

National Aeronautics and Space Administration



# Mars Exploration Program

Presentation to the Planetary Science Subcommittee



# MARS

*—the search for life*

Doug McCuiston  
Director, Mars Exploration Program  
10 May 2011

# Mars Program Overall Status

	STATUS	COMMENTS
<b>Odyssey</b>	G	Nominal spacecraft/instrument extended mission operations. Primary MER UHF relay support
<b>Mars Exploration Rovers</b>	Y	Opportunity in good health; no contact w/Spirit and survival chances dwindling
<b>ESA/Mars Express</b>	G	Nominal spacecraft/instrument extended mission operations.
<b>Mars Reconnaissance Orbiter</b>	G	Nominal spacecraft/instrument extended mission operations. Finishing MSL Landing sites then shift to 2016/18
<b>Mars Science Laboratory</b>	Y	Technical and cost issues stabilized; FY11 reserves low; Zoom MASTCAM deferred--couldn't meet schedule; rover STT completed; shipments to KSC have begun
<b>MAVEN</b>	G	Successfully Confirmed in Sept '10 and proceeding in Phase C/D
<b>EMTGO</b>	G	Passed ESA Syst-PDR Dec '10; passed NASA KDP-A Mar '11; scheds that have been out of synch being aligned successfully
<b>2018 Mission</b>	R	Two rover designs have not closed; ESA & NASA developed funding challenges in early '11; Decadal identified this as #1 priority; single rover design studies underway



Progress according to plan  
All commitments can be met.



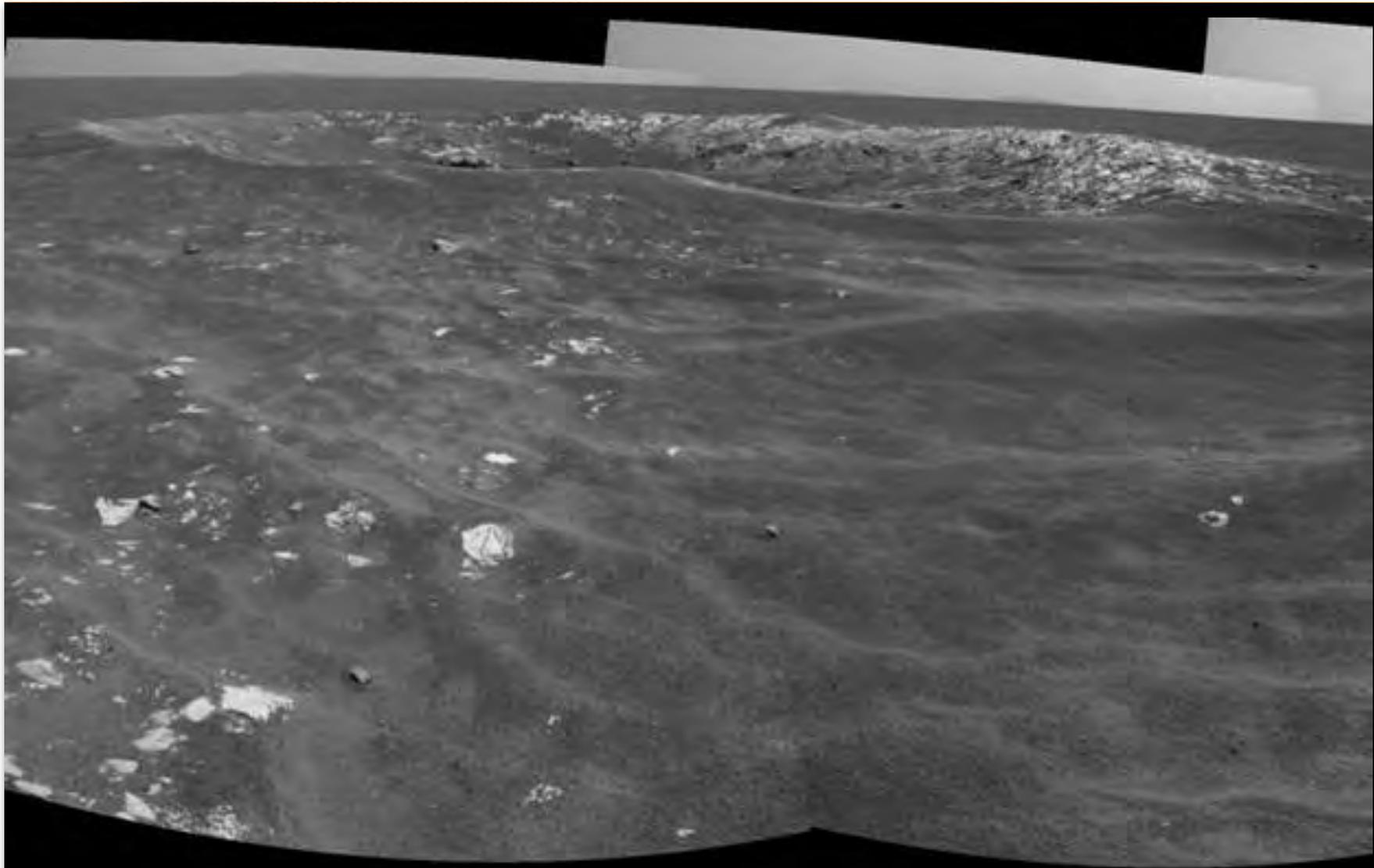
Area of concern; Problem can be resolved within reporting organization; Needs attention.



