

Astrophysics Explorers Program
2019 Small Explorer (SMEX)
Q&A for the DRAFT AO

Change Log		
Rev.	Date	Description of Changes
01	12/07/18	Added Q&A 1, 2
02	12/10/18	Q&A 3,4,5
03	02/14/19	Added Q&A 6-12
04	03/01/19	Added Q&A 13 and 14
05	03/05/19	Added Q&A 15, revised Q&A 4
06	03/07/19	Added Q&A 16
	04/03/19	Final AO issued
07	04/16/2019	Added Q&A 17-21, revised Q&A 4, 11 and 15
08	04/24/2019	Added Q&A 22 – 25
09	04/30/2019	Added Q&A 26
10	05/01/2019	Added Q&A 27 – 35
11	05/02/2019	Revised Q&A 27 – 28
12	05/14/2019	Added Q&A 36

Please Note: Questions 1 to 16 were submitted in response to the release of the Draft PEA for the 2019 Astrophysics SMEX AO

Q1 : Will the comment period for the SMEX AO end on December 7, 2018?

A1 : Comments on the SMEX AO will be accepted through December 21, 2018.

Q2 : Will there be additional clarification of the access to space for this AO?

A2 : Access to space for the SMEX AO will be clarified on or about Monday December 10, 2018.

Q3 : The draft Announcement of Opportunity (AO) allows proposers to propose alternative access to space, including contributed launch services. Will this option be included in the AO itself?

A3 : Alternative access (non-AO-provided launch vehicle and launch services) will not be an option in the final AO for SMEX, because NASA can now offer a larger range of primary and secondary launch options as AO-provided launches. The PI-managed Cost Cap will be \$145M in Fiscal Year (FY) 2020 dollars, not including any contributions. There will be no charge to the PI-managed Cost Cap for any AO-provided access to space.

Q4 : What AO-provided access to space will be offered in the SMEX AO? (revised 03/05/2019)

A4 : AO-provided launch services will include a dedicated launch as described in the ELV Launch Services Information Summary document now posted in the Program Library, and secondary launches utilizing one or more ports on an Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA), including the ESPA Grande option. We anticipate that launches on an ESPA or ESPA Grande as a secondary payload will be offered as AO-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. (not offered in SMEX AO, revised 03/05/2019) see Section 5.9.2.4 in the final SMEX AO and the Program Library documents under item 15, Cislunar Opportunities (updated 04/16/2019)*

Q5 : How will the requested orbit affect the likelihood of a rideshare proposal being selected?

A5 : 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.

Q6 : 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 74?

A6 : A letter from the contributing organization stating the highest level of commitment possible at the time should be submitted. Section 5.8.1.1 of the draft 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.”

Q7 : Will the cost cap be the same for missions using a dedicated launch, and missions using rideshare?

A7 : The PI-managed mission cost cap is the same for any mission, whether the launch is dedicated or a rideshare. All access to space will be AO-provided. This is a change from the draft AO, and will be reflected in the final AO.

Q8 : Will missions be allowed to propose rideshare that requires 2 ESPA ports (assuming that the mission provides its own separation system, adapters, etc.), with the same cost cap?

A8 : Yes (See answer to Q4).

Q9 : Does NASA intend to offer any launch services to GTO (or beyond) for observatories larger than those that fit within typical ESPA volume?

A9 : No launch services will be offered beyond those specified in the answer to Q4.

Q10 : Will the AO-provided access to low Earth orbit include the possibility of returning material from orbit, for example on a SpaceX Dragon? Could a proposer obtain a waiver to allow alternative access to space to accommodate a spacecraft capable of re-entry?

A10 : Returning material from orbit may be possible using ISS-bound vehicles capable of re-entry. Alternative access to space will not be an option in the final AO.

Q11 : Will an SMD Rideshare Users Guide be available?

A11 : The SMD Rideshare Users Guide is in preparation. If it is not available at the time the final AO is released, the Evolved Expendable Launch Vehicle Rideshare User's Guide (document *14b* in the *SMEX* Program Library) will be used instead. *The 2019 ESPA Rideshare User's Guide is available in the SMEX Program Library, see Q&A 17 and 18. (updated 04/16/2019)*

Q12 : 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?

A12 : The process will be similar to that for the 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, would 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. The final AO will reflect this information.

Q13 : The Launch Services Program Information Summary (Draft 11/20/2018, found in the Program Library) states that the RTS/Kwajalein launch site viability is ‘currently under review’. When will a decision be made, so teams can be assured that ~0 deg inclination orbits are viable to propose? Further, will there be a cost-upper associated with RTS, or any of the launch sites?

A13 : A range of low inclination orbits (0-20 deg) is expected to be available within the mass, performance, and environment constraints provided in the LSP Information Summary. Proposers should assume

that NASA can provide a launch service that can support a 0-20 deg inclination insertion and stay within the \$50M cost. Although representative Launch Sites were shown, proposers should NOT assume a specific launch site location, as this will be determined during the competitive launch service acquisition process. If for some reason a specific launch site is required, the proposal should document sufficient supporting rationale for that requirement.

