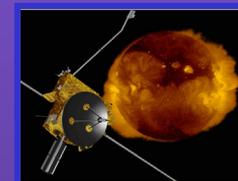
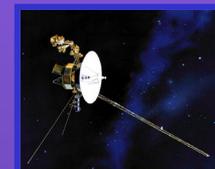
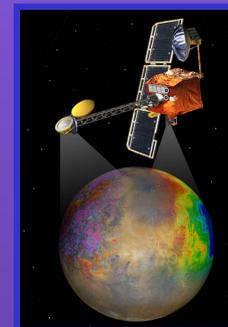
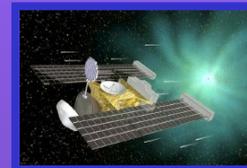
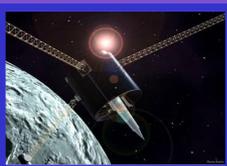


RESOURCE ALLOCATION REVIEW BOARD

February 11, 2003





March 20, 2003

Refer to: 930-03-009-ESB:lc

TO: Distribution

FROM: Eugene S. Burke

SUBJECT: February 11, 2003 Resource Allocation Review Board (RARB) Meeting Minutes

The following are the Minutes of the NASA/JPL Deep Space Network (DSN) Resource Allocation Review Board (RARB) Meeting held at JPL on February 11, 2003. The purpose of this Review is to address the oversubscription of the DSN 26/34/70-meter tracking assets. The Review Board consists of Project Managers, Project Scientists, and key JPL Interplanetary Network Directorate (IND) Deep Space Mission System (DSMS) Managers or their representatives. The Board is responsible for reviewing new or changed requirements, adopting recommendations to reduce periods of heavy contention, and for controlling changes to requirements. This Review addressed contention in 2004, 2005, and 2006.

Review Board Members

The following Review Board Members or their representatives attended:

Bill Weber	JPL	Chairman
Gene Burke	JPL	Resource Allocation Planning & Scheduling Office Manager
Belinda Arroyo	JPL	MGS, Mars Odyssey, SIRTf Project Representative
Allen Berman	JPL	DSMS Operations Office Deputy Program Manager
Irene Bibyk	GSFC	ST-5 Project Representative
Albert Chang	JPL	Nozomi, Lunar-A, Selene Project Representative
Peter Doms	JPL	Deep Space Mission System (DSMS) Manager
Bob Farquhar	APL	MESSENGER, New Horizons Mission Director
Albert Haldemann	JPL	Mars Exploration Rover Deputy Project Scientist
Ed Hirst	JPL	Genesis Project Representative
Dwight Holmes	JPL	INTEGRAL Representative
Erik Holmgren	CSOC	CSOC JPL Site Manager Representative
Chris Jacobs	JPL	Reference Frame Calibration Project Representative
Mike Klein	JPL	Radio Astronomy Project Manager
Ken Kimball	JPL	DSMS Engineering Program Office
Ron Mahmot	GSFC	Space Science Mission Operations Project Manager (ISTP, ACE, Image, MAP)
Ed Massey	JPL	Ulysses/Voyager Project Manager
John McKinney	JPL	Deep Impact Project Representative
Rich Miller	JPL	DSMS Plans & Commitments Office Manager
Bob Mitchell	JPL	Cassini Program Manager
Dan Ossing	APL	STEREO Project Representative
Jeff Plaut	JPL	Mars 2001 Odyssey Mission Project Scientist
Bob Ryan	JPL	Stardust Project Representative
Rance Skidmore	Omitron	GOES Project Representative
Martin Slade	JPL	GSSR Project Manager
Pete Theisinger	JPL	Mars Exploration Rover (MER) Project Manager
Tommy Thompson	JPL	Mars Express Orbiter U.S. Deputy Project Manager
Brent Williams	SAO	Chandra Project Representative

Review Materials

These Minutes include the material included in the bound handout book, as well as the presentations distributed at the RARB:

Agenda

1. Introduction B. Weber
2. Overview, Contention Summary G. Burke
3. Action Items D. Morris
4. Code S Nasa Headquarters B. Geldzahler
5. JPL DSMS Plans & Commitments Program Office R. Miller
6. JPL DSMS Engineering Program Office K. Kimball for J. Statman
7. JPL DSMS Operations Program Office A. Berman for J. Wackley
8. New Or Modified Project Requirements
 - Radar Measurements of Planetary Rotations with Unprecedented Accuracy:
 - New Advances in Planetary Geophysics J. Margot
9. GSSR Planetary Radar M. Slade
10. Resource Contentions
 - Analysis & Recommendations N. Lacey
 - Responses Projects
 - Discussion / Decisions All
11. New Action Items & Summary G. Burke

Introduction - Bill Weber, RARB Chairman

Mr. Weber welcomed the Review Board and all the mission representatives to the RARB and thanked all the mission representatives for all their work in resolving the overcrowded period discussed at the last RARB, in August 2002. He noted that the unfortunate loss of Contour, and the Deep Impact launch slip, should both help to relieve some of the stress on the Network.

Planned improvements at the DSN sites are going very well, and DSS-24 is now online and is performing very well. DSS-43 and DSS-65 are now available for back up.

The NSP implementation is now back on track. The NSP status had been Yellow for the last year or more, but is now listed as Green after the last review. Projects seem to be pleased with the results from NSP Telemetry, Command, and particularly Radiometric data. Operations teams are doing well with their preparations.

Overview, Contention Summary - Gene Burke

Mr. Burke reiterated that the Projects, as well as the various scheduling offices have indeed done a lot of work, and the 2003 schedules are clear through November. Negotiations for the 2004 schedule weeks are being worked through the Mars program office as part of an Action Item.

An overview of unsupportable time at all the subnets was shown, and a problem at the 70-meter antenna sited toward the end of 2004, due to a scheduled 70-meter antenna downtime. Mr. Burke stressed the importance in keeping up with maintenance on the 70-meter antennas due to their age. In the past, scheduling has been very accommodating to Projects and given up a lot of maintenance time, but in order to prevent unexpected downtimes, maintenance needs to be preserved as much as possible. There are many extensive downtimes scheduled in 2004 for the rehabilitation of the antennas, which is going to take a lot of scheduling work over the next year to accommodate all the Projects.

In the 2006 interval, the main source of contention is from Mars mission requirements. A lot of scheduling work will need to be done in order to stay within the capacity and capabilities of the Network. In the past it was an effort to load the 70-meter network, but usage is ramping up more and more every year, particularly with the Mars missions, through to 2009.

August 2002 RARB Action Items Review – David Morris

D. Morris discussed Actions Items from the August 2002 RARB. Actions Items 1 - 6 and 8 - 9 have been closed. Action Item number 7 remains open, as planned.

Backup slides were reviewed regarding Action Item 6. The Action Item provided a planning envelope definition to Mars Program during November 2003 through March 2004, while assuring other missions their committed support. There is currently no margin for problems. If unexpected problems occur, capacity will shrink. The Network Simplification Program (NSP) promised to reduce setup time to 30 minutes, but if NSP does not reduce setup time, the spacecraft communication time may take a hit. Parkes Radiotelescope is an alternate asset contracted by NASA to help alleviate stress to the Canberra complex during the high activity period. The slack caused by the Contour loss of mission has been offset by the Cassini move of their Gravitational Wave Experiment.

Deep Impact launch change to December 2004 has improved January's outlook. We anticipate needing this freed-up time (50% Mars viewperiod overlap) to provide increased setup time for missions with short period contact tracks; especially to provide relief for missions that have significant overlap with the Mars viewperiods, such as SIRTf. Presently, we anticipate no increase in Mars program schedule envelope to allow for increased setup time. The plan is to restore time to missions that reduced tracking time for Deep Impact. If excess time is still available, it will be then offered to all missions. Everyone is very concerned and is working hard to address issues that have risen due to the high activity period.

NASA Office of Space Science Code S – Dr. Barry Geldzahler

Mr. Holmes discussed the federal budget increase of 30% to \$3.414 billion for Space Science efforts. Some areas of increased expenditure are in optical communications and nuclear power.

In an effort to increase data return from future missions, \$31 million has been allocated to initiate the development of the first operational Deep Space Optical Communications System. A mission from the Mars Exploration program will be first to use this system in 2009.

Over the next five years, \$3 billion will be allocated to develop and demonstrate nuclear power for spacecraft propulsion and operations. In 2003, \$279 million will be allocated.

NASA has established a Prioritization Board to resolve any conflicts that may arise during the 2003 – 2004 high activity period, but RAPSO and the RARB process will continue to be the first step in resolving issues. The Prioritization Board will be made up of NASA executives, which should dispel any issues of favoritism or impropriety toward JPL missions.

NASA has also established an Executive Management Board to meet every 6 months, which is comprised of industry, NASA and governmental leaders. This Board is to help determine upgrades and operational issues, as well as help NASA Headquarters and DSN executives in developing DSN initiatives.

JPL DSMS Plans and Commitments Program Office – Rich Miller

DSMS Operations established a workshop in September, consisting of three working groups. The three groups were tasked to produce:

- An Emergency Book: Reference documentation (including failure trees) and tools to enable quick diagnostics and recovery of DSN failures.
- Triage: Produce detailed procedures including review with the Projects.
- Test and training: Develop operations plans for integrated training, including scenarios and scripts.

At this time, there are two alternate assets being planned, Parkes radio telescope and New Norcia. The workshop was on hold during January to produce the RFP for CSOC replacement, but will reconvene in late February and March to prepare for the DSMS Missions Workshop #2, scheduled April 2-3, 2003.

JPL DSMS Engineering Program Office – Ken Kimball for Joe Statman

Mr. Kimball discussed recently completed tasks as well as those in progress, with an emphasis on tasks that are to be completed for the 2003 – 2004 high activity period.

The 20kW Transmitter first installation was completed on the Beam Waveguide antenna at DSS-24, December 27.

The Network Simplification Project (NSP) is now available at DSS-24, DSS-43 and DSS-65. There have been many unexpected issues troubling implementation of NSP, but there are no serious issues at this time. NSP is also running at the CTT Trailer and at MIL71.

AMMOS 27.1 provides for new Space Link Extension (SLE) and radio-metric processing capabilities.

There are several items scheduled for completion before the 2003-2004 crunch period. X/X/Ka feeds, DSS-55, 2-MSPA, Arraying at Overseas Complexes, Delta-DOR capability, and further installations of NSP and 20kW transmitter capabilities.

The implementation for Turbo Code should be completed before the 2003 – 2004 overload period. Turbo-Code will add a new error-correcting method to all the 34- and 70- meter antennas, as well as be a commitment for the Messenger Project.

The RAPSOM Team is being asked to evaluate the impact of downtimes and determine if it would be worthwhile to contract other assets, such as Greenbank, to supplement the DSN.

JPL DSMS Operations Program Office – Allen Berman for Joe Wackley

NASA plans to have a unified RFP to take on the existing CSOC contract, but because of the uniqueness of Goldstone and the DSN, JPL requested that NASA allow JPL to acquire and manage its own contract, separate from the CSOC replacement. NASA Headquarters granted the request. A Task Description Document draft has been completed and will be presented at an upcoming Industry Briefing.

In late December 2002, at the DSMS Delivery Review, it became apparent that the NSP was not as mature as desired. It was decided to begin implementation with some restrictions, because the need for the NSP was so great. Initially, restrictions were to increase setup time from 1 to 2 hours and limit NSP supports to 2 per day. Since navigation was the weakest area of the delivery, radiometric data was decommitted from use. A Tiger Team was assigned to investigate the issues associated with the navigation data and concluded that most problems were in hand, and that the remaining issues would be fixed in the next delivery. Therefore, restrictions on using radiometric data have been lifted.

There are other weaknesses with infrastructure and support products, so another Tiger Team composed of CSOC personnel is investigating these issues.

Approximately 15 anomalies have complicated the NSP system and are making it much harder to operate than anticipated, and more difficult for the developers to train the operators. These issues and workarounds are reducing operator proficiency.

Despite many issues, the NSP implementation continues and will be delivered to all stations by June 1, 2003. Acceptance testing and readiness reviews are ongoing. It is hoped that the next build will work out most of the anomalies and workarounds. The addition of Turbo-Code should contribute to a more robust system.

Space Link Extension capability was implemented on the 26m network subnet during mid-2002. Driving these efforts was the ESA INTEGRAL mission, which launched on October 17, 2002. In the first months the system suffered many problems, but there has been a notable improvement in support during December and January. The system is suffering from two primary problems; the TCP halts - which have been greatly reduced by fixes already implemented; and Telemetry data drop outs - whose fixes are currently being implemented.

DSMS Preparations for the 2003-2004 Activity Contention Period are well underway

- Updating documentation and procedures
- Reducing maintenance time by doing maintenance early
- Reducing support preparation time through NSP

Other issues requiring attention are:

- Operating/coordinating non-DSN asset support (“alternate assets”)
- Improving time-critical response to Spacecraft emergencies and network failures
- Coping with extended Level 1 support periods
- Developing MSPA operational scenarios

In the Network Operations Control Center, a new position has been established to assist the Operations Chief with real time resolutions to problems. Training for the Tracking Support Specialist (TSS) position is almost complete and will be on shift in July 2003. Also, in the Control Center there are plans to refurbish the Darkroom including replacing the consoles and making space for the two new TSS position consoles.

Presentation: New or Modified Project Requirements – Dr. Jean-Luc Margot

Dr. Margot presented to the Review Board a description of the modified requirements of the Goldstone Solar System Radar Project, as well as some goals and highlights of the Project’s more recent successes. The motivation behind the modification of GSSR requirements is to investigate the intimate connection between dynamics and geophysics and apply insights of the geophysics of the Earth, particularly spin properties to other terrestrial planets, in hopes of revealing interior structure, mechanical properties, and major geophysical processes.

The GSSR program has developed new radar techniques that have proven to be very efficient and inexpensive and yet provide measurements of planetary spin states with unprecedented accuracy. Earth-based observations require only one hour.

