Astrophysics Explorers Program
2021 Missions of Opportunity
Q&A

Change Log		
Revision	**Date**	**Description of Changes**
01	04/02/2021	Added Q&A 1 – 9
02	04/08/2021	Added Q&A 10 – 12
03	04/20/2021	Added Q&A 13
04	04/30/2021	Added Q&A 14
05	04/09/2021	Added Q&A 15
06	06/22/2021	Added Q&A 16
07	07/20/2021	Added Q&A 17, 18
08	07/27/2021	Added Q&A 19, 20
09	08/04/2021	Added Q&A 21
10	08/27/2021	Added Q&A 22
11	09/03/2021	Added Q&A 23
12	09/10/2021	Revised Q&A 20, 23
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20	11/05/2021	Added Q&A 43

Q-1 **Where technologies are proposed that are not yet mature to TRL 6, is the proposed backup plan evaluated against the baseline science?**

A-1 Yes. TMC only considers the Baseline Science Mission (see Section 5.2.3 of the PEA) when evaluating the proposals. Backup plans are required for technology not yet at TRL 6, and TMC evaluates those plans against the Baseline Science Mission. Proposals generally include less-mature technologies to enable more ambitious baseline science. A team proposing less-mature technology should make its best case for the approach to maturing that technology, and its best argument that the backup technology will produce science that will also meet the baseline or will produce science only slightly degraded from the baseline. Factor B-4 of the Science Implementation review considers the backup plans in the context of the threshold mission.

Q-2 **How is the threshold science mission assessed?**

A-2 Requirement B-18 of the SALMON-3 AO defines the threshold science mission as the "minimum acceptable data and scientific return for the mission, below which the mission would not be worth pursuing". The scientific value of the Threshold Mission is considered in the Form A review. In the Science Implementation review, factor B-4 assesses "the approach to descoping the Baseline Science Mission to the Threshold Science Mission" if development problems force a reduction in scope, while the maturity of both baseline and threshold Level 1 science requirements are evaluated in Step 2.

Q-3 **Part of Requirement tbd-37 of the PEA states "Two extra pages each are allotted for each additional separate, nonidentical science instrument in the Science Sections (Sections D and E), and two extra pages each are allotted for each additional separate, nonidentical flight element (e.g., additional spacecraft are allotted two extra pages, but only if they are nonidentical spacecraft) in the Mission Implementation and Management Sections (Sections F and G)". Does the "additional separate, non-identical science instrument or flight element" count start from zero or one?**

A-3 The word "additional" means that no extra pages are allotted where only a single instrument and a single flight element is proposed, or where all instruments and all flight elements are identical. For example, a proposed investigation with two separate, non-identical science instruments would be allotted two extra pages in the Science Section (Sections D and E).

Q-4 **Can a Launch Vehicle be purchased from non-U.S. sources using NASA funds? Can supplies and services be purchased from non-U.S. sources using NASA funds?**

A-4 The NASA FAR Supplement (NFS) under 1835.016-70, "Foreign participation under broad agency announcements (BAAs)" item (a)(2) states that "use of a non-U.S. manufactured launch vehicle is permitted only on a no-exchange-of-funds basis"; NASA funds may not be used. Item (a)(3) states "NASA funding may not be used for subcontracted foreign research efforts. The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipients is permitted."

Q-5 **Are unencumbered cost reserves required to be budgeted under the PI-Managed Mission Cost (PIMMC) for PEA-provided access to space?**

A-5 Missions are not required to hold cost reserves against the cost of PEA-provided launch services (whether standard or mission-unique), or against the impact to the mission of any launch delay caused by PEA-provided access to space. Proposers are responsible for potential launch delay costs as a result of spacecraft or payload delays.

Q-6 **May respondents propose Commercial Ground Station services in place of SCaN provided data services?**

A-6 Yes. Requirement 46 in Section 5.3.11 of the SALMON-3 AO states "Proposals shall include mission requirements for telecommunications, tracking, and navigation; proposals shall also include a plan for meeting those requirements. If non-NASA networks are used, a cost plan for the use of services shall also be included in the PI-Managed Mission Cost." Please also note that this section also states "NASA funds may not be used for the construction of new facilities for non-NASA communications service."

Q-7 **Will Requirement 110 of the SALMON-3 AO be revised to allow for submission via NASA's Large File Transfer (LFT)?**

A-7 The final PEA will specify how electronic files must be submitted.