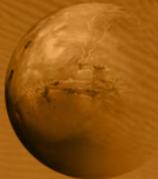
Significant problem; Solution not identified  
Needs action/help beyond reporting organization.



OPPORTUNITY:  
Under 5km to go to Endeavour Crater!

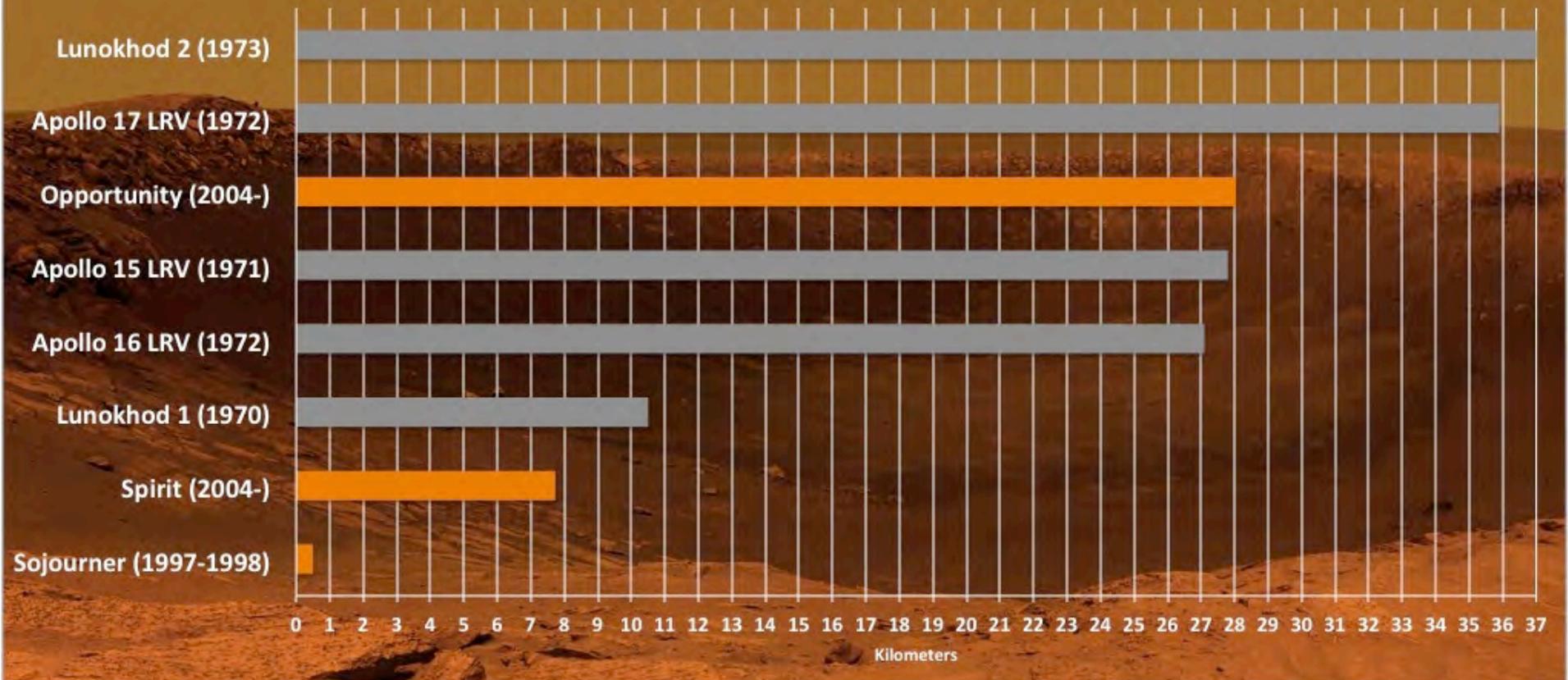


