

**MAGNETOSPHERIC MULTISCALE MISSION
PREPROPOSAL CONFERENCE:
QUESTIONS AND ANSWERS**

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RULES OF THE ROAD - Reminder

Written questions received by NASA at least one week prior to the conference will be answered at the PPC. PPC presentations, including answers to all questions addressed at the Conference, will be posted in the MMS Library shortly after the Conference.

"Inquiries regarding this AO may be directed to the MMS Program Scientist. Inquiries are preferred in writing, (submitted by) E-mail; the character string "MMS AO" (without quotes) used in the Subject line.... Any updates to information during this AO solicitation process will be made available at (<http://spacescience.nasa.gov>, open "Research Solicitations" from the menu), including answers to questions submitted by proposers to the Program Scientist as discussed above."

- MMS AO Section 6.1

The AO and documents referenced in it are the only binding documents concerning this opportunity. In the event of conflict between these charts and the Announcement of Opportunity (AO), the AO takes precedence.

QUESTION 1: PROPOSAL SUBMISSION DEADLINE

Q1: Section 8.0, p. 24 on the schedule lists the proposal due date (in March) as being before 4:30 EDT. Did you mean EST?

AO Errata: Section 8.0

Replace

"Proposal submittal due by 4:30 PM **EDT** March 19, 2002"

With

"Proposal submittal due by 4:30 PM **EST** March 19, 2002"

QUESTION 2: PHASE A SELECTION DATE

Q2: Paragraph 5.1.6 identifies June 2003 as a goal for Phase A selections and Paragraph 8.0 lists July 2003. If the Phase A Concept Study reports are due in December 2003, should the study be implemented and performed over 5 or 6 months?

AO Errata: Section 8.0 SCHEDULE

Replace

"Selection of Investigations for Phase A Study (goal) **July**, 2003"

With

"Selection of Investigations for Phase A Study (goal) **June**, 2003"

QUESTION 3: PHASE E START DATE

Q3: Section 1.4, page 3, definition of Phase E is "launch plus 90 days"the data policy outlined in section 5.4 (page 17), gives launch plus 60 days for calibration.

AO Errata - Section 5.4.1

Replace:

".... after the initial check out and calibration period (approximately **two** months after launch), the MMS database and requisite basic analysis software will be made available.."

With:

".... after the initial check out and calibration period (approximately **three** months after launch), the MMS database and requisite basic analysis software will be made available.."

QUESTIONS 4 & 5: FLIGHT SPARES

Q4: In Section 1.2 it says that the ISST proposal should include "delivery to NASA of **four** suites of flight instruments:" in section 5.1.1. it says "In addition to the suite of instruments for each S/C, it is required that one fully qualified flight spare of each instrument be provided."

Q5: In the case of an instrument with multiple identical sensors, does a "spare instrument" mean a single sensor or a complete set of multiple sensors plus DPU?

AO Errata: Section 5.1.1, First paragraph, sentence 4

Replace "In addition to the suite of instruments for each S/C, it is required that one fully qualified flight spare of each instrument be provided.

with "In designing this strawman payload it was assumed that one fully qualified flight spare of each instrument would be required."

"Spare instrument" in this case meant "spare instrument, not "spare sensor."

QUESTIONS 6 & 7: CHANGES IN PROGRAM

Q6: Why wasn't the cost cap increased to cover cost of the spares?

A6: See Errata for Section 5.1.1: NASA does not require provision of a full flight spare instrument suite. While doing so would be one way of mitigating risk, the primary requirement in the AO regarding risk management is that the proposer must define the risk management approach he/she intends to use to ensure successful achievement of its objectives within established resource, funding, and schedule constraints through provision of a safety and mission assurance program that meets the requirements in the *MMS Mission Assurance Requirements* (MAR) document.

- MMS AO Section 5.1.1

QUESTIONS 6 & 7: CHANGES IN PROGRAM, cont.

Q7: Why was the implementation phase schedule reduced by 6 months?

A7: The circumstances that were assumed when the original schedule was created no longer held as the final AO was being prepared. These changes in circumstances (the delay of the AO, for example) put unanticipated stress on program resources. Taking into account STP and MMS priorities and resources, it was judged that the least disruptive way of absorbing the additional stress was to shorten the time allotted for the implementation phase.

Message: from now on, whenever unexpected bad things happen to MMS they will have to dealt with either by everyone involved being very creative, or by loss of program content.

QUESTION 8: RELATION BETWEEN ISST AND IDS INVESTIGATIONS

Q8: Is funding for the IDS PI's part of their individual awards?

