

2019 Missions of Opportunity

Astrophysics Explorer Program Q&A for the ~~DRAFT~~ SALMON-3 PEA O

Change Log		
Rev.	Date	Description of Changes
01	11/07/18	Added Q&A 1; deprecated 12/10/2018, see Q&A 7, 13
02	11/13/18	Added Q&A 2
03	11/26/18	Revised Q&As 1 and 2, Added Q&As 3 and 4
04	12/07/18	Added Q&A 5, 6
05	12/10/18	Added Q&A 7-11, revised Q&A 3
06	12/18/18	Added Q&A 12
07	02/15/19	Amended Q&A 7, added Q&A 13-18
08	03/06/19	Amended Q&A 9, 13 and 16; added Q&A 19-20
	04/03/19	Final PEA O issued
09	04/12/19	Added Q&A 21-26, Amended A13, 16, 17, 19, 20
10	04/29/19	Added Q&A 27-35
11	05/02/19	Added Q&A 36-44
12	05/03/19	Added Q&A 45-47
13	05/14/19	Added Q&A 48

Please Note: Questions 1 to 20 were submitted in response to the release of the Draft PEA for the 2019 Astrophysics Explorers MO

Q1 : Section 5.6.2 "Cost of Access to Space" beginning on page TBD-19 of "SALMON-3 PEA TBD: 2019 Astrophysics Explorers Mission of Opportunity" states

"The costs for PEA-provided access to space options listed below will be subtracted from the PEA tbd Cost Cap and held in the Astrophysics Division at NASA, who will also manage any and all launch contingencies. The following costs are associated with access to space provided under this PEA:

...

* For a constellation of CubeSats up to a total of 24U or a SmallSat, missions utilizing one port on an Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA), or for missions utilizing a small launcher, see the LSP Small Payload Access to Space Catalog in the Program Library for costs."

Does this mean that there is a charge to the \$35M Cost Cap for SmallSats that utilize an ESPA? Please clarify. (Note: Q&A 7 and Q&A 13 take precedence over this Q&A 1, due to updated policy decisions)

A1 : There were mistakes on the Draft PEA page TBD-20. The Access to Space information will be corrected in the Final PEA. The draft LSP Small Payload Access to Space Catalog is available in the Program Library and the final version will be posted when the final PEA is released.

Q2 : Will the ESPA Grande be offered for a PEA-provided launch?

A2 : ~~No; only the non-Grande version of the ESPA will be offered.~~ Edit 11/26/2018: Yes, the ESPA Grande will be offered for a PEA-provided launch. This will be corrected in the Final PEA.

Q3 : What is considered a SmallSat? (Note: Q&A 16 takes precedence over this Q&A 3, due to updated policy decisions)

A3 : For this call, a SmallSat is a "small complete mission with a PI-managed cost cap under \$35M, using a spacecraft compatible with an ESPA-class payload interface." This will be corrected in the Final PEA.

Q4 : Can a CubeSat constellation use more than one ESPA port? (See also Q&A 16)

A4 : Yes, a CubeSat constellation will be allowed to use multiple ESPA ports. This will be corrected in the Final PEA.

Q5 : Will the comment period for the Missions of Opportunity PEA end on December 7, 2018?

A5 : Comments on the MO PEA will be accepted through December 21, 2018.

Q6 : Will there be additional clarification of the access to space for the MO PEA?

A6 : Access to space for the MO PEA will be clarified on or about Monday December 10.

Q7 : The draft Program Element Appendix (PEA) allows proposers to propose alternative access to space, including contributed launch services. Will this option be included in the PEA itself?

A7 : Alternative access (non-PEA-provided launch vehicle and launch services) will not be an option in the final PEA, because NASA can now offer a larger range of rideshare options as PEA-provided launches.

The Table on page TBD-20 of the draft PEA will be replaced, and a revised version of the LSP Small Payload Access to Space Catalog will be posted. (*See also Q&A 13.*)

Q8 : Why does the LSP Small Payload Access to Space document show a charge to the PI-Managed Cost Cap of a “full” SCM for access to space on an ESPA, but no charge for the same access for a SmallSat?

A8 : NASA is particularly interested in demonstrating that compelling astrophysics science can be done with a SmallSat as a secondary payload, and therefore provides an incentive to propose at that level.

