MSL Project Status and Landing Site Selection Schedule

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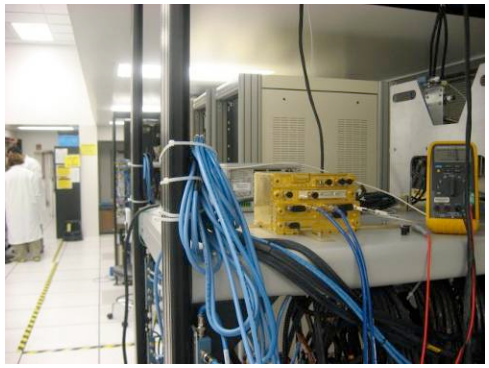
On behalf of MSL project, especially
Mission Design/Navigation Team: L. D'Amario et al.
EDL Team: A. Steltzner et al.
Flight System: M. Wallace/H. Eisen et al.

Project Status

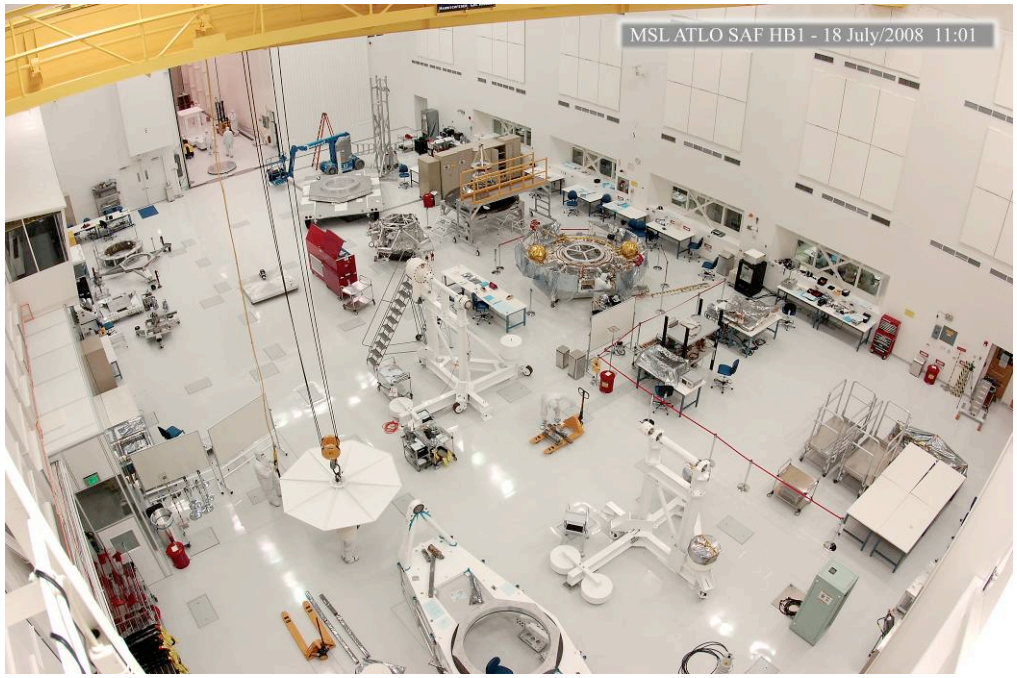
- Significant progress on major spacecraft components
  - MSL is really 3 spacecraft
    - Cruise stage
    - Descent stage
    - Rover
- Significant progress on instruments
  - MARDI delivered (DAN in transit)
  - All others coming soon (by Dec 08/Jan 09)
- Major flight and ground software deliveries
  - Support critical system testing and preparing for cruise activities
- Lots of work to go, especially in system integration, the system level test program, and software development

