

Roving Mars: Mission Operations and Science at JSC



Astromaterials Research and Exploration Science (ARES) Division (XI)



Mars Science Laboratory Mission *Curiosity*



Curiosity's Current Location – the Pahrump Hills

ARES Science Team

Eight JSC Scientists on the MSL Science Team

- 3 MSL Co-Investigators (Ming, Morris, Jones)
- 2 MSL Participating Scientists (Niles, Oehler)
- 3 MSL Collaborators (Rampe, Archer, Sutter)

Four JSC Scientists on the MER Science Team

- 1 MER Co-Investigator (Morris)
- 2 MER Participating Scientists (Ming, Mittlefehldt)
- 1 MER Collaborator (Peretyazhko)



Doug Ming Leading MSL Operations at JPL

ARES Testbed Activities and Data Analysis

- **Three laboratories house MSL instrument testbeds**
 - Sample Analysis at Mars (SAM)
 - Chemistry and Mineralogy (CheMin)
 - Chemistry Camera (ChemCam)
- **Two laboratories house MER instrument testbeds**
 - Mossbauer Spectrometer
 - Visible/Near IR Pancam
- Testbed Instruments operate similar to flight instruments
- Characterize Mars analog materials and instrument performance
- Continued data analysis after mission is over

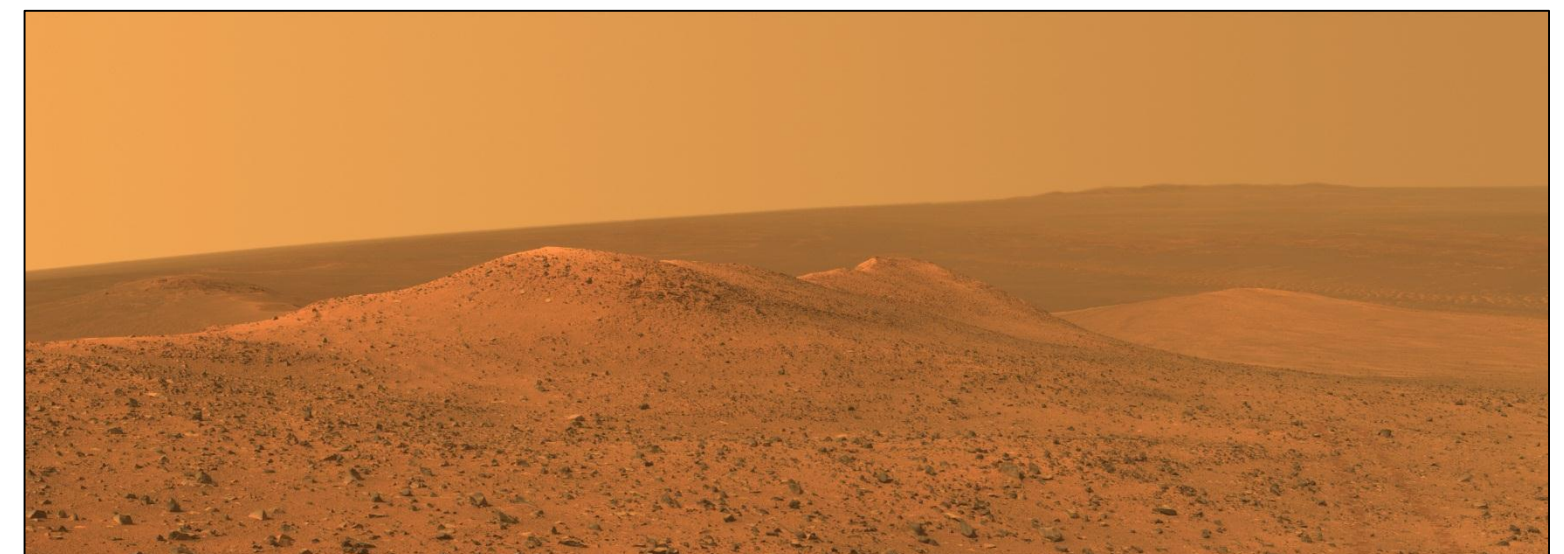
SAM Testbed Activities



Doug Archer
MSL Science Team

- Heats samples and “sniffs” the evolved gases
- Looks for organic material
- Characterizes the Martian atmosphere

Mars Exploration Rovers Mission *Opportunity*



Opportunity's Current Location – Rim of Endeavour Crater

ARES Mission Operations

MSL Science Operations Working Group Chair (Ming)

- Leads science tactical operations

MER Long Term Planer (Mittlefehldt)

- Leads science strategic operations

Payload Uplink Leads (Rampe, Mittlefehldt, Ming)

- Delivers command sequences for MSL CheMin and MER APXS

Payload Downlink Leads (Rampe, Morris, Ming, Archer, Mittlefehldt)

- Analyzes downlinked data from MSL CheMin and SAM and MER APXS

Science Theme Group Members

- Plans daily science operations

ARES Science Team Publications

ARES Scientists have been authors on >125 peer-reviewed articles on Mars robotic mission results, including over 40 articles in the prestigious journals *Science* and *Nature* (several key ARES-lead publications and journal covers shown below).

- Morris et al., 2004, Mössbauer Mineralogy on Mars: First Results from the *Spirit* Landing Site in Gusev Crater. *Science*, vol. 305, p. 833-836.
- Morris et al., 2010, Identification of carbonate-rich outcrops on Mars by the *Spirit* Rover. *Science*. Vol. 329, p. 421-424.
- Niles et al. (2010), Stable isotope measurements of martian atmospheric CO₂ at the Phoenix Landing Site. *Science*. Vol. 329, p. 1134-1337.
- Ming *et al.*, 2014, Volatile and Organic Compositions of Sedimentary Rocks in Yellowknife Bay, Gale crater, Mars. *Science*, Vol. 343, Issue 6169.

Meridiani Planum



Gale Crater