A8: NASA (will) **separately solicit** MMS Interdisciplinary Science (IDS) proposals to conduct **independent science investigations** that address the MMS science objectives. The IDS funding is separate from the ISST and is not included in the funding profile for the ISST included in this AO.

- MMS AO Section 1.4.2

QUESTION 9: PROPOSAL SECTIONS C and D

Q9: Under B.c.2.b, which details the content of the "Science Investigation," the AO asks for information regarding mission operations support. In Table B-1 6 pages are allocated for a separate section that also includes "Mission Operations Support." Where does mission operations support belong?

AO Errata: Table B-1. Proposal Page Guideline

Replace

"Science Investigation Description 37(pages)" and
"Mission Operations Support, Science Operations, and Data Analysis Plan Concept 6 (pages)"

With

"Science Investigation Description 39 (pages)" and
"Data Collection, Analysis, and Archiving 4 (pages)"

QUESTION 10: TRAVEL FUNDING

Q10: Should the funding for the SWG meetings to be included in the proposal be only for the PI and up to four Co-Is?

A10: Budget should include all the travel that the PI considers necessary.

QUESTION 11: TOTAL INVESTIGATION COST

Q11: Section G of Appendix B (page B-8), second paragraph, end, defines "Total Investigation Cost" as the "Total NASA Cost plus *foreign* contributions". Did you mean "Total NASA Cost plus *all* contributions?"

AO Errata - Appendix B Section F, First paragraph, final phrase in last sentence

Replace:

"...Total Investigation Cost (Total NASA Cost plus **foreign** contributions)."

with:

"...Total Investigation Cost (Total NASA Cost plus **all** contributions)."

QUESTIONS 12 & 13: TABLE B-2

Q12: B-2 (page B-15), has a row heading "Phase B/C/D," with WBS elements listed below it. There is no heading for Phase E costs and some of the WBS elements listed below B/C/D are (I think) Phase E WBS items. Should the heading in the table have an "E" added.

Q13: did you mean to have two columns labeled "FY 06" in Table B-2?

AO Errata - Table B.2

Add row for "Phase E" after "Phase B/C/D" row

Delete second column labeled "FY 06"

QUESTIONS 14 & 15: TABLE 5.1

Q14: Table 5.1 is labeled "Nominal Payload Resources" and section 5.1.1 refers to maximum possible values of s/c resources. What do the values in Table 5.1 represent?

Q15: Please clarify the meaning of the burst data rate of 104 kbps in Table 5.1. Is that the maximum rate from the payload?

AO Errata - Section 5.1.1, First paragraph, Last sentence

Replace:

"The maximum possible values of spacecraft resources for the MMS payload are based on NASA's accommodation studies and given in Table 5.1 as guidelines."

with

"Values of spacecraft resources (not including contingency) for the MMS payload based on NASA's accommodation studies are given in Table 5.1 as guidelines."

A15: See above. The 104 kbps refers to the burst rate for the instrument suite

QUESTIONS 16 - 18: PAYLOAD RESOURCES, cont.

Q16: Will a proposal be responsive if it provides a spacecraft design and orbital plan that fulfills the scientific objectives with an instrument mass greater than that in Table 5.1?

Q17: Will a proposal be considered responsive if it proposes higher data rates and a compatible data telemetry plan?

Q18: If the ranging system is not required, can the payload absorb the resources?

A16 -18: The division between payload and spacecraft resources assumed in the AO is based on the best current understanding of the requirements of both. Proposers are not required to propose to these values, but they must justify changes to the nominal payload resources or strawman S/C by demonstrating that they would produce **significant added scientific value**.

A18: See A13-15. Requirements on the ranging system will not be known until the end of Phase A; thus no decision on its presence or characteristics is appropriate at this time.

QUESTION 19 - 22: AVAILABILITY OF ADDITIONAL INFORMATION

Q19: What are the assumptions that have gone into the data rates in Table 5.1

Q20: Is there a spin referenced clock in addition to the 1s clock used to synch up the s/c?

Q21: The Definition Team Report specifies a time resolution of 0.75 seconds for plasma measurements and ~1.5 seconds for energetic particles. To which specific questions to be answered by MMS do these two time resolution values apply?

Q22: Will the project provide a spacecraft electrical/software interface simulator to the instrument teams?

A19-22: In general all of the information that NASA certifies for use as a basis of MMS proposals is contained in the AO itself and/or in documents referenced within the AO. Many details of spacecraft design, in particular, have not yet been determined.

QUESTION 23 & 24: AVAILABILITY OF ADDITIONAL INFORMATION, cont.

