Mars Exploration Program Analysis Group (MEPAG)

MEPAG Meeting #37

R. Aileen Yingst, MEPAG Chair

26 July 2019

Pasadena, CA

MRO HiRISE Image of MSL Curiosity *in the Clay Unit*
U. Arizona / JPL / NASA /

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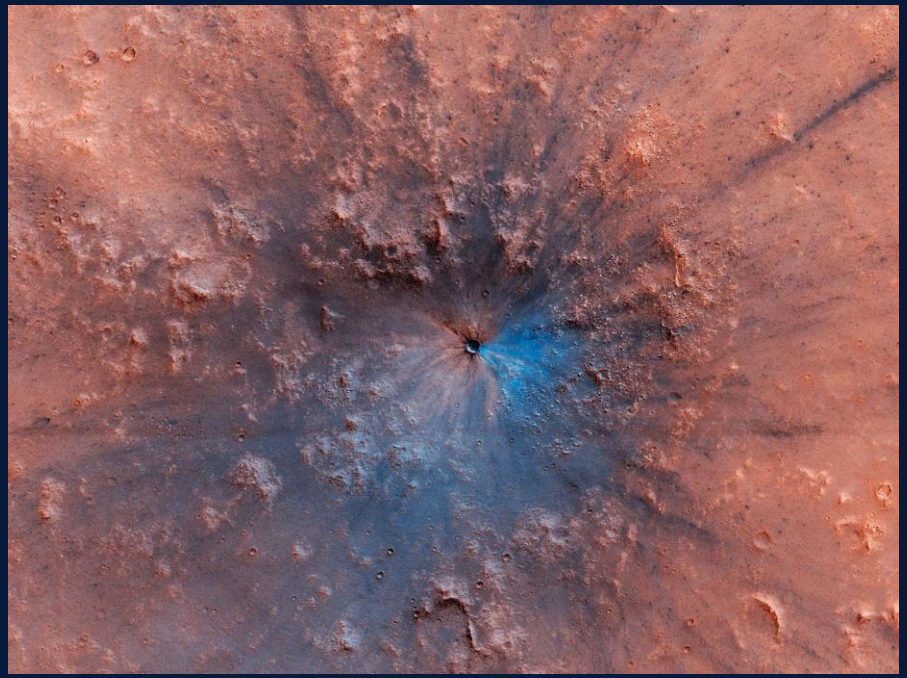
Outline

1) Logistics and Meeting Goals
2) Overview of MEPAG
    1) Committees, members, guests
    2) MEPAG activities
3) Overview of agenda
4) Plans for this MEPAG meeting
    1) Update findings
    2) Preparation for Decadal Survey



HiRISE false-color image of crater formed in last 3 years
https://mars.jpl.nasa.gov/resources/22574/

Meeting Ground Rules

- Speakers will be kept on time according to the agenda
- Questions/comments from local audience?
  - Wait for microphone and state name/affiliation
- Questions/comments from remote audience?
  - Use chat box on Adobe Connect; moderators will track questions
  - Feedback/questions after meeting? → MEPAGmeetingqs@jpl.nasa.gov
- Presentations and Meeting summary notes (once cleared and waivered) will be made available on MEPAG website after ~August 12
  - We will develop a draft of Findings during the course of the meeting
  - These will be briefed to the Mars Exploration Program and, through the Planetary Science Advisory Committee (PAC), to the NASA Advisory Council (NAC)
  - Please do not take pictures of slides

