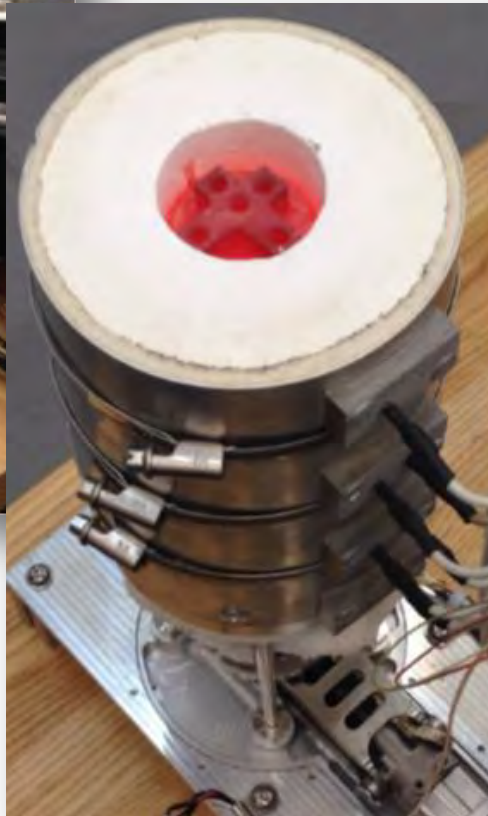
2014-04



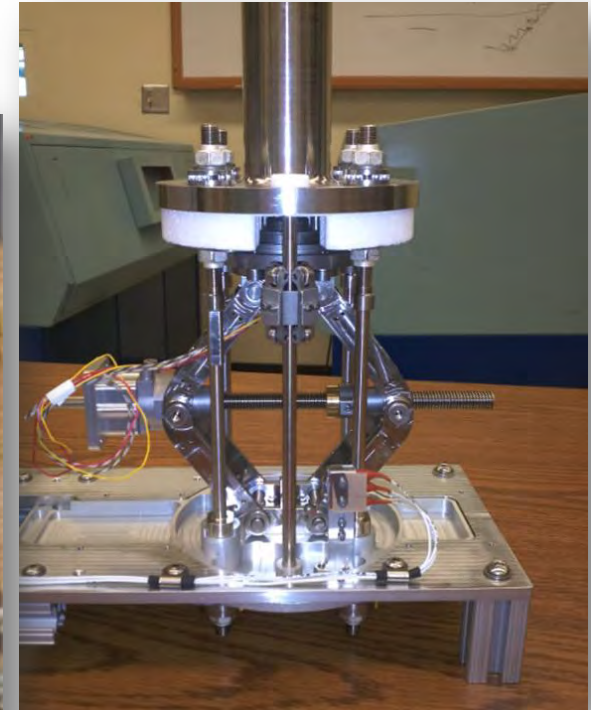
- RESOLVE ISRU payload systems undergoing engineering test
 - Subsystem TVAC and vibe testing, drilling in relevant environment, etc



OVEN Reactor Checkout Testing



OVEN Reactor Heater at 700+°C



OVEN Reactor Mechanical Assembly

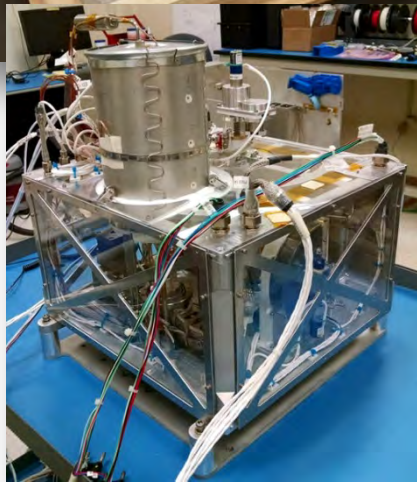
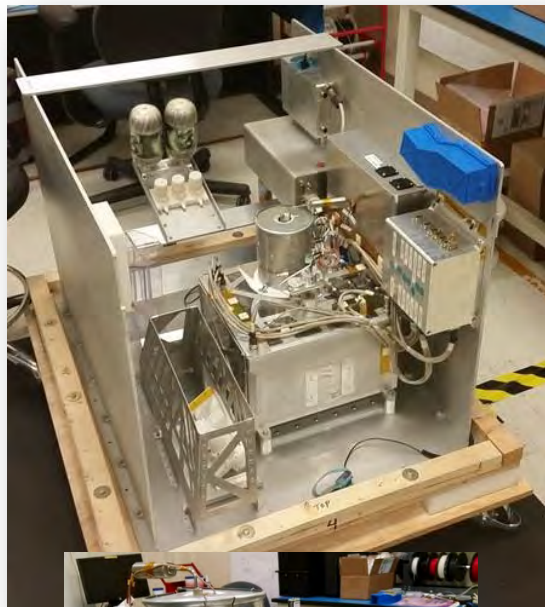
RP15 Payload Activities

