HELIOPHYSICS SMALL EXPLORERS (SMEX) 2016
ANNOUNCEMENT OF OPPORTUNITY (AO)
ELV LAUNCH SERVICES PROGRAM INFORMATION SUMMARY
08/24/2017

NASA-Provided ELV Launch Services Ground Rules/Policy

This document provides additional information for NASA-provided ELV launch services. Under this AO, the Proposer may arrange alternative access to space. Reference the AO paragraph 5.9.4 for more information on those options.

Any Expendable Launch Vehicles (ELV) provided by NASA will be procured and managed by the NASA/Launch Services Program (LSP) using government contracts.

Under the provisions of the NASA Launch Service (NLS) contract, the launch service includes the launch vehicle (LV) and associated standard services, non-standard services (mission unique options), all engineering and analysis, and minimum performance standards. LSP also provides technical management of the launch service, technical insight into the LV production/test, coordinates and approves mission-specific integration activities, provides mission unique LV hardware/software development, provides payload-processing accommodations, and manages the launch campaign/countdown.

At the appropriate time following mission selection, LSP using its standing contracts will competitively select a launch service provider and award a Launch Service Task Order (LSTO) for the mission based on customer requirements. The LSTO is 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. Accordingly, assumption of a specific launch vehicle configuration as part of the AO proposal will not guarantee that the proposed LV configuration will be selected unless there is firm technical rationale for sole source. Any such rationale should be clearly identified and explained in the proposal.

All NASA-procured launch services are to be consistent with NASA Policy Directive (NPD) 8610.7, NASA Launch Services Risk Mitigation Policy. Expendable launch services acquired by NASA will be managed in accordance with NPD 8610.23, Technical Oversight of Expendable Launch Vehicle (ELV) Launch Services and NPD 8610.24, Launch Services Program (LSP) Pre-Launch Readiness Reviews. These NPD's can be accessed through the URLs:

http://nodis.gsfc.nasa.gov/displayDir.cfm?t=NPD&c=8610&s=7D

http://nodis.gsfc.nasa.gov/displayDir.cfm?t=NPD&c=8610&s=23C

http://nodis.gsfc.nasa.gov/displayDir.cfm?t=NPD&c=8610&s=24C

or they are located in the AO library.

Launch Vehicle Information/Configuration/Performance

For a NASA-provided ELV 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 various circular orbits. 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 available under the baseline launch service, for which demonstrated compatibility is expected.

The LSP has developed a performance website for vehicles currently on contract to NASA. This website contains information relevant to NASA-procured launch services. This planning tool can be found at the following web address:

http://elvperf.ksc.nasa.gov/Pages/Default.aspx/.

Access to this site is available to anyone with an Internet connection and is generally available at any time. For questions, utilize the point(s) of contact listed in this document.

Launch Service Costs

The Heliophysics Explorer Program will hold the launch service costs. Services provided in the launch service costs to be covered by the Heliophysics Explorer Program are:

- the launch vehicle, engineering, analysis, and minimum performance standards and services provided by the NLS contract in place at the time of LV selection;
- mission integration;
- launch site payload processing;
- range safety support;
- down range telemetry support (launch vehicle data only);
- nominal allocation for non-standard/mission unique launch vehicle modifications/services – items typically necessary to customize the basic vehicle hardware to meet spacecraft driven requirements. See Attachment 2 for items included in Heliophysics SMEX 2016 AO.

The "baseline" launch service for this AO is based upon a small-class vehicle.

The Explorer LV budget set aside for SMEX 2016 does not include funding for PI 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 Launch Services Program 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.

Aly Mendoza-Hill
Mission Manager
NASA Launch Services Program
Code VA-C
Kennedy Space Center, FL 32899
Phone: 321-861-5914
Email: Alicia.Mendoza-Hill@nasa.gov

Attachment 1
ELV Launch Services Characteristics/Capabilities

Performance Information:

Table 1 lists the typical inclinations for the launch sites available on NLS-II. Any deviation from these inclinations will have an impact on available performance. For mission specific information, utilize the LSP performance website and/or the point(s) of contact listed in this document. The LSP performance website may provide multiple vehicle solutions for a practical orbit, however not all vehicles are to be considered in this AO due to cost constraints. Please communicate with the point(s) of contact listed in this document for additional information.