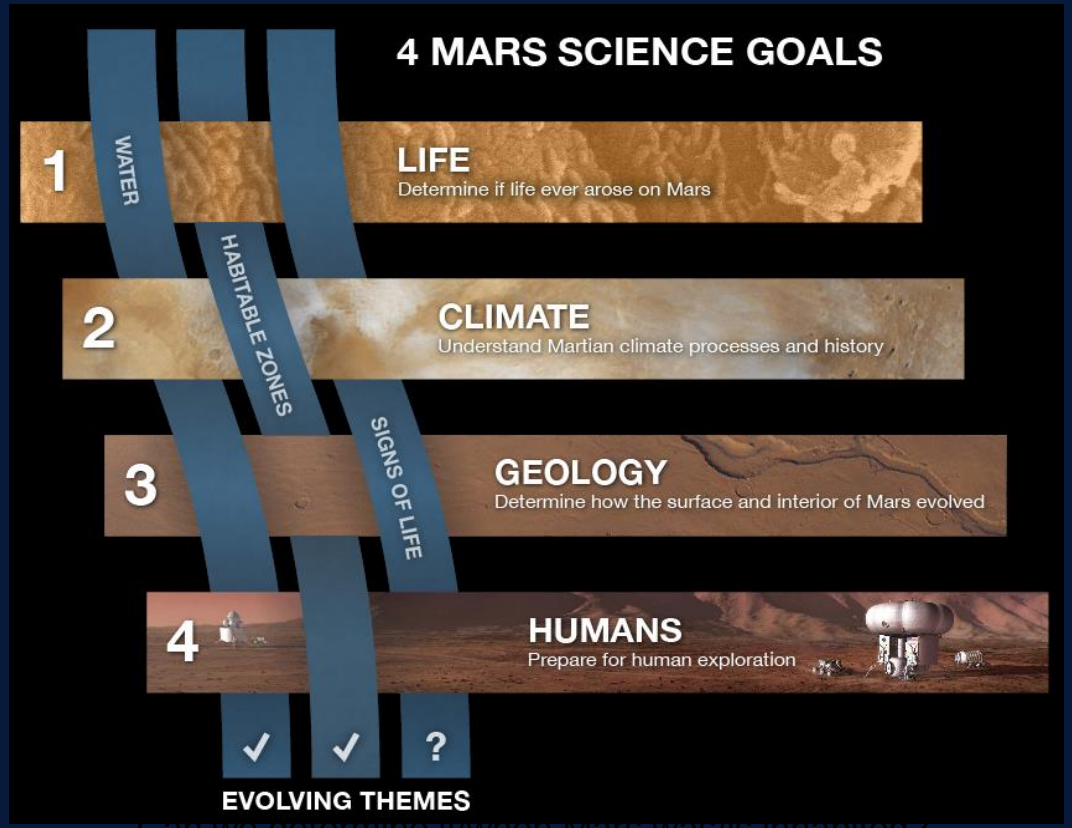
- General Goals of F2F meetings:
  - Receive updates from *and provide feedback to* NASA HQ and the Mars Exploration Program
  - Address upcoming requests and possible requests for input
    - Decadal Survey
    - Goals Document
  - Initiate draft of comments and recommended actions to NASA HQ and Mars Exploration Program (Findings and Concerns)

- Goals of this abbreviated meeting
  - Generate Findings and/or Recommendations
    - Using 9th Mars and other inputs, create Findings on key topics. These will also feed into input for the next Decadal Survey
  - Make preparations for next Decadal Survey (DS)
    - Discuss key concerns
    - Begin defining “Big Questions”
  - Define future MEPAG activities

Mars Exploration Program Analysis Group (MEPAG)

*The **Mars Exploration Program** is an integrated program of research activities and robotic flight missions dedicated to:*

- *Understanding how Mars has evolved as a planet*
- *Discovering whether there is evidence of life, past or present*
- *Preparations for future exploration by humans on Mars itself*