2015-05



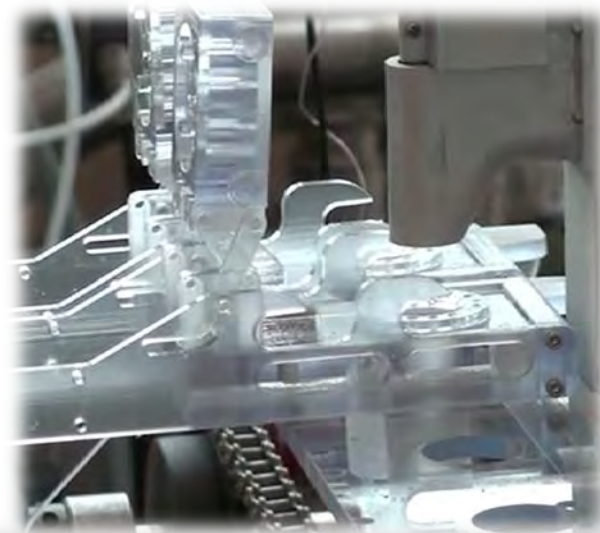
Material capture

Payload & Drill subsystem

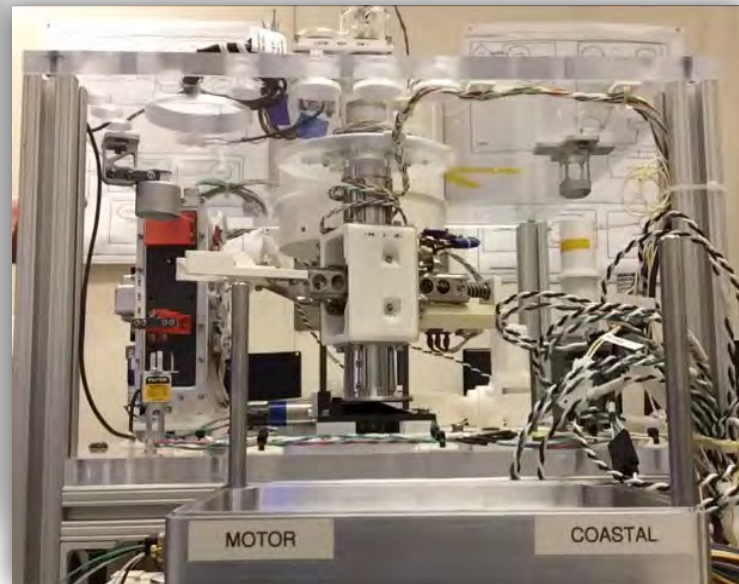


Material capture

Regolith filling the crucible



Crucible processing

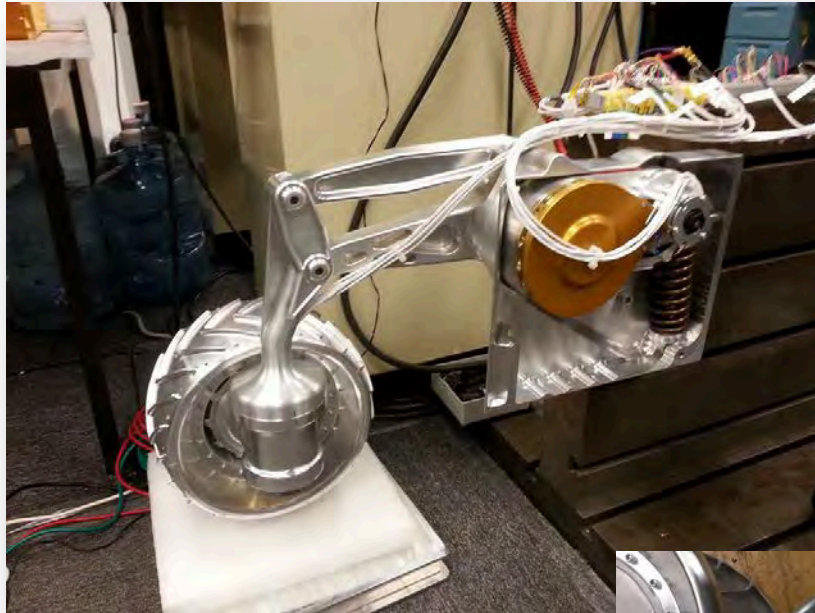


RP15 Rover Activities