The goal of GSSR observations at Mercury is to characterize the core of Mercury to understand the planet, and the formation and evolution of terrestrial planets in general. GSSR observations will measure small oscillations in spin rate (called longitude librations). The amplitude of the librations will help determine characteristics of the core. GSSR Radio Speckle Displacement (RSD) observations will illuminate Mercury then measure the speckle pattern return. Much like light hitting a mirrored ball, the light will be reflected in many different directions. These New techniques have greatly improved our knowledge of Mercury. Applying this technique requires very little time relative to the great return.

The goal of GSSR observations at Venus is to establish long-term monitoring of the spin rate to reveal excitations on a variety of timescales, as are observed on Earth. These variations represent major geophysical processes, from atmospheric & climatic effects to core-mantle interactions. The spin rate at Venus has not been measured in the ten years since Magellan. Radar can detect 1% changes in atmospheric angular momentum, corresponding to a few minutes in spin period. Characterizing the polar moment of inertia of Venus is crucial for constraining interior models and for understanding Venus in relation to Earth and other terrestrial planets. Spin precession provides a direct measurement of the moment of inertia, but is not accessible to orbiting spacecraft. The expected 1-2 arcsecond/year spin precession can be measured from the ground with a long time baseline.

In conclusion, Dr. Margot stressed that important advances in planetary geophysics should obviously be supported, regardless of relevance to spacecraft missions. The GSSR Project has been able to answer some big questions while making relatively small demands on the DSN, advancing solar system exploration. Radar observations have a huge return for the small amount of antenna time needed; hence they represent a very cost-effective allocation of resources.

GSSR Planetary Radar – Dr. Martin Slade

Dr. Slade added to Dr. Margot's presentation by discussing details of the specific Planetary Radar requirements.

Resource Contention Summary – Napoleon Lacey

Presentations were made regarding the Loading Study initial conditions and changes in Project requirements. The approach used in identifying and evaluating contentions for this Review has changed. For the years addressed at this Review, each month is evaluated for contentions. There is a description of critical events, an analysis of potential problems, and proposed recommendations listed for each month. Background/source information is also shown (view the "*Red Book*" by clicking the link).

Following are the results from the RARB negotiations described in detail, which will be used as the new baseline for DSN resource allocation.

February 11, 2003 RARB Contention Resolution Minutes

2004 Contention Period - January - Weeks 01 - 05

To resolve intra-Mars Program conflicts, the Multi-mission DSN Allocation and Planning Team has agreed (ref: RARB AI #7) to provide a Mars Program coordinated input to Resource Allocation (Mid-Range) Planning Team of at least one week per week at least 6 months prior to the schedule week.

2004 Contention Period - February - Weeks 06 - 09

Chandra agreed to move 7 passes per week to the 26m and increase supports to 2 hours.

Gravity Probe-B agreed to move week 06 support to week 11, reduce to 8 hour passes, and will work overlap periods with M010 and MER missions in Mid-Range Schedule.

Agreements to the following recommendations made by RAPS0 are deferred by the Mars Program, as outlined in Action Item #7 of the August 2002 RARB:

- Mars Odyssey mapping/relay accept 4 gaps in 70m support in weeks 06, 07 and 08, and 5 gaps in week 09. Use 34m support to fill gaps: On Mondays 3 hours at DSS-26, on Wednesdays 8 hours at DSS-54,55,65 and on Thursdays 3 hours at DSS-26 and 3 hours at DSS-54,55,65. In week 09 fill an additional 3-hour gap on Friday using DSS-26.
- MER depending on landing site selection MSPA Rovers A or B with Mars Odyssey on 34m antennas as defined above.

2004 Contention Period - March - Weeks 10 - 13

Agreements to the following recommendations made by RAPSO are deferred by the Mars Program, as outlined in Action Item #7 of the August 2002 RARB:

- Mars Odyssey mapping/relay accept 4 gaps in 70m support in weeks 10 and 13, and 5 gaps in weeks 11 and 12. Use 34m support to fill gaps: On Mondays 3 hours at DSS-26, on Wednesdays 8 hours at DSS-54,55,65 and on Thursdays 3 hours at DSS-26 and 5 hours at DSS-54,55,65. On Tuesday in week 11 use 8 hours at DSS-45,55. In week 12 fill an additional 3-hour gap on Friday using DSS-26.
- Mars Express MSPA 7 orbital science passes requested at DSS-24,54 with MGS mapping in weeks 10 and 11.
- MGS MSPA 7 DSS-26,45,65 passes with Mars Express orbital science at DSS-24,54 in week 10. In week 11 reduce DSS-25,45,65 request from 16 to 14 passes and MSPA 7 passes with Mars Express orbital science at DSS-24,54. Use DSS-25,65 for the remaining 7 passes (change in week 11 needed to resolve contention on the 34m BWG1).
- MER depending on landing site selection MSPA Rovers A or B with Mars Odyssey on 34m antennas as defined above. To accommodate GPB move from week 06, reduce one 70m pass per Rover in week 11 to 7 hours.

2004 Contention Period - April - Weeks 14 - 18

Genesis Project agreed to use DSS-24,54 for 5 routine passes in week 17.

SOHO Project agreed in advance of the RARB to reduce 9.6 hour passes at DSS-16,34,66 to 6 hours in weeks 17 and 18.

Agreements to the following recommendations made by RAPSO are deferred by the Mars Program, as outlined in Action Item #7 of the August 2002 RARB:

- Mars Odyssey mapping/relay accept 5 gaps in 70m support in weeks 14, 16 and 17, and 6 gaps in weeks 15 and 18. Use 34m support to fill gaps: On Mondays 1 hour at DSS-26 and 3 hours at DSS-45, on Wednesdays 8 hours at DSS-54,55,65 and on Thursdays 3 hours at DSS-26 and 5 hours at DSS-54,55,65. In weeks 15 and 18 fill an additional 3-hour gap on Friday using DSS-26.
- MER depending on landing site selection MSPA Rovers A or B with Mars Odyssey on 34m antennas as defined above.

2004 Contention Period - May - Weeks 19 - 22

Agreements to the following recommendations made by RAPSO are deferred by the Mars Program:

- Mars Odyssey mapping/relay accept 5 gaps in 70m support in weeks 19, 21 and 22, and 7 gaps in week 20. Use 34m support to fill gaps: On Mondays 1 hour at DSS-26 and 1 hour at DSS-45, on Wednesdays 8 hours at DSS-54,55,65 and on Thursdays 1 hour at DSS-26 and 3 hours at DSS-54,55,65. In week 20 on Friday use 1 hour at DSS-26 and 1 hour at DSS-45.
- MER depending on landing site selection MSPA Rovers A or B with Mars Odyssey on 34m antennas as defined above.

Note: Mars Project requested to extend the period covered by the August 2002 RARB Action Item #7. Gene Burke responded that Mars scheduling personnel should work with RAPS member Susan Lineaweaver in resolving Mars support contentions after the period defined in Action Item #7 of the August 2002 RARB, rather than extend the Action Item.

2004 Contention Period - June - Weeks 23 - 26

Chandra agreed to move 7 passes to the 26m and increase supports to 2 hours in week 26.

Mars Express accepts the recommendation to reduce 3 of 7 orbital science/occultation passes requested at DSS-24,54 in weeks 25 and 26 from 14.5 hours to 10 hours in duration.

2004 Contention Period - July - Weeks 27 - 31

Chandra agreed to move 7 passes per week to the 26m and increase supports to 2 hours in weeks 27 and 28.

2004 Contention Period - August - Weeks 32 - 35

Mars Express accepts the recommendation to reduce 2 of 7 passes/week requested at DSS-63 to 6 hours in weeks 34 and 35.

Mars Odyssey accepts the recommendation to move 1 pass to DSS-45 and 2 passes to DSS-55 of the 14 passes requested at DSS-43,63 in week 33. After the RARB Mars Odyssey accepted the alternate recommendation to move 1 pass to DSS-45, MSPA7 passes with MEX at DSS-63 and support the remaining 6 passes at DSS-43 in week 43 and to support the six 7-10 hour passes requested in week 35 at DSS-43 only.

Note: Mars Project requests that MSPA be utilized with Mars Odyssey as often as possible rather than change or delete supports.

2004 Contention Period - September - Weeks 36 - 40

Mars Express accepts the recommendation to change 2 - 3 DSS-63 orbital science/solar corona passes to use two to three 4-hour passes at DSS-25,26 to support orbital science, and two to three 4-hour passes at DSS-63 to support solar corona.

2004 Contention Period - October - Weeks 41 - 44

DSS-14 downtime proposal was approved by all Board members and was uncontested by any Project representatives. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: MAP, Mars Odyssey and Voyager 1. Deleted Toutatis B support in week 41.

Mars Express agreed change 2 - 3 DSS-63 orbital science/solar corona passes to use two to three 4-hour passes at DSS-25,26 to support orbital science, and two to three 4-hour passes at DSS-63 to support solar corona.

Voyager 1 previously agreed to delete DTR array support in week 44, and to track the event using DSS-15. A DTR P/B pass is planned at DSS-14 to replay data in week 48.

2004 Contention Period - November - Weeks 45 - 48

DSS-14 downtime proposal was approved by all Board Members and was uncontested by any Project representatives. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: Cassini, DSN, EVN, GBRA, Mars Odyssey, MAP, and Voyager 1 routine U/L.

Mars Express agreed to change 2 - 3 DSS-63 orbital science/solar corona passes to use two to three 4-hour passes at DSS-25,26 to support orbital science, and two to three 4-hour passes at DSS-63 to support solar corona in weeks 45-47.

Note: An Action Item was taken to analyze the impact of DSS-45 downtime in weeks 43-49, make recommendations, then present the downtime proposal at the March JURAP meeting.

2004 Contention Period - December - Week 49 - 53

Mars Express agreed to reduce the number of orbital science/occultation passes planned at DSS-24,55 in weeks 52 and 53 from 7 to 5, to MSPA 2 orbital science passes with MGS mapping/beta supplement at DSS-26,45,65 and to plan two 4-hour occultation passes at DSS-24.

MGS agreed to MSPA 2 mapping/beta supplement passes with Mars Express in weeks 52 and 53.

2005 Contention Period - January - Weeks 01 - 04

DSS-26 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: Cassini, MESSENGER and Voyager 1.

DSS-27 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: ACE and Cluster 2 SSO.

DSS agreed to reduce DSS-27 maintenance from eight to six hours in week 01.

2005 Contention Period - February - Weeks 05 - 08

DSS-26 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: Cassini and MESSENGER.

2005 Contention Period - March - Weeks 09 - 13

RFC agreed to reduce support from 24 hours to 12 hours in weeks 11 and 12.

Space Geodesy agrees to delete support in week 10.

SOHO previously agreed to reduce two 8-hour passes in TSO weeks 09 and 13 to 6 hours, and reduce seven 9.6-hour passes to 6 hours in weeks 10 - 12.

Note: Although the SOHO Project agreed to the recommendation above, they requested to internally work out contention due to the uncertainty of the Lunar-A launch. It is agreed to approve the proposal, but to restore the time if it becomes available due to Lunar-A.

2005 Contention Period - April - Weeks 14 - 17

DSS-15 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: GSSR, RFC, and Space Geodesy.

DSS-25 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: Cassini.

Note: Cassini agreed to tentatively accept the DSS-25 downtime, but will need to assess the impact to its Ka-band radio science data collection and provide feedback to RAPSO for possible re-planning of DSS-25 downtime.

DSS-54 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: Cassini tour, Deep Impact, IMAGE, Mars Express orbital science, MESSENGER, MGS mapping/beta supplement, MUSES-C rendezvous, and Wind.

DSS-55 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: Voyager 1.

Chandra Project agrees to move 7 passes per week to 26m and increase supports to 2 hours, and change 34-BWG1 supports to DSS-24,34, rather than the proposed move to DSS-66.

DSS agreed to delete DSS-15 maintenance support in week 17.

2005 Contention Period - May - Weeks 18 - 21

DSS-25 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: Cassini and MUSES-C.

Note: Cassini agreed to tentatively accept the DSS-25 downtime, but will need to assess the impact to its Ka-band radio science data collection and provide feedback to RAPSO for possible re-planning of DSS-25 downtime.

DSS-34 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: Deep Impact, IMAGE, and MGS.

Chandra agreed to move 7 passes per week to 26m and increase supports to 2 hours, and change 34-BWG1 supports to DSS-24,54, rather than the proposed move to DSS-46.

2005 Contention Period - June - Weeks 22 - 26

DSS-24 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: IMAGE, and Wind.

DSS-34 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: ACE, Deep Impact, IMAGE, MGS, MESSENGER, MUSES-C, and Wind. (2)

Chandra agreed to move 7 passes per week to DSS-46 and change 34-BWG1 supports to DSS-24,54 in weeks 22 - 25, move 7 passes to DSS-16 and change 34-BWG1 supports to DSS-34,54 in week 26, and increase 26m supports to 2 hours.

Cluster 2 agreed to delete DSS-34 from SSO requirement in weeks 22 - 25 and delete DSS-24 SSO requirement in week 26.

2005 Contention Period - July - Weeks 27 - 30

DSS-43 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: MAP, Mars Odyssey, SIRTf, and Voyager 2.

Voyager 2 previously agreed to change routine uplink at DSS-43 to DSS-34 BLF in week 30.

Mars Express agreed to delete R/S bi-static supports at DSS-43 in week 30.

Note: Mars Express agreed to tentatively accept DSS-43 downtime, but will need to assess the impact to its Radio Science Bi-Static data collection and provide feedback to RAPSO for possible re-planning of the downtime.

2005 Contention Period - August - Weeks 31 - 34

DSS-43 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: MAP, Mars Odyssey, and SIRTf.

Note: Mars Express agreed to tentatively accept DSS-43 downtime, but will need to assess the impact to its Radio Science Bi-Static data collection and provide feedback to RAPSO for possible re-planning of the downtime.

DSS agreed to reduce DSS-16 and DSS-66 maintenance to 6-hours in weeks 31 and 32.

