



*MEPAG Report to the Planetary
 Science Subcommittee*

Jack Mustard, MEPAG Chair

July 9, 2009



Very Recent Science Results

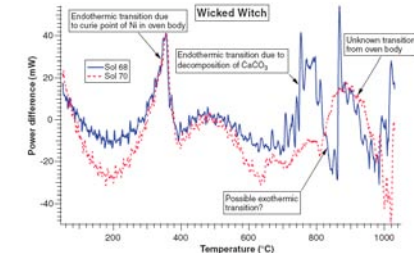
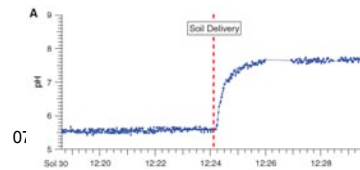
Phoenix Results Published in Science:

Ice table at the depth, location, and concentration predicted by orbital data and theory

Perchlorate (ClO₄) 0.4-0.6% uniformly present, contains most of the Cl, extremely hydroscopic

Carbonate in abundances of 3-5 wt.% detected by two instruments: TEGA and MECA

Chemistry buffered by carbonate resulting in an alkaline soil pH



*Developments in Mars Exploration Since
 January PSS Meeting - Program*

- Mars Science Laboratory (Curiosity) has been given approval to move ahead to completion for 2011 launch
- MAVEN on track for 2013 launch
- MEPAG meeting March 3-4, 2009: Kickoff for Decadal Survey preparation activities
- Architecture planning for the next decade
 - Mars Architecture Tiger Team-3 (MATT-3, P. Christensen, Chair) February 2009
 - June 2009 Red Team review of MATT architectures (MART, S. Hubbard, Chair)
 - NASA-ESA Joint Instrument Definition Team (JIDT) for 2016 orbiter formed



MEPAG Preparations for the Planetary Decadal Survey

- MEPAG will fully support any requests from the Decadal Survey (DS) chairs and subject panels
- Based on the current DS task statements, MEPAG has the following activities underway:
 - MEPAG White Papers
 - Mars community support and coordination
- Much of the next MEPAG meeting will be devoted to obtaining broad community consensus on the MEPAG position papers and introducing Mars community-generated topical whitepapers.
- Important Mars dates for the Decadal Survey
 - July 29-30, 2009 MEPAG Meeting, Providence, RI
 - September 9-11, 2009 First meeting of Mars Panel
 - November 4-6, 2009 Second meeting of Mars Panel
 - February/March, 2010 MEPAG Meeting, Monrovia, CA

Mars Exploration Program Analysis Group (MEPAG)

chartered by NASA HQ to assist in planning the scientific exploration of Mars

The screenshot shows the website interface with navigation tabs for Home, Reports, Meetings, Assessments, and Other. Below the navigation is a table of updated materials:

Date	Title	Letter
14 April 2009	To the Mars Community	Doc (1.8.03) PDF (1.8.03)

Below this is a table of MEPAG White Papers:

Title/Comments	Task Description	Authorship	Draft Report	Final Report
Science Goals, Objectives, Investigations, and Priorities 2009	Input to Task #3 in NSC	MEPAG Goals		
High-level summary of the 2009 state of knowledge in Mars science and the formulation of the top Mars-related science objectives for the next decade	Developed by MEPAG Executive Committee	MEPAG Executive Committee		
The importance of a program of strategically linked, partially independent missions to achieve the top science objectives for Mars exploration	Input to Task #2 in NSC	MEPAG Executive Committee		
Strategic Technology Development Needs/ Opportunities for Future Mars Exploration	Input to Task #2 in NSC	Doc (1.8.03) PDF (1.8.03)		
2018 science and mission definitions (MER-SAG)	Task	MER-SAG		

MEPAG Decadal Survey Website

- Provides an overview to the community of MEPAG's specific contributions as well as community white papers
- Provides a mechanism for community input and review
- <http://mepag.jpl.nasa.gov/decadal/index.html>