2015-06



Rover Suspension/Drive Subsystem



Suspension assembly



1g wheels

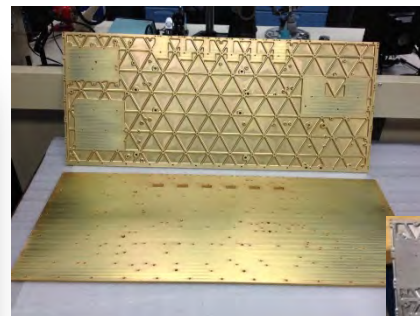


RP15 Rover Activities

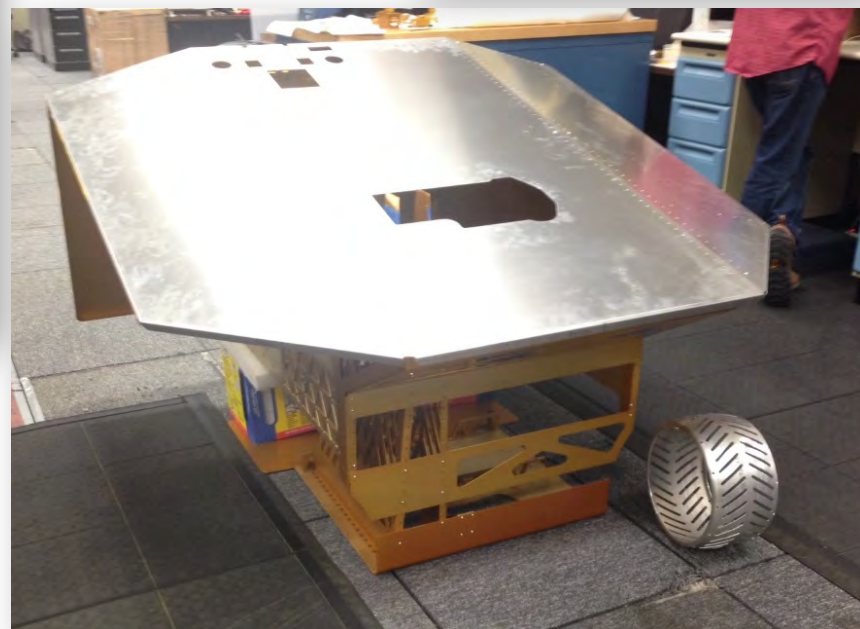
2015-06



Rover Frame/Chassis



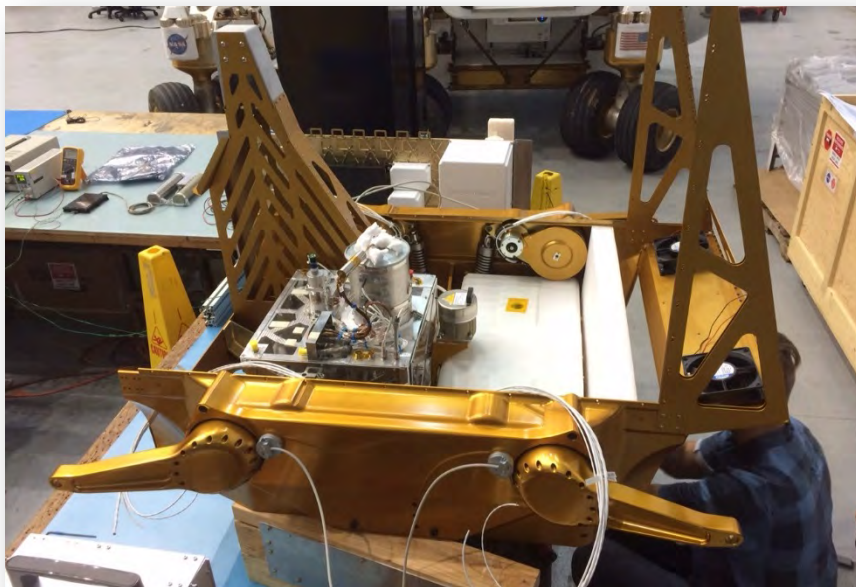