Voyager 2 previously agreed to change routine uplink at DSS-43 to DSS-34 BLF.

Mars Express agreed to delete R/S bi-static supports at DSS-43.

Note: Mars Express agreed to tentatively accept DSS-43 downtime, but will need to assess the impact to its Radio Science Bi-Static data collection and provide feedback to RAPSO for possible re-planning of the downtime.

2005 Contention Period - September - Weeks 35 - 39

DSS-43 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: MAP, Mars Odyssey, SIRTf, and Voyager 2.

Note: Mars Express agreed to tentatively accept DSS-43 downtime, but will need to assess the impact to its Radio Science Bi-Static data collection and provide feedback to RAPSO for possible re-planning of the downtime.

DSS-63 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: MAP, Mars Odyssey, SIRTf, and Voyager 1.

Cluster 2 agreed to remove DSS-43 from SSO and MSO supports in week 36.

GSSR previously agreed to delete Mars RSD Arecibo support in week 39.

Voyager 2 previously agreed to change routine uplink at DSS-43 to DSS-34 BLF in week 35 and 36, and change requested DSS-43 DTR playback support to DSS-34 in week 36.

Mars Express - delete R/S bi-static supports at DSS-43 in weeks 35 and 36.

Note: Mars Express agreed to tentatively accept DSS-43 downtime, but will need to assess the impact to its Radio Science Bi-Static data collection and provide feedback to RAPSO for possible re-planning of the downtime.

2005 Contention Period - October - Weeks 40 – 43

DSS-63 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: Cassini, GBRA, GSSR, MAP, Mars Odyssey, Nozomi, SIRTF, and Voyager 1.

GBRA agreed to change VLBA support at DSS-14\63 to DSS-14 only, and delete weekly Host Country supports.

GSSR previously agreed to delete Mars RSD Arecibo DSS-63 support.

2005 Contention Period - November - Weeks 44 - 47

DSS-63 downtime proposal was accepted by the affected Projects and approved by the Board. Project/user supports re-allocated to other DSS resources to accommodate the requested downtime: GBRA, GSSR, MAP, Mars Odyssey, Nozomi, SIRTF, and Voyager 1.

DSS agreed to delete antenna bearing maintenance at DSS-14 in week 44.

GSSR previously agreed to delete support for Mars RSD Arecibo in week 44.

Mars Global Surveyor agreed to reduce 3 of 7 14-hour supports to 10-hours and MSPA with Mars Odyssey on the 70m.

2005 Contention Period - December - Week 48 - 52

None.

2006 Contention Period - January - Weeks 01 - 04

DSS previously agreed to reduce maintenance at DSS-24 from 8 hours to 6 hours and at DSS-34 and DSS-54 from 6 hours to 4 hours in week 02. Increase maintenance at DSS-34 and DSS-54 from 6 hours to 8 hours in weeks 03 and 04.

Chandra agreed to move 11 passes per week in weeks 01 and 02 to the 26m and increase supports to 2 hours and change remaining 34-BWG1 supports to DSS-24,54.

2006 Contention Period - February - Weeks 05 - 08

None.

2006 Contention Period - March - Weeks 09 - 13

None.

2006 Contention Period - April - Weeks 14 - 17

None.

2006 Contention Period - May - Weeks 18 - 21

None.

2006 Contention Period - June - Weeks 22 - 26

DSS previously agreed to reduce DSS-14 routine maintenance from two 8-hour supports to one 8-hour support, and reduce DSS-25 and DSS-26 maintenance from 8-hours to 6-hours in week 22. (1)

GSSR previously agreed to delete simultaneous GODR support in week 22, reduce support in weeks 24 and 26 from 8 hours to 4 hours, and delete GSSR Mercury support in week 25.

EVN agreed to reduce support from two 16-hour supports to two 8-hour supports in week 22 and add two 8-hour supports in week 23.

Note: EVN requested that if the time becomes available later, the support time will be reinstated.

2006 Contention Period - July - Weeks 27 - 30

None.

2006 Contention Period - August - Weeks 31 - 35

None.

2006 Contention Period - September - Weeks 36 – 39

DSS-24 downtime proposal was approved by all Board members and was uncontested by any Project representatives. Projects/user supports re-allocated to other DSS resources to accommodate the requested downtime: ACE, Cassini, IMAGE, New Horizons, and SOHO.

Chandra agreed to move 7 passes per week to 26m and increase support to 2 hours, and change 34m BWG1 supports to DSS-34,54, rather than the proposed change to DSS-16.

Cluster 2 agreed to delete requirement for DSS-24 for SSO and MSO supports.

DSS previously agreed to delete 1 routine 8-hour maintenance at DSS-14 and one 6-hour at DSS-63.

Note: Chandra stated that an updated ULP would be submitted soon.

2006 Contention Period - October - Weeks 40 – 43

DSS-24 downtime proposal was approved by all Board members and was uncontested by any Project representatives. Projects/user supports re-allocated to other DSS resources to accommodate the requested downtime: ACE, Cassini, IMAGE, New Horizons, and SOHO.

Chandra agreed to move 7 passes per week to 26m and increase supports to 2 hours, and change 34m BWG1 supports to DSS-34,54 in weeks 40 – 42, rather than the proposed DSS-16.

Cluster 2 previously agreed to delete requirement for DSS-24 for SSO and MSO supports.

GBRA agreed to change Host Country at DSS-43 to three 8-hour supports in week 42.

Mars Express agreed to delete one 10-hour pass per week. Reduce 3 passes from 10 hours to 6.5 hours at DSS-14,63 in weeks 40 and 43, and reduce 2 passes from 10 hours to 6.5 hours at DSS-14,63 in weeks 41 and 42.

Mars Odyssey agreed to reduce one 10-hour pass per week to two 4-hour passes at DSS-14,63. MSPA four 10-hour standalone passes with MGS at DSS-43,34 HEF in weeks 40 and 41, but requested that 70m support be substituted for the 34 HEF.

MGS agreed to MSPA 4 passes per week with Mars Odyssey at DSS-43,34 HEF in weeks 40 and 41. (1, 2)
RFC Cat M&E agreed to move support from week 42 to week 46. (2)

Space Geodesy agreed to move support from week 42 to week 45. (2)

2006 Contention Period - November - Weeks 44 - 48

EVN agreed to change support from two 16-hour passes to three 12-hour passes and move one each to weeks 45 - 47.

GBRA agreed to change RA500 SOC-M4 support from one 24-hour pass to three 8-hour passes.

Mars Express agreed to delete one support per week. Reduce 2 passes from 10 hours to 5.5 hours at DSS-14, 63 in weeks 44, 45, 47, and 48, and reduce 3 passes from 10 hours to 5.5 hours at DSS-14,63 in week 46.

Mars Odyssey agreed to reduce three passes per week from 10 hours to 8 hours and MSPA with Mars Reconnaissance Orbiter at DSS-43, adding two 4-hour stand-alone passes at DSS-14,63 for reduced time, and MSPA one 10-hour pass per week with MGS on 34 HEF in weeks 45 - 48.

Mars Reconnaissance Orbiter agreed to MSPA 3 passes per week with Mars Odyssey at DSS-43 in weeks 45 - 48.

MGS agreed to MSPA one 10-hour pass per week with Mars Odyssey in weeks 45 - 48.

2006 Contention Period - December - Week 49 - 52

None.

Action Item Status

From August 13, 2002 and February 11, 2003

Resource Allocation Review Board (RARB)

Action Item Summary

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
01	2003-2004	December-April	Mars Program	B. Arroyo	06/01/2003	Open

ACTION: (aka 8/13/02 RARB A.I. #7) Multi-mission DSN Allocation and Planning (MDAP) provide a Mars Program coordinated input to Resource Allocation (Mid-Range) Planning Team (RAPT) of at least one week per week at least 6 months prior to the schedule week. This action will use the result of Action Item 6 to clarify the scope of resources in which to plan to.

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
02	2004	October-December	RAPSO	S. Lineaweaver	04/20/2003	Pending

ACTION: Analyze proposed DSS-45 downtime (10/18/2004 – 12/05/2004) for Antenna Controller Replacement (ACR) and Microwave Switch Controller (USC).

RESPONSE: (4/20/03) Presentation of contention analysis due at March JURAP meeting.

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
03	2005	April-May	Cassini	D. Seal	02/25/2003	Closed

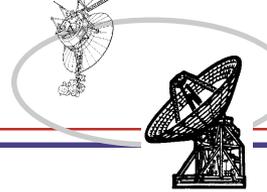
ACTION: Provide Cassini Occultation Plans regarding DSS-25 planned downtime.

RESPONSE: (02/18/03) Information provided showed Cassini's need for DSS-25 prior to February 19 and after April 30.

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
04	2005	July-August	Mars Express	T. Thompson	04/10/2003	Closed

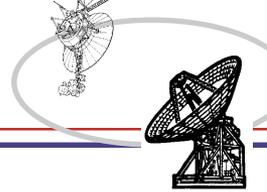
ACTION: Provide impact to Mars Express requested weekly Bi-Static Radio Science requirement during planned DSS-43 downtime.

RESPONSE: (2/19/03) Mars Express requests that the Bi-Static experiments be moved to another 70M antenna in each week that DSS-43 is down. When using another 70M antenna, continue to use the same 70M antenna for several weeks versus having DSS-63 one week and DSS-14 the next



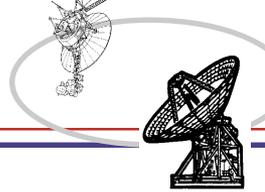
Agenda

- **INTRODUCTION** **B. Weber** **8:30**
- **OVERVIEW, CONTENTION SUMMARY** **G. Burke** **8:45**
- **ACTION ITEMS** **D. Morris** **8:50**
- **CODE S NASA HEADQUARTERS** **B. Geldzahler** **9:00**
- **JPL DSMS PLANS & COMMITMENTS PROGRAM OFFICE** **R. Miller** **9:20**
- **JPL DSMS ENGINEERING PROGRAM OFFICE** **J. Statman** **9:40**
- **JPL DSMS OPERATIONS PROGRAM OFFICE** **J. Wackley** **10:00**
- **NEW OR MODIFIED PROJECT REQUIREMENTS**
 - **Radar Measurements of Planetary Rotations With Unprecedented Accuracy:
New Insights on the Geophysics of the Terrestrial Planets** **J. Margot** **10:20**
 - **Goldstone to VLA Mars Observations** **M. Slade** **10:40**
- **RESOURCE CONTENTIONS**
 - **Analysis & Recommendations** **N. Lacey** **11:00**
 - **Responses** **Projects**
 - **Discussion / Decisions** **All**
- **NEW ACTION ITEMS & SUMMARY** **G. Burke**



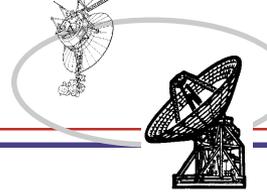
Review Board Members

Bill Weber	JPL	Chairman
Gene Burke	JPL	Resource Allocation Planning & Scheduling Office Mgr
Irene Bibyk	GSFC	ST-5 Project Representative
Gene Brower	Caltech	Mars Global Surveyor Project Scientist
Donald Burnett	Caltech	Genesis Project Scientist
Albert Chang	JPL	Nozomi, Lunar-A, Selene Project Representative
Alan Cummings	Caltech	Voyager Project Scientist Representative
Peter Doms	JPL	Deep Space Mission System (DSMS) Manager
Tom Duxbury	JPL	Stardust Project Manager
Bob Farquhar	APL	MESSENGER, New Horizons Director
David Gallagher	JPL	SIRTF Project Manager
Sarah Gavit	JPL	DAWN Project Manager
Roger Gibbs	JPL	Mars 2001 Odyssey Project Manager
Jim Graf	JPL	Mars Reconnaissance Orbiter Project Manager



Review Board Members

Albert Haldemann	JPL	Mars Exploration Rover Project Scientist
Dwight Holmes	JPL	INTEGRAL Representative
Erik Holmgren	CSOC	CSOC JPL Site Manager Representative
Richard Horttor	JPL	Mars Express Orbiter U.S. Project Manager
Chris Jacobs	JPL	Reference Frame Calibration Project Representative
Torrence Johnson	JPL	Galileo Project Scientist
Mike Klein	JPL	Radio Astronomy Project Manager
Ken Kimball	JPL	DSMS Engineering Program Office
Ron Mahmot	GSFC	Space Science Mission Operations Project Manager (ISTP, ACE, Image, MAP)
Ed Massey	JPL	Ulysses/Voyager Project Manager
Dennis Matson	JPL	Cassini Program Scientist
John McNamee	JPL	Deep Impact Project Manager
Rich Miller	JPL	DSMS Plans & Commitments Office Manager
Bob Mitchell	JPL	Cassini Program Manager



Review Board Members

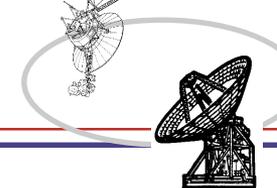
Dan Ossing	APL	STEREO Project Representative
Jeff Plaut	JPL	Mars 2001 Odyssey Mission Project Scientist
Rance Skidmore	Omitron	GOES Project Representative
Martin Slade	JPL	GSSR Project Manager
Ed Smith	JPL	Ulysses Project Scientist
Joel Smith	JPL	Muses-C U.S. Project Manager
Don Sweetnam	JPL	Genesis Project Manager
Eileen Theilig	JPL	Galileo Project Manager
Pete Theisinger	JPL	Mars Exploration Rover (MER) Project Manager
Tom Thorpe	JPL	Mars Global Surveyor Project Manager
Phil Varghese	JPL	Planetary Flight Projects Mission Management Office
Joe Wackley	JPL	DSMS Operations Office Program Manager
Greg Wright	MSFC	Chandra Project Manager Representative



Jet Propulsion Laboratory
California Institute of Technology

Deep Space Mission System (DSMS)