Q9 : What orbits are anticipated for PEA-provided access to space for Small Complete Missions and SmallSats utilizing one or more ports on an Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA)? (amended 03/06/2019)

A9 : We anticipate that rideshares on an ESPA or ESPA Grande will be offered as PEA-provided launch services to the following orbit categories:

a) to Low Earth Orbit at 400km-600km

b) to Geostationary Transfer Orbit and beyond: this option may include the ESPA Grande on the NASA Heliophysics IMAP mission if space is available, and a rideshare with ESA’s PLATO for a mission proposed as a science collaboration with ESA scientists.

~~c) to cislunar space; see e.g. the Statement of Work for Commercial Lunar Payload Services (CLPS) in the Program Library.~~

Q10 : How will the requested orbit affect the likelihood of a rideshare proposal being selected?

A10 : After the evaluation, but prior to the selection decision, NASA will perform an accommodation study of selectable investigation proposals to assess the extent to which the proposed investigation is compatible with the expected rideshare opportunities. The NASA Small Spacecraft Systems Virtual Institute (<https://www.nasa.gov/smallsat-institute>) will operate a website that consolidates and shares known public information on ESPA-Class launch accommodation opportunities and capabilities. A proposed investigation with a high probability of being compatible with several platforms is more likely to be selected than one with less flexible accommodation and orbit requirements.

Q11 : If a mission on ISS would extend beyond 2024, will NASA still provide the funding to support the continued operations?

A11 : A proposer should assume that there will be no change in the accessibility of ISS as a science platform beyond 2024.

Q12 : Will suborbital-class payloads (balloon-borne missions and CubeSats) be solicited in the 2019 Astrophysics Explorers Missions of Opportunity PEA?

A12 : No. In the 2019 Astrophysics Explorers Mission of Opportunity PEA, NASA is emphasizing the new class of SmallSats as secondary payloads within the \$35M cost cap category. Thus suborbital-class missions (balloon-borne missions and CubeSats) are not being solicited at this time. NASA has learned lessons from developing the GUSTO balloon mission within the Explorers Program, and NASA does not yet have qualified superpressure balloons. In lieu of soliciting highly-capable balloon and CubeSat missions in the Explorers Program at this time, NASA will be studying alternative opportunities to propose such investigations within the Astrophysics Research Program.

Q13 : Will a new version be provided for the Table on page tbd-20 of the draft? (amended 03/06/2019; 4/12/2019)

A13 : This Table, shown below, has been corrected in the final PEA (section 5.6.2).

SCM option	Cost cap (see Section 5.6.1)	Cost of access to space to PIMMC (see Section 5.6.2)
Hosted on ISS or lunar Gateway	\$75M	None
CubeSat up to 12U for ride to cislunar space	\$35M	None
SmallSat on ESPA or ESPA Grande	\$35M	None
“Full” SCM on ESPA	\$75M	\$10M
SCM (including SmallSat) using a Small Launcher	\$75M or \$35M	\$10M or \$15M

Q14 : If my proposed investigation includes a contribution from a non-US partner for which a commitment cannot be made until some months after the proposal due date, how should this be handled in the letters of commitment in Requirement 90 of the SALMON-3 AO?

A14 : A letter from the contributing organization stating the highest level of commitment possible at the time should be submitted. Section 5.9.1.1 of the SALMON-3 AO lists the required elements for institutional Letters of Commitment required from all organizations offering contributions of goods and/or services. Item (iv) in this section states, “(iv) the strongest possible statement of financial commitment from the responsible organization to assure NASA that all contributions will be provided as proposed, including whether the contribution and/or funding has been approved and/or what further decisions must be made before the funding is committed by the partner.”

Q15 : Will NASA consider the forward-feeding technology aspects (both hardware and software that may enable future science) of a proposed MO as elements of "Science, Exploration or Technology Merit"?

A15 : As stated in Section 5.3.4, this PEA solicits science investigations and does not solicit technology or advanced engineering development projects. Thus in the first two evaluation factors in Section 7.2.1 of SALMON-3, only Science Merit and Science Implementation Merit will be considered.

Q16 : What is considered a SmallSat for the purpose of this call? Will CubeSat constellations be treated as SmallSats if they can be packaged for access to space on an ESPA (or ESPA Grande) port? (amended 4/12/2019)

A16 : For this call, a SmallSat is a “small complete mission with a PI-managed cost cap under \$35M, that is hosted on the ISS or the Lunar Gateway, is launched as a secondary payload using one or more ESPA or ESPA Grande ports, or uses a Small Launcher.” No access to space will be provided through the CubeSat Launch Initiative, or for CubeSats on alternate carriers such as the Surf Board, Aft Bulkhead Carrier or C-Adapter Platform. A CubeSat constellation may be proposed as a SmallSat if it can be packaged for access to space as a SmallSat. This will be clarified and corrected in the Final PEA.