Heat spreaders



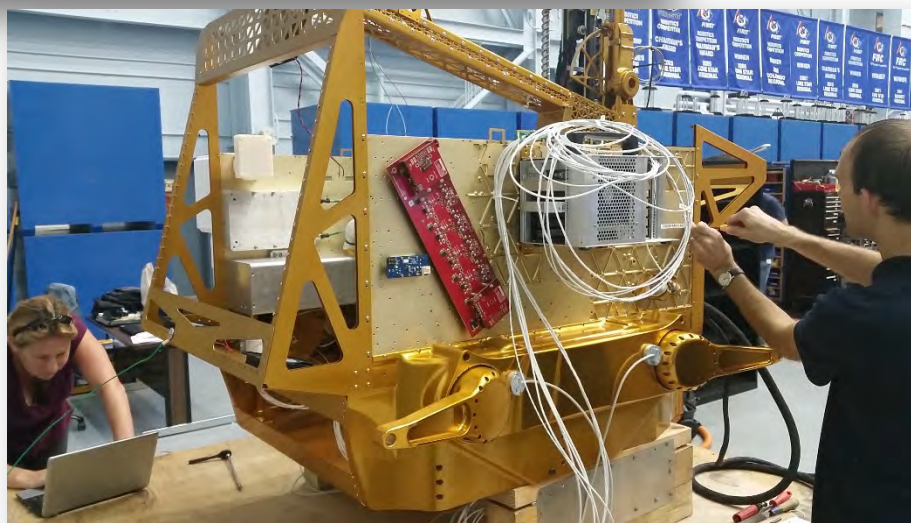
Batteries

RP15 Rover/Payload integration

2015-07



Rover
Assembly



RP15 Assembly Time-Lapse

2015-07



Rover
Assembly

RP15 In the Dirt

2015-08-15



RP15 in the JSC Rock Yard
"Driver's Training"



