National Aeronautics and Space Administration

Mars Exploration Program Analysis Group

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Mars Exploration Program

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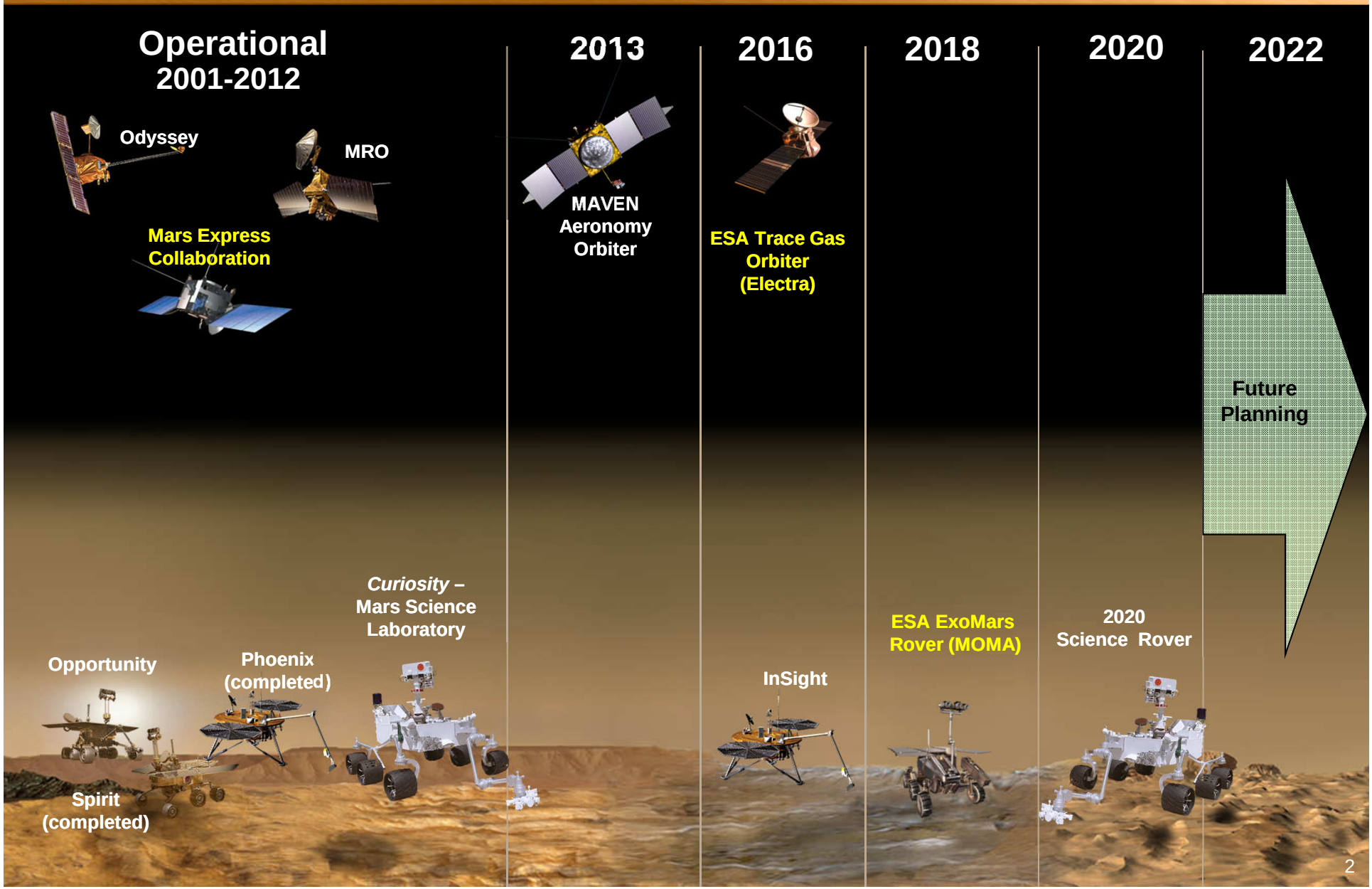
Mars Exploration
Strategic In-Guide Plan



Science Definition Team – Statement of Task

The SDT is tasked to formulate a detailed mission concept that is traceable to highest priority, community-vetted scientific goals and objectives (i.e., *Vision and Voyages* NRC Planetary Decadal Survey and related MEPAG Goals/Objectives) that will be formally presented to the Mars Exploration Program and leaders of the Science Mission Directorate (SMD); any and all mission concepts must fit within available resources and associated levels of acceptable risk as provided by the pre-project team.