Q-8 **The PEA allows investigation teams to propose non-PEA-provided launch services where the PI arranges the required launch services for their proposed mission. Will proposed investigations be required to hold cost reserves against the cost of the launch services arranged by the PI?**

A-8 Yes. The cost of non-PEA-provided launch services is part of the PI-Managed Mission Cost and is subject to the cost reserves requirement in Section 5.6.4 of the PEA.

Q-9 **A manufacturer lists a significantly higher mass limit (700 kg) in their data sheet for ESPA Grande than the maximum of 465 kg given in the SMD ESPA Rideshare Users Guide (RUG) in the MO Program Library. Is the mass limit for this acquisition more stringent than what an ESPA Grande is capable?**

A-9 The mass capacity given in the SMD ESPA RUG reflects anticipated accommodation constraints for a secondary payload, and not only the structural limits of the ESPA ring.

Q-10 **Are investigations deployed to cis-lunar space limited to the 'SmallSat' category, with a cost cap of $40M)?**

A-10 Yes.

Q-11 **Are investigations using non-PEA-provided access to space limited to 'SmallSats' with a cost cap of $40M?**

A-11 The option to use non-PEA-provided access to space is available for all categories of Small Complete Mission.

Q-12 **Must the proposed solution for the Space Systems Protection requirements be independently FIPS certified, or just FIPS compliant as verified by the Project?**

A-12 FIPS compliant as verified by the project is sufficient. The FIPS web site (https://csrc.nist.gov/projects/cryptographic-module-validation-program/validated-modules/search/all) lists compliant systems that have been independently certified. However, the project does not need to pay for a separate independent certification of a system that does not appear in the list.

Q-13 What forms of propulsion for the secondary payload would make for maximum flexibility, and which can be accommodated with more difficulty?

A-13 Less risky propulsion systems such as green propellant and electric propulsion would make for maximum flexibility. Hydrazine is allowed, but NASA policies with respect to pressure vessels and propulsion safety may require higher scrutiny or insight on the development of hydrazine propellant systems on rideshare payloads, to ensure safety for all the payloads.

Q-14 The EVM-3 AO was amended on January 22, 2021 to change the reduction in the Adjusted AO Cost Cap for proposals using Commercial FAA-Licensed Launch Services. Will a similar change be reflected in the final PEA?

A-14 The *Commercial FAA-Licensed Launch Services Program Information Summary* document in the MO Program Library has been updated as follows: "The cost for this launch service is to be reflected as a reduction in the Adjusted PEA Cost Cap of ~~$12M~~ $9M per launch."

Q-15 Will this PEA adopt the newly released SMD Class D Mission Assurance Requirements (MAR) Document in place of the Explorers Class D MAR (EXP-RQMT-0003 Rev B)?

A-15 Yes. The new Class D MAR has been posted to the Program Library and the text of the final PEA will reflect this change.

Q-16 The table in Section 9 of the PEA gives a target downselection date of Fall 2023, which is only a year after the target selection date for the 9-month competitive phase A studies. Is the downselection date correct?

A-16 The listed target downselection date was a typo. The final PEA will include corrected dates.

Q-17 In the event that an Explorers investigation requires concurrent operating NASA assets (e.g. JWST) for science objective closure, is there an approach to secure the required observing time as part of the Explorers proposal process?

A-17 At the moment there is no approach in place to secure observing time on a NASA observatory (including Webb) as part of the Explorers proposal process. Observing time on a NASA observatory may be proposed as a Science Enhancement Option (SEO).The science review panel will consider the merit of the proposed SEO.

Q-18 **Does the Explorers program allow for supporting ground-based observations required for science closure to be made with NSF assets (e.g. Gemini), provided the necessary commitments are made and documented in the proposal?**

A-18 Explorers proposals may include partnerships with, and contributions from, ground-based observatories. NASA has no policies that distinguish NSF-supported ground-based facilities from other ground-based facilities.

Q-19 **A new document "Lunar Exploration Ground Sites (LEGS)" has been posted under item 5 in the MIDEX Program Library, offering direct-to earth communication and navigation services for missions operating from 36,000 kilometers (km) in the GEO to cis-lunar space and other orbits out to 2 million km, bridging the gap between the NEN and DSN. How should a proposer obtain further information about LEGS capabilities and associated costs**?