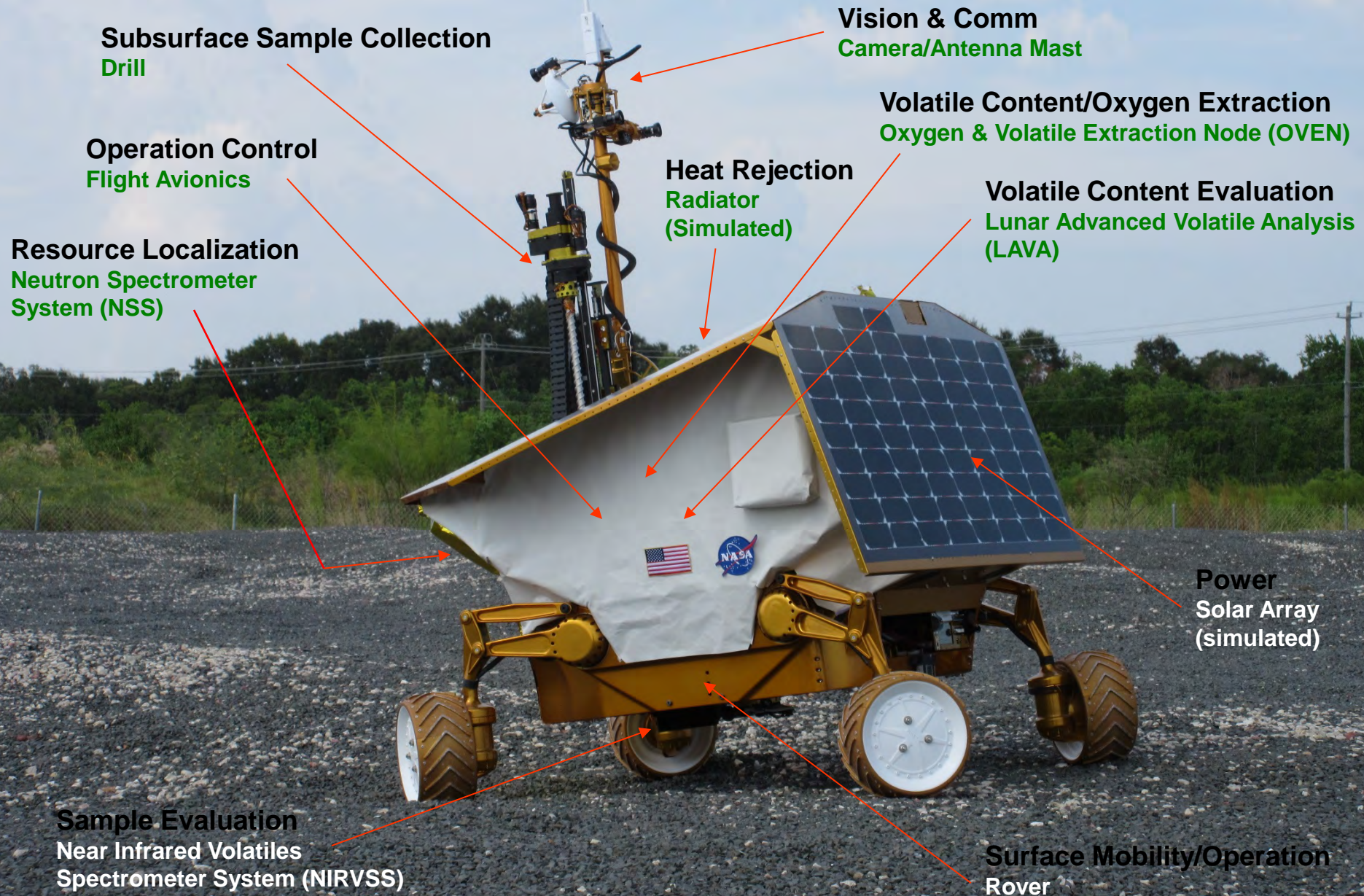
RP15 In the Dirt

2015-08-15



RP15 in the JSC Rock Yard
Tuning suspension system

RP15 Field Testing: Surface Segment (Payload/Rover)