Table 1 Representative Launch Site Inclinations

Launch Site	Assumed Inclinations
CCAFS	28.5° - 51.6°
RTS	0° - 20°, ~60°
VAFB	70° - 90° Sun-synch
WFF	38° - 51.6°

Performance Ground Rules:

- This LV performance available on NLS-II 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.
- Performance is for baseline LV configuration; non-standard, mission-unique hardware will require additional assessment.
- 38-inch (0.96-meter) separation system.
- Mass of entire separation system is book-kept on the launch vehicle side.

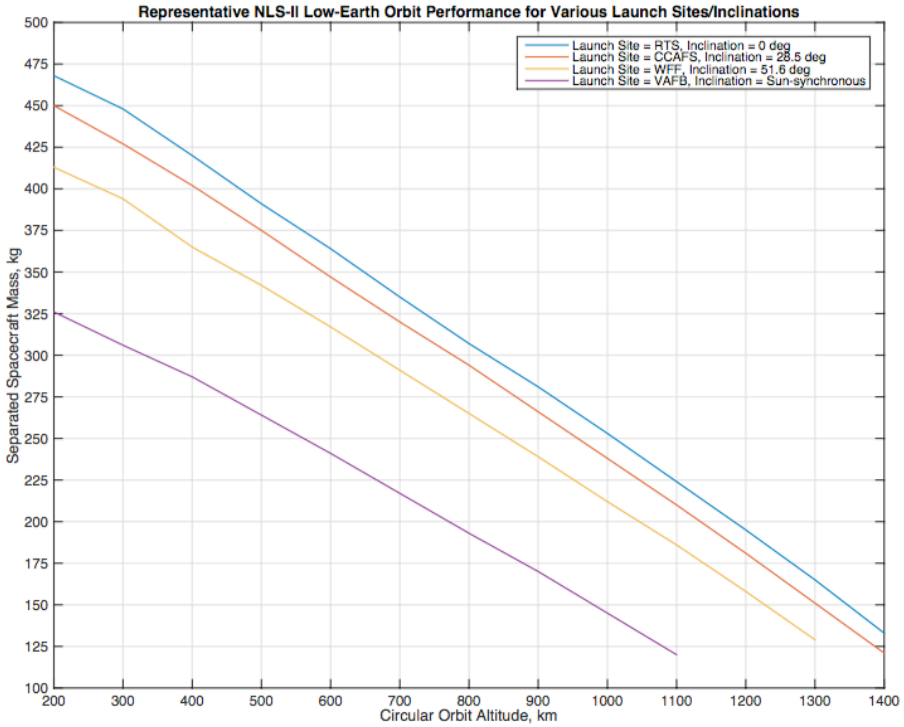


Figure 1
Limiting Orbit Performance Curves

- Figure depicts representative nominal performance to various circular orbits.
- Vehicle injection dispersion capabilities will determine the accuracy of targeting these orbits.

Payload Envelope:

Figure 2 below shows the encompassing static payload fairing envelope that will ensure compatibility with all current potential small-class launch vehicle configurations on the LSP NLS-II contracts.