The SDT report will be essential in formulating the HQ-approved set of 2020 Mars rover mission science goals and measurement objectives suitable for open solicitation via a NASA SMD Payload AO that is to be released for open competition in Summer 2013.

SDT Primary Assumptions and Guidelines

- The mission will launch in 2020.
- The total cost of the instruments has a nominal cost limit of ~$100M (including margin/reserves). This includes the development and implementation costs of US instruments (~$80M) and the estimated costs of any contributed elements (~$20M), but not including surface operations costs. The cost of science support equipment, such as an arm, is budgeted separately and not included in this ~$100M/$80M limit for instruments.
- The mission will employ Mars Science Laboratory (MSL) SkyCrane-derived entry, descent, and landing flight systems, and *Curiosity*-class roving capabilities. Consideration of the scientific value and cost implications of improving access to high-value science landing sites should be provided by the SDT in consultation with the pre-project team.
- The mission lifetime requirement is surface operation for one Mars year (~690 Earth Days).
- Mission pre-project activities will provide additional constraints on payload mass, volume, data rate, and configuration solutions that will establish realistic boundary conditions for SDT consideration.

SDT Charter Mission Objectives

A. Explore an astrobiologically relevant ancient environment on Mars to decipher its geological processes and history, including the assessment of past habitability and potential preservation of possible biosignatures.

B. In situ science: Search for potential biosignatures within that geological environment and preserved record.

C. Demonstrate significant technical progress towards the future return of scientifically selected, well-documented samples to Earth.

D. Provide an opportunity for contributed HEOMD or Space Technology Program (STP) participation, compatible with the science payload and within the mission's payload capacity.

SDT Activity Schedule

- SDT Kick-off Meeting Jan. 24, 2013
  - Teleconference meetings every week
  - Two Face-to-Face meetings
- Two PowerPoint reports
  - mid-April
  - May 31
- Final Text – July 1
- Disband

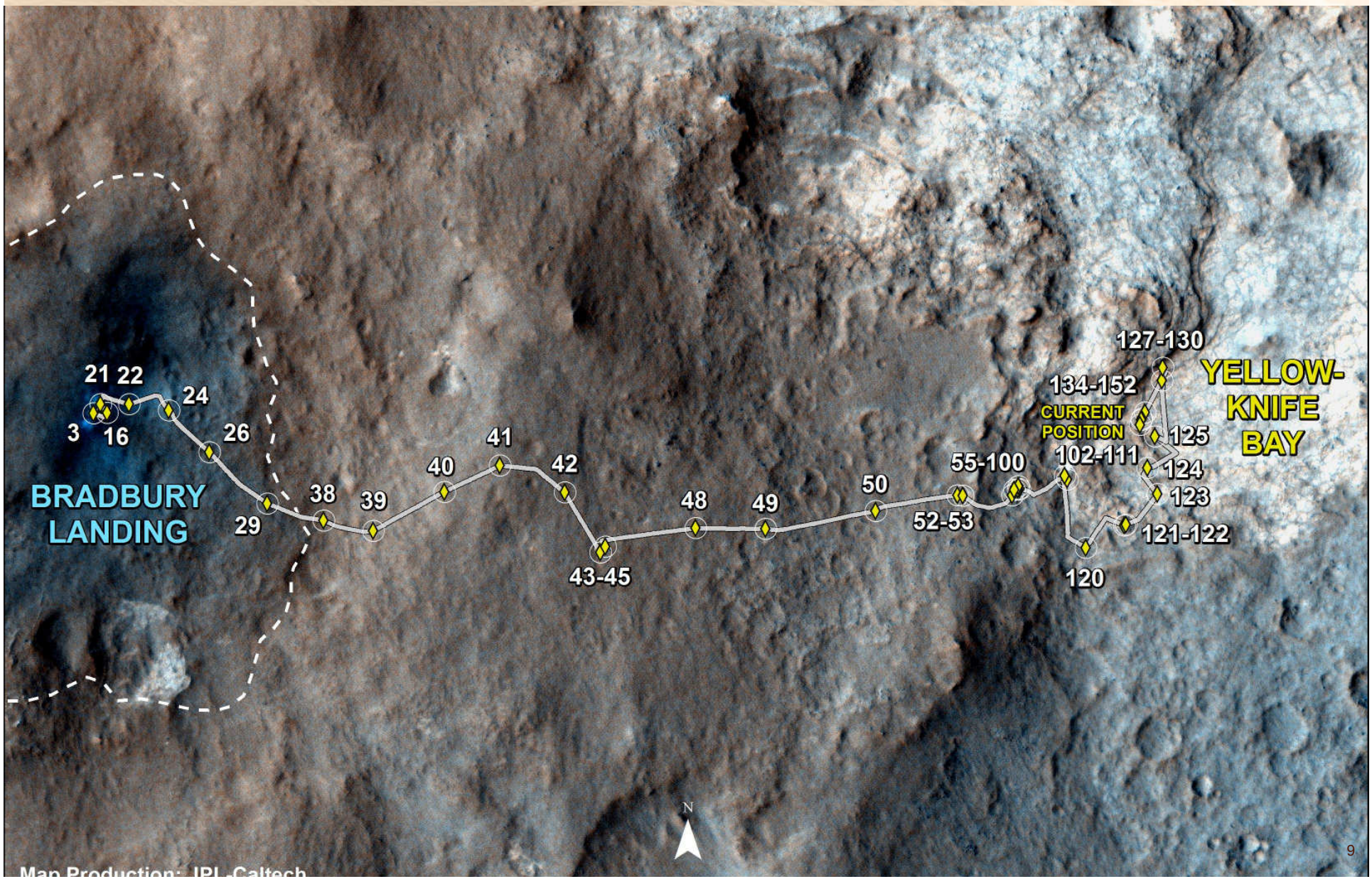
Establishing a “Red” Team to review interim and final material

