2022 HELIOPHYSICS SMALL EXPLORER (SMEX) ANNOUNCEMENT OF OPPORTUNITY (AO) LAUNCH SERVICES PROGRAM (LSP) INFORMATION SUMMARY
8 September 2022

AO-Provided Primary Launch Services Ground Rules/Policy

This document provides additional information for the AO-provided primary launch services. This launch service will be provided by NASA and procured and managed by the NASA/Launch Services Program (LSP) using government contracts.

Note: Under this AO, the Proposer may arrange Principal Investigator (PI)-provided access to space per AO stated requirements. This information summary does not apply to PI-provided access to space.

Under the provisions of the NASA contract, the launch service includes the launch vehicle (LV) and associated standard services, non-standard services (mission-specific options), LV-provided engineering and analysis, mission-specific LV hardware/software development, payload processing accommodations, and management of the launch campaign/countdown. LSP provides technical management of the launch service, technical insight into the LV production/test (commensurate with a Class D mission), and coordination and approval of mission-specific integration activities.

At the appropriate time following mission down-selection (i.e., KDP B), LSP, using the recently established Venture-Class Acquisition of Dedicated and Rideshare (VADR) contracting mechanism, will competitively select a launch service provider and award a launch service contract for the mission based on customer requirements. The contract will be awarded to the Contractor that provides the best value in launch services to meet the Government's requirements based on technical capability/risk, reasonableness of proposed price, and past performance when applicable.

All NASA-procured launch services are to be consistent with NASA Policy Directive (NPD) 8610.7D, NASA Launch Services Risk Mitigation Policy. Commercial launch services acquired by NASA will be managed in accordance with NPD 8610.23C, Attachment C: Class D Mission Launch Vehicle Modified Technical Oversight, and NPD 8610.24C, Launch Services Program (LSP) Pre-Launch Readiness Reviews (or NASA participation in launch service provider's commercial readiness process). These NPDs can be accessed through the NASA Online Directives Information System (NODIS) Library:

https://nodis3.gsfc.nasa.gov/displayDir.cfm?t=NPD&c=8610&s=7D
https://nodis3.gsfc.nasa.gov/displayDir.cfm?t=NPD&c=8610&s=23C
https://nodis3.gsfc.nasa.gov/displayDir.cfm?t=NPD&c=8610&s=24C

Launch Vehicle Information/Configuration/Performance

For a NASA/LSP-provided launch service, the proposal must be designed to the enveloping launch vehicle characteristics and capabilities provided in Attachment 1. Figure 1 depicts representative nominal performance to the Option A, 500-km Sun-Synchronous Orbit (SSO) example. Vehicle injection dispersion capabilities will determine the accuracy of targeting these orbits. Attachment 1, Figure 2 depicts the constraining payload fairing static envelope that would ensure compatibility across the range of potential launch vehicles currently expected to be available under the baseline launch service.

Launch Service Costs

The AO provided launch services covered by the Heliophysics Explorers Program include:

- the launch vehicle, engineering, analysis, and minimum performance standards and services provided by the NASA contract in place at the time of LV selection
- mission integration
- launch site payload processing
- FAA licensed launch approval
- Orbital Parameter Message (OPM) for payload separation
- nominal allocation for non-standard/mission specific launch vehicle modifications/services – items typically necessary to customize the basic vehicle hardware to meet spacecraft (S/C)-driven requirements. See Attachment 2 for items included in 2022 Heliophysics SMEX AO.

For the purpose of aligning secondary payload schedules with the primary mission launch readiness date on AO-provided Launch Services, it will be requested for the proposers to submit potential costs for up to two years of storage. See AO Section 5.9.2.1 for details. This cost is outside of the PIMMC and is covered by the Heliophysics Explorers Program.

However, the Heliophysics LV budget set aside for the 2022 Heliophysics SMEX does not include funding for PI- or payload-caused launch delays.