Navcam mosaic of the crater Freedom 7  
taken on sol 2586

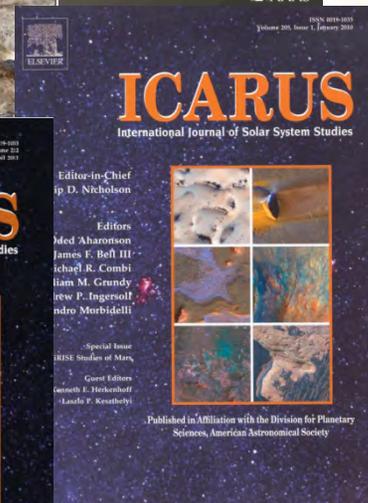
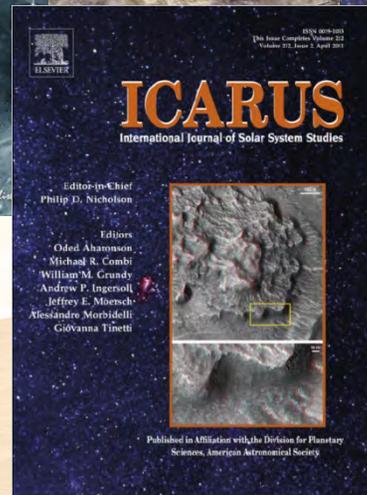
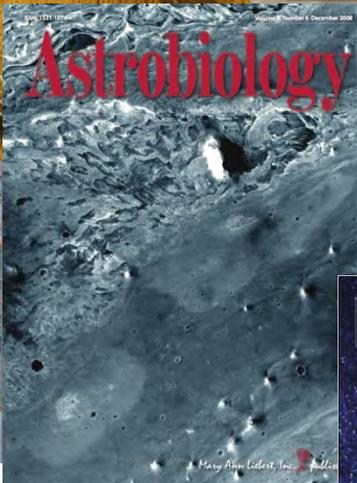
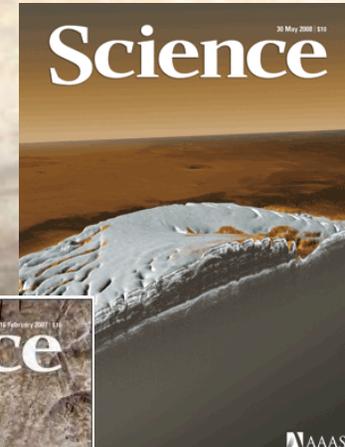
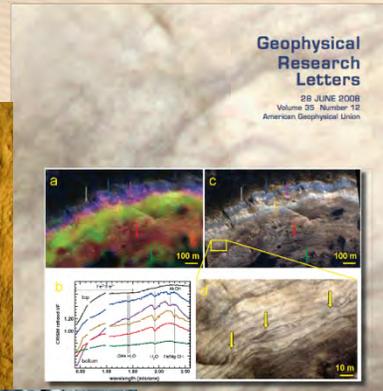