SDT Roster

Chair	Professional Affiliation	Interest/Experience
Mustard, Jack	Brown University	Generalist, geology, Remote Sensing, MRO, MEPAG, DS, MSS-SAG
Allwood, Abby	JPL	Field astrobiology, early life on Earth, E2E-SAG, JSWG, MSR
Bell, Jim	ASU	Remote Sensing, Instruments, MER, MSL, Planetary Society
Brinckerhoff, William	NASA GSFC	Analytical Chemistry, Instruments, AFL-SGG
Carr, Michael	USGS, ret.	Geology, Hydrology, ND-SAG, E2E, P-SAG, Viking, MER, PPS
DesMarais, Dave	NASA ARC	Astrobio, field instruments, DS, ND-SAG, MER, MSL, MEPAG
Edgett, Ken	MSSS	Geology, geomorph, MPF, MER, MRO, MSL, MGS, cameras
Eigenbrode, Jen	NASA GSFC	Organic geochemistry, MSL, ND-SAG
Elkins-Tanton, Lindy	DTM, CIW	Petrology, CAPS, DS
Grant, John	Smithsonian, DC	geophysics, landing site selection, MER, HiRISE, E2E, PSS
Ming, Doug	NASA JSC	Geochemistry, MSL (CHEMIN, SAM), MER, PHX
Murchie, Scott	JHU-APL	IR spectroscopy, MRO (CRISM), MESSENGER, MSS-SAG
Onstott, Tullis	Princeton Univ	Geomicrobiology, biogeochemistry
Ruff, Steve	Ariz. State Univ.	MER, spectral geology, MGS (TES), MER, ND, E2E, JSWG
Sephton, Mark	Imperial College	Organics extraction and analysis, ExoMars, Astrobiology, E2E
Steele, Andrew	Carnegie Inst., Wash	astrobiology, meteorites, samples, ND-, P-SAG, AFL-SSG, PPS
Treiman, Allen	LPI	Meteorites, Samples, Igneous Petrology
Adler, Mark	JPL	Technology development, MER, MSR,
Drake, Bret	NASA JSC	System engineering, long-lead planning for humans to Mars
Ex-officio (n = 7)		
Meyer, Michael	NASA	Mars Lead Scientist
Mitch Schulte	NASA	Mars 2020 Program Scientist
George Tahu	NASA	Mars 2020 Program Executive
David Beaty	JPL	Acting Project Scientist, Mars Program Office, JPL
Deborah Bass	JPL	Acting Deputy Proj. Sci, Mars Program Office, JPL
Jim Garvin	NASA	Mars Program Scientist
Jorge Vago	ESA	ESA science repressentative
Michael Wargo	NASA	HEOMD representative
Supporting resources (n = 2)		
Wallace, Matt	JPL	engineering liason
Sarah Milkovich	JPL	SDT documentarian, logistics