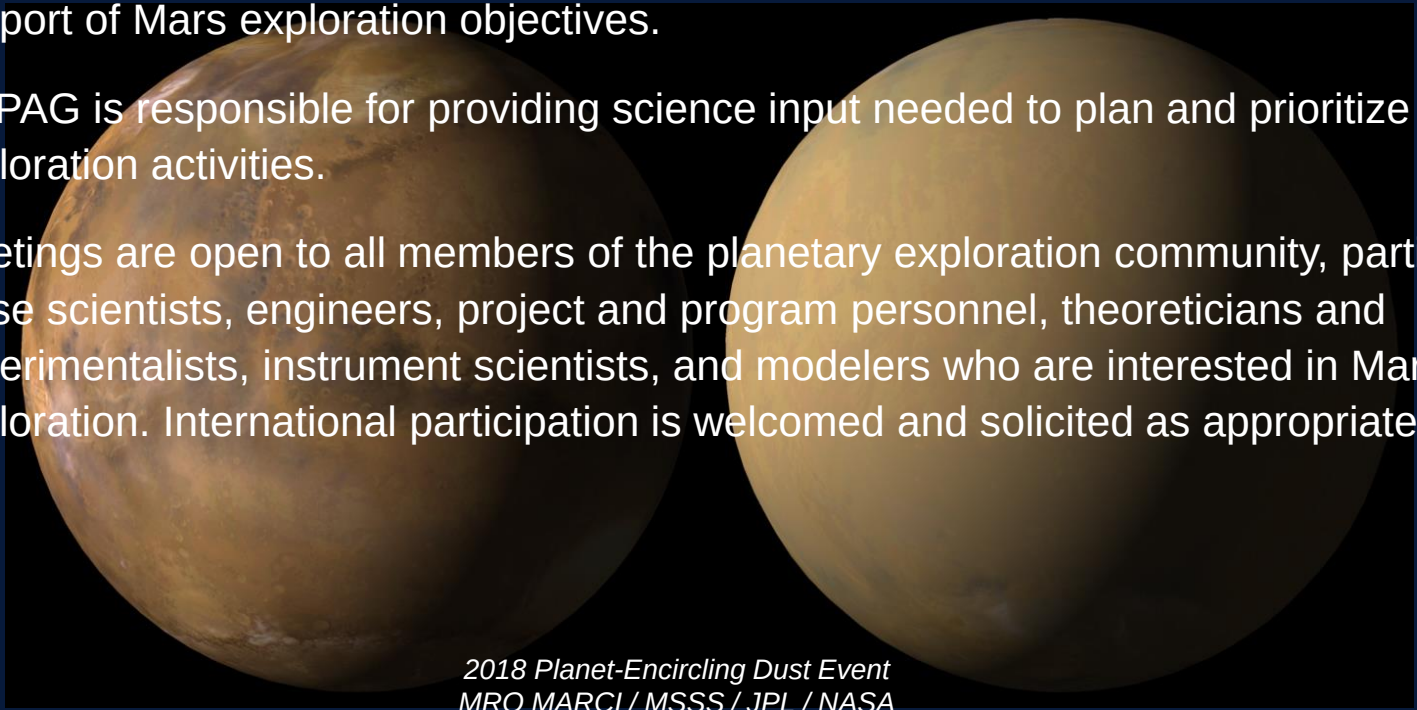


Can we determine if/when Mars was/is inhabited?

What is MEPAG?

https://mepag.jpl.nasa.gov/about.cfm

- MEPAG serves as a community-based, interdisciplinary forum for inquiry and analysis in support of Mars exploration objectives.
- MEPAG is responsible for providing science input needed to plan and prioritize Mars exploration activities.
- Meetings are open to all members of the planetary exploration community, particularly those scientists, engineers, project and program personnel, theoreticians and experimentalists, instrument scientists, and modelers who are interested in Mars exploration. International participation is welcomed and solicited as appropriate.



2018 Planet-Encircling Dust Event
MRO MARCI / MSSS / JPL / NASA

What does MEPAG do?

- MEPAG conducts analysis activities on topics of relevance to Mars-related exploration, including maintaining the Goals Document. http://mepag.nasa.gov/reports.cfm
  - 4 Main Goals : 1) Life, 2) Climate, 3) Geology, 4) Preparation for Humans (not prioritized)
  - Prioritized Hierarchy within each Goal: Objectives, Sub-objectives, and Investigations
  - Cross-cutting and interdisciplinary themes identified and articulated
- Analysis tasks may be requested by NASA, including its Planetary Science Division, Mars Exploration Program (MEP), its Science and Human Exploration & Operations Mission Directorates (SMD, HEOMD), and its advisory committees, such as the Planetary Science Advisory Committee (PAC).
- Tasks may also be requested through NASA by committees of the National Academy of Sciences (NAS) Space Sciences Board. MEPAG may choose to organize Science Analysis Groups (SAGs) to deal with specific issues; these SAGs report their findings to the full community. Findings are reported to the requestors and posted to the community on the MEPAG website, and status reports are routinely made to MEP and PAC.
  - Note that MEPAG is *not* a formal part of the NASA advisory structure; the AG Chairs are routinely invited to report to the PAC

How is MEPAG organized?