Evaluation Criteria

Attachment 3 shows a preliminary evaluation checklist to be used as a guide for the evaluators during the proposal evaluation phase. This checklist should provide an indication of the types of information that are expected to be contained in the proposals. If the proposal does not provide sufficient information to be evaluated for each section, the launch vehicle section of the proposal may not be evaluated for full content and may be listed as a finding.

NASA LSP Point of Contact for Additional Information

Additional information including performance quotes, mission integration inquiries, and costs for non-standard services may be obtained from the point of contact below. Otherwise questions must be directed as indicated in the Technical and Scientific Inquiries section of the AO.

Chuck Tatro
Mission Manager
NASA Launch Services Program
Code VA-C
Kennedy Space Center, FL 32899
Phone: 321-867-1121
Email: charles.a.tatro@nasa.gov

Attachment 1
Launch Service Characteristics/Capabilities

Performance Information:

Performance capabilities to a range of orbit altitudes/inclinations are various from the multitude of launch service providers on the VADR contract. Figure 1 depicts an expected representative nominal performance to an example SSO orbit associated with Option A in the AO. Figure 2 depicts an expected representative nominal performance to an example SSO orbit associated with Option B in the AO. For mission specific information, contact the point(s) of contact listed in this document.

Performance Ground Rules:

- The LV performance available generally does not include impacts associated with orbital debris compliance; this must be evaluated on a mission-specific basis. Depending on the LV configuration, this could result in a significant performance impact to ensure full compliance with orbital debris policy.
- Guidance reserves have been allocated to account for 3-sigma flight performance.
- Vehicle-specific injection dispersion capabilities will determine the accuracy to which the orbit targets can be achieved.
- Performance is for baseline LV configuration; non-standard, mission-unique hardware will require additional assessment.
- A representative separation system is assumed, the mass of which is book-kept on the launch vehicle side.