RESOURCE ALLOCATION REVIEW BOARD

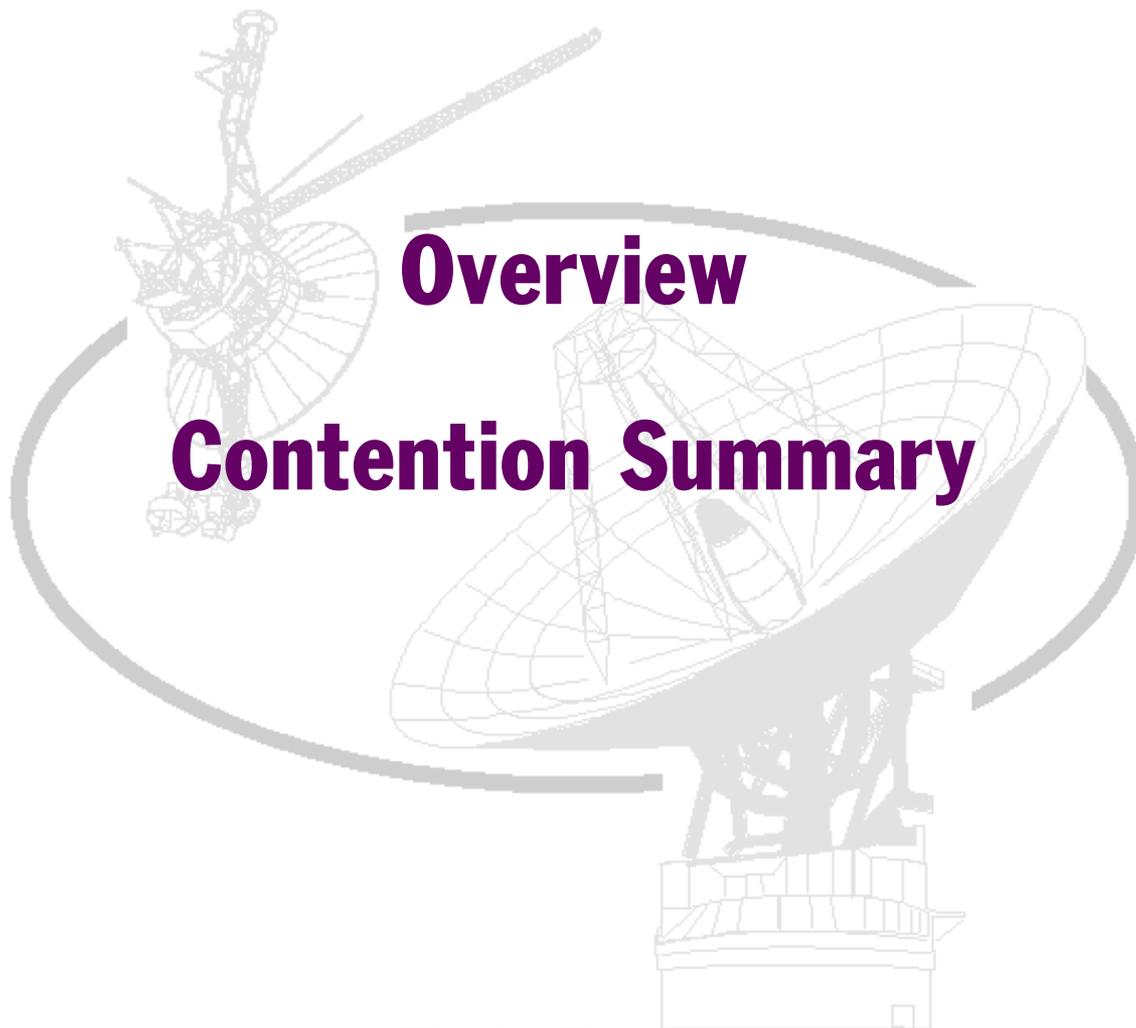
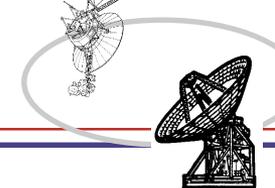


Welcome and Introduction

Bill Weber

Director, Interplanetary Network Directorate

JPL

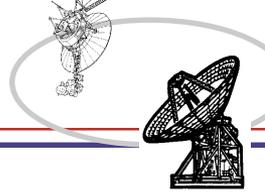


Overview

Contention Summary

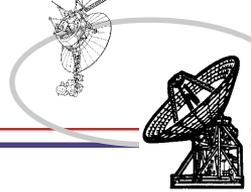
E. S. Burke





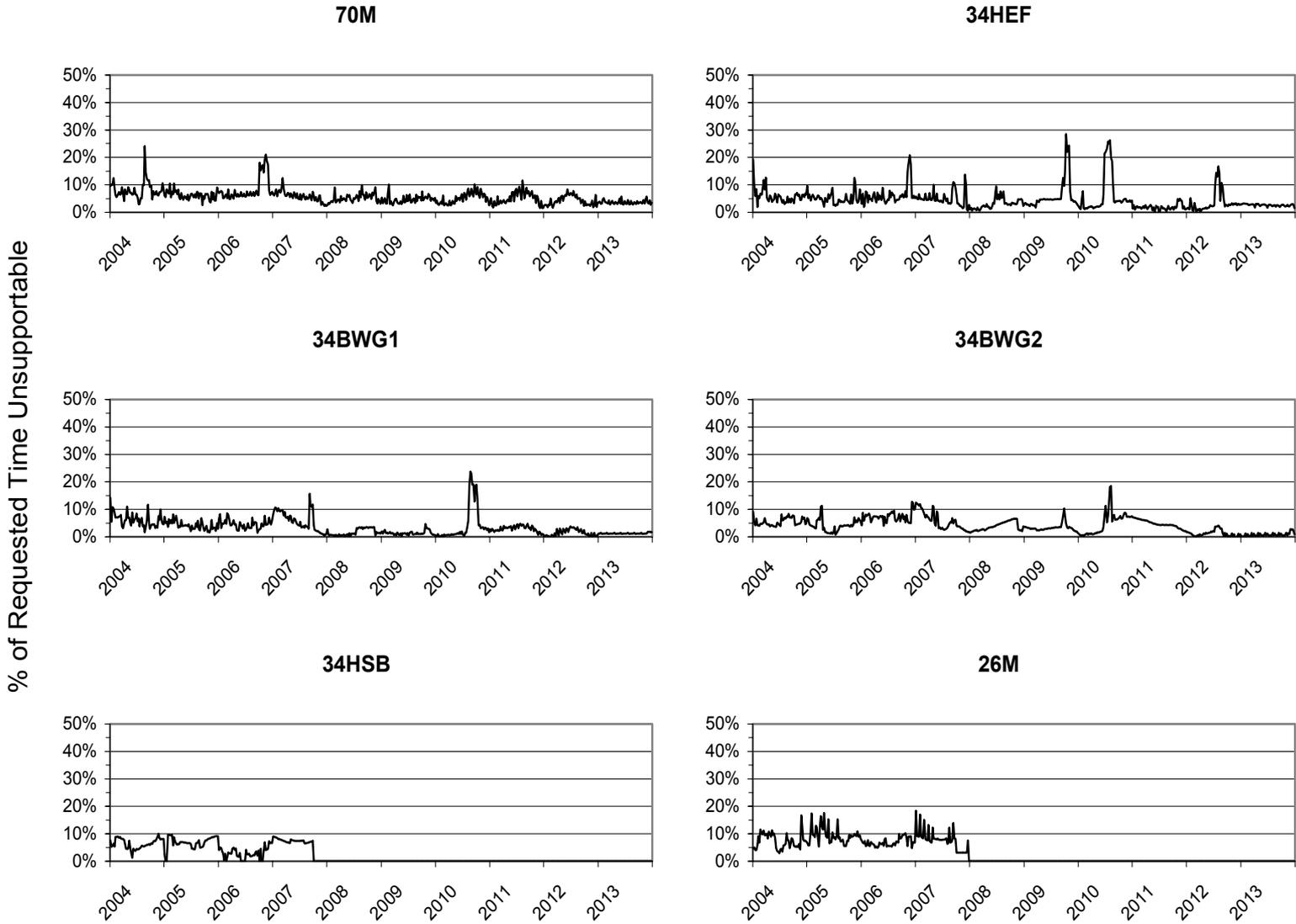
Introduction

- **Welcome To The Resource Allocation Review**
 - **Board was Established to Provide Control of Tracking Requests 26, 34, & 70-Meter Subnets**
 - **Recommend Resource Allocation and Assist in Capacity Planning**
- **Requirements 2004 Through 2013**
- **Conflicts in 2004 Through 2006 Needing Resolution**



RESOURCE ALLOCATION REVIEW BOARD

Projected Unsupportable Time Summary



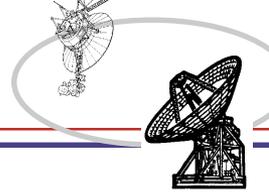
$$\text{Projected Unsupportable Time} = \frac{\text{Total Expected Unsupportable Time}}{\text{Total Requested Resource Usage Time}}$$



RESOURCE ALLOCATION REVIEW BOARD

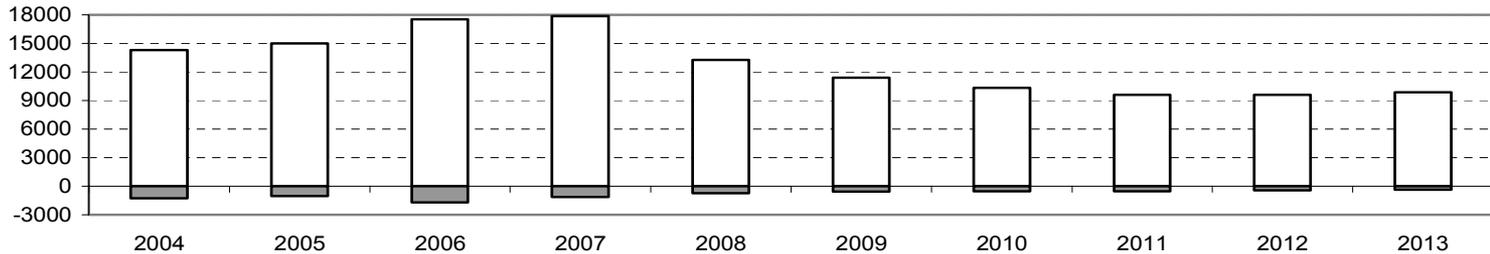
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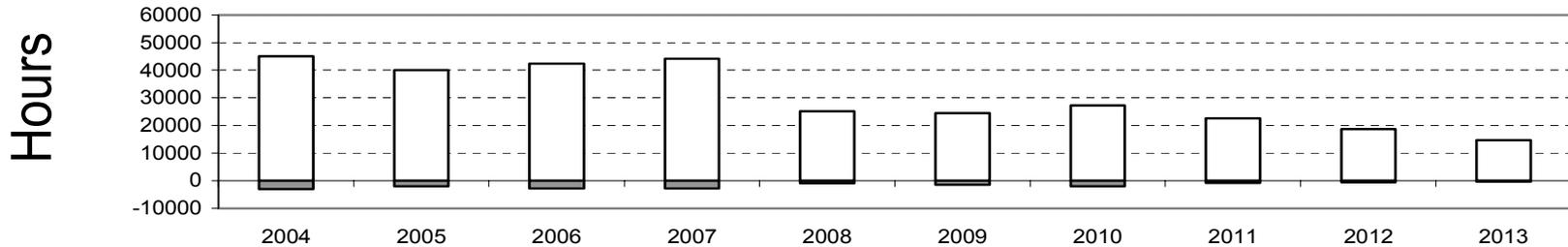


Projected Yearly Supportable Time Summary

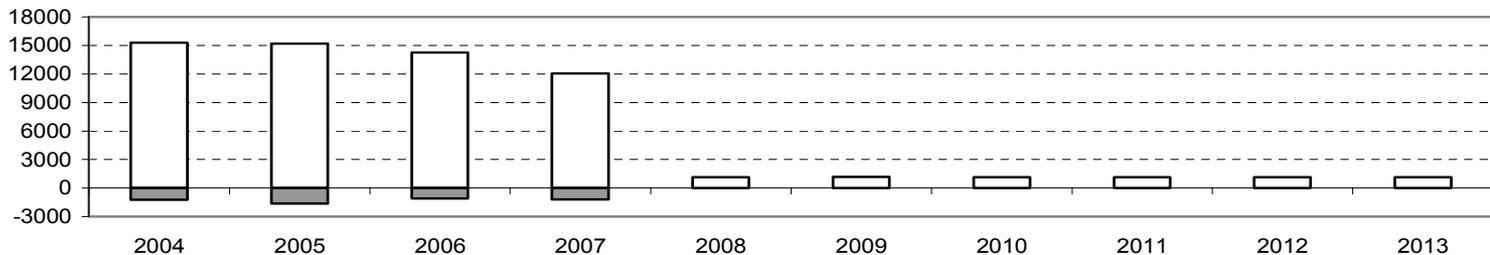
70M



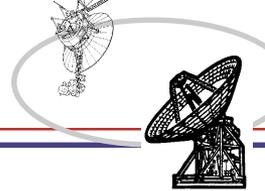
34M



26M



Unshaded Area = Supportable
Shaded Area = Unsupportable



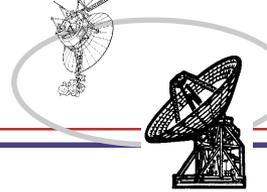
Action Item Status

From August 13, 2002 RARB

(Resource Allocation Review Board)

David G. Morris

JPL



Action Item Summary

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
01	2003	Jan-Dec	DSMS P & C	R. Miller	9/19/2002	Closed

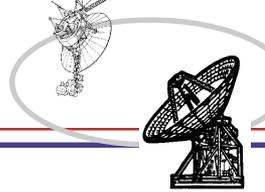
ACTION: Investigate and Negotiate the feasibility of alternate assets providing current DSN Catalog Maintenance and Enhancement (CAT M&E) radio sources.

