



Options for Accommodating the MSL Launch Slip

*Presentation at the
Planetary Science Subcommittee*

James L. Green
Director, Planetary Science Division

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Outline



- Review of the October 2008 PSS “Guiding Principles”
- Conflicts of Interest
- Budgetary Options
- MSL launch manifest conflicts
- Summary



PSS Recommendations- Oct. 2



- Reaffirm support for MSL. However, the PSS retracts its earlier recommendation that NASA make every effort to remain on schedule for a 2009 launch for MSL.
- NASA should make a prompt decision on a launch timeline for MSL that minimizes both the risk to the full success of that mission and the impact on other programs. Consistent with concurrent SMD policy, cost increases should be:
 - Borne by JPL, the implementing organization for the mission
 - Additional funds sought next from Mars Exploration Program
 - Impacts to non-Mars programs, as needed after those two sources of funds are utilized, should be sought through delays rather than cancellation of approved missions now under development
- NASA should conduct an external review to assess the causes of the MSL cost overruns and to recommend changes to prevent similar situations for future missions.
- **These recommendations were taken into account to develop a new fiscal solution to accommodate the launch slip of MSL to 2011**



Timeline of Events



- Several options to handle cost implications of the MSL launch slip within the Planetary Science Division have been created
 - Use the “Guiding Principles” determined by the Planetary Science Subcommittee (PSS)
 - Mars programs effected the most; then the rest of planetary; delaying missions preferable to cancellation
- Discussion with OMB of all the options (completed)
- Initial analysis of projected cost and MSL-Juno launch conflict (completed)
- • PSS meeting to review options and obtain community recommendations
- Complete the analysis of cost & launch conflicts (could take months!)
- Update will be presented to the NASA Advisory Committee (NAC-SC), in February 2009
- Implemented in NASA’s budget development process (FY10-15)
- Began the process to assessing the causes of the MSL cost overruns to prevent similar situations for future missions (ie: Next Flagship)



Conflicts of Interest in the PSS



- Some members of the PSS are involved with programs that will be affected by the MSL slip
 - PSS members should not comment on any activity they are in conflict with
- Procedure:
 - JLG will complete this whole presentation
 - Clarification questions only are acceptable
 - Q&A period to follow presentation
 - Strictly controlled by Executive Secretary & PSS Chair



Available Trade Space



- Current Hq estimate for MSL is an ~\$400M above baseline
 - Covers launch slip and 2 years of MSL operations (FY10-14)
 - Funding will come from MEP but we have a phasing problem
- Steps to be taken within Mars Exploration Program include:
 - Deplete Hq MEP program reserves
 - Reduce scope of Mars Technology efforts
 - Reduce scope of Mars 2016 (strategic only if NASA/ESA merge goals)
 - Reductions in Mars operating missions: includes carry over, funding for extensions, and reserves
- Overview of the Planetary Science trade space:
 - Juno (potential launch delay if launch conflict is not resolved)
 - GRAIL (potential launch delay)
 - Lunar Program (delays in LADEE/ILN)
 - NF & Discovery Programs (delay in release of next competitive AO)
 - Outer Planets Flagship (reduced study effort)
 - Planetary Operating missions (carry over and extensions)
 - Stirling Engine technology development
- Not considered as part of the trade space:
 - MAVEN (launch in 2013) - strategic communication for landed assets
 - Planetary, Lunar, and Mars R&A



Defined Options



- Option #1: Cancel MSL
- Option #2: Base Funding Approach (~\$353M)
 - Delete Mars technology (FY10-11/MSL and use 12-14 for paybacks)
 - Downsize Mars16 effort (work the NASA/ESA collaboration)
 - Reduce SMD EDL infrastructure funding (MSL/Mars16 approach keeps PSD commitment)
 - Reduce Mars operating mission carry over, reduce funding for extensions, and reduce reserves
 - Rephase OPF study effort (down in FY10-11 payback in FY12-13) to align with ESA's schedule
 - Rephase without impact: Discovery & New Frontiers reserves, start of the LRO science mission
- Option for the remainder (\$47M in FY10-11)
 - Option #2a: Rephase Juno NASA Hq held reserves -- or
 - Option #2b: Delay Discovery AO & ASRG development -- or
 - Option #2c: Delay ILN & rephase Lunar Missions of Opportunities
- If MSL slip greater than \$400M some combination of options is needed