# Opportunity—Can It Set a Driving Record?

Off Earth Distance Driven



# MRO Science Cover Stories



# MAVEN Instrument Hardware



*Solar Wind Electron Analyzer (SWEA)  
Digital Controller Board*



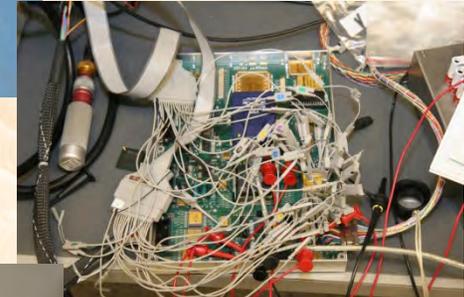
*Imaging UltraViolet Spectrometer (IUVS)  
High Voltage Power Supply Housing  
(flight and flight spare)*



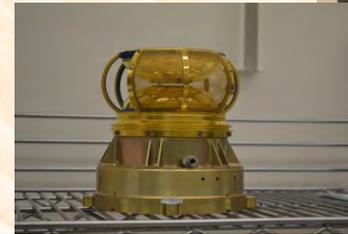
*Magnetometer EM Sensor*



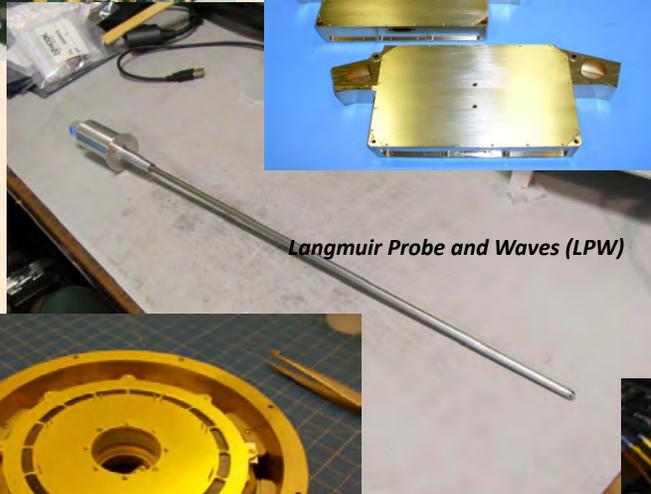
*Neutral Gas and Ion Mass Spectrometer (NGIMS)  
Command & Data Handling Board in Test*



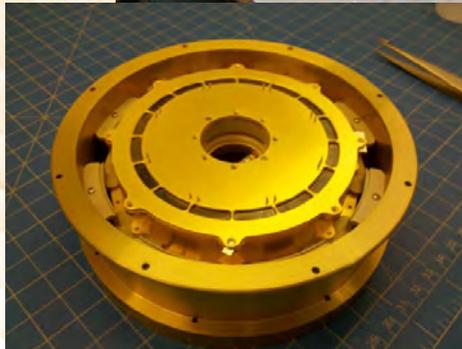
*Solar Wind Electron Analyzer (SWEA) EM Fit Check*



*Langmuir Probe and Waves (LPW)*



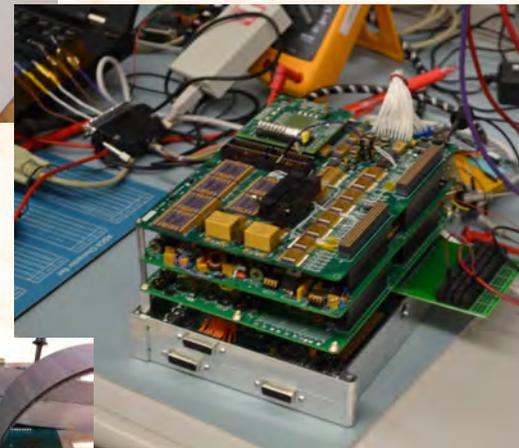
*SupraThermal and Thermal Ion Composition (STATIC)  
Time of Flight (TOF) Engineering Model*