System Integration and Test

AEGSE: Single Slice Rack



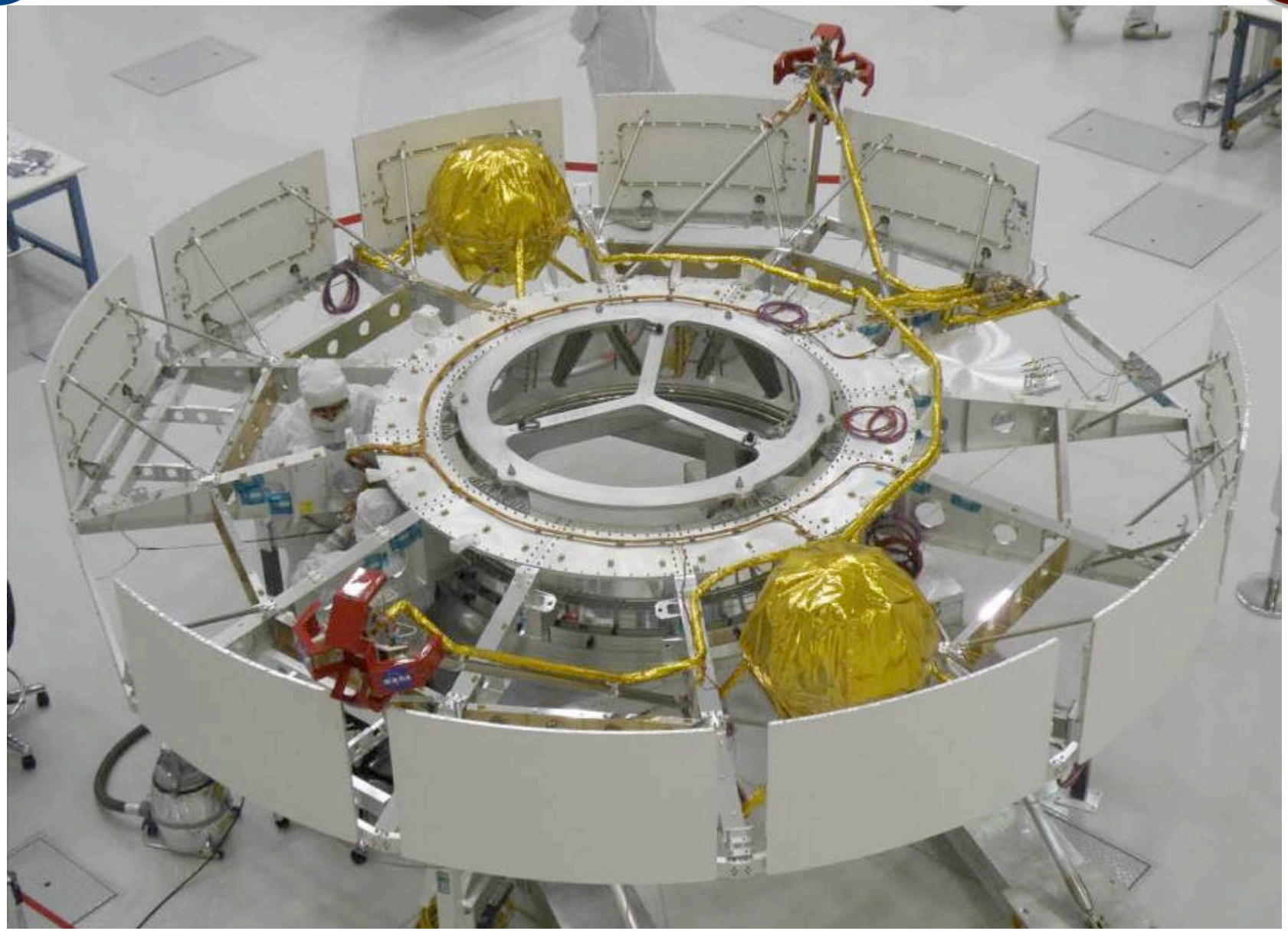
STB: FS SDST



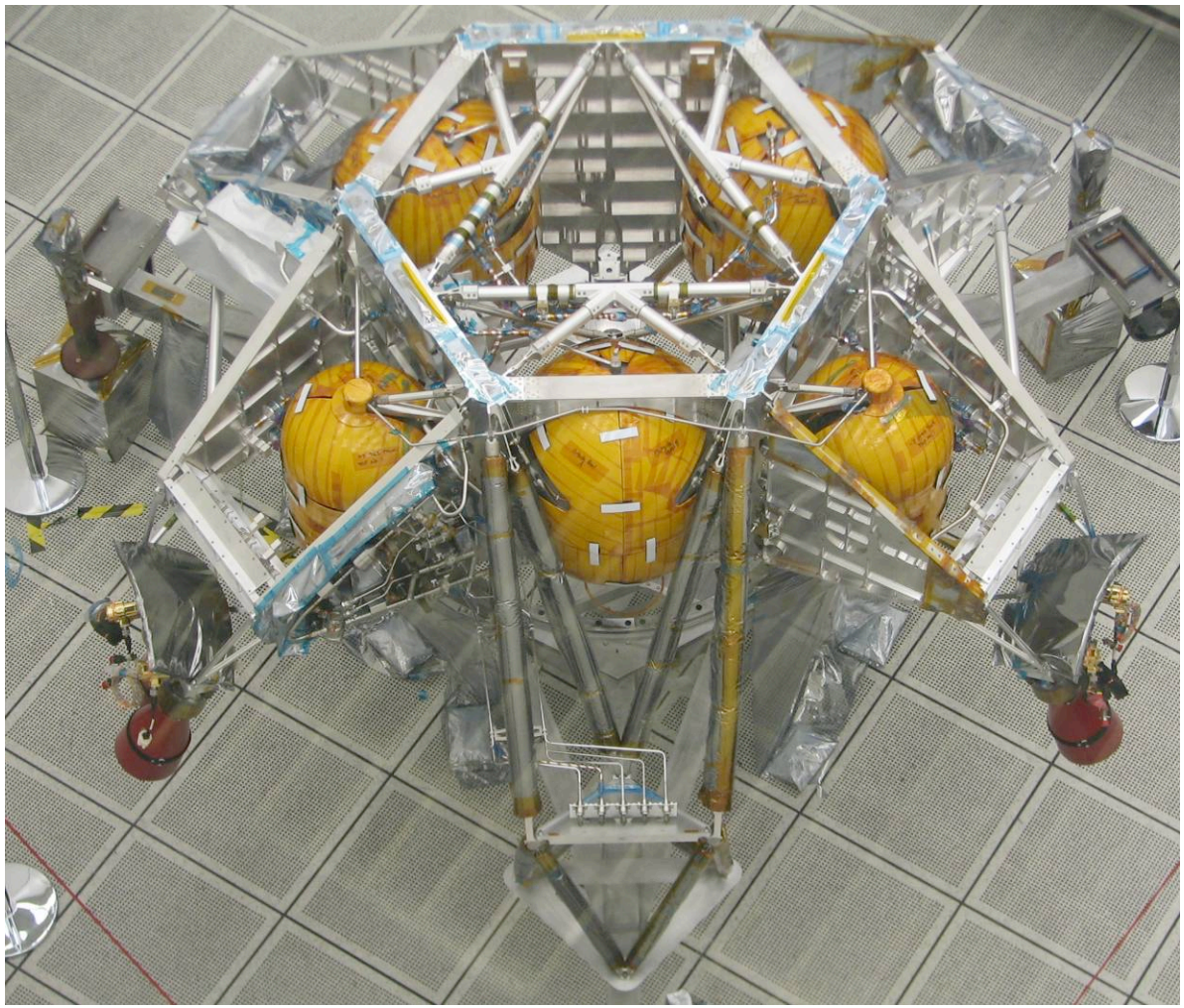
ATLO: SCARF w/ Cradle & Motor Installed

ATLO: FM RPAM-A (covered) & RPAM-B

Cruise Stage



Descent Stage
Prop Integration In-progress



Propellant Tanks (x3)

Pressurant Tank (x2)