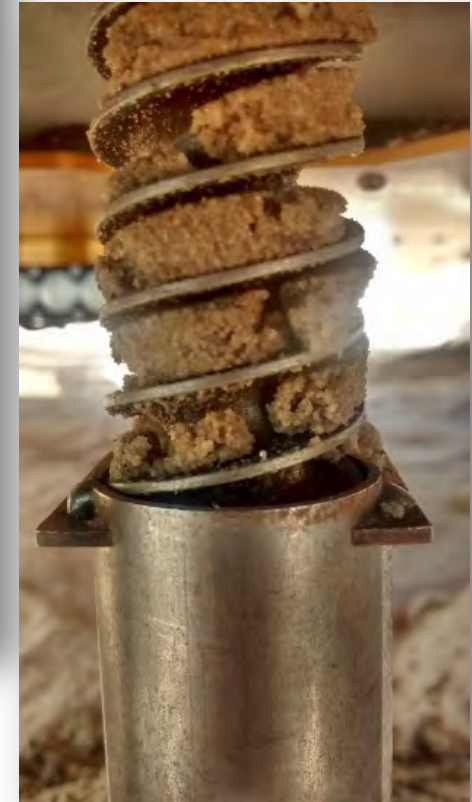


RP15 Drilling on a slope in the Field

2015-08-24



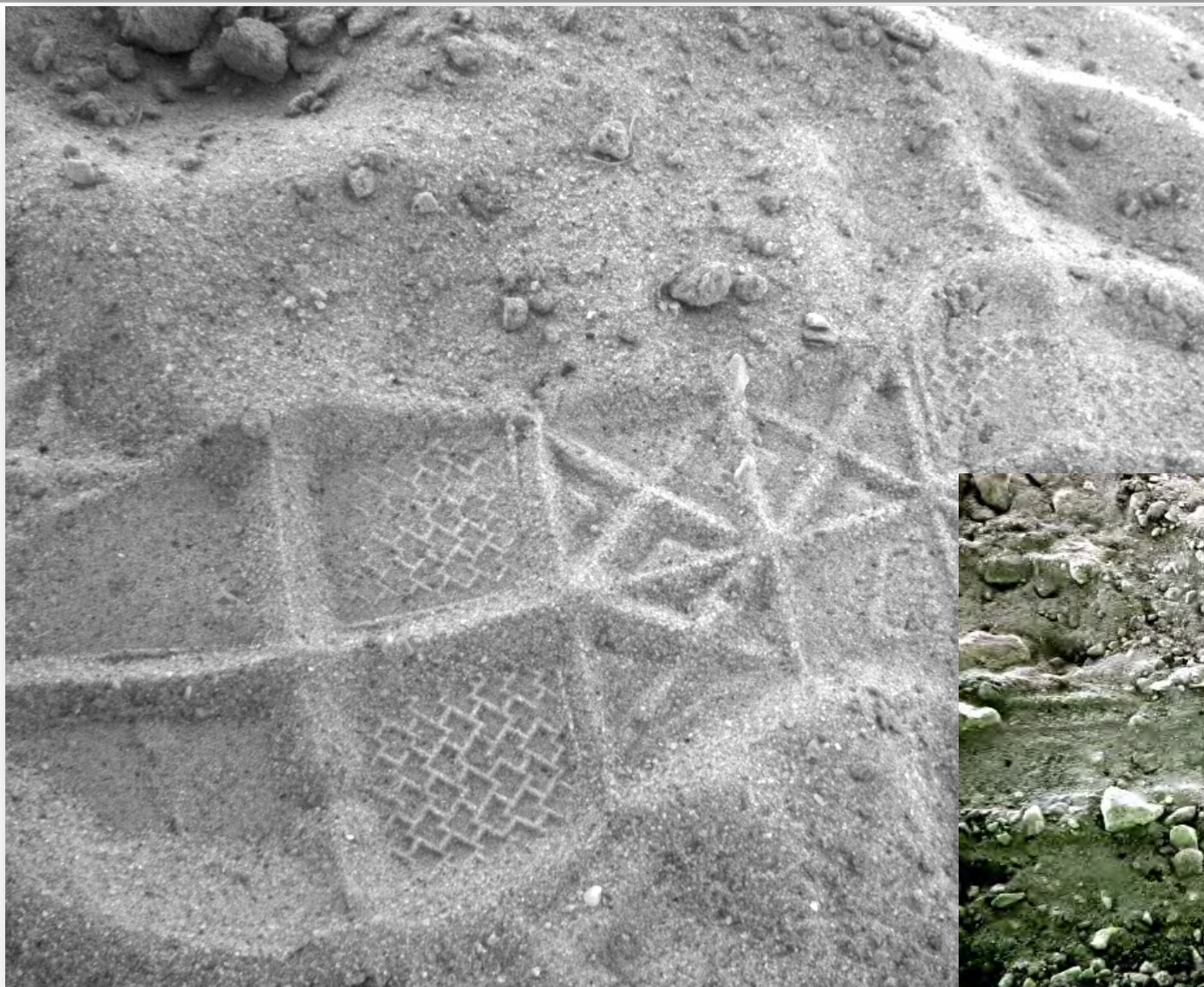
Sloped Drilling at JSC



Sand Captured in Drill
Brush Housing & Flutes

RP15 Initial Terrestrial Images

2015-08-11



RP15 “DOC”
camera images
looking at
candidate drill
sites from the
rover



RP15 Distributed Operations Test testing

2015-08-21



NASA-ARC Mission Control room driving RP15 rover @ NASA-JSC