*Remote Sensing Data Processing Unit (RSDPU)  
Processor*



*Particles & Fields  
Data Processing Unit (PFDPU)  
Partial Stack*



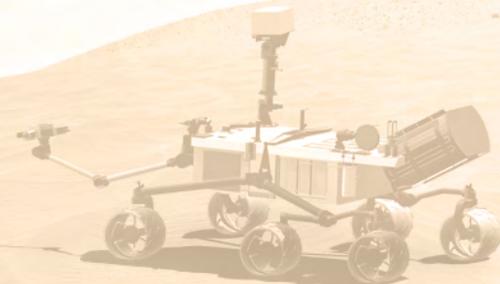
*Extreme UltraViolet (EUV)  
Mechanical Parts*



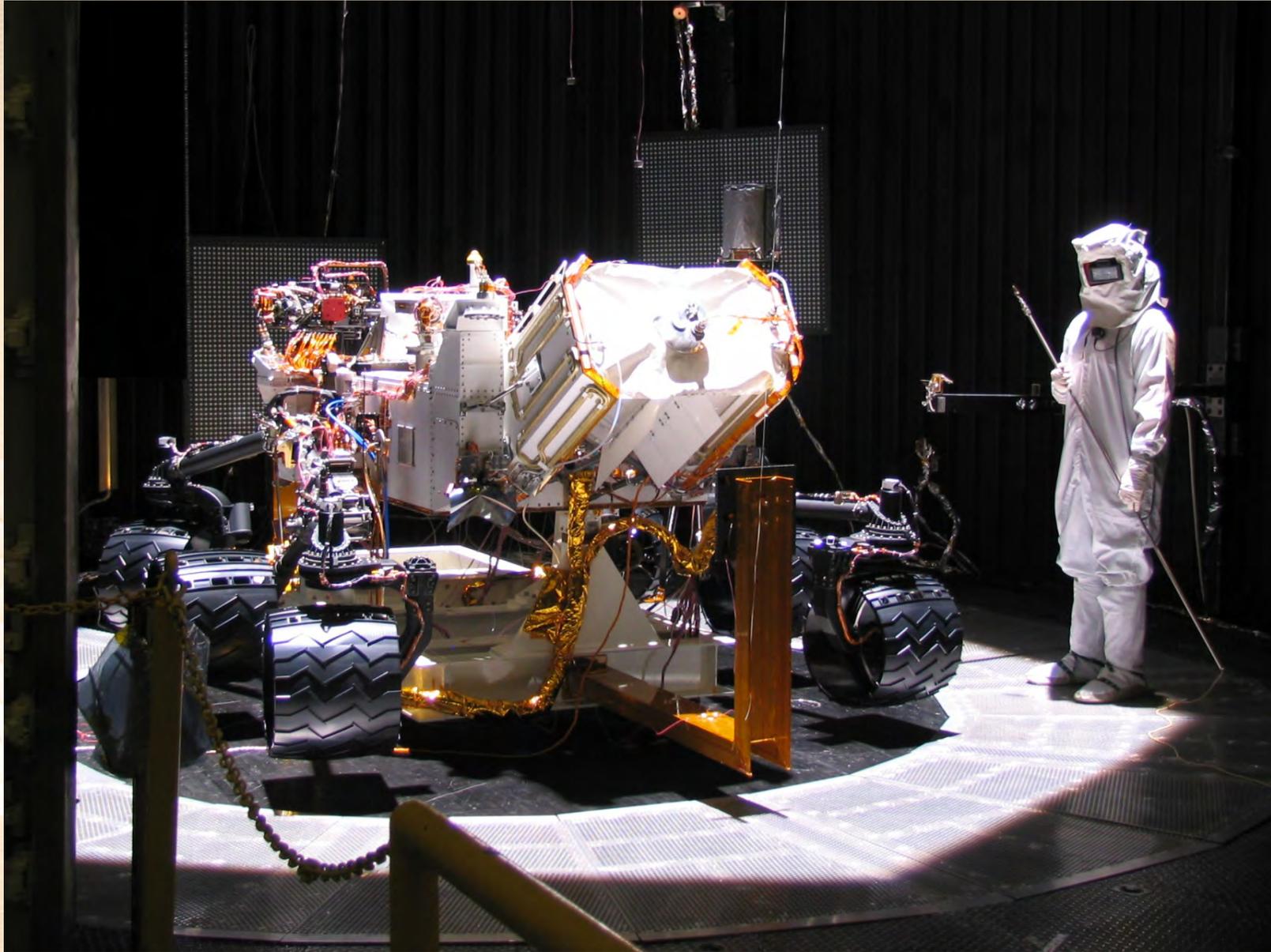


# MSL/Curiosity Milestones

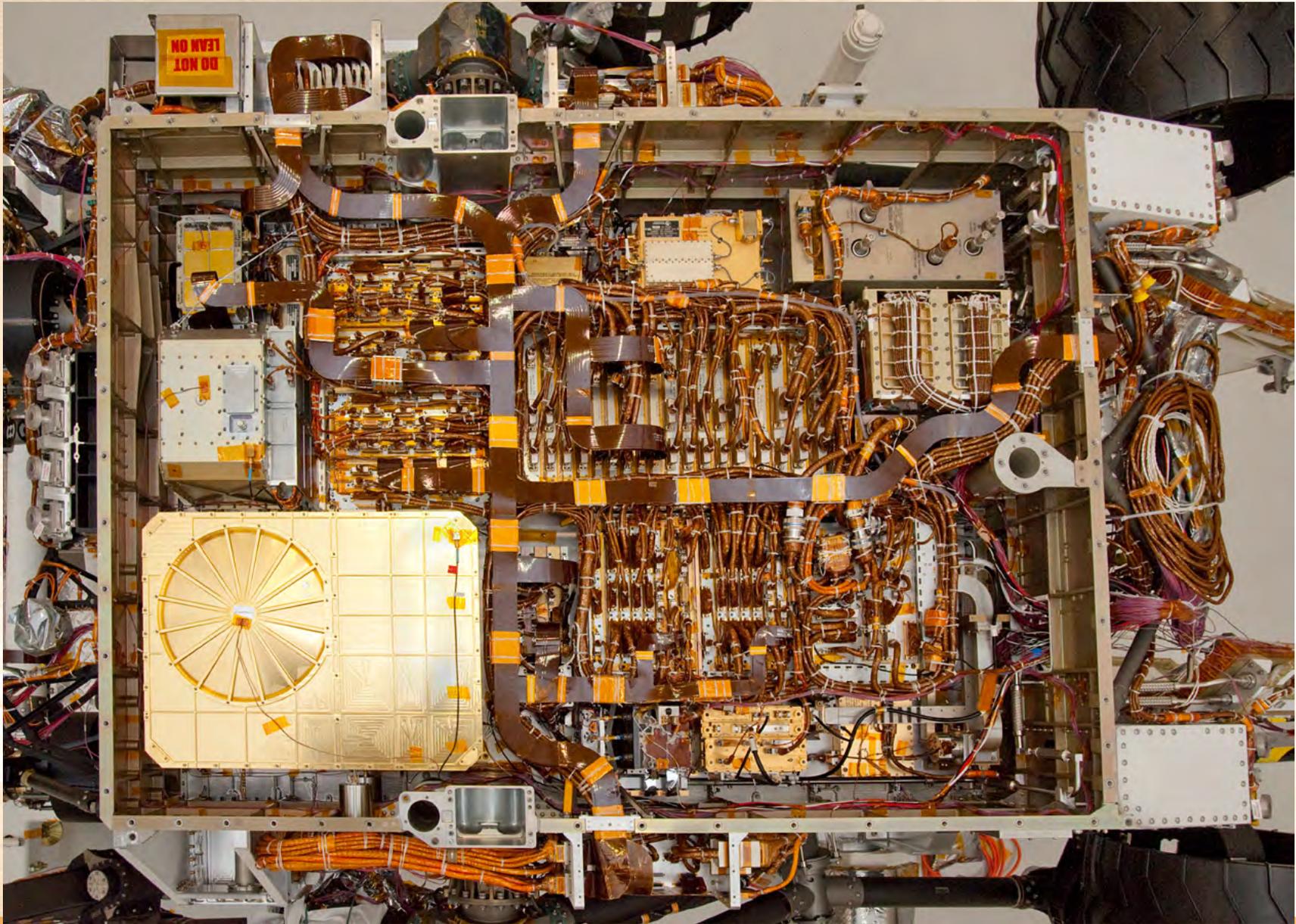
- MSL is proceeding very well
- MSL shipments to the Cape have begun
  - Pre-Ship Review #1 April 26, 2011
    - Cruise Stage and Aeroshell ship to KSC May 11<sup>th</sup>
    - GSE arrived in April
  - Pre-Ship Review #2 June 6/7, 2011
    - Rover and Descent Stage ship June 22<sup>nd</sup>
  - MMRTG Pre-Ship Review May 18<sup>th</sup>
- Call for Participating Scientist
  - Received 149 proposals; funding to select ~20
  - Selections expected in August '11
- Landing Site Selection
  - Next Landing Site Workshop May 16-18, 2011
  - Selection expected in mid/late June
- Launch Window opens, Nov. 25, 2011
- Landing on Mars, Aug. 2012