Q23: Have any formal orbital dynamics studies were done in support of the orbit scenarios presented in the MMS STDT document and if so, how one could get access to the results of those studies?

Q24: Please clarify the meaning of a 100 krad dose behind 2.5 mm of aluminum. Does it include a RDM? What is the RDM figure?

AO Errata - Appendix C

Add ``Orbit Design Requirements for MMS," NASA document number 460-RQMT-0042, C. Petruzzo, March 26, 2001
and " "Magnetospheric Multiscale Mission Radiation Requirements"

A24: The 100 krad dose contains a Radiation Design Margin (RDM) factor of 2

QUESTIONS 25 & 26: MISSION ASSURANCE REQUIREMENTS

Q25: Does NASA require Missions Assurance documents for EACH INSTRUMENT as opposed to the complete payload?

A25: The MMS MAR must be flowed down to all participants. However, if there are specific requirements in the MAR that a proposer believes can be met in an alternative way, a deviation for each requirement can be submitted during Phase A.

Q26. Would NASA consider using the MIDEX PA program for MMS?

A26: No

QUESTION 27: SELECTION CRITERIA

Q27: What role will "Other" factors play in the selection?

AO ERRATA - Section 1.5 Replace entire section with

"All proposals submitted in response to this AO will be subjected to a preliminary screening to determine compliance with the constraints, requirements, and guidelines of this AO, including the demonstrated commitment of the proposer to meeting NASA's stated goals for education and public outreach, technology infusion/transfer, and participation of small disadvantaged businesses, women owned small businesses, Historically Black Colleges and Universities, and other Minority Educational Institutions. Proposals not in compliance may be returned to the proposer without further review. Proposal(s) in compliance with this AO after this preliminary screening, will be evaluated on its(their) scientific and technical merit as determined by science peer review as well as its(their) feasibility of implementation as determined by the Technical, Management, and Cost (TMC) panel. Pending the submission of proposals of adequate merit, one (or more) proposal(s) submitted in response to this AO will be selected for a funded Phase A study(ies) as based principally on this evaluation. See Section 7.1 below in this AO for further details."

QUESTION 28: SELECTION CRITERIA

Q28: The AO states that "The scientific objectives of the MMS mission are to explore and understand the ...process of, primarily, magnetic reconnection" Is it accurate to conclude that the instrument evaluations will be based primarily on how well they address the reconnection science?

A28: " Proposals will be evaluated with respect to the science merit of the proposed investigation, including its focus on the objectives discussed in Section 2.0, technical merit of the proposed instrument suite, and feasibility.

- MMS AO Section 7.1

The key questions ...to be answered in order to achieve this science objective are listed in Table 2.1. The questions in Group 1 relate to the primary MMS science objective and are ...the highest priority...the questions in Group 2 are ...of lower priority.

- MMS AO Section 2.0

QUESTION 29 & 30: ADDITIONAL ELEMENTS

Q29: Can we propose to include the mass memory and its management in the instrument package and to absorb the spacecraft resources allocated for it?

Q30: Can we propose a launch vehicle other than the 7925H as long as the ISST absorbs the additional vehicle cost?

A29&30: "Elements for MMS not listed in Section 1.2 may be proposed if the proposal demonstrates that such additions are justified and do not displace any of the required elements. These elements will not be considered in the evaluation for selection, but may be included in the Phase A Concept Study, to be considered in the evaluation for approval for Phase B. Any additional elements must be costed separately. "

- MMS AO Section 1.4.1

QUESTION 31: BOOM MASS CONTINGENCY

Q31: Between the draft AO and the final AO, responsibility for the boom systems reverted from the spacecraft to the instrument PI. Shouldn't the weight allocation for booms be transferred to the instrument PI also?

A31: It was - note raising of Mass in Table 5.1 from 39 kg in the draft to 44 kg in the final AO.

QUESTIONS 32 & 33: CHANGES FROM STRAWMAN

Q32: Can alternate mission designs (for example, different orbital inclinations) be proposed?

Q33: The AO specifies the use of the 1553 interface buss. Is it permissible to propose instrumentation that would bypass the 1553 interface buss or use alternative devices?

A32&33: "The S/C description is for a strawman S/C; proposals may reflect changes to the required S/C interfaces or characteristics in order to achieve their proposed science goals. However, any changes to the nominal payload resources or strawman S/C characteristics needed by a proposed payload must be indicated and justified in the proposal." - MMS AO Section 5.1.1

QUESTION 34: WHAT IS THE EXACT SCHEDULE?