A-19 Information on costs will be included in an updated version of the SCaN MOCS document, which will be available in the Program Library by September 2021. Meanwhile, proposers may contact the POC named in Section 6.1 of the current SCaN MOCS document.

Q-20 **A new document "SMD-SCaN MOA cost changes April2021" has been posted under item 5 in the MIDEX Program Library, showing changes in the cost attribution between the mission and SCaN, relative to the SCaN MOCS Rev 2, effective 03/15/2021. Will this information be included in an updated version of the SCaN MOCS document?**

A-20 ~~Information on cost attribution will be included in an updated version of the SCaN MOCS document, which will be available in the Program Library by September 2021.~~ This document has been deleted. See Q&A 24. *[Amended 09/10/2021]*

Q-21 **A new document "Near Space Network Brochure (NSN) Brochure" has been posted under item 5 in the MO Program Library, stating that NSN provides communications and navigation services for missions within 2 million kilometers of Earth. How are the NSN capabilities related to the Near Earth Network, and to the LEGS capabilities of Q&A 19?**

A-21 The Near Space Network will incorporate the capabilities of the Near Earth Network (NEN) and LEGS. A user guide for NSN is in preparation. Meanwhile, proposers may contact the POC named in Section 6.1 of the current SCaN MOCS document, or Vir Thanvi, Near Space Network Project Manager, at vir.thanvi@nasa.gov.

Q-22 **The PEA released on August 24, 2021 gives the target Downselection date as Fall 2024, which is a change from the draft AO/PEA, and leaves only a short period between the Phase B start and the Launch Readiness Date (LRD). Is the LRD correct as stated?**

A-22 The target Selection and Downselection dates were clarified on August 27, 2021, and the clarification is posted on NSPIRES.

Q-23 **The recently posted SCAN MOCS Rev 4 document says that pass costs must be estimated and included in the, but the Cost Changes for DSN/NSN document says that these costs are not the responsibility of the mission. Are these consistent?**

A-23 Yes, the documents are consistent. The Cost Changes document specifies internal funding transfers within NASA, and has now been removed from the Program Library. Requirement 47 of the SALMON-3 AO states that all communication costs for NASA's network services should be included in the PI-Managed Mission Cost, even if the mission will not be directly billed, with the sole exception of DSN Aperture Fees. ~~which costs are covered by SCaN and which are the responsibility of the mission. Those that are listed in the cost changes document as the responsibility of the mission fall under the cost cap, as stated in Requirement 47 of the SALMON-3 AO. The SCaN MOCS document states that proposers must estimate all costs, in accordance with NASA's full cost accounting policies, including those that will be covered by SCaN.~~ *[Amended 09/10/2021]*

Q-24 **At the Preproposal Conference and in the Foreword Section of the PEA, it was strongly recommended not to bid to the cost cap because of all the items deferred to step 2. Will the TMC panel have some pre-defined cost allocation for those items in step 1? What is your guidance in terms of reserves in relation to the deferred items?**

A-24 All costs that are proposed under the PIMMC will be evaluated, except those for items deferred to Step 2. TMC does not hold a cost allocation for those deferred items. A proposal at the cost cap holding the minimum required reserves would be compliant, but cost savings might be required at Step 2 to accommodate the deferred items, especially if the evaluation panel identifies cost threats to the unencumbered reserves. Proposers should provide justifications for the reserves that they propose to hold (see SALMON-3 AO Requirements 78 and 79, and PEA Section 5.6.4 which modifies Requirement 78 of the SALMON-3 AO). If proposing under the cost cap, keep in mind that in Phase A, the (Step-2) PIMMC will not increase more than 20% from the (Step-1) proposed PIMMC, nor can it be above the AO cost cap or adjusted AO cost cap.

Q-25 **Requirement Q-12 of the PEA stipulates that the Rideshare Accommodation worksheet should be provided in section E of the proposal, while Requirement Q-21 specifies that the Rideshare Accommodation worksheet should be included as Appendix J.13. Should it be included twice in the proposal?**

A-25 A single copy in the proposal is sufficient: the Rideshare Accommodation worksheet should be provided as Appendix J.13, and as a spreadsheet on the CD-ROM. As specified in Requirement Q-12, this table must summarize information from other sections of the proposal, and not provide new information. It will not be considered during the evaluation, but is required for the accommodation study of selectable rideshare investigation proposals that follows the evaluation

Q-26 **Are there any restrictions on using an international vendor for components?**

A-26 The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipient is permitted (Section 5.8.1 of the SALMON-3 AO).