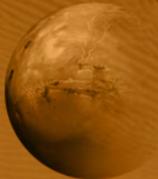


# Curiosity Rover in T/V Chamber

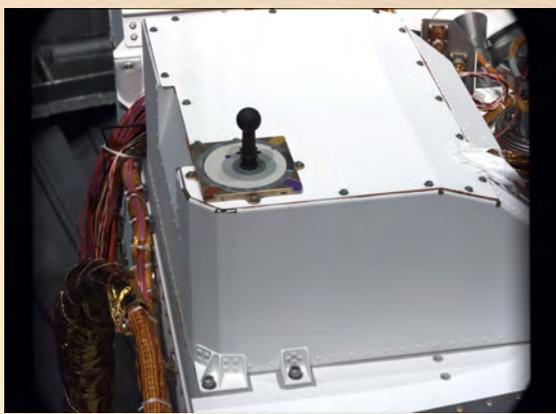


# Curiosity Rover—Belly-up





# Curiosity Rover

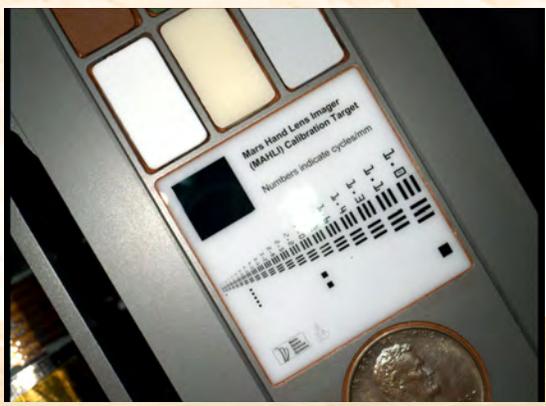


First  
MASTCAM  
Image



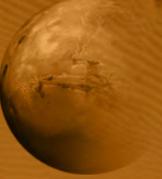
MEDLI integrated  
into the  
Heatshield

First  
MAHLI Cal  
Image



The background of the slide is a composite image. The top portion shows a dark orange, rippled surface, possibly sand dunes, with a small, reddish planet (Mars) in the upper left corner. The middle and bottom portions show a vast, sandy desert landscape under a bright, hazy sky. In the lower right foreground, a Mars rover is positioned on the sand, facing left. The rover has six wheels, a central body, and various instruments on top.