RESPONSE: (9/19/02) The Reference Frame and Calibration Project reevaluated requirements which reduced scheduling constraints for acquiring sources. Therefore forecasted allocations should prove adequate with only some missed periods in 2003.

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
02			DSMS Engineering	J. Statman	9/19/2002	Closed

ACTION: Provide date when 810-5 will be updated with revised G/T values based upon new X/X/Ka feeds on the 34m BWG. (Reference page 28 of DSMS Engineering presentation.)

RESPONSE: (10/18/02) Module 104 will be published by 7/1/2002; measurements will be taken in February 2003.



Action Item Summary

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
03	2003	July-August	GSSR & Mars Program Office	A. Haldeman C. Edwards	12/12/2002	Closed

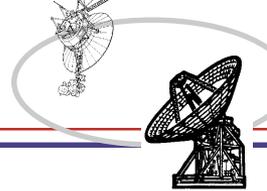
ACTION: Investigate and negotiate the conflicting requirements for GSSR-Mars Landing Survey vs. ongoing Mars Program spacecraft support.

RESPONSE: (11/14/02) The GSSR-Mars Landing Survey reevaluated requirements which reduced scheduling constraints and those are proceeding through RAPT. The first two allocation requests have been inserted into weeks 28 and 29 without any conflicts. Requests for weeks 31-38 are inserted and these weeks will be negotiated soon.

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
04	2003	October	SGP	P. Wolken	9/19/2002	Closed

ACTION: Consult with the Project for a decision regarding all SGP recommendations made by RAPSO and provide RARB Representative authority to negotiate recommendations that reduce SGP support.

RESPONSE: (11/14/02) Closed with SGP CSR.



Action Item Summary

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
05	2003	December	NASA HQ Code S	B. Geldzahler	10/17/2002	Closed

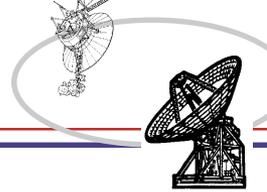
ACTION: Coordinate NASA Code Y to NOAA support for GOES N to be outside the 2003 – 2004 High Activity period. R. Skidmore states that the GOES-N Project is aware of the contentions and GSFC representatives will work with the Project for a decision to resolve the issues.

RESPONSE: (11/26/2002) Launch Date is now Not Earlier Than (NET) April 1, 2004.

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
06	2003- 2004	December- April	DSMS Plans & Cmt Office and Mars Program	R. Miller C. Edwards	10/11/2002	Closed

ACTION: Develop planning envelope for Mars Program to plan their critical support within. This is to preserve and assure other missions' committed support throughout this period as well as needed DSS Maintenance as presently defined.

RESPONSE: (11/22/2002) RAPSO has presented and received concurrence from Mars Program and DSMS Plans and Commitments Office for the definition of this planning envelope.



Action Item Summary

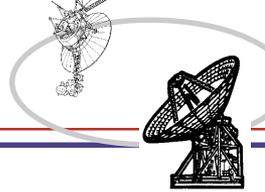
<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
07	2003-2004	December-April	Mars Program	B. Arroyo	06/01/2003	Open

ACTION: Multi-mission DSN Allocation and Planning (MDAP) provide a Mars Program coordinated input to Resource Allocation (Mid-Range) Planning Team (RAPT) of at least one week per week at least 6 months prior to the schedule week. This action will use the result of Action Item 6 to clarify the scope of resources in which to plan to.

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
08	2005	April-June	RAPSO	N. Lacey	10/17/2002	Closed

ACTION: Coordinate new plan for DSS-63 Antenna Controller Replacement Task with DSMS Engineering based upon newly defined requirements provided by Cassini.

RESPONSE: (11/19/2002) The DSS-63 Antenna Controller Replacement with the concurrence of DSMS Engineering is now planned for 09/19/05 - 11/06/05, Weeks 38 - 44, DOY 262 - 310.



Action Item Summary

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
09	2005	July	RAPSO	N. Lacey	10/17/2002	Closed

ACTION: Coordinate new plan for DSS-43 Antenna Controller Replacement Task with DSMS Engineering based upon newly defined requirements provided by Cassini.

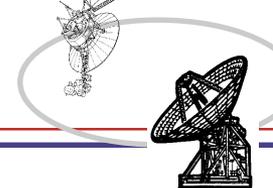
RESPONSE: (11/19/2002) The DSS-43 Antenna Controller Replacement with the concurrence of DSMS Engineering is now planned for 07/25/05 - 09/11/05, Weeks 30 - 36, DOY 206 - 254.



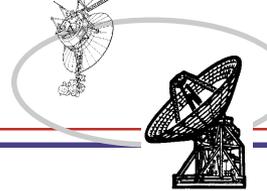
Jet Propulsion Laboratory
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Deep Space Mission System (DSMS)

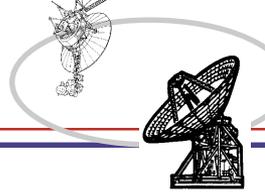
RESOURCE ALLOCATION REVIEW BOARD



Action Item #6 Backup Slides

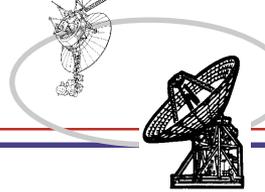


- **Action Item 6**
 - **High Activity Period November 2003 – March 2004**
 - **Agreement Highlights**
 - **Deep Impact Launch Change**



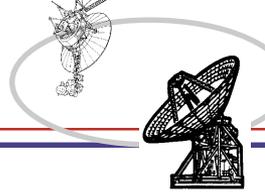
High Activity Period November 2003 – March 2004

- **System is at capacity – NO MARGIN**
- **Unexpected Problems – Capacity Shrinks**
 - **Antenna Failures, Film Height Alarms, etc.**
 - **Triage Process Facilitates Remedies**
- **Maximize Tracking Time – 30 minute Setup as Promised by NSP**
 - **Our Plan is to Maintain Current Pass Duration for Missions With Long Pass Duration**
 - **Spacecraft Communication Time Takes a Hit**
- **Parkes Radiotelescope**
 - **April 1 – Initial Schedule September 1 through December 31, 2003**
 - **Block Time Is Being Reserved for Testing, Proficiency and Operations.**
- **CONTOUR Loss of Mission; Cassini Gravitational Wave - November**
- **Deep Impact Launch Change**



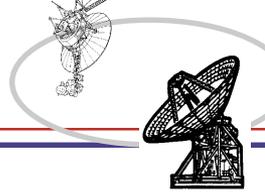
RARB Action Item 6 Agreement Highlight

- **Mars Program Support Envelope Definition: (December 2003 – April 2004)**
 - **Signed by Chad Edwards and Rich Miller on November 22, 2002.**
 - **Used Mars Projects' Agreements From the August 2002 RARB.**
 - **No Significant Requirement Changes in This Period From Mars Projects**
 - **Specific Monthly Highlights:**
 - **December 2003 - RARB Recommendations Accepted by Projects.**
 - **January 2004 - RARB Recommendations Accepted by Projects Outside of the Mars Program.**
 - **January (Week 05) Through April (Week 17) - Unresolved 70 meter Maintenance Issues. No 34-meter Issues.**
 - **MER Surface Operations and Mars Odyssey 70 meter Support Compared With DSS Daylight Preventative Maintenance Results in 4 to 6 Projected Gaps Each Week. Can Be Resolved With 34-meter Support.**



Deep Impact Launch Change

- **What Is the Impact of This Launch Change?**
- **Deep Impact Had a 50% Viewperiod Overlap With Mars (Evening Rise).**
 - **Deep Impact Only Had Higher Levels of Support in Their First 30 Days!**
 - **In the Month of January, the DSN Is at Capacity in the Mars View. NO MARGIN.**
 - **We Are in a Very Critical Support Phase for MER A and MER B.**
 - **Planned on NSP Providing 30 Minute Setup Time for 34m & 70m non-MSPA Passes.**
 - **Setup Time Will Probably Revert to Legacy Times of 45 Minutes to One Hour.**
- **We Anticipate Needing This Freed up Time to Provide:**
 - **Increased Setup Time for Missions With Short Period Contact Tracks;**
 - **Especially to Provide Relief for Missions That Have Significant Overlap With Mars Viewperiod Such as SIRTF.**
 - **Presently, No Increase in Mars Program (Agreed To) Schedule Envelope to Allow for Increased Setup Time (ref: RARB A.I. #6).**
 - **Restore Time to Missions That Reduced in Order to Allow Deep Impact to Fit.**
 - **If Excess Time Is Still Available, Then This Will Be Offered to All Missions.**

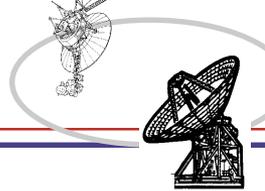


**Presentation to the
Resource Allocation Review Board
Feb 11, 2003**

Dr. Barry Geldzahler
Program Executive for Space Operations
Solar System Exploration Division
Office of Space Science - NASA Headquarters
202-358-0512 bgeldzah@hq.nasa.gov

- **Management of the DSN**
- **Working groups**
- **Positions available at HQ**
- **Peer Reviews**
- **Prioritization Board**

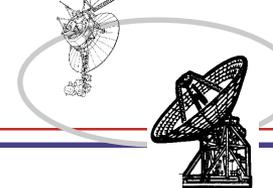




Code S News

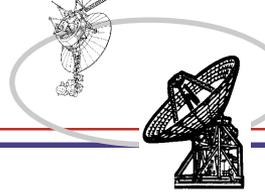
- We're still on a continuing resolution- the latest through Feb 20
- NASA HQ is installing a new financial management system, but our travel manager is not yet integrated. Hence, all travel by HQ personnel is now done on risk. End of February is the target date for full implementation.
- Great news about the budget:
- Space Science:

	2002	2003	2004
	2,902	3,414	4,007



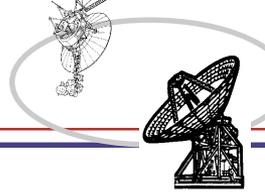
Optical Communications

- **Getting More Scientific Data Back.** Like power and propulsion, today's communications technology also limits scientific research in space. Since the beginning of space exploration, radio waves have transmitted information to and from Earth. But radio signals weaken as they travel and carry limited scientific data. Optical communications, which rely on lasers, can carry much larger amounts of information than radio signals—enough to send video-like transmissions from deep space missions.
- To take advantage of this emerging technology and greatly improve the scientific and educational return of future research missions, the President's Budget provides \$31 million to initiate development of the first operational deep space optical communications system. Spacecraft in the Mars Exploration Program will be the first missions to use this technology in 2009, increasing the amount of data they can transmit back to Earth.



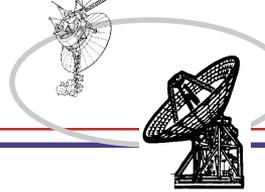
Nuclear Power

- Increasing the scientific return from missions to these planets requires new power and propulsion technologies. For example, using existing propulsion technology, it can take half a decade or more for spacecraft to travel to Jupiter and other planets in the outer solar system. Once there, it is difficult and sometimes impossible for spacecraft to enter orbit around one or more of a planet's moons. In addition, power on a spacecraft is a scarce resource.
- Science instruments on these spacecraft often run on the same amount of electricity as a light bulb. High radiation and extreme temperatures in some of these worlds also limit the lifetime of spacecraft power sources to a few months or less.
- To develop and demonstrate new power and propulsion technologies to overcome these limitations, the President's Budget proposes \$279 million; (\$3 billion over five years) for Project Prometheus, which builds on the Nuclear Systems Initiative started last year. Project Prometheus includes the development of the first nuclear-electric space mission, called the Jupiter Icy Moons Orbiter. This mission will conduct extensive, in-depth studies of the moons of Jupiter that may harbor subsurface oceans and thus have important implications in the search for life beyond Earth. In addition, it will prove new technologies for future NASA missions.



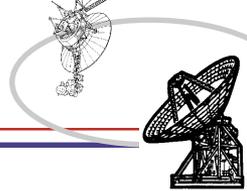
Prioritization Board

- HQ has established a Prioritization Board to help resolve conflicts during the 2003/04 crunch period.
- The RAPSO process will be the first steps
 - s/c emergency
 - mandatory for achievement of primary object. Support essential to s/c survival
 - major, unique scientific event. Time critical
 - minimum DSS maintenance; minimum support to maintain scientific validity
 - mandatory to achieve primary objectives- not time critical
 - time critical events not essential to achieving primary objectives
 - repeated scientific objectives
- If an impasse remains, the decision will be made at HQ.
- The HQ group will be set up this year and will provide guidance to RAPSO
- Third meeting, Jan, 2003, at HQ to help resolve conflicts in the current cycle and to get practice for the 2003/04 crunch



Executive Management Board

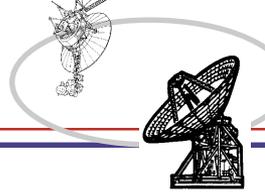
- NASA HQ has establishing an Executive Management Board to help determine upgrades and operations issues
- Will help NASA HQ DSN Program Executive weigh options for future DSN initiatives
- The Board will meet every 6 months



IND Plans and Commitments Office
'03-'04 DSMS and Missions Preparations
for Feb '03 RARB

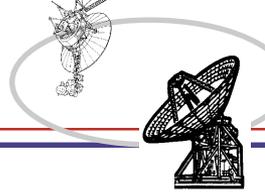
R. B. Miller

JPL



'03-'04 DSMS and Missions Preparations

- In September the DSMS Operations established three small working groups to produce
 - An Emergency Book:
 - reference documentation (including failure trees) and tools to enable quick diagnostics and recovery of DSN failures
 - Triage
 - Produce detailed procedures including review with the Projects
 - Test and training
 - Develop operations plans for integrated training, including scenarios and scripts
- Got off to a good start using a November DSN Operations Working Group (a periodic working meeting of personnel from all DSN sites and Pasadena) with 03-04 status and preparations as its theme.
- Has slowed in January due to intense activity to prepare CSOC replacement RFP.
- Will crank back up in late February and March to prepare for 03-04 DSMS Missions Workshop #2 in April