Q-27 **Our concept development has been based on use of the DSN (34m Ka). Is it acceptable at this stage to continue with our existing plans and hold LEGS vs DSN for the ground system as a Step 2 trade? Or, given our orbit altitude, do we need to shift to LEGS in Step 1?**

A-27 For Step 1 of this AO, proposers may use the 34m Network as the basis for their design, but must also include a LEGS compatible mode. In their Step 2 submission, proposers will be expected to include a trade between the 34m and LEGS compatible modes, and base their concept of operations on the results of that trade. For future AOs, it is expected that all missions within the 2 million km boundary will use LEGS, while missions outside that boundary would use DSN assets.

Q-28 **Jennifer Scott Williams is listed in the PEA as the Point of Contact for ISS feasibility, however Steven Huning was listed in the ISS presentation during the Preproposal conference. Who should we contact regarding ISS resource accommodation and feasibility of our payload?**

A-28 Contact Steven Huning from the ISS Resource Integration Office for ISS resource accommodation and feasibility of your payload:

Steven Huning
ISS Research Integration Office/Mail Step OZ3
Johnson Space Center
National Aeronautics and Space Administration
Houston, TX 77058
Telephone: 832-248-1034
steven.w.huning@nasa.gov

Q-29 **Do we have to coordinate telemetry downlink for a payload installed externally on the ISS?**

A-29 Payload telemetry for science operations will be downlinked to the ground 24 hours a day, apart from short periods when no TDRSS is in sight of ISS; during those periods, a recorder will keep the downlink data for later transmission. Available data transmission rates are described in the backup section of the *ISS Research Capability for Hosting Space Science Instruments* presentation from pre-proposal conference (https://explorers.larc.nasa.gov/2021APMIDEX/pdf_files/09-ISS.pdf).

Q-30 **Do we have to coordinate command uplink sessions for a payload installed externally on the ISS?**

A-30 To send commands to the payload, the investigation team would request a "command window" from the ISS Huntsville Operations Support Center (HOSC). The HOSC coordinates those requests from all the Payload Developers and schedules an approved window for each payload, during which the investigation team can command the payload. However, the command software (both on the payload and on the ground) must be coordinated with the HOSC and JSC Command and Data Handling (C&DH) teams via an interface document, and requires a prescribed series of tests. Any changes to that software will require the same coordination and testing, so the payload team must anticipate needs well in advance.

Q-31 **Are there any updates to the Rideshare Users Guide or the accommodation worksheet?**

A-31 Yes, updates to both the SMD Rideshare Users Guide and the accommodation worksheet have been posted to the program library.

Q-32 **Our concept development has been based on use of the DSN (34m Ka). Is it acceptable at this stage to continue with our existing plans and hold LEGS vs DSN for the ground system as a Step 2 trade? Or, given our orbit altitude, do we need to shift to LEGS in Step 1?**

A-32 For Step 1 of this AO, proposers may use the 34m Network as the basis for their design but must also include a LEGS compatible mode. In their Step 2 submission, proposers will be expected to include a trade between the 34m and LEGS compatible modes and base their concept of operations on the results of that trade. For future AOs, it is expected that all missions within the 2 million km boundary will use LEGS, while missions outside that boundary would use DSN assets.

Q-33 **For AO purposes, is Lunar Exploration Ground Segment (LEGS) part of the DSN or NSN?**

A-33 The LEGS system is part of the Near Space Network (NSN).

Q-34 **Would the LEGS costs be part of the PIMMC, whereas the DSN aperture fees are outside of the PIMMC?**

A-34 Yes, but see the Q&A 32.

Q-35 **When will LEGS be fully functional with all antennas?**

A-35 The LEGS system is still in development. It is expected that the first node will be active in 2024 and the other two nodes after that. SCaN expects that the LEGS system will be fully operational in the 2026 timeframe.

Q-36 Is there cost estimating information for LEGS available?

A-36 Please see section 5 of the Mission Operations Communication Services (MOCS) document, Rev 4, which is included in the Program library. For the purposes of cost estimation, the use of LEGS is analogous to the use of NSN Direct-to Earth assets (Table 5-1).