Q17 : Will an SMD Rideshare Users Guide be available in the Program Library? (amended 4/12/2019)

A17 : ~~The SMD Rideshare Users Guide is in preparation. If it is not available when the final PEA is issued, the Evolved Expendable Launch Vehicle Rideshare User's Guide (document 21 in the MO Program Library) will be used instead. This will be clarified in the final PEA.~~ Rideshare documents are provided under Item 15 (Rideshare documents) in the MO Program Library. Information on Rideshare opportunities may evolve during the AO progress; proposers should check the Program Library for updates (PEA section 5.1.2.1).

Q18 : ESPA rideshare missions must conform to the launch planning dates of the primary mission, which may not mesh with the AO-mandated Launch Readiness Date. How will the AO deal with launch dates for proposed rideshare missions?

A18 : The process in the final PEA will be similar to that for CubeSats proposed to the Earth Venture Instrument-5 solicitation (Section 4.5.3 of PEA K to SALMON-2, see <https://essp.larc.nasa.gov/EVI-5>, including Table 3). Costs of integration to the NASA selected launch vehicle, and investigation costs during any potential gap between delivery and the start of integration to the designated launch vehicle, will be outside the PIMMC. Proposers will be required to estimate costs to minimally support the investigation during a gap between delivery and the start of integration to the launch vehicle. This will be clarified in the final PEA.

Q19 : Will payloads hosted on the lunar Gateway be solicited? (amended 4/12/2019)

A19 : ~~While NASA expects to offer opportunities for science payloads hosted on the lunar Gateway, the Gateway architecture is still evolving and interface documents are not sufficiently mature to offer such opportunities in this PEA. Accordingly, the final PEA will not solicit payloads hosted on the lunar Gateway.~~ Opportunities involving the Lunar Gateway are described in the Foreword and in section 5.1.2.5 of the final PEA.

Q20 : Is more detail available regarding the cis-lunar opportunities, beyond the Statement of Work for Commercial Lunar Payload Services (CLPS) in the Program Library? (amended 4/12/2019)

A20 : ~~To improve the chances to accommodate a selected payload, the final PEA will not solicit ESPA rideshare payloads to cislunar space. Instead, it~~ The PEA solicits single CubeSats up to 12U for rideshare to cislunar orbits, potentially using the SLS EM-2, or a future contract under the CLPS statement of work. Selected payload developers would need to dispose of their payloads after their mission is complete, either onto the lunar surface or into space beyond any lunar orbit. The cost cap for such CubeSats will be \$35M. CubeSats will not otherwise be solicited in this PEA, except as stipulated in QA16.

As stipulated in QA10, NASA will perform an accommodation study of selectable rideshare proposals after the evaluation, but prior to the selection decision, to assess the extent to which the proposed investigation is compatible with the expected rideshare opportunities. For rideshare payloads to cislunar space, a similar evaluation will be conducted after review of the Phase A study and prior to the downselection decision. Selection or downselection will be informed by the likely availability of suitable rides.

The following questions were submitted in response to the release of the Final PEA for the 2019 Astrophysics Explorers MO

Q21: Should proposers use a version of Table B3b that begins with FY2020?

A21 : Yes. The Microsoft Excel table templates in the Program Library have been updated from those in SALMON-3.

Q22 : Will SMD provide the “Do No Harm” requirements referenced in the SMD Rideshare Policy SPD-32)?

A22 : Do No Harm guidance is provided in the 2019 ESPA Rideshare Users Guide, available in the MO Program Library (Item 15a). All rideshare documents may be updated periodically, but no later than 30 days before proposals are due. It is each proposer's responsibility to check for updates.

Q23 : Will there be an ESPA System Interface Specification (SIS) similar to the 2018 IMAP Mission of Opportunity SIS? Will there be one enveloping specification, or one for each of the orbit categories

A23 : Proposers of ESPA Rideshare payloads should consult the 2019 ESPA Rideshare Users Guide. Proposers of CubeSats for rideshare to cislunar space should follow the Cislunar Cubesat Requirements: item a in the Cislunar Documents section of the MO program library.