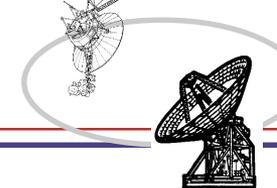
'03-'04 DSMS and Missions Preparations, Continued 03-04 DSMS Missions Workshop #2

April 6 and 7

- Workshop #1 was wake up call, #2 focus is detailed plans and procedures

Topics:

- Status of DSN/AMMOS '03-'04 Implementations.
- Operational experience with the Network Simplification Project
 - Update of NSP effect on setup and take down times
 - Missions discuss their experience with the operational use of NSP
- Triage and related topics.
 - Detailed procedures
 - Priority table
 - "War Room" concept
 - Development of Test and Training Plan for Triage
- DSN concept for failure procedures worked in advance (the "Emergency Book")
- Arraying (potential usage and any training needs)
- 2-MSPA (Multiple Spacecraft per Antenna) operations
- Operations with Alternate Assets
- Agree on remaining program of work (Expected Products from the Workshop)
 - Identify open areas for future work which require cross Mission or joint Mission-DSMS effort
 - Agree on need dates and commitment to provide the resources to do the work



JPL Deep Space Mission System (DSMS)

Engineering Program Office (940)

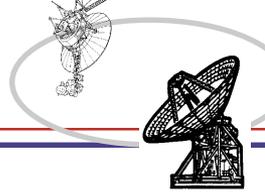
RARB

February 2003

K. R. Kimball

(for J. I. Statman)

JPL



Agenda

- **Tasks recently completed**
- **Tasks to be completed before the 03-04 heavy loading**
- **Tasks to be completed after the 03-04 heavy loading**

Consult your TMS Manager for details of schedule and functional capabilities

**RESOURCE ALLOCATION REVIEW BOARD**

Jet Propulsion Laboratory

California Institute of Technology

**Where Are We In The Life Cycle? (1/31/2003)**

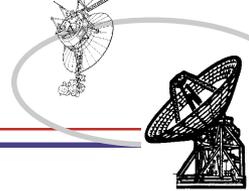
Task	New or Increment		Prelim Design	Detailed Design	Implement, 1 st unit	System tests	AT	1 st DDR	Repeat
26m Antennas – D3.1	Increment								
TTC&DM – D27.0 (TDDS)	Increment								
System Performance Test**	New/Inc								
NMC D1.4	Increment								
NSP	New/Inc								X
20 KW Tx on BWG's	New								X
TTC&DM D27.1 (TDDS)	Increment								
NSS - Contour	Increment								
NSS – DDOR	Increment								
NSS – NSP	Increment								
2-MSPA CS/NMC/NSS	Increment					X			
Ka-band on BWG	New					X			
DSS 55	New/Inc				X				
Overseas Arraying	New/Inc				X				
Delta-DOR – VSR	New								
Delta-DOR - Processor	New					X			
Parkes	New				X				
New Norcia	New								

**Funded and managed by the Operations Office

**RESOURCE ALLOCATION REVIEW BOARD**

Jet Propulsion Laboratory

California Institute of Technology

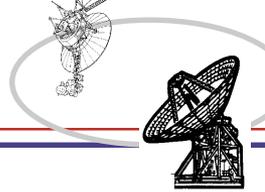
**Where Are We In The Life Cycle? (1/31/2002)**

Task	New or Increment*		Prelim Design	Detailed Design	Implem't, 1 st unit	System tests		Repeat?
70m CoF								
Servo drives	Increment					14		43, 63
Grouting***	Increment					14*		43*, 63*
34m CoF								
BWG Axles	Increment					24, 25, 26, 54**		34, 54**
Encoder Upgrades	Increment					24, 25, 26		34, 54
Pintle Bearing Replacement	Increment		N/A	N/A	N/A	N/A		34

* Major regrout at DSS-43, minor regrout at DSS-14 and DSS-63

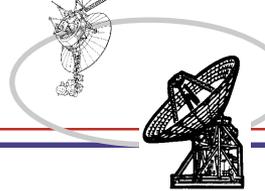
** At DSS54, two axles were replaced, the other two axles will be replaced later

*** Funded and managed by the Operations Office



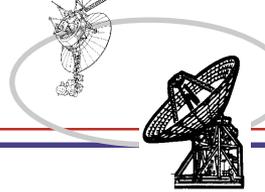
Tasks Recently Completed

- **20 kW Txr on BWG (first installation)**
 - Operational at DSS 24 since December 27th
 - Upgrades to other BWG's are underway, DSS 26 is next
- **NSP (Network Simplification Project) D3.2.1 (First Installation)**
 - Operational at DSS 24 since December 27th
 - DSS 43 and DSS 65 scheduled to return to service week of 2/9/2003
- **AMMOS 27.1**
 - New SLE and radio-metric processing capabilities



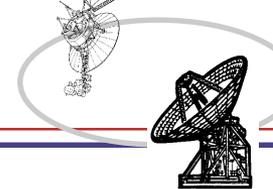
Tasks to be Completed Before the '03-'04 Overload

- **X/X/Ka-band feeds**
- **DSS-55**
- **2-MSPA**
- **Arraying at Overseas DSCC's**
- **Delta-DOR**
- **Follow-on NSP and 20 kW installations**



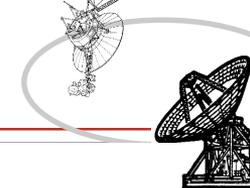
X/X/Ka Feeds

- **WHAT:**
 - Replace the X/X feeds at the BWG's with X/X/Ka-band feeds
- **WHEN:**
 - Operational – varies by antenna
 - DSS 26 – 4/2003
 - DSS 55 – 11/1/03
- **IMPACT ON CUSTOMERS:**
 - Ka-band downlink capability
 - Improved X-band BWG downlink sensitivity at X-band
 - 0.5-2.5 dB depending on the operations mode and reference antenna



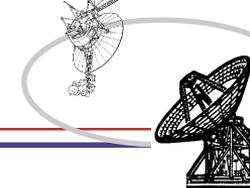
DSS 55

- **WHAT:**
 - Add a new antenna, a 34m BWG at MDSCC
- **WHEN:**
 - Operational – 1/11/03
- **IMPACT ON CUSTOMERS:**
 - Additional capacity



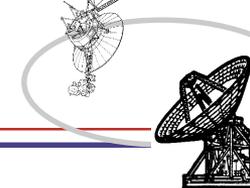
DSS 55 – Aug 2, 2001





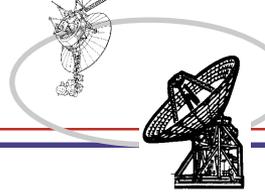
DSS 55 – Aug 3, 2002





DSS-55 – December 2002 – Quadripod Lift





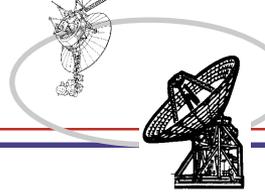
20 kW Txr's on BWG – Additional Installations

- **WHAT:**
 - Replace the 4 kW X-Band Txr's with 20 kW Txr's
- **WHEN:**
 - Varies by antenna
- **IMPACT ON CUSTOMERS:**
 - Better uplink capability
 - Same as HEF
 - Simplifies scheduling (HEF-BWG trade)



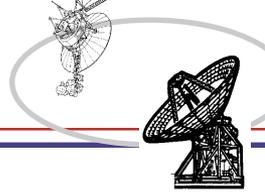
20 kW Txr





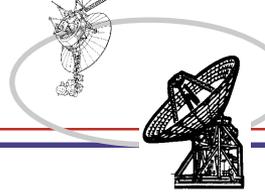
2-MSPA

- **WHAT:**
 - Simplify the operations to support the downlink from two (virtual) spacecraft that are in the same beam
- **WHEN:**
 - Operational – Spring 03 (will depend on scheduling vs. the SIRT/MER MCCB)
- **IMPACT ON CUSTOMERS:**
 - Additional effective capacity
 - Note limitations
 - Only one uplink
 - Must have compatible RF characteristics



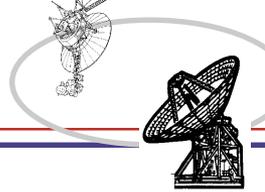
Arraying at Overseas Stations

- **WHAT:**
 - Add arraying capability at MDSCC and CDSCC
- **WHEN:**
 - Operational – Summer 03
- **IMPACT ON CUSTOMERS:**
 - Additional capacity, especially when the 70m antenna is busy
 - Are customers planning the usage?



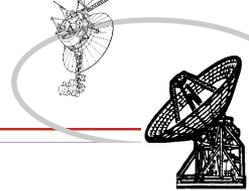
Delta DOR

- **WHAT:**
 - Add a new navigation tool
 - Validates traditional radio-metric measurements
 - Enables better targeting
- **WHEN:**
 - Central processing operational – Spring '03
 - VSR's (DSCC equipment) already operational
- **IMPACT ON CUSTOMERS:**
 - Additional tool for the navigation teams
 - Navigation strategy should be refined/adjusted as needed



NSP

- **WHAT:**
 - Replace the telemetry/ranging/Doppler equipment for the 34/70m antennas
- **WHEN:**
 - Varies by antenna
 - DSS 24 operational since 12/27/2002
- **IMPACT ON CUSTOMERS:**
 - New interfaces
 - Some new capabilities, e.g. telemetry SLE



NSP Schedule (as of 1/30/03)

http://nsp.jpl.nasa.gov/deployment/NSP-deployment.pdf - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://nsp.jpl.nasa.gov/deployment/NSP-deployment.pdf

100%

Deep Space Mission System
NSP Deployment



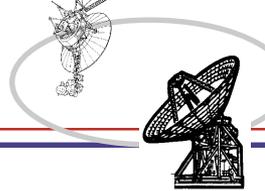

NSP DSS Station Downtime

NSP DSN TT&C	DOWNTIME	Status
• DSS-24	10/21/02 - 12/27/02	Complete
• DSS-43	01/07/03 - 02/09/03	In Progress
• DSS-65	01/07/03 - 02/09/03	In Progress
• CTT Trailer	01/24/03 - 02/10/03	In Progress
• MIL-71	01/24/03 - 02/14/03	In Progress
• DSS-25	02/10/03 - 03/09/03	
• DSS-34	02/10/03 - 04/06/03	
• DSS-63	02/10/03 - 04/20/03	
• DSS-26 Operational	by 04/01/03	
• DSS-15	03/10/03 - 04/09/03	
• DSS-45	04/07/03 - 05/02/03	
• DSS-14	04/21/03 - 05/12/03	
• DSS-54	04/21/03 - 05/12/03	
• NSP v4.0 (turbo)	09/2003	
• DSS-55 Operational	by 11/01/03	

Done Internet

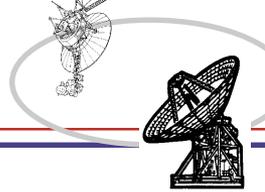
Start Joe's ... meetin... Eudor... 940-R... 940-p... Search... http://...

11:49 AM



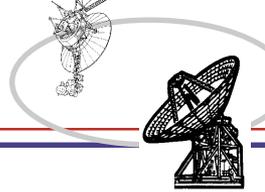
Turbo Code

- **WHAT:**
 - Add a new error-correcting method to all the 34/70m antennas
- **WHEN:**
 - Operational – 9/03 (being replanned to 8/03)
- **IMPACT ON CUSTOMERS:**
 - Better coding gain, e.g. by 0.8 dB for a typical code, compared to MCD3
 - Note: The MCD3 is not available to new customers. Turbo code should be used as the high performance code



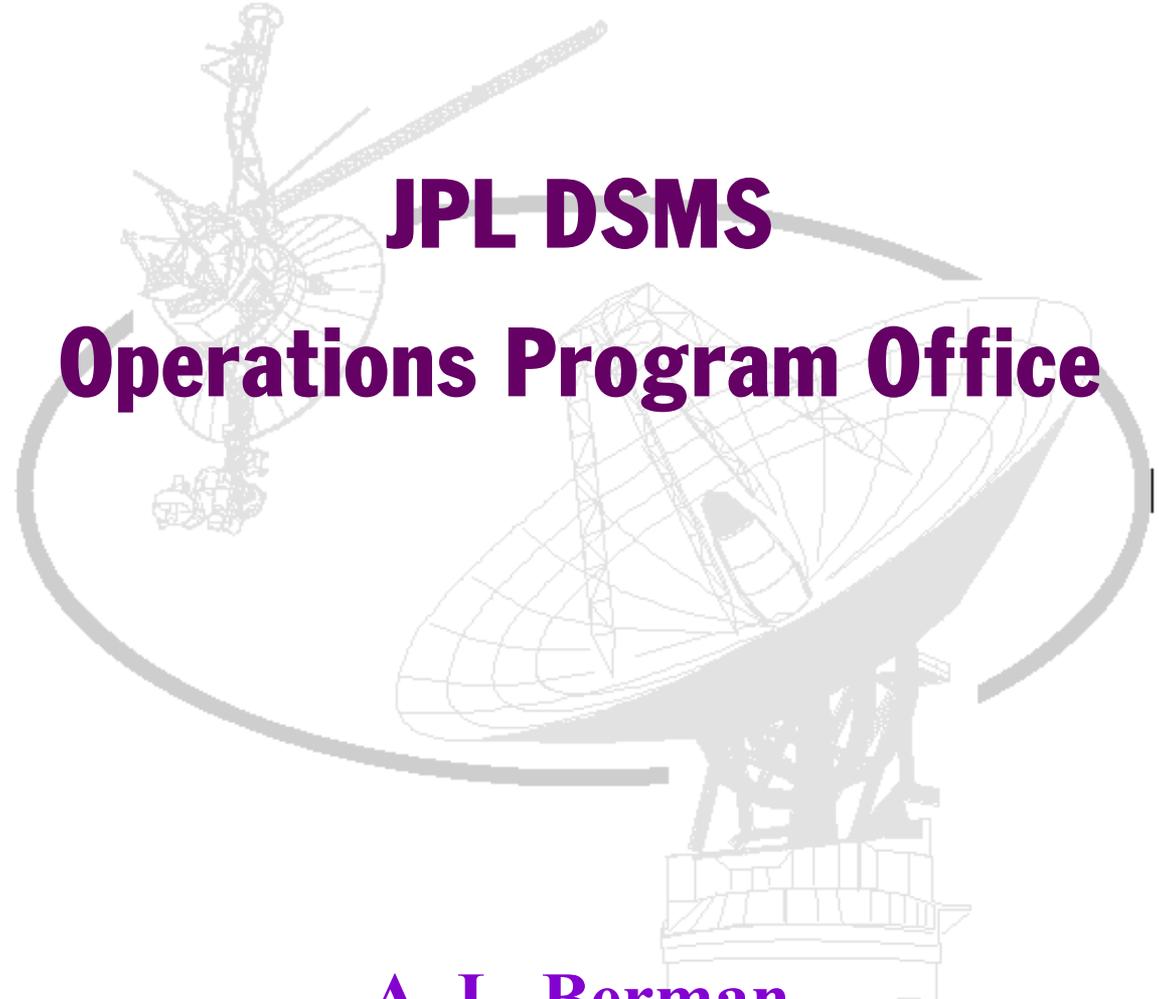
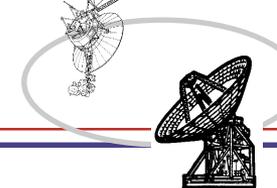
Tasks to be Completed After FY03