Q-37 Could the LEGS system accommodate for continuous link?

A-37 The answer depends on the mission concept of operations. There is a difference between continuous support over a 24 hour period with no gaps, a standard pass length that includes a handover between systems, or and a series of contact times. Contact the SCaN POC listed in the AO for more information.

Q-38 The AO strongly recommends downlink of science data using Ka band services. Does that recommendation apply to all services? Does that recommendation apply to commercial or proposing institution services?

A-38 The frequency recommendation applies to all NASA /SCaN services. Most commercial entities agree with the recommendation. Proposers are encouraged to reach to the SCaN Mission Commitment Office via exploration-enabled@lists.nasa.gov to determine if commercial service providers [that may be under contract to SCaN] would be able to accommodate other frequency bands.

Q-39 Where can customers get more information on the SCaN's services, costs and interfaces?

A-39 Additional information can be found on the respective organization websites or by contacting the Mission Commitment Office at exploration-enabled@lists.nasa.gov.

- For an overview of SCaN Services:
  - https://www.nasa.gov/directorates/heo/scan/services/overview/index.html
- The SCaN Customer Service Portal:
  - https://www.nasa.gov/directorates/heo/scan/csp
- The SCaN Customer Service Portal Resource Documents
  - https://www.nasa.gov/directorates/heo/scan/csp/resources/
- Mission Operations Communication Services (MOCS) Document:
  - 2021 Astrophysics MO Program Library, Item 8 under Documents Referenced by SALMON-3

- For NSN Services:
  - https://esc.gsfc.nasa.gov/projects/NSN
- For DSN Services:
  - https://deepspace.jpl.nasa.gov/about/commitments-office/

Q-40 **Must the NSN per-minute fees be included in the PI-Managed Mission Cost (PIMMC), and in the cost tables? Section 5 of the recently posted SCaN MOCS Rev 4 document states both that the "calculated estimate of services provided is required by the SMD to document the full value of the mission and its services", and that "NASA missions that use standard services will not be charged by SCaN for recurring cost for aperture or per-minute fees."**

A-40 The NSN per-minute fees must be included in the cost tables and in the PIMMC, as stated in Requirement 47 of the SALMON-3 AO. The SCaN MOCS Rev 4 document discusses what costs SCaN will charge to SMD. To level the playing field, and to enable trades between SCaN services and other aspects of the mission, all NSN communication costs must be included in the PI-Managed Mission Cost, whether or not SCaN will charge SMD for those services. See Q&A 23 and Q&A 34 above.

Q-41 **Are proposals allowed to include embedded videos?**

A-41 No, embedded videos and animations are not allowed in proposals.

Q-42 **There is an inconsistency in the maximum ESPA Grande space vehicle mass reported in two documents in the 2021 Astrophysics Explorers MO Program Library. In the "ESPA Rideshare Users Guide" the maximum port mass capacity is stated as 465 kg in Table 6.1, whereas in the "Evolved Expendable Launch Vehicle Rideshare User's Guide" the maximum mass is stated as 320 kg in section 5.4. Please confirm which is correct.**

A-42 The "ESPA Rideshare Users Guide" which reports the maximum port capacity as 465 kg supersedes the "Evolved Expendable Launch Vehicle Rideshare User's Guide." The latter document has been deleted from the Program Library.

Q-43 **The SALMON-3 AO includes Requirement 99 on marking export-controlled material, but has no requirement for Controlled Unclassified Information (CUI) markings. Are proposals required to have CUI markings?**

A-43 Proposals written in their entirety by non-government institutions are not mandated to follow CUI marking instructions. However, proposals that are written fully or partially by government institutions are required to include CUI markings. For those proposals, it is mandatory to include a banner marking at the top of each page that contains CUI, to alert the reader. For example, pages with export-controlled information would get a "CUI//SP-EXPT" banner. Though not required except for NASA Export Controlled information, portion marking is a highly encouraged and can be accomplished by including a red bordered box, as shown in the document CUI_Portion_Marking_Sample.pdf in the Program Library. Portion marking can also be done according to NASA CUI Handbook, page 11 (https://cset.nasa.gov/wp-content/uploads/2021/05/ITS-HBK-CUI_v1.0.0.pdf).