Q24 : What material must be supplied for the rideshare accommodation study described in Q10?

A24 : Proposers must complete a Rideshare Accommodation Worksheet, available under Rideshare documents (Item 15b) in the MO program library.

Q25 : For a single investigation utilizing two ESPA/ESPA Grande slots, can a single spacecraft interface with both ports, or can a spacecraft mounted on one port use the available volume of a neighboring second port?

A25 : A single investigation using more than one spacecraft could use two PEA-provided ESPA (or ESPA Grande) ports on the same launch vehicle to accommodate two payloads. For maximum flight opportunity these should be independent, with no electrical or mechanical connection between them. If electrical connection is required, using a 'fly-away' connector, this should be noted in the Accommodation Worksheet. If a single spacecraft would extend beyond the dimensions given in Section 5.2.2 of the 2019 Astro ESPA RUG, that should be noted in the Accommodation Worksheet.

Q26 : In Figure 5.2 of the 2019 Astro ESPA RUG, in which direction does the axis Y point?

A26 : The axis Y points along the velocity vector of the launch vehicle.

Q27 : What is the page limit for the classified heritage appendix? Is it also 30 pages, in addition to 30 pages of an unclassified heritage appendix?

A27 : No, the total page limit for both unclassified plus any classified appendices is 30. In other words, the page count of the unclassified appendix plus a classified appendix must not exceed 30 pages. Extra pages for the classified appendix are allowed only for Letters of Validation from the technology sponsor of the classified heritage technology.

Q28 : The 2016 (DoD) RUG in the Program Library gave the time from installation in the fairing to launch as 7 days, and indicated there would normally be no access to a secondary payload in that period. The new 2019 Astro ESPA RUG also indicates no access, but does not give a length of time. Should we assume the 2016 number?

A28 : No, you should not assume that the 2016 number is valid. The period during which no access to the payload is possible will depend on the spacecraft vendor and the process used to integrate primary and rideshare payloads.

Q29 : No payload, including the primary one, can withstand an infinitely long launch delay without access. Can an upper limit be provided for a possible launch delay where the launch proceeds without access to payloads?

A29 : No upper limit can be provided at this point, because the integration process differs depending on the launch vehicle and vendor. Bids for launch vehicles are generally solicited after the primary payload has passed its confirmation review. SMD expects that as those bids are solicited, rideshare accommodation will be included as an option on the contract task, scoped according to the likely rideshare payloads.

Q30 : Is it currently known that there will not (or will) be ESPA Grande launch opportunities with a 5-meter fairing?

A30 : That is not currently known. SMD expects that as bids are solicited for the launch vehicle and payload integration, rideshare accommodation will be included as an option on the contract task, scoped according to the likely rideshare payloads. The presence or absence of an ESPA Grande, and the fairing size, will depend on the bids received.

Q31 : How does a proposal request consideration for selection without completing a phase A concept study?

A31 : Section 5.3.1 of the MO PEA states that “The proposal must make the case that it is not only necessary, but also that it is technically feasible for the project to be selected for development without a competitive Phase A concept study.” There is no other requirement to request such consideration.

Q32 : If a proposal requests selection without completing a Phase A concept study, and is not selected on that basis, will it also be considered for selection via the two-step process? How are the changed schedule and budget handled in that case?

A32 : A proposal that requests selection without completing a Phase A concept study may be selected instead to enter Step 2 and complete a Phase A concept study. The proposed budget and schedule must follow Section 5.6.3 of the MO PEA, just as for other proposals.

Q33 : How will NASA gather sufficient information to evaluate a request to select the proposal without a Phase A concept study?

A33 : A proposal that requests selection without completing a Phase A concept study will be evaluated in the same way as all other proposals.

Q34 : What are the TRL requirements to select the proposal without a Phase A concept study?

A34 : The TRL requirements for a proposal that requests selection without completing a Phase A concept study are the same as for all other proposals.

Q35 : What would be the schedule for moving to phase B if the proposal is selected without completing a concept study report?

A35 : Section 5.6.3 of the MO PEA states that “Final funding profiles (Phases A-F) for all downselected investigations will be negotiated between the Explorers Program and the downselected investigation teams.” This applies also to a proposal selected without completing a phase A concept study.

Q36 : Will investigations that make use of the lunar Gateway (Section 5.1.2.5) require a “Letter of Technical Interface and Resource Accommodation Feasibility Assessment” in analogy to the letter required for ISS payloads (Requirement O-7, Section 5.1.2.4)?