NASA-JSC Rock Yard from the rover (left) stereo camera



3-D Image Viewing of NIRVSS Camera Images During DOT



NASA-KSC Payload Control room



RP15 Rocky Weather in Houston

2015-08-18



Mother Nature
rebellling. Building sand
barriers to flowing
water

Heading back to the
highbay to do a
systems check (*all ok*)

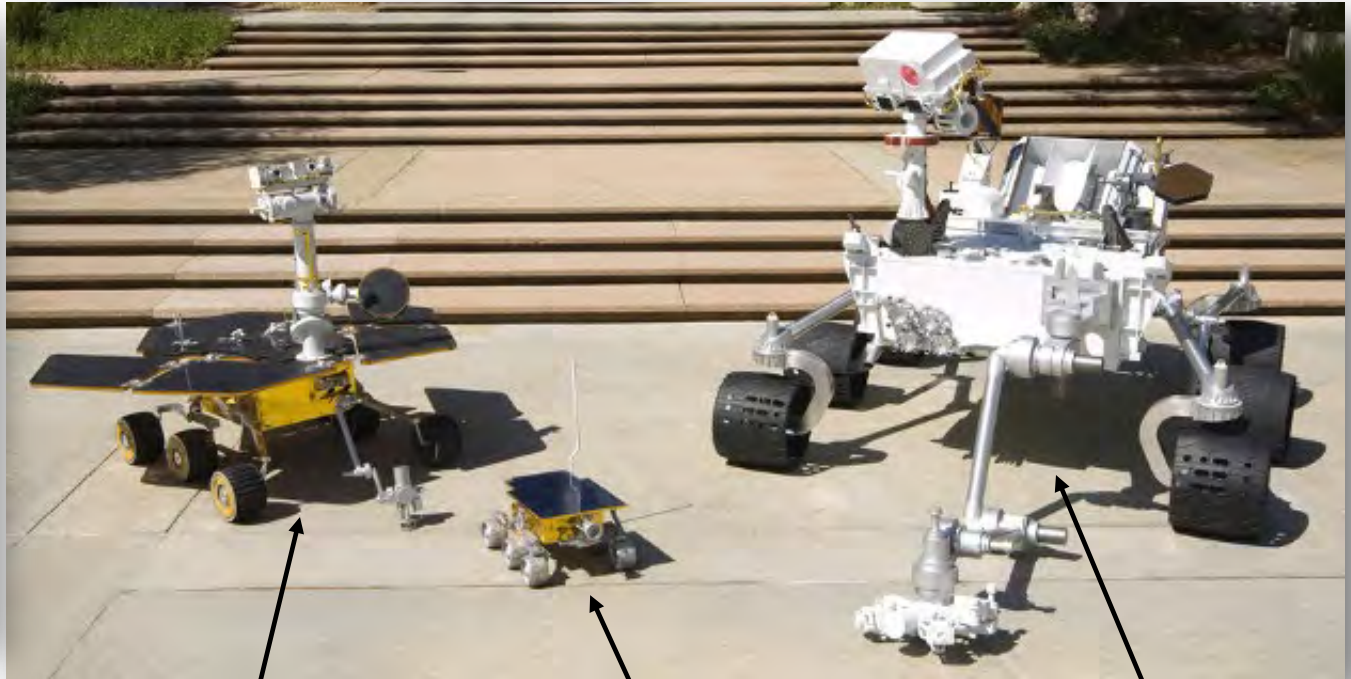


Rover Dimensional Comparison (approx.)