PCA

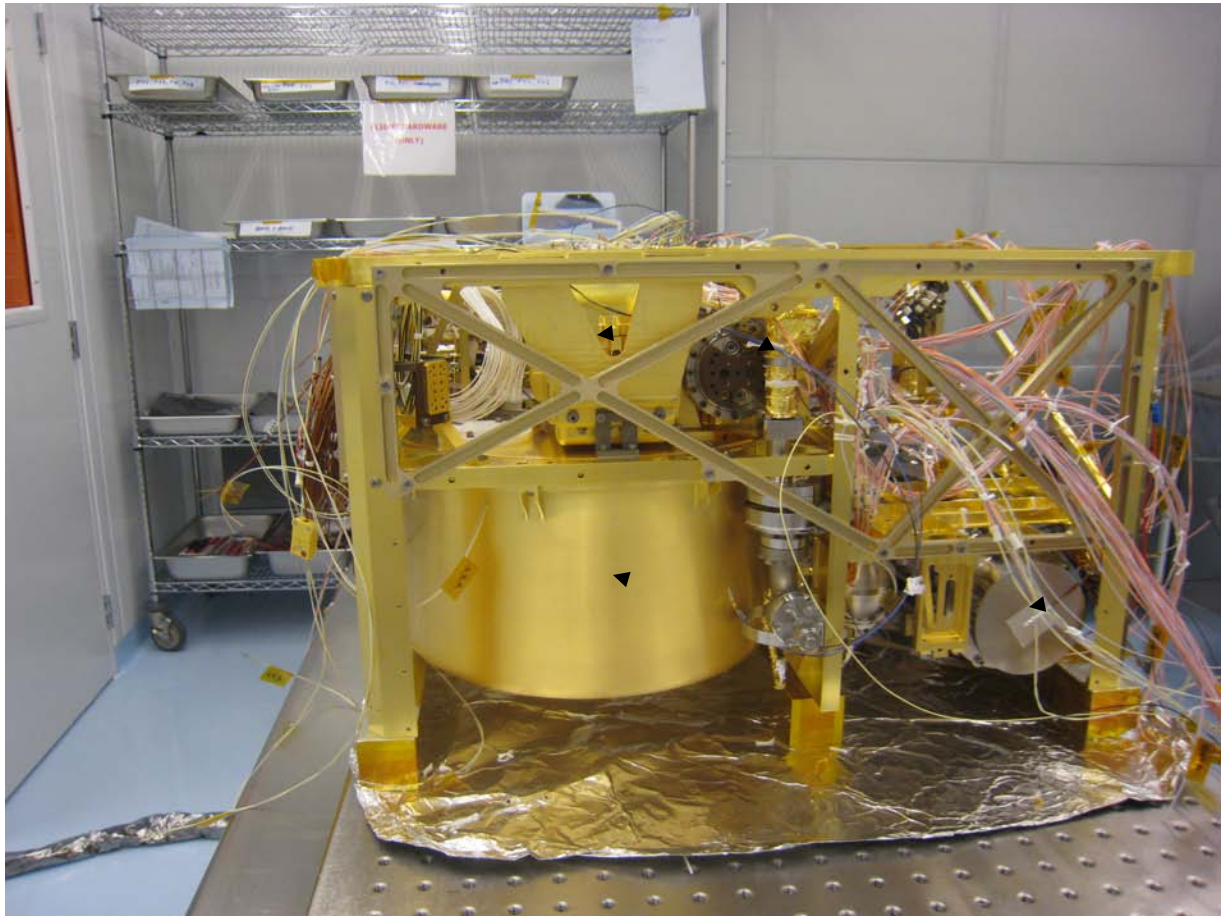
MLE

Service Valves

TDS (radar) Truss

Flight Rover Chassis & Mobility

SAM Suite in Clean Room



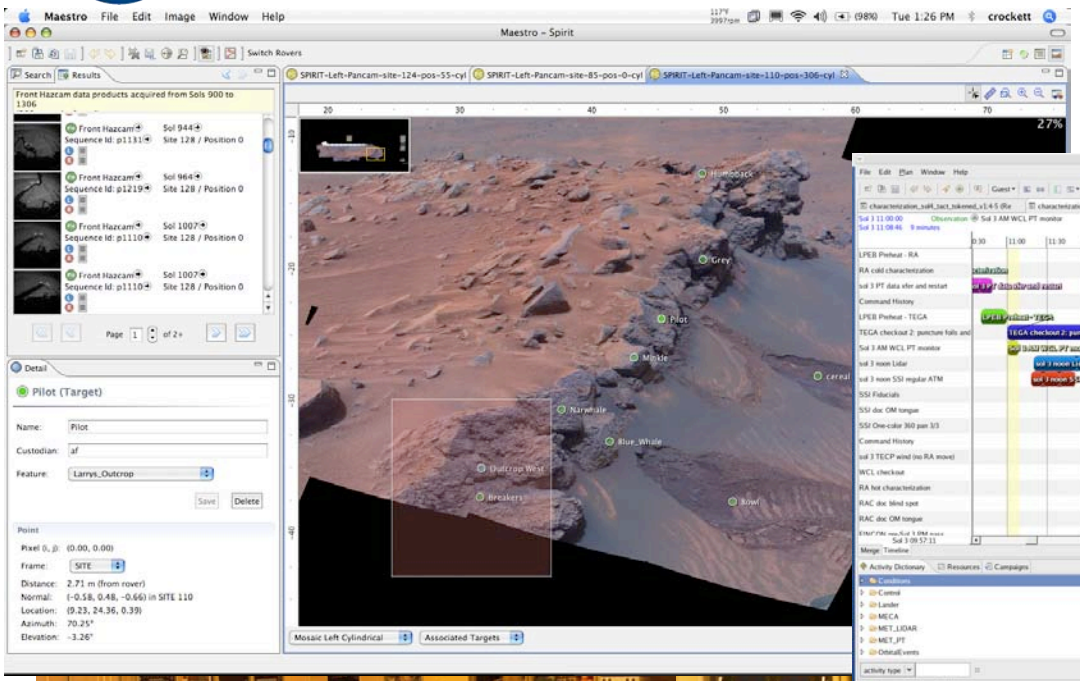
QMS

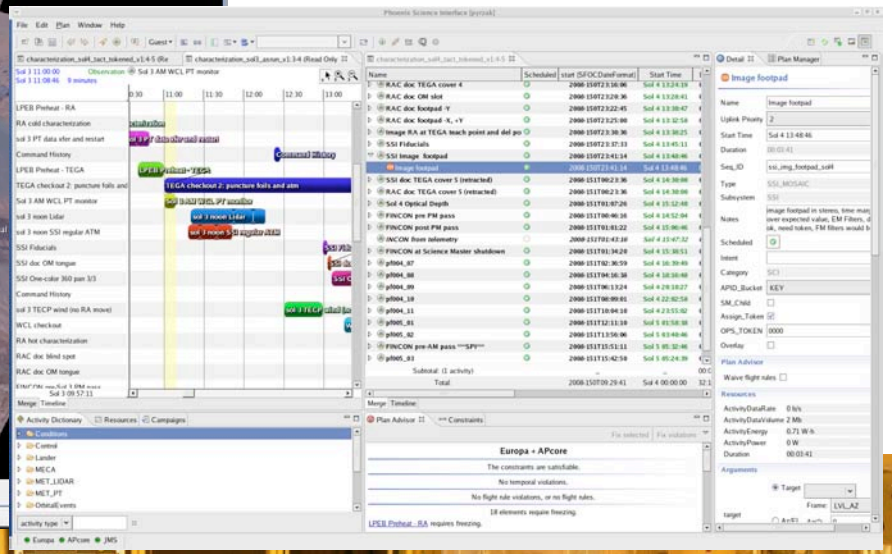
RF Electronics

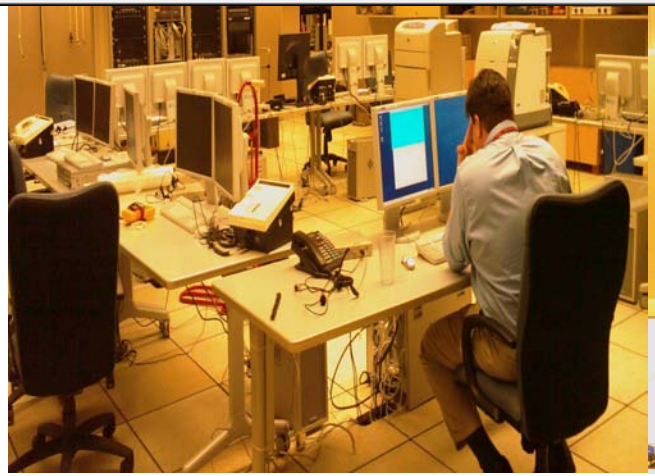
TLS

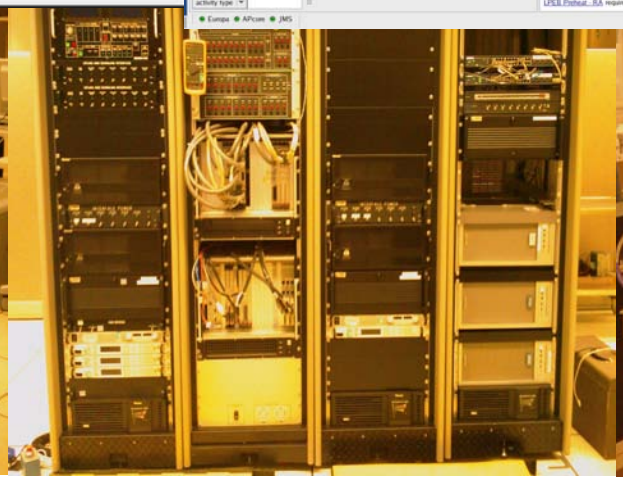
SMS cover

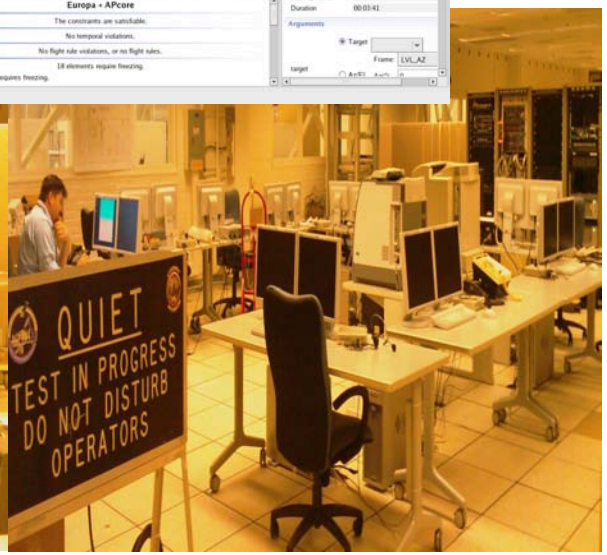
Ground System







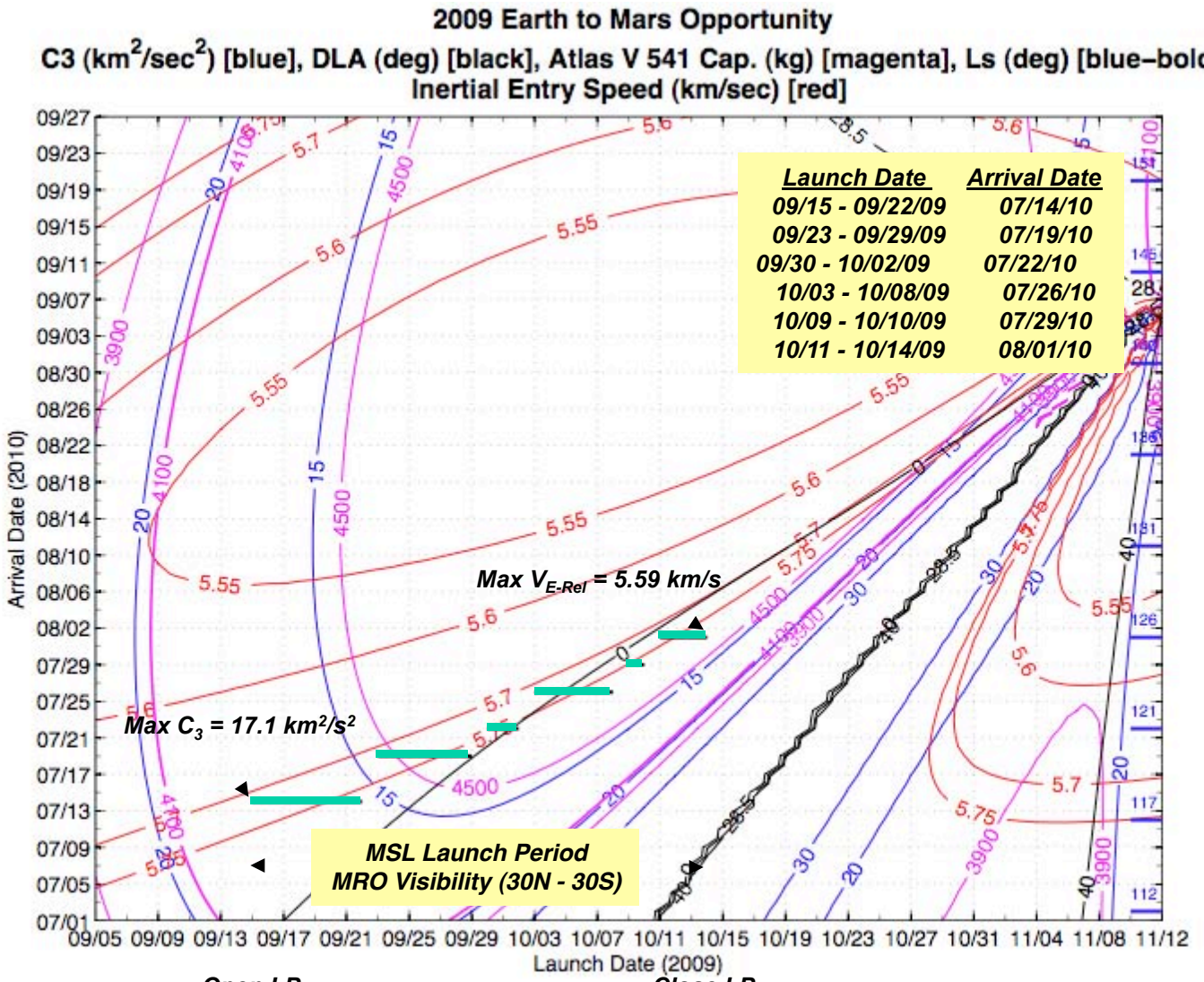




Important Change (for the better) since 2nd Workshop (and Dec. 4th Morning After)

- Based on improved UHF link analysis from trajectory and telecom, we were able to merge the multiple target specs (each covering specific latitude bands) into a ***single target spec covering 30N-30S***
  - ***All current candidate sites reachable with in-flight retarget beginning at TCM-1 from central launch vehicle target***
  - Considerably simplifies targeting and backup site strategy
    - No hemispheric or band-specific backups needed
  - There is a single launch period but still multiple arrival dates

Status – Launch/Arrival Strategy



Project Technical Status Related to Landing Site Selection