A36 : No, a letter of Technical Interface and Resource Accommodation is not required from the Lunar Gateway office.

Q37 : How will Gateway interface and accommodation assessments be evaluated given that details on Gateway continue to evolve (Section 5.1.2.5)?

A37 : Because the Gateway interface is still evolving, TMC will not evaluate the proposed interface and accommodation. Instead, TMC will provide comments to the accommodation study team on the proposed Gateway interface and accommodation. These comments will not be considered by the TMC panel in the risk rating.

Q38 : The AO states that “NASA will perform an accommodation study for selectable proposals after the evaluation, but prior to the selection decision” for missions to cislunar space. To what extent should accommodation be addressed in the proposal?

A38 : Proposer should show compliance with the lunar Gateway information for proposers in the Program Library, including the “Gateway PL IF 2019-04-19” document and robotics document.

Q39 : The AO states that “interface requirements...” and associated costs must be included within the PIMMC costs. To what extent should accommodation be addressed in the proposal to demonstrate those costs are adequate? Are higher margins/reserves sufficient given the unknowns associated with the lunar Gateway?

A39 : Proposers should provide justifications for the margins and reserves that they propose to use.

Q40 : For Gateway payloads that do not have independent propulsion/navigation, what end of life planning is appropriate? Can access for transport back to Earth be assumed?

A40 : It should not be assumed that the payload will be brought back to Earth, but disposal will be arranged. Disposal methods and locations (e.g., heliocentric orbit) are still being determined.

Q41 : What is the anticipated attitude of the Lunar Gateway? For example, ISS maintains a Local Vertical Local Horizontal (LVLH) attitude, i.e. a rotating frame centered on the Earth. What should be assumed regarding the attitude of Gateway relative to the Moon?

A41 : Gateway is expected to operate in a Near Rectilinear Halo Orbit (NRHO) in a fixed tail-to-Sun orientation, where Gateway attitude rotates once a month with respect to the Earth-Moon frame. A Gateway payload will not maintain a fixed orientation relative to the Moon.

Q42 : What is the downlink telemetry path from the Lunar Gateway to the Science Operations Centers of proposed payloads?

A42 : Gateway to Earth communication is expected to use X-band and Ka-band downlink, with the potential for some additional optical communication. Ground stations and networks could include NASA, international partner, and commercial stations. Data is then routed on the ground to the payload users, likely through or to the Mission Control Center in Houston, TX, and/or the Payload Operations and Integration Center at Marshall Space Flight Center in Huntsville, AL.

Q43 : What kind of navigation support is expected for Lunar Gateway? Will Gateway ephemeris and attitude information be provided, and if so what is the level of uncertainty for those parameters?

A43 : Gateway is likely to be able to provide ephemeris and attitude information. The design is not yet finalized.

Q44 : Are proposals allowed to include embedded videos?

A44 : No, embedded videos and animations are not allowed in proposals.

Q45 : Does NASA have a preference for a proposer using the NASA Near Earth Network (NEN), vs. commercial providers like KSAT?

A45 : NASA has no preference for the use of NEN as opposed to a commercial provider such as KSAT. The proposal must show that the proposed solution fits the mission requirements and that the costs are properly accounted for in the budget.

Q46 : Is the ESPA rideshare applicable to DoD and commercial launches?

A46 : The information in the 2019 Astro ESPA RUG is intended to be appropriate also to rideshares where the primary payload is not a NASA payload.

Q47 : What's the difference, other than cost cap, between a SmallSat SCM and non-SmallSat SCM?

A47 : SmallSats are small payloads within the \$35M cost cap, hosted on ISS or on the lunar Gateway; accommodated as rideshares on an ESPA or ESPA Grande; or using a small launcher for access to space. Full SCMs use these same PEA-provided options for access to space, but have a \$75M cost cap.

Q48 : When must a Gateway-attached payload be delivered for integration, in order to meet the AO-required launch readiness date of May 2025?

A48 : Proposers should assume that Gateway-attached payloads must be delivered 6 months ahead of the AO-required launch readiness date. This requirement may be updated for the Phase A study. For a Gateway-attached payload, just as for a rideshare payload, investigation costs during any potential gap between delivery and the start of integration to the designated launch vehicle will be outside the PI-managed cost cap. Proposers will be required to estimate costs to minimally support the investigation during a gap between delivery and the start of integration.