RP/RP15 (2015):

- 1.5m x 1.5m x 2.0m (LxWxH)
- Weighs about 300kg



Spirit/Opportunity (2004):

- 1.6m x 2.3m x 1.5m (LxWxH)
- Weighs about 180kg

Sojourner (1996):

- 0.6m x 0.5m x 0.3m (LxWxH)
- Weighs about 11kg

Curiosity (1996):


- 3.0m x 2.8m x 2.1m (LxWxH)
- Weighs about 900kg

RP's Impressive Social Media penetration



- Rep Mike Honda's Chief staffer requested an RP briefing @ NASA-ARC because, *"the techie staffers read about it on Twitter"*

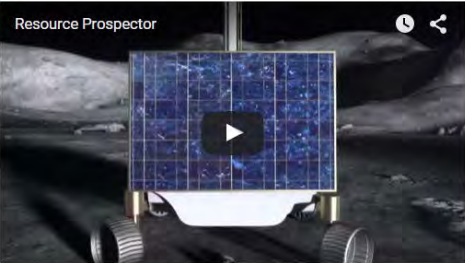
NASAexplores @NASAexplores · Jul 8
Resource Prospector continues rover hardware integration for upcoming earth-based field tests! #321TechOff



Spectrum3847 @Spectrum3847 · Jul 7
Resource Prospector youtu.be/MXWslEK6Q via @YouTube VERY COOL @NASA

YouTube

Resource Prospector



Resource Prospector

Resource Prospector (RP) is an in-situ resource utilization (ISRU) technology demonstration mission which will test extraction of oxygen, water and other vol...



CAPE CANAVERAL SLC-46

ARES

June 2026

#JOURNEYTOMARS

RESOURCE PROSPECTOR MISSION

SUCCESSFUL HARVEST OF RESOURCES FROM THE MOON

#THEMARTIAN

The Martian Movie @MartianMovie · 22h
In June 2026, @NASA's Resource Prospector Mission becomes the 1st mining expedition on another world. #JourneyToMars

NASA Explores

Timeline About

87,653 people Kimberly Ennis

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Ask for NASA Explores's phone

<http://www.nasa.gov/directorates/heo/ae/index.html>

PHOTOS



VIDEOS



NASA Explores

September 3 at 10:55am

Congrats to Resource Prospector! The RP15 team successfully completed their 2015 goals early and under budget!

One of the successful requirements was testing the "dash" speed of the rover. Came in at a sporny 0.45 meters/sec up and down 2-3 degree slopes!



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Most Relevant

Evolvable Lunar Architecture Press Conference

2015-07-20



The Top Strategic Risk:
“We don’t know exactly how much water is in the moon or how deep, or how plentiful it is. This is a key strategic issue we need to understand... and if there is one thing we should do soon, it is to send soon a resource prospector to the moon”.

Charles Miller - Study PI & President of NexGen Space LLC



Press conference by National Space Society (NSS) and Space Frontier Foundation (SFF) announcing their support for NASA's funding of the newly released NexGen Space study. Study: "Economic Assessment and Systems Analysis of an Evolvable Lunar Architecture that Leverages Commercial Space Capabilities and Public - Private - Partnerships"; NASA funded the \$100K study; Independent review of the study occurred 2015-03

Let's Go...



Resource Prospector (RP) Overview



Mission:

- Characterize the nature and distribution of water/volatiles in lunar polar sub-surface materials
- Demonstrate ISRU processing of lunar regolith

RP20 Specs:

- Mission Life: 6-14 earth days
(*extended missions being studied*)
- Rover + Payload Mass: 300 kg
- Total system wet mass (on LV): 5000 kg
- Rover Dimensions: 1.4m x 1.4m x 2m
- Rover Power (nom): 300W
- Customer: HEOMD/AES
- Cost: <\$250M (excl LV & Lander)
- Mission Class: D-Cat3
- Launch Vehicle: Falcon 9 v1.1

Project Timeline:

- ✓ FY13: Pre-Phase A: MCR (Pre-Formulation)
- ✓ FY14: Phase A (Formulation)
- FY15: Phase A (Demonstration: RP15)
- FY16: Phase B prep -> SRR/MDR
- FY17: PDR (Implementation)
- FY18: CDR (Critical design)
- FY19: I&T
- FY20: RP launch



Rover Avionics



Power
Distribution Unit



3-axis mobility
controller testbed

Motor Controllers with Single
wheel testbed