Outstanding Issue

Juno and MSL in 2011
Launch Window Contention



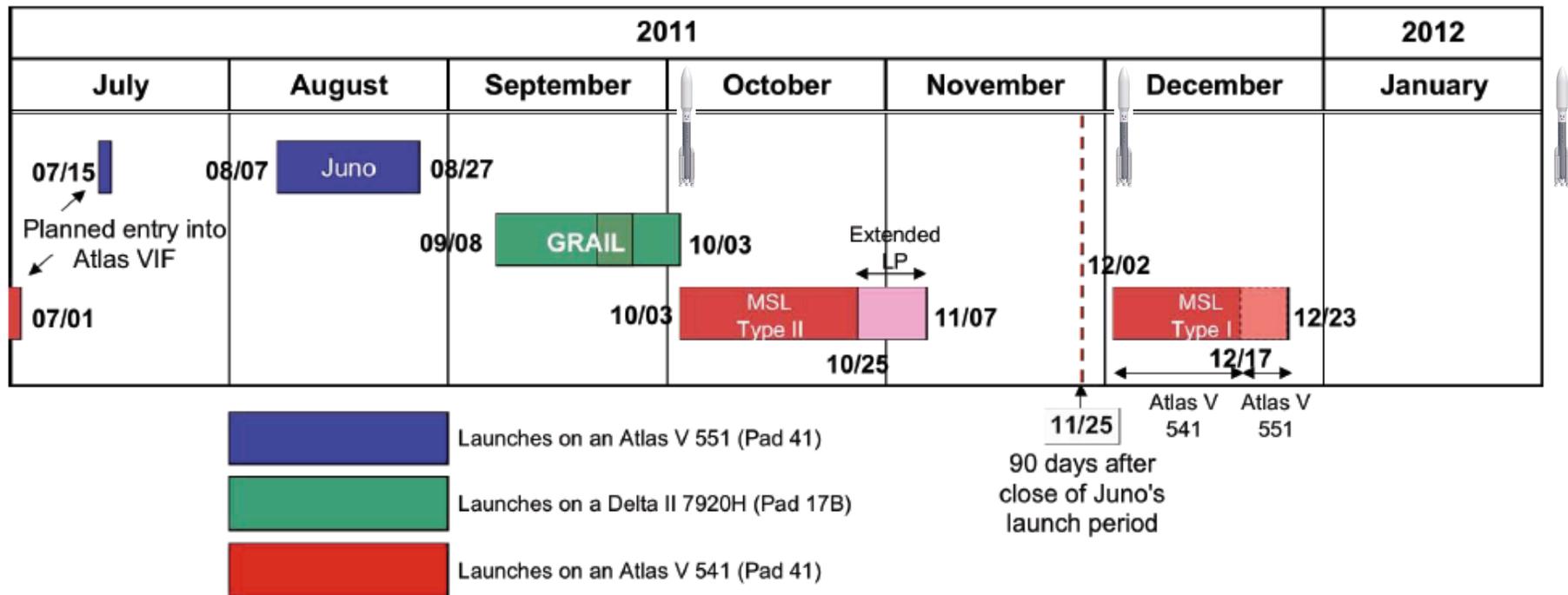
Background



- Current Atlas V Launch Manifest is crowded in Fall/Winter 2011
 - Wedging MSL into the 2011 Atlas V manifest will take some effort
 - Juno is on-track for August 2011 Launch
 - MSL Launch Windows begin in October 2011 and extends through December 2011
 - There are other DoD and commercial missions on the manifest in the same timeframe
- Standard cycle time between Atlas V launches
 - Non-Nuclear:
 - » Established as 60 days (Atlas V 401)
 - » “EELV Acceleration Effort” could reduce this to 45 days
 - Nuclear:
 - » Established as 90 days
 - » “EELV Acceleration Effort” may reduce this to ~75 days
- EELV Acceleration Effort is seriously being looked at for many reasons