- Chair: appointed by the MEPAG Executive Committee in consultation with NASA Headquarters.
- MEPAG Executive Committee : MEPAG Chair (lead), previous MEPAG Chair, MEP Lead Scientist, Mars Program Office Chief Scientist, Goals Committee Chair, and up to 5 additional members of the MEPAG community. Ex officio member: HEOMD Chief Scientist for Exploration.
- Goals Committee: Goal Chair, two members for each of four goals.
- ExComm/Committee membership: Solicited from the MEPAG community and determined by the Chair and Executive Committee.
- Typical term: ~2-3 years

Logistical and organizational support to MEPAG, including its analysis groups, is provided through the Mars Program Office, located at the Jet Propulsion Laboratory.

MEPAG Committees

- Executive Committee (R. A. Yingst, Chair, appointed 4/19)
  - W. Calvin (Univ. Nevada Reno)
  - B. Cohen (GSFC)
  - J. Eigenbrode (GSFC)
  - J. Filiberto (LPI)
  - J. Johnson (JHU-APL) →*Past chair*
  - D. Banfield (Cornell) →*Goals Committee Chair*
  - S. Hubbard (Stanford University)
  - D. Beaty, R. Zurek (JPL)
  - M. Meyer (NASA HQ)
  - J. Bleacher (HEOMD, NASA HQ) Ex Officio

Artist's conception, first humans on Mars
https://mars.jpl.nasa.gov/resources/22530/

- Goals Committee (D. Banfield, Chair)
  - Goal I *<Life>* (S.S. Johnson, Georgetown University; J. Stern, GSFC)
  - Goal II *<Climate>* (R. Wordsworth, Harvard University; D. Brain, Univ. Colorado)
  - Goal III *<Geology>* (B. Horgan, Purdue University; R. Williams, Planetary Science Institute)
  - Goal IV *<Human Exploration>* (J. Bleacher GSFC (P. Niles, JSC); M. Rucker, JSC)

Executive Committee

R. Aileen Yingst, Chair, PSI

Jeff Johnson, Past Chair, JHU-APL

Wendy Calvin, UNR

Don Banfield, Goals Committee Chair, Cornell

Scott Hubbard, Stanford

Jen Eigenbrode, GSFC

Dave Beaty, MPO/JPL

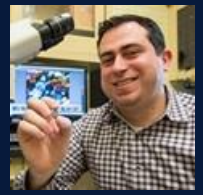
Michael Meyer, NASA HQ

Jacob Bleacher, NASA HQ

Rich Zurek, MPO/JPL

Barbara Cohen, GSFC

Justin Filiberto, LPI



Goals Committee

Don Banfield, Goals Committee Chair, Cornell

Jen Stern
NASA GSFC, Goal 1

Briony Horgan,
Purdue, Goal 3

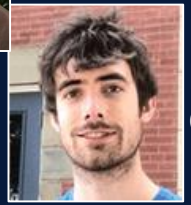
Sarah Stewart Johnson
Georgetown, Goal 1

Need image

Becky Williams,
PSI, Goal 3

David Brain
Univ. Colorado, Boulder
Goal 2

Michelle Rucker,
NASA JSC, Goal 4



Robin Wordsworth
Harvard University,
Goal 2

Paul Niles, JSC

Jacob Bleacher,
NASA GSFC, Goal 4

Recent MEPAG Activities since last F2F (April 2018)

- VM2 (June, 2018): MSR reports—Berlin workshop, MEPAG Goals revision related to ice and polar science
- VM3 (September, 2018): Overviews of NASEM reports on “Planetary Protection” and on the Mid-Term Decadal Survey *Vision & Voyages.*
- VM4 : (Feb., 2019) Briefing on new NRA *Planetary Mission Concept Studies* and ICE-SAG interim report
- VM5 (June, 2019): MEPAG Chair transition; report from Humans to Mars Summit (ISRU panel report) and on MSR Science Planning Group (MSPG); ICE-SAG final report presentation
- The Ice & Climate Evolution Science Analysis Group (ICE-SAG) report has been released! (https://mepag.jpl.nasa.gov/reports/ICESAG_Report_FINAL.pdf)