- **X/X/Ka-band feeds**
 - For the remaining BWG
 - Schedule is TBD
- **Antenna controllers for the 70m and HEF**
 - Will require significant downtime
- **70m refurbishment**
 - Will require significant downtime



Summary

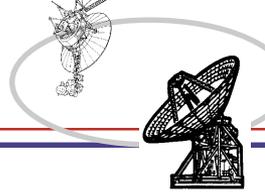
- **We depend on the customers to:**
 - **Take advantage of the capabilities we have put in place**
 - **SLE, TDN's, arraying**
 - **Define what capabilities we should put in place**
 - **Beyond sustaining of current capabilities**
 - **Help us to select capabilities that are least cost-efficient that could be candidates for decommissioning**
- **Your input is priceless!**



JPL DSMS Operations Program Office

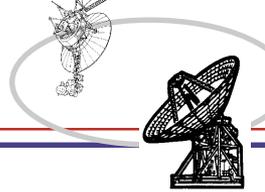
A. L. Berman





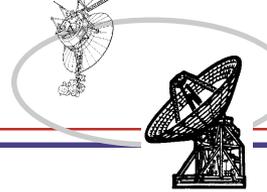
MAINTENANCE AND OPERATIONS (M&O) CONTRACT CHANGE

- NASA Headquarters chose not to renew the current Consolidated Space Operations Contract [CSOC]
 - ❖ CSOC Contract expiration is December 31, 2003 (not particularly auspicious timing for the DSN!)
- NASA's plan is to have all NASA Centers M&O Contracts acquired under a single NASA umbrella RFP/Contract Acquisition effort
 - ❖ Because of a high degree of DSN M&O uniqueness, JPL requested that its M&O Contract acquisition and management be severed from the NASA umbrella acquisition, and accomplished by JPL/DSMS.
 - ✓ Request granted by Headquarters.
 - ❖ DSN anticipates an increase in DSN/M&O Contractor alignment, M&O efficiency/proficiency, and improved service, under the new contract.
- Progress to date on new M&O contract acquisition
 - ❖ Draft of Task Description Document (TDD) completed
 - ❖ Industry Briefing scheduled for later this month



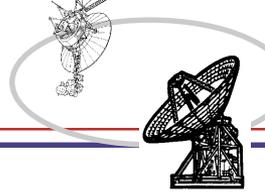
NETWORK SIMPLIFICATION PROJECT (NSP)

- Major upgrade to modernize and otherwise improve the data systems signal processing capabilities at all deep space 34m and 70m antennas
 - ❖ Eliminate obsolete equipment and software
 - ❖ NSP software -- 2.3 million lines of code
 - ❖ Equipment rack reduction greater than 50%
- Acceptance testing started in mid-September, and completed in mid-December
 - ❖ Subsystem Testing (functional capabilities)
 - ❖ Project Interfaces Testing
 - ❖ System Performance Testing
- First station implementation, DSS 24, approved for operational support, starting on December 27



NETWORK SIMPLIFICATION PROJECT (Con't)

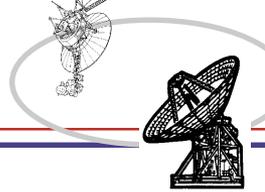
- Because NSP capabilities not as mature as desired, initial restrictions were placed on DSS 24
 - ❖ Maximum of two supports per day
 - ❖ Set-up time allocation increased from 1 to 2 hours
 - ❖ Radio Metric data decommitted
- DSS 24 returned to normal loading capability and legacy set-up time on January 7
- Start-up problems with NSP
 - ❖ Inadequate navigation throughput (Tiger Team working)
 - ✓ Recent Team report (Feb. 7) indicates very considerable improvement
 - ❖ Infrastructure and Support Products weakness (also Tiger Team working)
 - ❖ Numerous (less critical) anomalies, complicating operator proficiency with the burden of numerous workarounds
 - ❖ Operator training, despite very significant effort, slower than anticipated



NETWORK SIMPLIFICATION PROJECT (Con't)

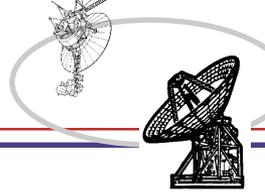
- Plan for near term NSP improvement
 - ❖ New NSP software version will be acceptance tested in February, and operational in March; will correct the worst 15 or so anomalies, and should immediately improve navigation throughput, infrastructure and support products, and overall operator proficiency (via significant reduction in required workarounds)
- Plan for long term NSP improvement
 - ❖ A second build in September will add Turbo Code and fix remaining significant anomalies not fixed in the March build
- Proceeding full steam ahead with the long planned schedule to convert all stations to NSP by May 1
 - ❖ DSS 43* and DSS 65 returned to service as NSP stations on February 9
 - ❖ DSS 25, DSS 34, and DSS 63 went down on February 10, for NSP conversion

*actually February 11, because of a non-NSP problem



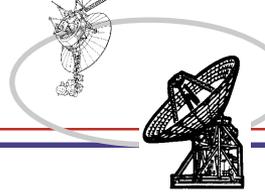
SPACE LINK EXTENSION (SLE) AND INTEGRAL FIRST USER SUPPORT

- Space Link Extension (SLE) capability implemented on the 26m subnet during mid-2002
- First Project User was the ESA INTEGRAL Mission, launched on October 17 (Goldstone support only)
- Initial October/November INTEGRAL Support plagued with difficulties
- Notable improvement in INTEGRAL Support in December and January
- Primarily, two remaining problems
 - ❖ TCP (Telemetry Processor) halts--greatly reduced by fixes already implemented, further fixes planned
 - ❖ Telemetry data (single frame) drop outs--fixes planned



PREPARATION FOR THE 03/04 ACTIVITY CONTENTION PERIOD (ACP)

- DSMS Operations is preparing for the ACP in the following general areas:
 - ❖ Updating documentation and procedures
 - ❖ Reducing maintenance time
 - ❖ Reducing support preparation time
 - ❖ Operating/coordinating non-DSN asset support ("alternate assets")
 - ❖ Improving time critical response to Spacecraft emergencies and network failures
 - ❖ Coping with extended Level 1 support periods
 - ❖ Developing MSPA operational scenarios



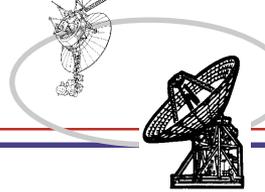
PREPARATION FOR THE 03/04 ACP (Con't)

➤ Control Center Operations

- ❖ New position established in NOCC--Tracking Support Specialist [TSS]
 - ✓ Will assist Ops Chief with near-real time resolution of ground problems, provision of support products, and resolution of Project problems and support conflicts
 - ✓ TSSs hired and in training now, will be operational in July
- ❖ Plans to reconfigure and refurbish the NOCC ("Darkroom")
 - ✓ Replace old consoles and add TSS positions (2)

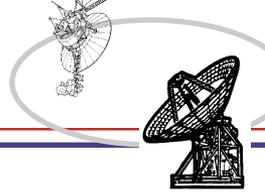
➤ Maintenance

- ❖ Maintenance plan issued which identifies significant maintenance required to be accomplished prior to October 2003
- ❖ 70m Servo Rehab--DSS 14 and 43 completed, starting on DSS 63 now



PREPARATION FOR THE 03/04 ACP (Con't)

- **DSN Operations Working Group (DOWG)**
 - ❖ Representatives from Offices 930, 940, Pasadena CSOC, and all Complexes, meet in person, and via telecon, to work ACP problems and preparation
- **Alternate Assets**
 - ❖ Agreement reached with CSIRO (Australian Agency) on necessary implementation of and support by the Parkes antenna
- **NSP reduction in [basic] station Set-up Time (1 hour to 30 minutes)**
 - ❖ Closely monitoring and evaluating NSP experience
 - ❖ So far, we have not seen any data which points us to the conclusion that NSP set-up time can be reduced from the current legacy value.
 - ❖ A legacy system study of 2-MSPA indicates that the previously planned value of 2 hours set-up time, can be reduced to 1.5 hours, and that is now the new RAP planning value.

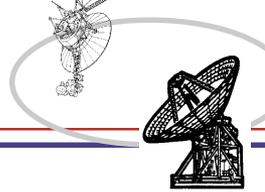


NEW OR MODIFIED PROJECT REQUIREMENTS

**Radar Measurements of Planetary Rotations
with Unprecedented Accuracy:
New Advances in Planetary Geophysics**

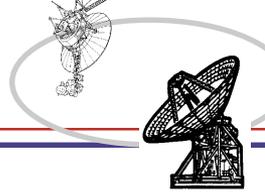
**Dr. Jean-Luc Margot
California Institute of Technology**





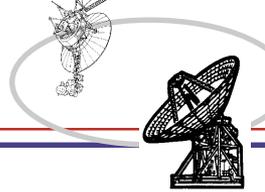
Motivation

- Intimate connection between dynamics and geophysics.
- Phenomenal insights have been gained by studying the irregular rotation of Earth.
- Spin properties reveal interior structure, mechanical properties, and major geophysical processes.
- **Our goal: Extend the geophysics of Earth rotation to other terrestrial planets.**



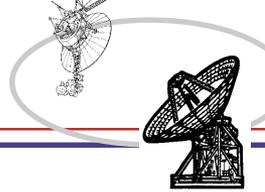
How?

- New radar technique provides measurements of planetary spin states with unprecedented accuracy.
- Rotation rates accurate to better than 1 part in 10^5 .
- Spin orientations accurate to arcseconds.
- **Inexpensive and efficient: Earth-based observations require one-hour session per measurement.**



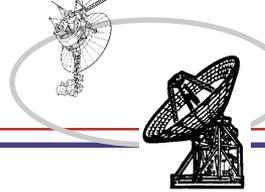
Science at Mercury

- Major problem in planetary science for the past 30 years: How is the magnetic field generated?
- Dynamo in a molten core? Remanent crustal field?
- **Fundamental implications for planetary magnetic field generation and for planetary thermal evolution.**
- Core may be molten if a $>1\%$ weight fraction of sulphur lowers the melting point. Profound implications for the composition and the amount of radial mixing in the early inner solar system.
- **Characterizing the core of Mercury is a crucial requirement to understand this planet, and the formation and evolution of terrestrial planets in general.**



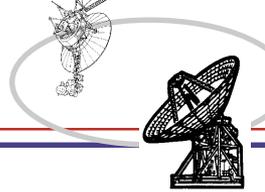
Science at Mercury (Con't)

- Peale (1976) described how the size and state of the core can be derived by measuring the obliquity, librations, and second-order gravitational harmonics.
- Radar can measure small oscillations in spin rate (called longitude librations). The amplitude of the librations will be twice as large if the core is liquid than if the core is solid.



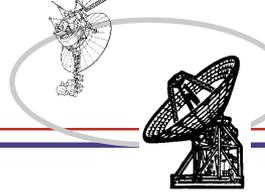
Science at Venus

- Slow retrograde spin of Venus is unexpected. Balance between solid body and atmospheric tides? Stable?
- Changes in atmospheric angular momentum at Venus affect the rotation of the solid planet in a measurable way. Are there secular trends or seasonal variations in spin rate?
- **Fundamental implications for the rotational history of the planet, the climate at Venus, and atmospheric dynamics.**
- The spin rate at Venus has not been measured in the ten years since Magellan.
- Long-term monitoring of the spin rate will reveal excitations on a variety of timescales, as is observed on Earth. **These variations represent major geophysical processes, from atmospheric & climatic effects to core-mantle interactions.**



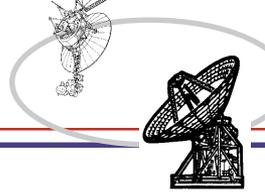
Science at Venus (Con't)

- Radar can detect 1% changes in atmospheric angular momentum, corresponding to a few minutes in spin period.
- **Characterizing the polar moment of inertia of Venus is crucial for constraining interior models and for understanding Venus in relation to Earth and other terrestrial planets.**
- Spin precession provides a direct measurement of the moment of inertia, but is not accessible to orbiting spacecraft.
- The expected 1-2 arcsecond/year spin precession can be measured from the ground with a long time baseline.



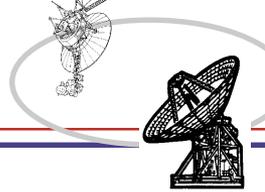
“Mission Support”

- Important advances in planetary geophysics should obviously be supported regardless of relevance to spacecraft missions. The proposed radar observations happen to be relevant.
- One of the primary MESSENGER science goals is to characterize the core of Mercury. Radar measurements of the obliquity and librations will have a tremendous impact.
- The Venus in-situ explorer will measure wind profiles and the stability of the greenhouse effect. Radar observations can place those point measurements in a much broader context.