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- Program-level position papers:
 1. Seek Signs of Life: Mars Exploration Program Science Overview for Decadal Survey
 - Authors: **Zurek**, Budney, Jakosky, Meyer, Mustard and others
 - Importance of a *program* of strategically-linked, partially-interdependent Mars missions to achieve top science objectives for Mars exploration
 2. Mars Science Goals, Objectives, Investigations, and Priorities:
 - Existing MEPAG "Goals Document" updated in 2009
 - Authors: **Johnson**, Amend, Steele, Bouger, Rafkin, Withers, Plescia, Hamilton, Tripathi, Westall
 3. State of Knowledge of Mars Science and Next Decade Objectives
 - Executive summary of current state of knowledge and extension to top science objectives realistically achievable during next 10 years
 - Authors: **MEPAG Executive Committee** and supporting experts

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4. Strategic Technology Developments for 2011-2020 Period to Enable Future Mars Missions
 - Authors: **Hayati**, Lavery, May, Munk, Powell, Gershom, Wolf, Lin, Spry, Stephenson, Anderson, Allen, Pearson, Backes, Reidel, Rivellini, Nesnas, Bolotin
5. Report from the Mars Mid-Range Rover Science Analysis Group (MRR-SAG)
 - Authors: **McSween, Pratt, Beaty, Crisp**, and the MRR-SAG
6. Report from the Mars Geophysical Network Science Analysis Group (NET-SAG)
 - Authors: **Banerdt, Spohn** and the NET-SAG
7. Mars Sample Return Overview
 - Authors: **Mattingly, Buxbaum** and others
8. Report from the Mars Science Orbiter SAG
 - Authors: Mike **Smith** and the MSO-SAG

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- Current identified community topical white papers:
 1. Mars Polar Science
 - Authors: Hecht, Fishbaugh and others
 2. Mars Atmospheric Science
 - Authors: Mischna and others
 3. Landing site characterization and selection
 - Authors: Golombek, Grant
 4. Mars crustal magnetism and dynamo history
 - Authors: Lillis and others
 5. In-situ geochronology
 - Authors: Conrad and others
 6. Investigation of the interior of Mars
 - Authors: Banerdt and others
 7. Astrobiology
 - Authors: Coordinated by NAI

2016 Joint Instrument Definition Team (JIDT)

- The Mars Science Orbiter SDT was asked by NASA to consider a scaled-down MSO focused on trace gases in the Mars atmosphere
 - Report given at the March MEPAG meeting on a “minimum” Trace Gas Mission deemed scientifically acceptable:
 - Required detection of a broad suite of trace gases with high sensitivity and correlation with atmospheric aerosols and temperature;
 - A mapping capability for specific trace gases was judged highly desirable
- NASA-ESA formed a Joint Instrument Definition Team (JIDT) to study options for a possible joint orbiter that would deploy ExoMars from orbit and continue on to conduct a science mission
 - Co-chaired by A. Chicarro (ESA) and R. Zurek (JPL) with US-ESA members
 - Advocated a Trace Gas Mission with both detection and mapping capabilities
 - Will report out on the evolving 2016 science options at next MEPAG meeting

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Mid Range Rover -SAG

- Evaluation of MSL and ExoMars discovery feed-forward to a 2018 or 2020 mid-range rover
- Analysis of a mission concept (objectives, measurements, implementation, and MSR feed-forward)
- Consideration of the needs of (a) fundamental in-situ science and (b) sample caching as feed-forward to sample return
- Presentation to be given at MEPAG July 29
- White Paper for Decadal Survey team ready by Sep 1

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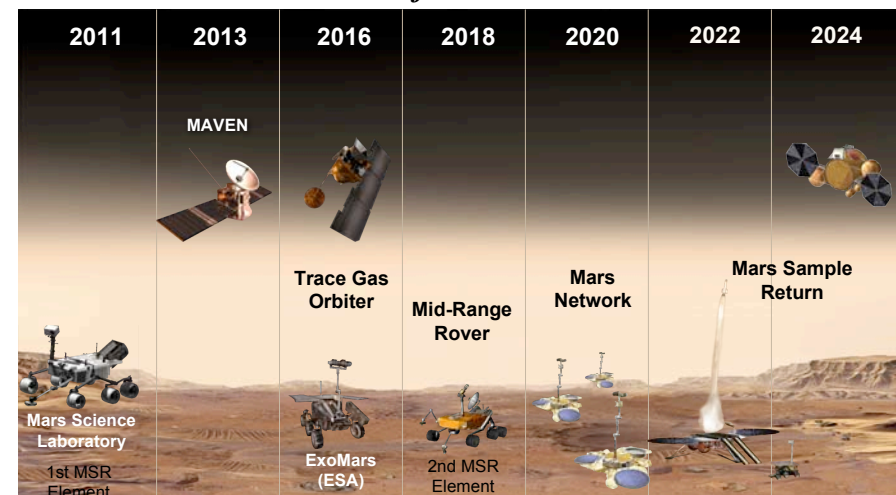
Network -SAG