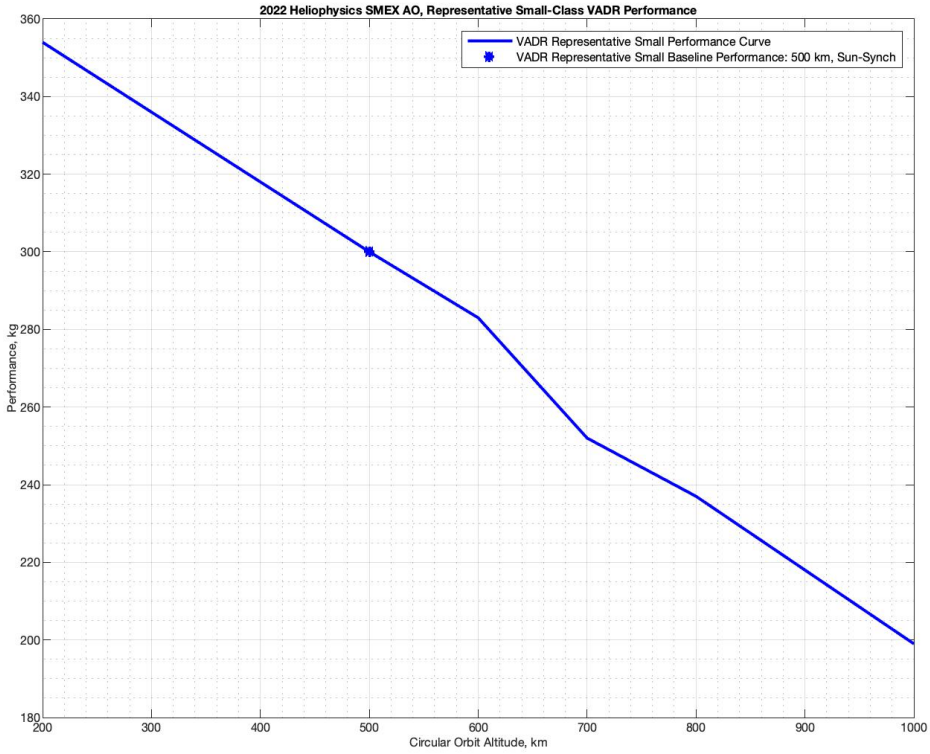

Figure 1: Constraining Performance Curves

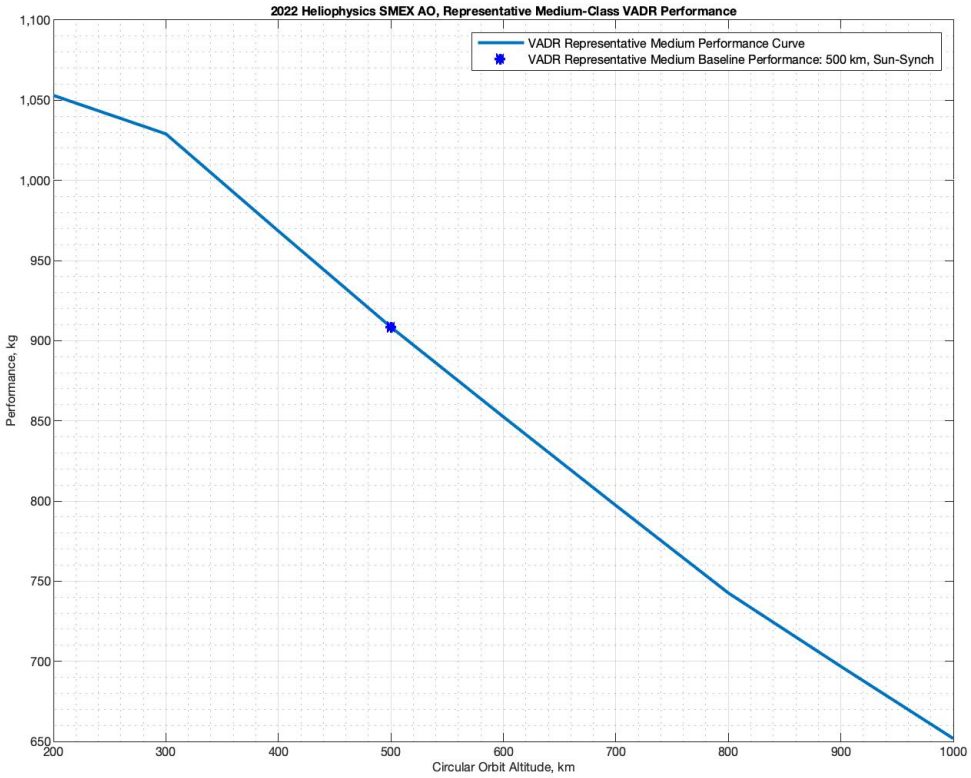

Figure 2: Constraining Performance Curves

Payload Envelopes:

Figure 3 below shows the constraining static payload fairing envelope that will enable compatibility with all potential launch vehicle configurations projected to meet the performance capability shown in Figure 1. Figure 4 below shows the constraining static payload fairing envelope that will enable compatibility with all potential launch vehicle configurations projected to meet the performance capability shown in Figure 2.

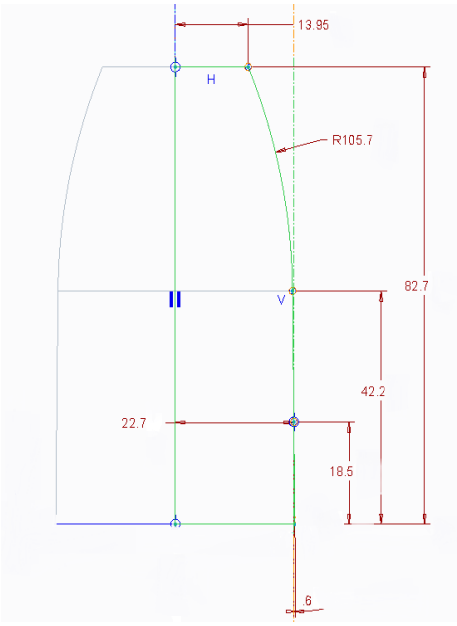

Figure 3
Static Fairing Envelope (in.)

- Proposals should include sufficient S/C dimensions to validate fit within this PLF static envelope, including any close approaches.