# NASA-ESA Partnership Progress



# Joint NASA/ESA Mars Exploration Update

- Decadal Survey rated the 2018 NASA MAX-C mission as their highest priority large-class mission
- President's 2012 budget reduced MEP in the Next Decades budget line
  - Implementation of MAX-C became un-implementable
  - Technical and cost risk had made a dual-rover landing higher risk than acceptable from December '10 review
- Bi-Lateral in March base-lined 2018 as a joint rover mission merging ExoMars and MAX-C rover mission objectives into a single rover
  - Joint engineering and science working groups established to merge requirements and create concepts to meet them
  - Late May meeting of ESA Programme Board to concur on initial concepts
  - Detailed studies planned through the remainder of CY11 to reach a NASA Mission Concept Review in Spring 2012
- No changes to 2016 from Decadal (endorsed) or Bi-Lateral (endorsed)



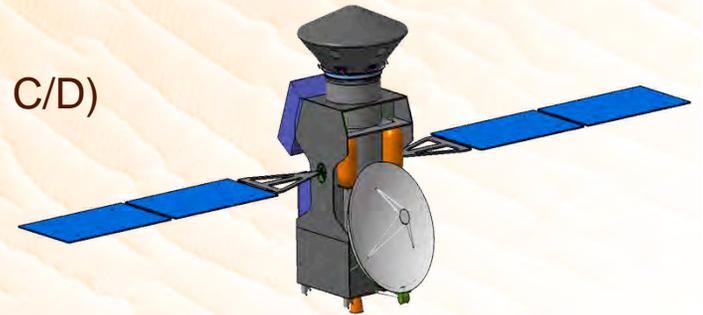
# 2016 ExoMars/Trace Gas Orbiter (EMTGO) Status

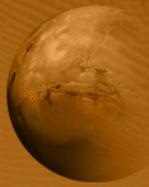
## ▶ Current Mission Status

- NASA
  - Project is in Formulation Phase (Phase A)
  - Successfully completed KDP-A review on 30 March 2011
  - Formulation Authorization Document approved
- ESA
  - Passed System PDR in December 2010
  - Approved to start Implementation Phase (Phase C/D)

## ▶ Recent Progress

- NASA
  - Draft Level 1 requirements created
  - NASA and ESA agreed on relay radio (Electra) delivery schedule
  - NASA's instruments delivery schedule to be negotiated next week
    - Instrument funding profile changed to help meet ESA delivery schedule
  - Science instruments are all under contract with JPL
- ESA
  - First price proposal received by ESA for Phase C/D
    - Negotiations ongoing with contractor on final cost for 2016 Orbiter
  - Expect to have Phase C/D Orbiter contract in place by mid-June
  - EDM instruments and US participating scientists selection nearly complete; announcements expected in early June





# 2018 Mars Joint Rover Status

- Initiated “clean sheet of paper” 2-phase concept study to define a single, joint rover surface mission
  - Phase 1 (April-May) Develop a feasible mission concept
  - Phase 2 (June-September) Develop more detail definition of *implementation approach* and work-share of Agencies
- Joint Engineering Working Group meetings began 1st week of April
  - First Face-to-Face meeting last week
- Joint Science Working Group to define merged science requirements began week of April 18<sup>th</sup>
  - Working with JEWG in integrated effort
- Key Upcoming Milestones
  - May 20: Joint Executive Board review of JEWG/JSWG studies
  - May 26-27: ESA Programme Board
  - Dec ‘11: ESA Council
  - 2Q CY12: Mission Concept Review

Cruise, aeroshell,  
& descent stage



Joint Rover  
landed  
payload



# Planned Portfolio of the Joint Mars Program