- Evaluation and assessment of the science priorities for a geophysical network mission for interior and atmospheric measurements
- Analysis of a mission concept (objectives, measurements and implementation) for 2018 or 2020
- Consideration of technologies to enable or enhance mission
- Presentation and White Paper ready for second Decadal Survey Mars Panel November 4, 2009

07/09/2009

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MATT-3 Preferred Architecture



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Expanding International Scope

- **With the increased international flavor of Mars science, MEPAG is expanding its international scope**
 - MEPAG continues to welcome international scientists at its meetings and to invite international programs to present their current plans
 - Given discussion of joint missions and programs to enable achievement of the highest priority science goals, this is more important than ever
 - However, this is independent of the results of specific, high-level discussions between NASA and ESA regarding joint Mars missions
- **Specific Actions taken by MEPAG:**
 - MEPAG Executive Committee has added an international member: Gian Gabriele Ori (recommended by ESA management)
 - MEPAG is working hard to make sure the international community is properly represented on the SAGs
 - MEPAG has added an international representative on the Goals Committee (Frances Westall)

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Future Planning

- **Provide inputs to the Planetary Science Decadal Survey**
 - Respond to current and any future DS requests
 - White papers to be delivered by September 1, 2009
- **Respond to NASA HQ decision on international scope of the program**
- **Next MEPAG Meeting: July 29 & 30, Providence, RI**

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DRAFT Agenda for MEPAG meeting of July 29 & 30, 2009 in Providence, RI

Start	Time	Agenda Item	
<i>Note: Times are tentative. All time speakers should assume that 20-50% of their time allocation is for discussion.</i>			
Day 1 – Wednesday July 29, 2009			
08:00 AM	00:15	Welcome, MEPAG Purpose, Scope, Expected Results	J. Mustard
08:15 AM	00:45	Mars Program Director's Comments	D. McCaution
09:00 AM	00:30	ESA's Mars Exploration Activities	TBD
09:30 AM	00:15	Introduction to Mars inputs to the DS	M. Meyer
09:45 AM	00:15	Break	
10:00 AM		Reports on Mission Planning Activity	
10:00 AM	01:00	2016 Trace Gas Orbiter	R. Zurek, TBD
11:00 AM	01:00	Mars Network SAG	(co-chairs TBD)
12:00 PM	01:30	Lunch	
01:30 PM	02:00	MRR-SAG	H. McSween, L. Pratt
02:30 PM	00:15	Break	
02:45 PM	00:45	Decadal Survey Process	D. Smith/Mars Panel Chair
04:30 PM		Community White Papers (order of papers TBD)	
04:30 PM	00:20	Ionosphere of Mars	P. Withers
04:50 PM	00:20	Landing site characterization program	J. Grant/M. Golombek
05:10 PM	00:20	TBD	TBD
05:30 PM		Adjourn	
Day 2 – Thursday July 30, 2009			
08:00 AM	00:15	Recap of yesterday and goals for today	J. Mustard
08:15 AM		Community White Papers (order of papers TBD)	
08:15 AM	00:20	The Value of Landed Meteorological Investigations on Mars	S. Rafkin
08:35 AM	00:20	Mars Atmospheric Science	M. Sifianu
08:55 AM	00:20	Mars Polar Science	M. Hecht
09:15 AM	00:20	Planetary Society Whitepaper – title TBD	TBD
09:35 AM	00:15	Break	
09:50 AM		Proposed MEPAG white Papers for the Decadal Survey	
		Mars state of knowledge, how things have changed since the last DS, objectives and strategies for the next planning period	J. Mustard
09:50 AM	01:45		
11:35 AM	00:15	Mars Technologies	S. Hays
11:50 AM	01:30	Lunch	
		Mars Program Implementation: Balancing science direction and engineering/budget constraints	F. Li
01:20 PM	00:30		
01:50 PM	01:00	Discussion	J. Mustard
02:40 PM	00:10	Future Planning for MEPAG Activities	J. Mustard
03:00 PM		Adjourn	