MEPAG Meeting #37 Agenda

Agenda for MEPAG face-to-face meeting #37 on July 26, 2019, in Pasadena, CA			
Start	Time	V3: Agenda (as of 07/08/2019)	
Note: All speakers should include time for discussion. All times are PDT			
Friday, July 26, 2019			
Mars Exploration Program Reports			
08:15 AM	0:30	Welcome; Agenda Preview, Desired Outcomes MEPAG Updates since last Meeting	A. Yingst, MEPAG Chair
08:45 AM	1:00	NASA: PSD & MEP Status, MSR Next Steps, Response to Mid-Term Assessment	L. Glaze, J. Watzin, M. Meyer
09:45 AM	0:10	Discussion	All
Mars Missions in Development			
09:55 AM	0:15	ExoMars RSP	J. Vago
10:10 AM	0:15	Mars 2020 Rover Science Status	K. Williford
10:25 AM	0:15	Martian Moons eXploration (MMX)	T. Usui
10:40 AM	0:15	UAE: Hope Mission	S. Amiri
10:55 AM	0:10	Discussion	All
HEOMD & Commercial Space			
11:05 AM	0:20	News on the Moon to Mars Initiative	P. Niles, J. Bleacher
11:25 AM	0:15	Reconnaissance & Emerging Strategies to Enable Human Exploration on Mars	R. Davis
11:40 AM	0:10	Discussion	All
Looking Forward: Next Decadal Survey			
11:50 AM	0:20	Highlights of 9th International Mars Conf.	TBC
12:10 PM	0:10	MEPAG Goals Update	D. Banfield
12:20 PM	0:10	White Papers	S. Diniega
12:30 PM	0:30	MEPAG Findings/Future Plans & Meetings	A. Yingst / All
01:00 PM		Adjourn	

MEPAG Key Issues for this meeting

- Update Findings
- Preparations for upcoming Decadal Survey
  - Mid-term Assessment response
  - “Big Questions”

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Mars Exploration Program Analysis Group (MEPAG)

MEPAG agrees with the recommendations of the consensus mid-term assessment of the Decadal Survey and stands read to assist. Mid-term recommendations were:

- NASA should continue planning and begin implementation of its proposed "focused and rapid" architecture to return samples from the Mars 2020 mission… [MEPAG Concern #1]
- NASA should ensure the longevity of the telecom infrastructure at Mars…This should not be accomplished by sacrificing science being conducted by existing orbiters. [MEPAG Concern #2]
- NASA should immediately work to reinvigorate international cooperation to help implement Mars exploration more effectively and affordably. [MEPAG Concern #1]
- NASA should develop a comprehensive Mars Exploration Program (MEP) architecture, strategic plan management structure, partnerships (including commercial partnerships), and budget that address the science goals for Mars outlined in V&V. [MEPAG Concern #1]
  - The architecture and strategic plan should maximize synergy among existing and future domestic and international missions, ensure a healthy and comprehensive technology pipeline…, and ensure sustenance of foundational infrastructure (telecom, imaging for site certification, etc.)
  - This approach of managing the MEP as a program, rather than just as a series of missions enables science optimization at the architectural level… [**Concerns in MEPAG Letter to PAC, April 30, 2018*]

MEPAG Concern #1: MEP Architecture (a)

- Completing Mars Sample Return (MSR):
  - Mars Sample Return is the highest priority goal for the Mars Exploration Program
  - A prime concern of the MEPAG community has been the absence of high-level commitment to missions needed to carry out the return of the samples to be collected by Mars 2020, to be launched in less than a year. *That may have changed*.
  - The FY19 President's Budget had money to study what would be required for the next steps in Mars Sample Return. The FY20 President's Budget has money for studies that may lead to a new start for MSR flight elements to launch in the decade 2023-2032.
- *We will hear today about progress on studies conducted in the framework of a Statement of Intent NASA signed in April 2018 with ESA to work jointly to plan MSR.*

MEPAG Concern #1: MEP Architecture (b)

- The Mars Exploration Program has other priorities along with MSR, as outlined in the MEPAG Goals.
- Looking forward, MEPAG believes that the MEP should address outstanding questions in Mars science *in parallel with,* or *as part of*, the orbiter and rover missions required for sample return.
- The current NASA architecture lacks flight opportunities for U.S. investigators to address outstanding questions in Mars science.
- *We will hear today about NASA's response to the Decadal recommendation to develop a comprehensive Mars Exploration Program (MEP) architecture, strategic plan, management, etc.*

