

# 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 CO<sub>2</sub> 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