- Figure has been reduced by 1.5" to account for a typical payload isolation system. If the Spacecraft is providing its own isolation system, 1.5 inches may be added to overall height shown.

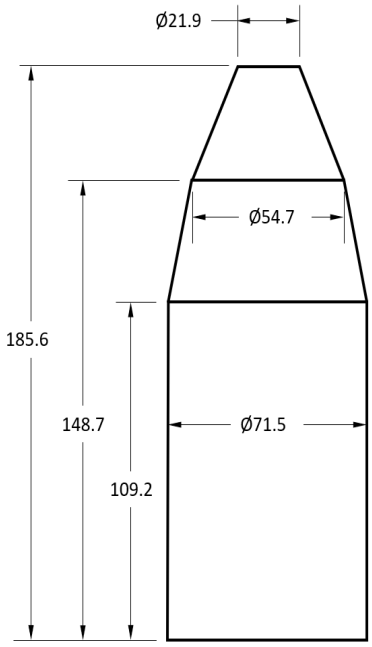

Figure 4
Static Fairing Envelope (in.)

- Proposals should include sufficient S/C dimensions to validate fit within this PLF static envelope, including any close approaches.

- Figure has been reduced by 1.5" to account for a typical payload isolation system. If the Spacecraft is providing its own isolation system, 1.5 inches may be added to overall height shown.

Attachment 2
NASA-LSP Standard Launch Services

This list provides an overview of the standard services that the spacecraft customer will receive with a NASA/LSP-Provided VADR Launch Service under Options A and B.

Integrated Services:

- LSP Contractor Engineering support
- LSP support to Payload Safety Working Group (PSWG)

VADR Launch Standard Service:

- Launch vehicle that meets customer's performance needs
- Payload processing facility (ISO 14644-1 Class 8 PPF) and non-fueling related support
- Standard LV-provided Payload Separation System
- Standard Payload Adapter
- Hardware that accurately simulates the mechanical interfaces and dynamic characteristics of the payload separation system, to be used by the payload project during shock and vibration testing
- Single-Spacecraft Collision/Contamination Avoidance Maneuver (CCAM) capability if needed
- Mission Specific Reviews
- Contractor-led Readiness Reviews
- Risk Identification
- Launch Vehicle insight and approval per NPD 8610.23C; Attachment C
- Mission integration management & engineering support
- Launch campaign management
- Orbital Parameter Message (OPM) for payload separation

Nominal Non-Standard/Mission-Specific Services included for SMEX 2022

- Mission-specific payload isolation system (if required)
- T-0 GN2 or pure air purge (if required)
- Spacecraft Spin/de-spin capability for separation (if required)
- Class 10K integration environment (if required)

The following list provides examples, but not limited to, non-standard/mission-specific services that are not included in this AO's NASA-provided launch service, and whose cost would need to be included as part of the PI-Managed Mission Cost.

- Custom Payload Adapters
- Auxiliary Propulsion for target orbit achievement
- Deployable Telemetry Tracking Assets for multiple spacecraft missions
- Post separation communication resource availability and coordination
- LV mods/analyses for non-separating interface with multiple SC deployments
- Hazardous Fuel, PPE, and fueling operations
- Test Payload Adapter

Attachment 3
Evaluation Form
Launch Services Program

Proposal Name: _____

Proposal #: _____

Evaluator POC: _____

Phone: _____

Email: _____

Launch Service Technical Evaluation:

Overall Assessment: - Given the ground rules in the AO, is the proposed launch vehicle (LV) concept feasible for this application? (☐Yes or ☐No)

Comments:_____

_____

_____

LV Performance: Area of concern (☐Yes or ☐No)

Proposed LV configuration: _____

Proposed Launch Date: _____

Launch Period (MM/DD/YYYY to MM/DD/YYYY): _____/____/_____ to _____/____/_____

Launch Window (On any given day of the launch period Minutes:Seconds): _____ : _____

Orbit requirements: Apogee: _____ km Perigee: _____ km Inclination:_____deg.