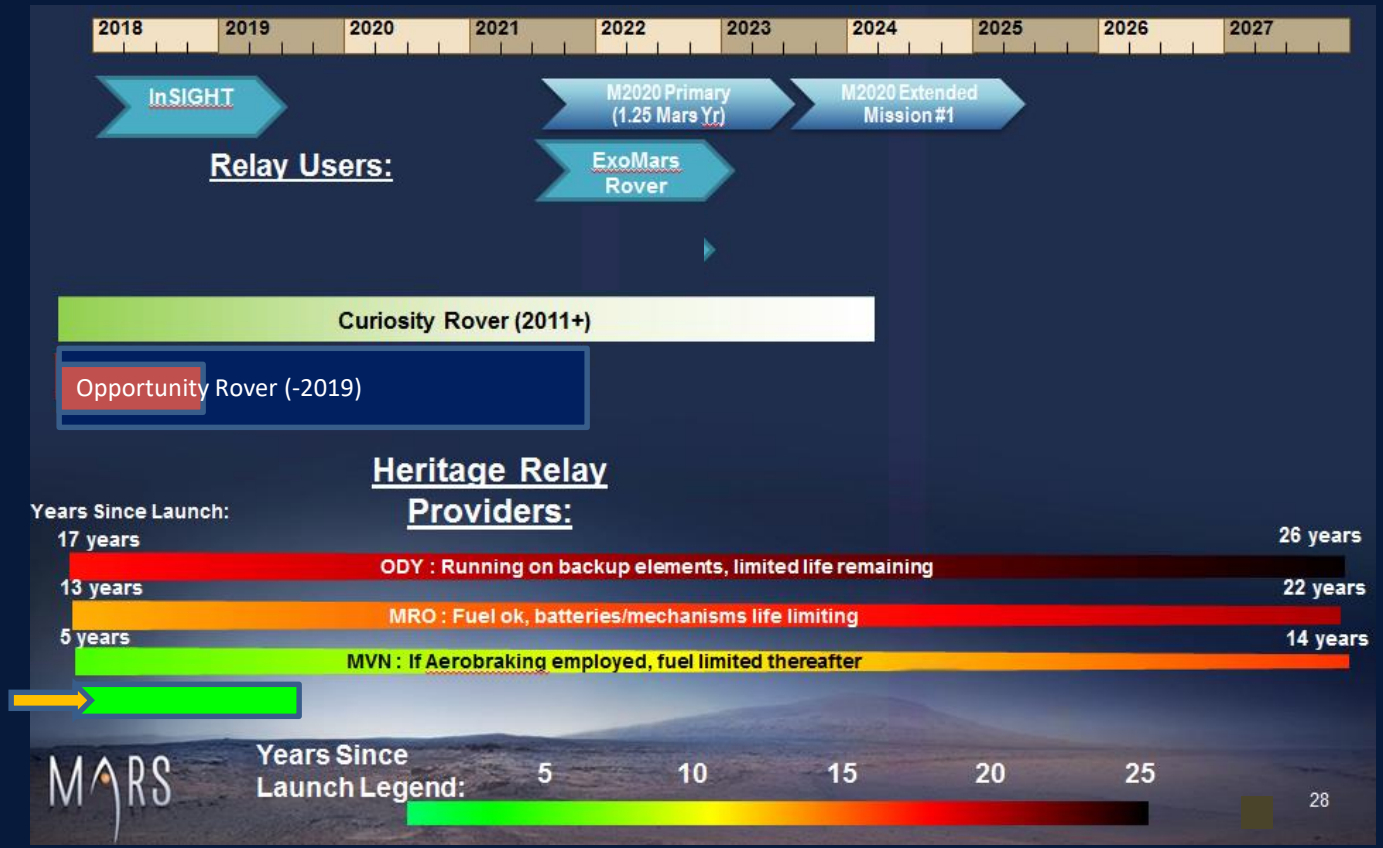
MEPAG Concern #2: MEP Infrastructure

- The communication infrastructure necessary to support ongoing orbital science and rover data return is aging.