Q34: Please confirm milestone dates for Contract award for Phase A, End of Phase A, Start of Bridge Phase, End of Bridge Phase, Contract award for Phase B, End of Phase B, Start of Phase C, End of Phase C, Start of Phase D, End of Phase D, Start of Phase E.

A34: Proposals should be consistent with the draft schedule provided in Section 5.1.6 and the budget profile given in Table 1.1, but proposers should also understand that schedules and budgets will not be determined in detail until Phase A.

QUESTIONS 35: BRIDGE PHASE

Q's35: A number of question reflected confusion over the timing and funding of bridge phases

These should all be addressed by the following changes

AO Errata: Table B-2

Add row for "Bridge Phase" after the "Total NASA Cost" row with footnote saying "Also include within Phase B and within Total NASA Cost."

7.3.1 Award Administration and Funding

Replace in its entirety with: "Each contract resulting from this selection for Phase A studies will contain a priced option for a Bridge Phase, as well as an advance agreement to add Phases B/C/D/ and E for follow-on mission phases (B/C/D/E). The advance agreement to add Phases B/C/D/ and E recognizes the authority established in the AO to contract for Phases B/C/D/ and E. If the investigation is approved to continue, terms and conditions for these phases will be negotiated based on the concept study report submitted for Phase A. A supplemental agreement shall be executed and shall represent an equitable adjustment to the estimated cost, deliverable items, and delivery schedules, and other affected terms of the contract for inclusion of Phases B through E. Proposals are to include a priced bridge phase option to be exercised upon investigations selected to proceed into phase B/C/D/E. The bridge phase is intended to cover a three month period of Phase B effort to provide program continuity while the Phase B/C/D and E negotiations are completed and these phases are added to the contract."

QUESTIONS 35: BRIDGE PHASE, cont.

APPENDIX B Section G: Second paragraph, Second, third and fourth sentences

Replace "Contracts for a fixed price Phase A concept study and a Bridge Phase A effort with an option to continue into Phases B/C/D/E will be issued. During the bridge phase, the contract modification for Phase B through E will be negotiated. Proposers must estimate the Total NASA Cost (see Table B-2 below in this Appendix) in the proposal and, if selected through this AO, in much more detail in the Phase A implementation plans."

with "Contracts for a cost reimbursement Phase A concept study and an option for the Bridge effort with an advance agreement to add Phases B/C/D/ and E will be issued. During the bridge phase, the contract modification for Phase B through E will be negotiated. Proposers must estimate the Total NASA Cost (see Table B-2 below in this Appendix) in the proposal and, if selected through this AO, in much more detail in the Phase A implementation plans."

CONTRACTING ISSUES

AO Errata

Section 1.3 Third sentence

Replace

"Approximately \$0.75M is reserved for each **fixed-price** contract for the Phase A and Phase A Bridge study resulting from selection(s) through the AO."

With

"Approximately \$0.75M is reserved for each **cost reimbursement** contract for the Phase A study resulting from selection(s) through the AO."

APPENDIX A Section VI STATUS OF COST PROPOSALS

Replace: "Submission of cost or pricing data, as defined in FAR 15.401, is required if the combined: Phase A and Bridge Phase costs exceed \$750,000."

with: "Because the Phase A cost exceeds \$550,000, submission of cost or pricing data, as defined in FAR 15.401, is required."

Amendment of presentation of 1/17/03

Two of the answers in the presentation: "Magnetospheric Multiscale Mission Preproposal Conference: Questions and Answers" given on January 17, 2003 were incorrect.

The correct answer to the question "Table 5.1 is labeled "Nominal Payload Resources" and section 5.1.1 refers to maximum possible values of s/c resources. What do the values in Table 5.1 represent?" (Question 14 in both the original and the amended presentation) is contained in the errata:

AO Errata - Section 5.1.1, First paragraph, Last sentence

Replace: "The maximum possible values of spacecraft resources for the MMS payload are based on NASA's accommodation studies and given in Table 5.1 as guidelines."

with "Values of spacecraft resources (not including contingency) for the MMS payload based on NASA's accommodation studies are given in Table 5.1 as guidelines."

Amendment of presentation of 1/17/03, cont.

A full answer to the question "Does NASA require Missions Assurance documents for EACH INSTRUMENT as opposed to the complete payload?" (Question 24 in the original presentation, Question 25 in the amended presentation) is:

A25: The MMS MAR must be flowed down to all participants. However, if there are specific requirements in the MAR that a proposer believes can be met in an alternative way, a deviation for each requirement can be submitted during Phase A.

An additional document has been added to the MMS library:

AO Errata - Appendix C

"Magnetospheric Multiscale Mission Radiation Requirements"