High Energy requirements: C_3: _____ km^2/sec^2 DLA: _____deg RLA: _____deg

Proposed LV Performance: _____

Mass (including reserves) Dry Mass: _____ kg Wet Mass: _____ kg

Dry Mass Margin: _____ kg _____ %

Wet Mass Margin _____ kg _____ %

Formulas:
Mass Margin kg = LV Performance – S/C Mass (including reserves)
Mass Margin % = [(Mass Margin kg)/ S/C Mass (including reserves) kg] X 100

LV Performance Comments/issues/concerns:

_____

_____

_____

Launch Service Cost Assessment: Area of concern (☐Yes or ☐No)

Is there additional funding for any mission specific modifications/services? (☐Yes or ☐No)

LV Integration: Area of concern (☐Yes or ☐No)

Does the proposer have experience in LV integration? (☐Yes or ☐No)

LV to Spacecraft Interface: Area of concern (☐Yes or ☐No)

Proposed Payload Fairing (PLF) _____

Spacecraft (S/C) Dimensions: Radial:_____ m Height _____ m

Any intrusions outside of the PLF usable *static* volume? (☐Yes or ☐No)

Mechanical Interface:

Standard Adapter: _____ Custom Adaptor: _____

Electrical Interface:

Standard _____ Pin(s) Connector(s): (☐Yes or ☐No)

Mission specific requirements:

Instrument T-0 GN_2 Purge: (☐Yes or ☐No)

T-0 S/C Battery Cooling: (☐Yes or ☐No)

Planetary Protection Requirements: (☐Yes or ☐No)

Contamination Control Requirements: PLF: (☐Yes or ☐No) LV adapter: (☐Yes or ☐No)

Cleanliness Level: _____ other: _____

Unique Facility Requirements: (☐Yes or ☐)

Pad: _____

S/C Processing Facility: _____

S/C Environmental Test Plans

Environmental Test Plan/Flow described: (☐Yes or ☐No)

Test Levels provided: (☐Yes or ☐No)

Test Schedule provided: (☐Yes or ☐No)

Comments/issues/concerns: _____

Spacecraft Schedule: Area of concern (☐Yes or ☐No)

Adequate timing of:

Launch Service Integration Start Time: ☐Yes or ☐No)

S/C Environmental Test Program: (☐Yes or ☐No)

Delivery of Verified S/C Model: (☐Yes or ☐No)

S/C ship date: (☐Yes or ☐No)

S/C to LV integrated Operations: (☐Yes or ☐No)

Missions with Radiological material Area of concern (☐Yes or ☐No)

List the Radiological Sources: _____

Are unique facilities required to store/process the Radiological Sources? (☐Yes or ☐No)

Any LV modifications required for additional safety or Launch approval? (☐Yes or ☐No)

Non-NASA Launch Services Area of concern (☐Yes or ☐No)

Does proposal address the PI's approach to managing the commercial launch service? (☐Yes or ☐No)

Is the proposal clear on the approach that the PI will utilize to ensure the adequacy of the technical work performed by the launch provider and to determine flight worthiness? (☐Yes or ☐No)

Does the proposal identify elements of the launch service in which the PI has approval per the modified approach for class D in NPD 8610.23? (☐Yes or ☐No)

Does the proposal identify elements of the launch service in which the PI will have insight per the modified approach for class D NPD 8610.23? (☐Yes or ☐No)

Does the proposal clearly identify the approach that the PI will utilize to perform a Category 1 Certification of the Common Launch Vehicle Configuration (CLVC) per NPD 8610.7, or is the PI providing a CLVC already Category 1 or higher certified? (☐Yes or ☐No)

Does the proposal address PI's responsibility to obtain NASA Flight Planning Board approval prior to acquisition of the launch service? (☐Yes or ☐No)

Does the cost estimate account for the full launch service including mission specific costs, payload processing facility costs, delay penalties, spacecraft fueling costs, and identified risks? (☐Yes or ☐No)

Indicate the type of launch vehicle payment schedule. Are all funds due up front or are payments made over the integration period? (☐Yes or ☐No)

END OF DOCUMENT