- *Progress to date:*
  - *MEP has been working to extend the life expectancy of the orbital fleet at Mars, mitigating issues as they arise.*
    - *MAVEN successfully lowered its apoapsis in order to be in an orbit more suited to relay support; in this orbit it is still able to conduct much of its science program*
    - *The ExoMars Trace Gas Orbiter, with its NASA provided Electra relay packages, has been returning impressive amounts of data from both InSight and MSL*

- Issues remain:
  - MAVEN and TGO have orbits that drift in local time, which affects timing of return of decisional data for rovers
  - MRO and ODY are still aging, but key relay providers

MEPAG Key Issue 2: MEP Infrastructure



TGO in service 2018

MEPAG Key Issues for this meeting

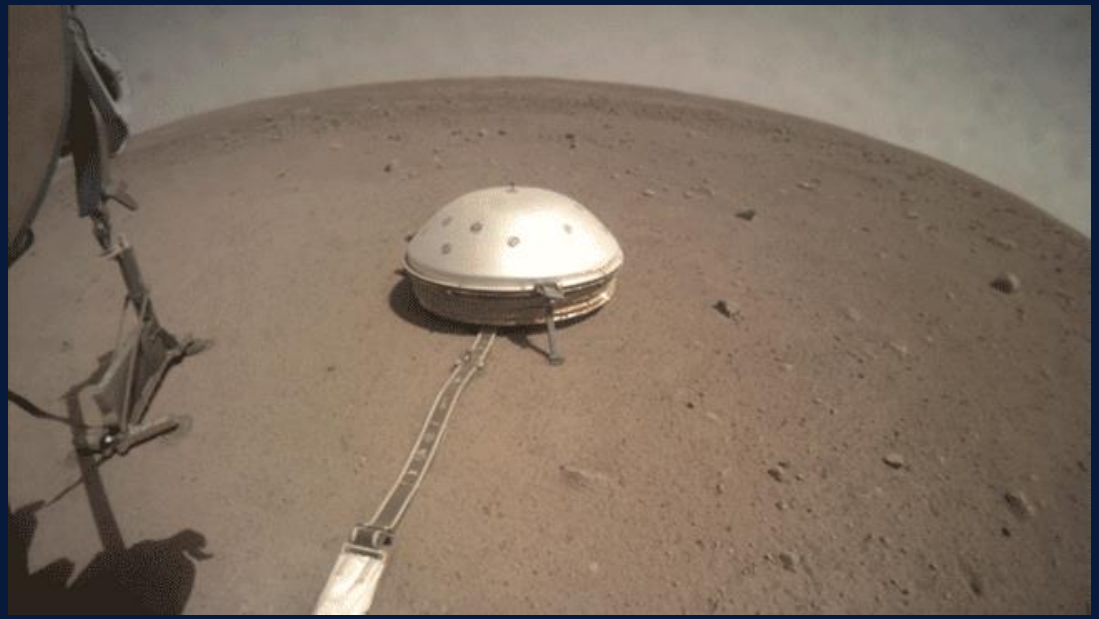
- Update Findings
- Preparations for upcoming Decadal Survey
  - Mid-term Assessment response
  - "Big Questions"

We hope to begin the process of defining these today and continue the process virtually.

- Preparation for Decadal Survey
  - MEPAG has had a request from HQ to respond to the following:
    - 1) What are highest priority questions for Solar System exploration, according to the MEPAG community? (think big)
    - 2) What do we believe are the highest priority questions for each of the other AGs (CAPTEM, LEAG, MAPSIT, MEPAG, [Mercury?], OPAG, SBAG, and VEXAG)?
  - NASA will use this response in assessing how to configure the decadal survey statement of task. Responses needed by August 15.
  - Notional DS timeline: Charter negotiated in the fall; call for white papers by end of year; early career workshop (Jan-Mar); Leadership announced at LPSC; Decadal deliberations get underway in a year, summer 2020

Mars: Other Open Issues

- Diversity
- New Frontiers



InSight Fisheye camera lifting the mole support structure
https://mars.nasa.gov/news/8455/nasas-insight-uncovers-the-mole/