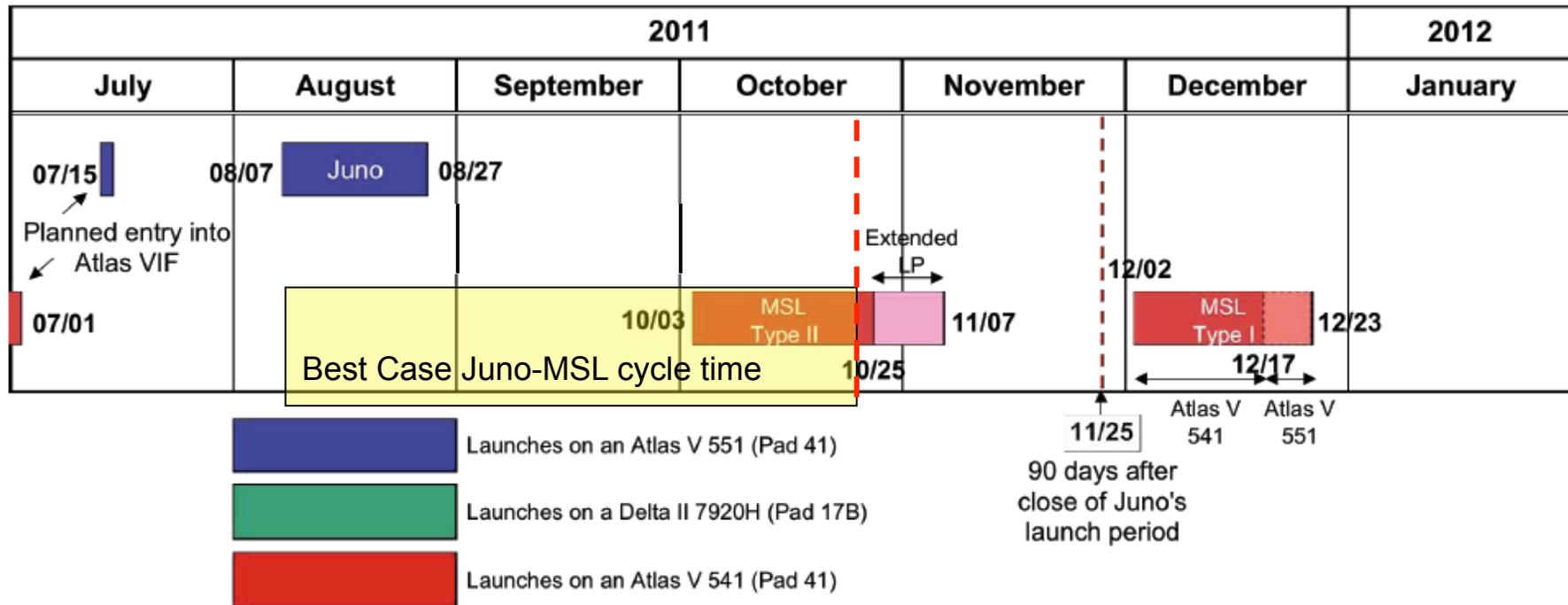
Atlas V manifest in 2011 is crowded



- Other customers are on the manifest for 10/1/2011, 12/1/2011 and 2/15/2012
- GRAIL is not a significant concern due to its Delta II launch from Cx-17
- MSL has two launch window options, with a small amount of flexibility
- Caveat: All MSL solutions still need careful entry velocity and radio coverage analysis



Best Case Juno-MSL Cycle Time



- Assume 90 day separation reduces to 75 days due to Acceleration
- Assume Juno Launches early in its window
- Consider upgrading MSL to Atlas 551 as risk mitigation



Launch Conflict Summary



- Keep Juno on track for August 2011 launch on an Atlas V
- Consider all launch window options for MSL with a hybrid preference
 - October 3 - November 7 (Type II)
 - December 2 - December 17 (Type I)
 - December 18 - December 23 (Type I + Requires Atlas V upgrade)
- Work with USAF and ULA to Implement the EELV Acceleration effort immediately for 2009, 2010, and 2011; and deconflict any missions that remain after acceleration
- As always, continue to look for efficiencies



Launch Options Reviewed



1. Reduce launch span between Atlas V missions
 - Possible solution is under discussion (ie: Acceleration Effort)
 2. Move Juno to another launch service (ie: Delta IV-H)
 - Cost and schedule do not make this a feasible solution
 3. Delay Juno launch by 13 months:
 - Increased radiation exposure (~15% coarse estimate)
 - Reduction of gravity science
 - Cost growth due to some redesign/implementation and delay
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- ***Acceleration Effort with ULA and the USAF is the optimal solution to provide MSL the best opportunities for launch in 2011 and to maintain Juno in August 2011***



Summary



- Options have been developed using PSS “guiding principles”
- MSL launch slip to 2011 will be funded by MEP but a rephasing of funding using other planetary programs must be part of the solution
 - Additional funding in FY10 & 11 is needed with payback in FY12 & 13
- An outstanding issue remains with MSL-Juno launch manifest conflicts but potential solutions look promising to keep Juno & MSL 2011 launches
- More analysis continues on total cost estimates and launch conflicts
- Will get back to the PSS if analysis leads outside the bounds of our current option space

Begin PSS Question and Answer Period



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Advance scientific knowledge of the origin and history of the solar system, the potential for life elsewhere, and the hazards and resources present as humans explore space

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