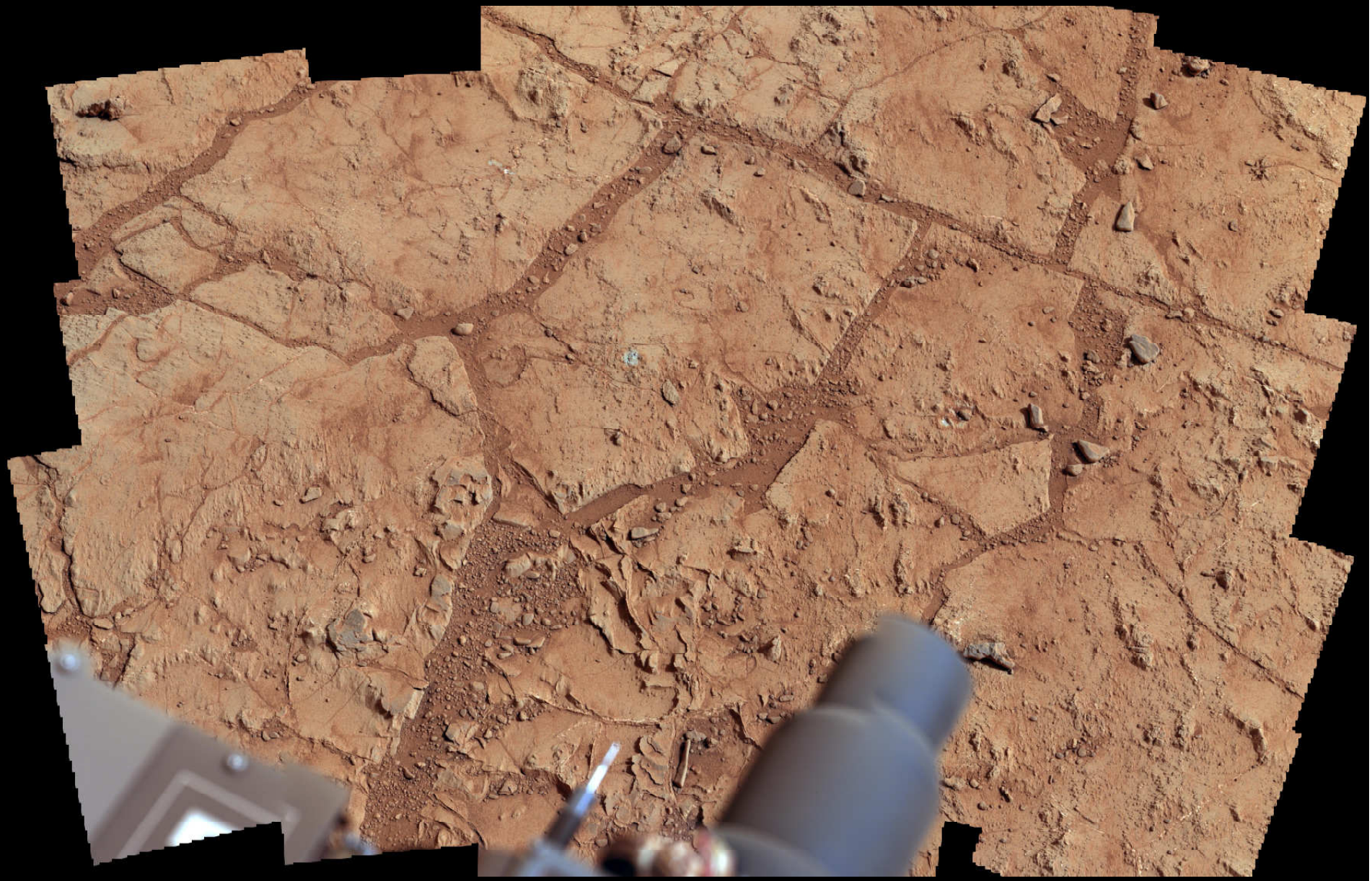
MAHLI
Self Portrait

Traverse Map Sol 152+



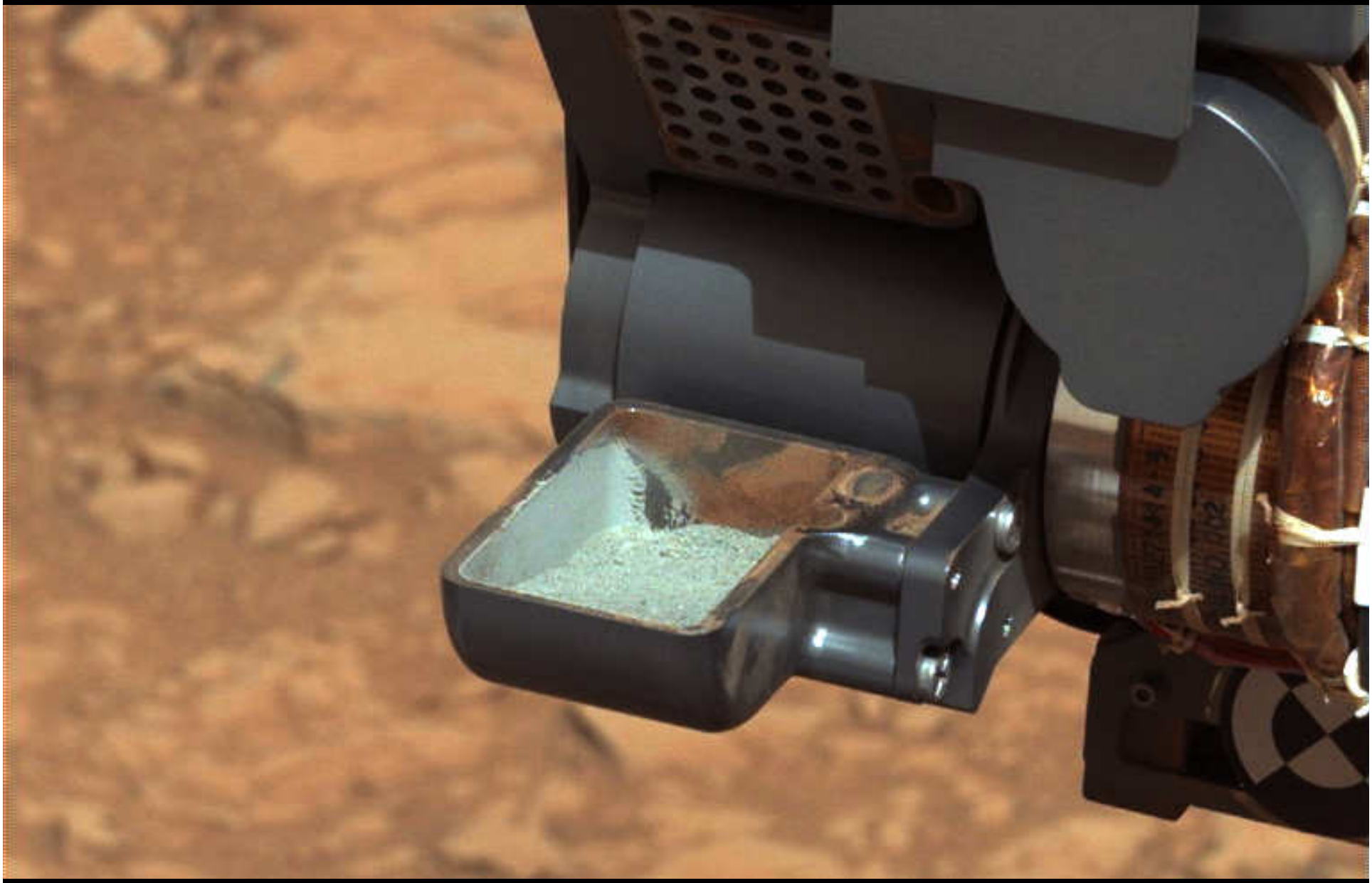
Yellowknife Bay

Drill Area



First Drill Sample

Drill Sample



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