Q14 : Will the AO clarify and explicitly state whether Basis of Estimate (BOE) details for cost should be included? If they are requested, would an additional Excel workbook be allowed as part of the proposal submission?

A14 : Requirement B-49 of the draft AO describes the information required in Section H of the proposal for the BOE, including examples. Proposers may give details of the information in other sections of the proposal, provided that the information is referenced in Section H. An additional BOE Excel workbook for section H will not be allowed. Note that page limits apply to most of the proposal sections.

Q15 : Please provide more detail regarding the specific cislunar opportunities referred to in Q4.

A15 : At this time, the possibilities for rideshares to cislunar space using ESPA or an equivalent system are not sufficiently developed; accordingly, the final AO will not solicit payloads for rideshare to cislunar orbits. Q4 has been revised to reflect this. *Cislunar opportunities are offered and described in Section 5.9.2.4 in the final SMEX AO. (updated 04/16/2019)*

Q16 : Will missions be required to follow NASA's February 1, 2019 direction to protect the command link and other aspects of the spacecraft?

A16 : On February 1, 2019, the NASA Associate Administrator issued a letter directing that all newly started or newly solicited robotic spacecraft protect their command uplink through the use of encryption that is compliant with Level 1 of the Federal Information Processing Standard (FIPS) 140-2. This requirement does not apply for (1) hosted instrument payloads; (2) Class C or D spacecraft lacking propulsion subsystems; and (3) spacecraft that will operate more than two million kilometers (“deep space”) from the Earth.

Additionally, the letter from the Associate Administrator required that the command uplink, position, navigation, and timing (PNT) subsystems recognize and survive interference. Finally, information pertaining to the command uplink, including command dictionaries, are now required to be protected — at least to the level of Sensitive But Unclassified (SBU). More information on protecting command uplink information may be found in the Asset Vulnerability Protection security classification guide issued by the NASA Office of Protective Services on August 29, 2017 and available through the Program Library.

These requirements are deferred until Step 2. Because these are new requirements, the additional costs associated with them will be outside the AO Cost Cap.

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

Q17 : Will SMD provide the “Do No Harm” requirements referenced in the SMD Rideshare Policy SPD-32)?

A17 : Do No Harm guidance is provided in the 2019 ESPA Rideshare Users Guide, available in the SMEX Program Library (Item 14d). 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.

Q18 : 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?

A18 : Proposers of ESPA Rideshare payloads should consult the 2019 ESPA Rideshare Users Guide, as referenced in the answer to Q17 above.

Q19 : What material must be supplied for the rideshare accommodation study described in Q5?

A19 : Proposers must complete a Rideshare Accommodation Worksheet, available under Rideshare documents (Item 14e) in the SMEX program library.

Q20 : 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?

A20 : 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 ESPA RUG, that should be noted in the Accommodation Worksheet.

Q21 : In Figure 5.2 of the 2019 ESPA RUG, in which direction does the axis Y point?

A21 : The axis Y points along the velocity vector of the launch vehicle.

Q22 : 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?

A22 : 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.

Q23 : 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?

A23 : 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.

Q24 : 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?

A24 : 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.

Q25 : Is it currently known that there will not (or will) be ESPA Grande launch opportunities with a 5-meter fairing?

A25 : 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.

Q26 : The Launch Services Program Information Summary lists a payload isolation system as a Mission Unique Service included at no cost for SMEX 2019, and Figure 2 describes how the available LV volume is reduced accordingly. Do the reported LV performance curves (Figure 1) make an allowance for the mass of such an isolation mechanism?

A26 : The performance curves do not include an allowance for a payload isolation system. To use the provided performance curves, if a payload isolation system is proposed, ten (10) kg should be added to the S/C launch mass to envelope the impact to the expected LV performance.

Q27 : Will investigations that make use of the lunar Gateway (Section 5.9.2.4) require a “Letter of Technical Interface and Resource Accommodation Feasibility Assessment” in analogy to the letter required for ISS payloads (Requirement 96, Section 5.9.2.3) [AO requirement number and section corrected 05/02/2019]?

A27 : No, a letter of Technical Interface and Resource Accommodation is not required from the Lunar Gateway office.

Q28 : How will Gateway interface and accommodation assessments be evaluated given that details on Gateway continue to evolve (Section 5.9.2.4)[AO section corrected 05/02/2019]?

A28 : 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.

Q29 : 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?

A29 : 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.

Q30 : 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?

A30 : Proposers should provide justifications for the margins and reserves that they propose to use.

Q31 : 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?

A31 : 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.

Q32 : 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?

A32 : 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.

Q33 : What is the downlink telemetry path from the Lunar Gateway to the Science Operations Centers of proposed payloads?

A33 : 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.

Q34 : 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?

A34 : Gateway is likely to be able to provide ephemeris and attitude information. The design is not yet finalized.

Q35 : Are proposals allowed to include embedded videos?

A35 : No, embedded videos and animations are not allowed in proposals.

Q36 : When must a Gateway-attached payload be delivered for integration, in order to meet the AO-required launch readiness date of May 2025?

A36 : 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.