- Acquiring orbiter and atmospheric model data sets
  - Examples: Mono and stereoHiRISE and CTX images, MCS, CRISM, GCMs, site dependent mesoscale atmospheric models
  - Tremendous support from MRO project and science team, and CDP team
- Processing data sets into usable products (more from Golombek+posters)
  - Digital terrain models at the 1m scale, rock counts, formatted atmospheric density maps, winds, etc
- Use of these products in detailed site by site engineering performance and safety analyses
  - Processing information currently available on site environments against system performance parameters
- Motor actuator heaters have been incorporated to best extent possible in rover design

Current Status on Site Evaluation

EDL Safety:

- Preliminary analysis complete
  - Atmospheric conditions including winds
  - Terrain affecting radar/powered descent (100-1000 m scales) over full ellipses
  - Rover-scale touchdown slopes (2-5 m scales) for a subset of the terrain (data availability)
  - Rock density for a subset of the terrain (data availability)
- All current site candidates acceptable at “>95% success level”
  - *Site to site variability in success level is small and is outweighed by remaining uncertainties*

Surface Performance:

- Preliminary work suggests
  - Motor actuator low temperature torque performance, and energy use for heaters finds all current sites meet at least Level-1 science rqmts
  - We don’t know the second digit of rover science efficiency yet pending additional results based on flight model actuators, and site by site mobility assessment

All sites are currently acceptable to project

- Engineering not a discriminator at this workshop

Upcoming Engineering Analysis

- Additional site coverage
  - More high resolution DTM's and rock hazard maps covering full ellipses and selected go-to areas
- Tuning of system "knobs" to improve performance
  - More data on rover touchdown capability from test program, more highly specific EDL simulations
  - Preliminary assessments available by late 10/08
  - Continuing in excruciating detail for site finalists
- Additional test data on actuator torque margin at low temperature, impacts on lifetime, effect of gradient heating
  - Flight actuators available for test next month, thermal gradient tests by end of CY08
- Additional analyses of "Go-To" traverses
  - Rover planners brought on board, first order analysis of each site by late 10/08
  - Detailed analyses on finalists

Landing Site Selection Remaining Major Events

(excludes internal/subsystem reviews and ongoing meetings)

- **Third Community Workshop 9/15-17/08**
  - Heavily science focused
- **"Morning After II" Late Oct/Early Nov 08**
  - Project + PSG +Reps from external science community
  - Combine current engineering assessments on site by site basis with science rankings
    => 3 finalists for highly detailed final study
- **Brief HQ on status ~11/08**
- **Engineering Assessment Status Workshop 1/09**
  - Status detailed engineering assessment, special attention on actuators/traverse
- **Fourth Community Workshop Early 4/09**
  - Final science assessment of site candidates
- **EDL Landing Site Safety Review Early 4/09**
  - Detailed site by site EDL engineering risk assessment
- **Project Final Landing Site Selection Meeting 4/09**
  - "Final" convolution of detailed engineering (EDL and traverse) and science assessment
  - => Recommended site ranking from Project
- **Independent Certification Review ~5/09**
- **Brief HQ ~6/09**
  - final site approval