Conclusions

- **BIG** science questions.
- **Small** demands on DSN.
- Clear benefits to solar system exploration program.
- **Radar observations have a huge return for the small amount of antenna time needed, hence they represent a very cost-effective allocation of resources.**

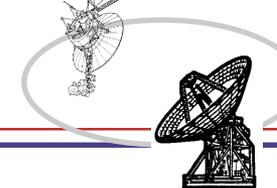


NEW OR MODIFIED PROJECT REQUIREMENTS

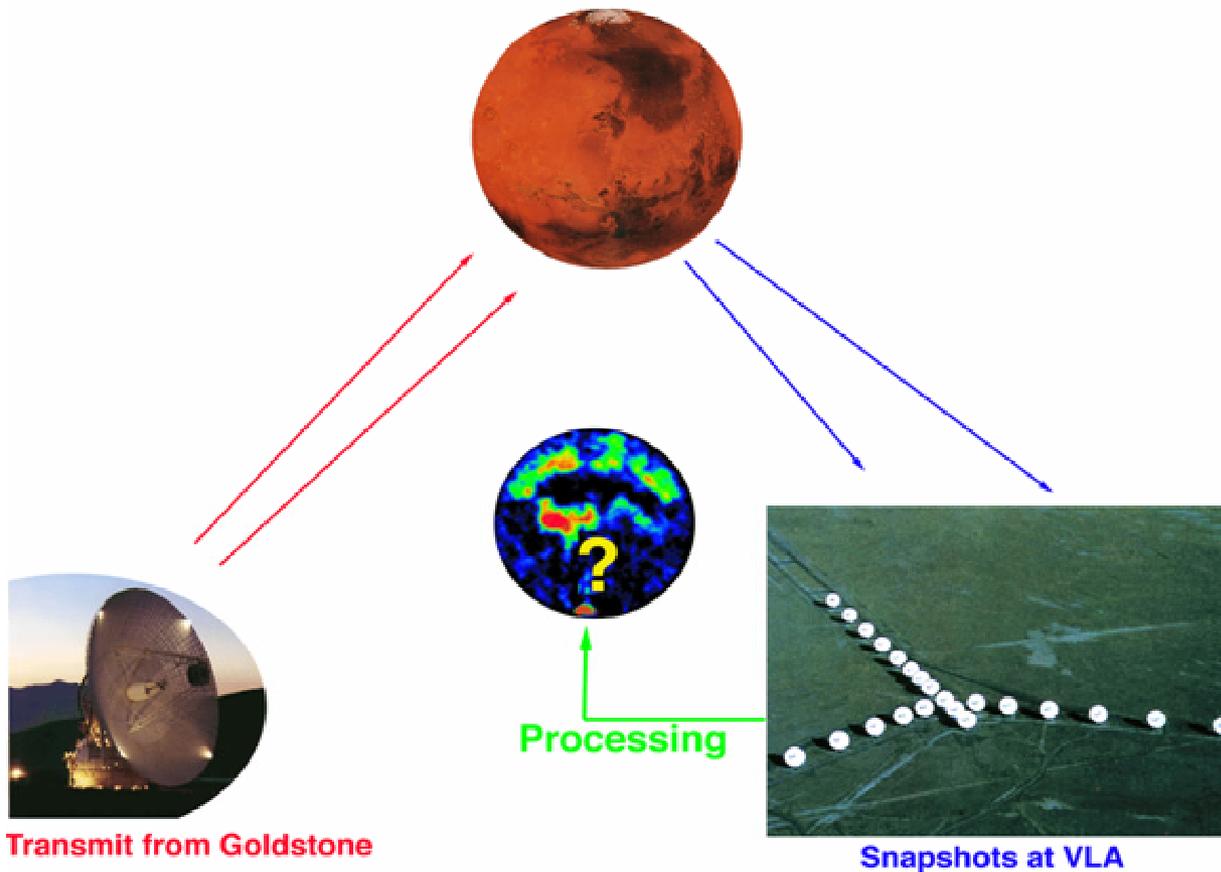
Goldstone to VLA Mars Observations

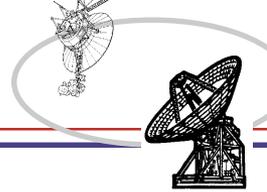
**Goldstone to Arecibo Observatory X-band
Mercury Icy North Polar Craters Experiments**

**Dr. Martin Slade
Goldstone Solar System Radar**



Goldstone/VLA Radar Aperture Synthesis Observations of Mars August 6 - Sept.5 ,2003 (4 tracks)

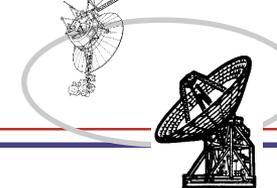




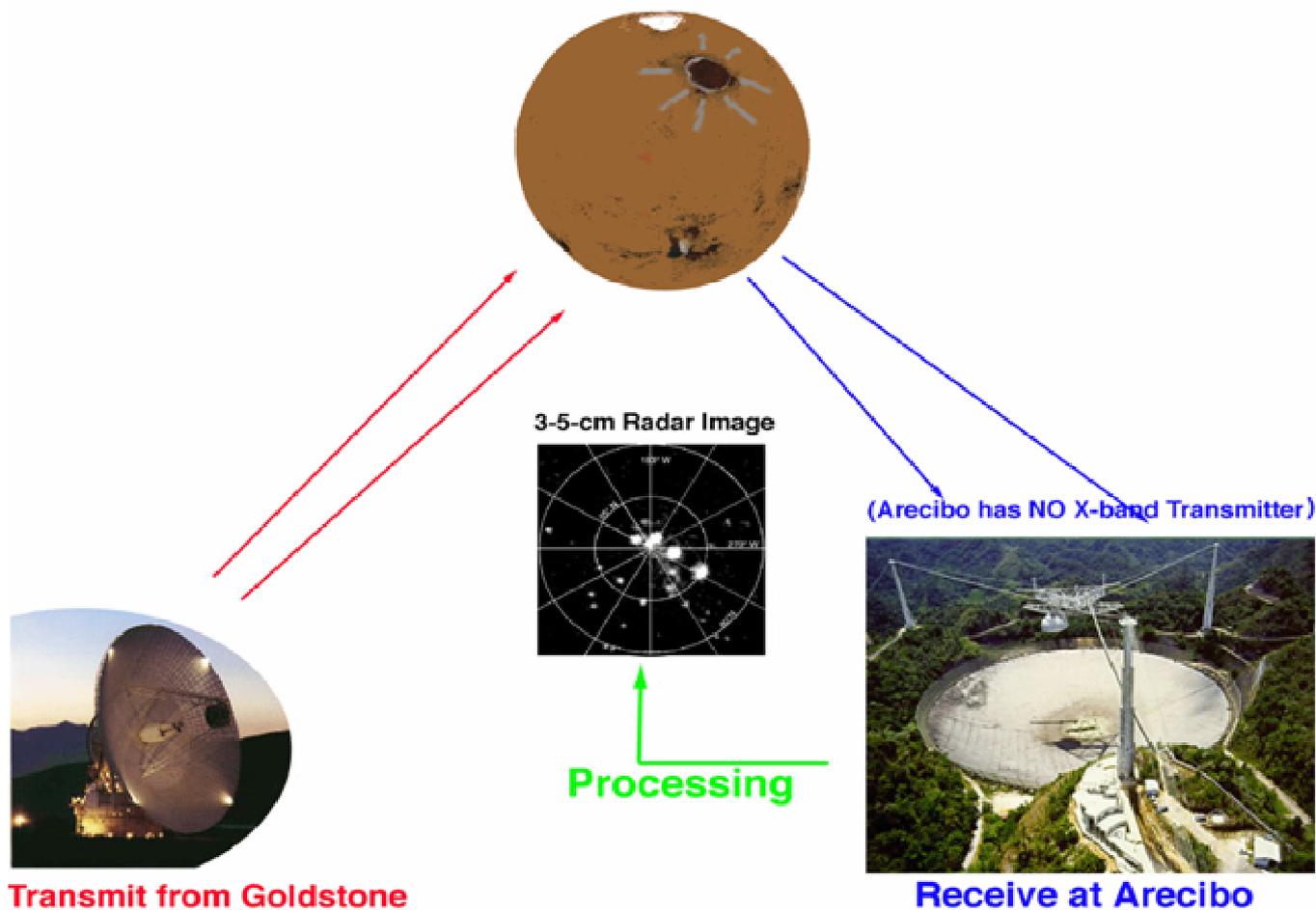
Goldstone to Arecibo Observatory X-band Mercury Icy North Polar Craters

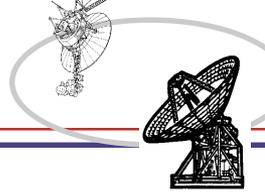
- Arecibo has no X-band transmitter; thus this two station configuration permits observations with a large increase in signal-to-noise, and smaller error bars on the measured radar reflectivities of icy craters.
- Comparison of 13-cm reflectivities with 3.5-cm values gives regolith (dust cover) thicknesses, since the loss per wavelength crossed of Mercury regolith is known (a particular regolith cover thickness is measured in wavelengths 3.5-cm/13-cm)
- The MESSENGER neutron spectrometer can only see through a few 10's of cm of regolith, and our crude measurements so far indicate 50-100 cm thick cover for SOME craters. We can provide CRUCIAL spectrometer targeting information.





Goldstone/Arecibo X-band Observations of Mercury's North Polar Ice-Filled Craters





Goldstone to Arecibo Observatory X-band Mercury Icy North Polar Craters

- Request: 5 tracks in Weeks 37-38, 2003, beginning no earlier than Sept. 11 (Mercury declination moves North into Arecibo view on Sept. 11, 2003.)
- Duration: roughly two hours plus PreCal and PostCal
- **On Sept. 20, 2003, the subradar latitude moves South of 7 degrees North Latitude; thus the view into the craters becomes nearly useless after that date.**



RAPSO

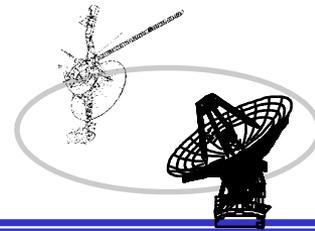
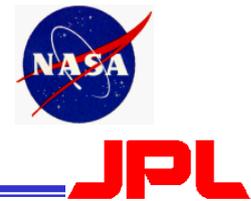
**Resource Allocation Planning
and Scheduling Office**



**Jet Propulsion Laboratory
California Institute of Technology**

**Action Item Status
From August 13, 2002 and
February 11, 2003 RARB
(Resource Allocation Review Board)**

David G. Morris



Resource Allocation Planning & Scheduling Office (RAPSO)

Action Item Summary

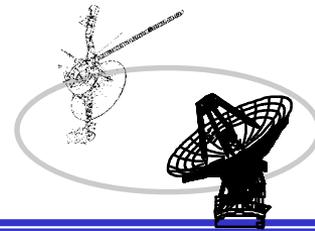
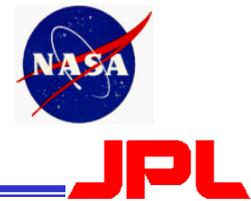
<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
01	2003- 2004	December- April	Mars Program	B. Arroyo	06/01/2003	Open

ACTION: (aka 8/13/02 RARB A.I. #7) Multi-mission DSN Allocation and Planning (MDAP) provide a Mars Program coordinated input to Resource Allocation (Mid-Range) Planning Team (RAPT) of at least one week per week at least 6 months prior to the schedule week. This action will use the result of Action Item 6 to clarify the scope of resources in which to plan to.

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
02	2004 December	October-	RAPSO	S. Lineaweaver	04/20/2003	Pending

ACTION: Analyze proposed DSS-45 downtime (10/18/2004 – 12/05/2004) for Antenna Controller Replacement (ACR) and Microwave Switch Controller (USC).

RESPONSE: (4/20/03) Presentation of contention analysis due at March JURAP meeting.



Resource Allocation Planning & Scheduling Office (RAPSO)

Action Item Summary

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
03	2005	April-May	Cassini	D. Seal	02/25/2003	Closed

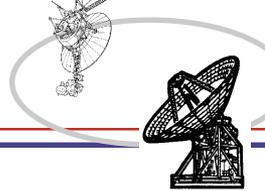
ACTION: Provide Cassini Occultation Plans regarding DSS-25 planned downtime.

RESPONSE: (02/18/03) Information provided showed Cassini's need for DSS-25 prior to February 19 and after April 30.

<i>AI#</i>	<i>Year</i>	<i>Month(s)</i>	<i>System</i>	<i>Responsible</i>	<i>Due Date</i>	<i>Status</i>
04	2005	July-August	Mars Express	T. Thompson	04/10/2003	Closed

ACTION: Provide impact to Mars Express requested weekly Bi-Static Radio Science requirement during planned DSS-43 downtime.

RESPONSE: (2/19/03) Mars Express requests that the Bi-Static experiments be moved to another 70M antenna in each week that DSS-43 is down. When using another 70M antenna, continue to use the same 70M antenna for several weeks versus having DSS-63 one week and DSS-14 the next



Resource Allocation Review

2004 - 2013

TIMELINE FOR NEXT REVIEW

August 12, 2003

Calendar Date	Milestones
May 6, 2003	Distribute Mission Set, Major Events and User Loading Profiles to Projects/Users for verification.
May 27, 2003	Deadline for Projects/User's responses to Mission Set, Major Events, and User's Loading Profiles; and last day for trajectory or viewperiod updates or submissions.
July 16, 2003	NASA Headquarters Science Review
July 24, 2003	Publish preliminary Contentions and Recommendations on the RAPWEB for Projects/User's review.
August 1, 2003	Complete the review of RAPWEB published contentions with Projects/Users
August 12, 2003	Resource Allocation Review