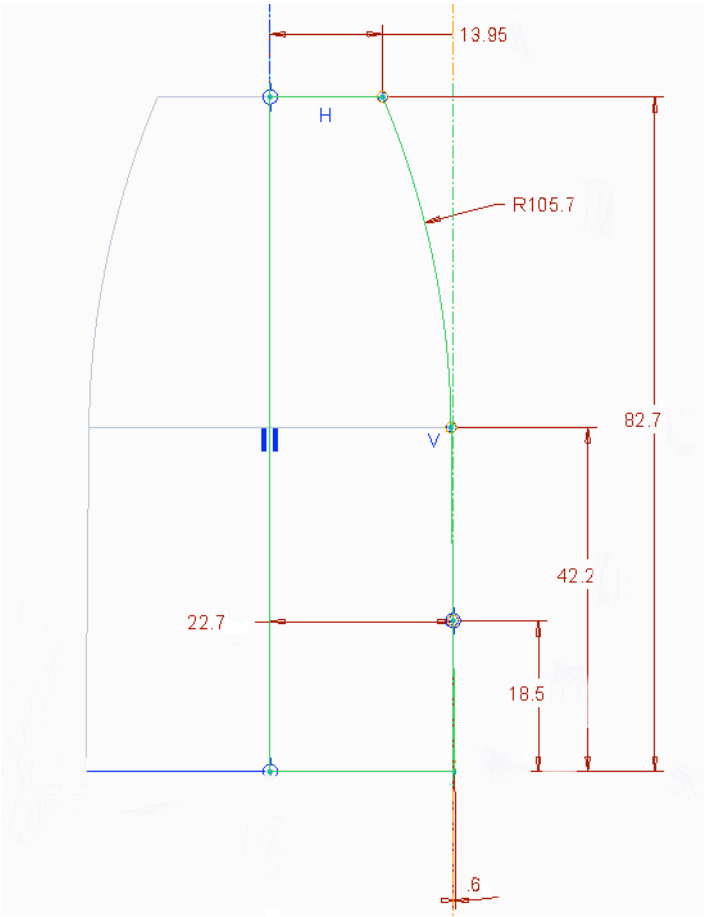


Figure 2
Static Fairing Envelope (in.)

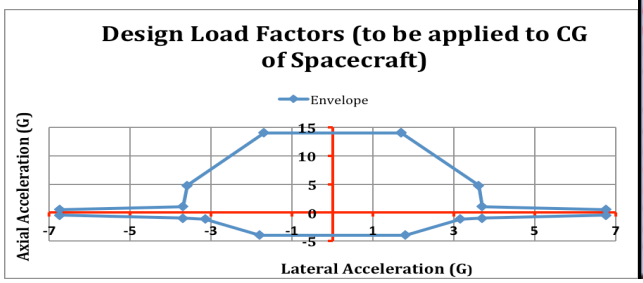
* Proposals should include sufficient S/C dimensions to validate fit within this PLF static envelope, including any close approaches.

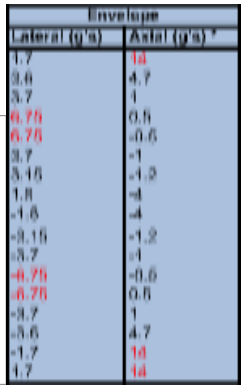
* Figure has been reduced by 1.5" to account for a typical payload isolation system. If the Spacecraft is providing its own isolation system, 1.5 inches may be added to overall height shown.

* In the case of a Pegasus XL, the optional HAPS would significantly reduce the available fairing envelope. Contact LSP POC for details.

Figures 3.x Enveloping Environments (Loads, CG, Acoustics, Shock)

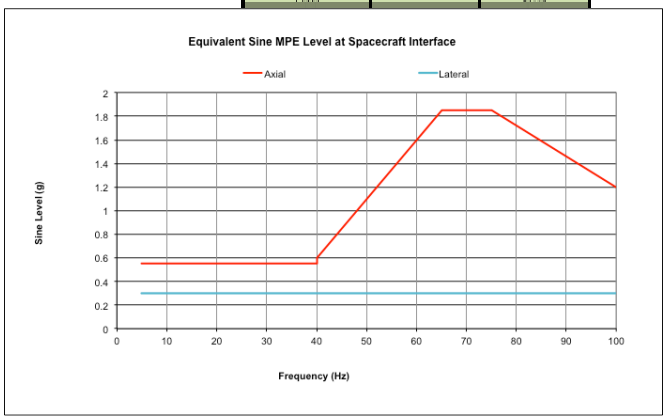
3.a CG Load Factors





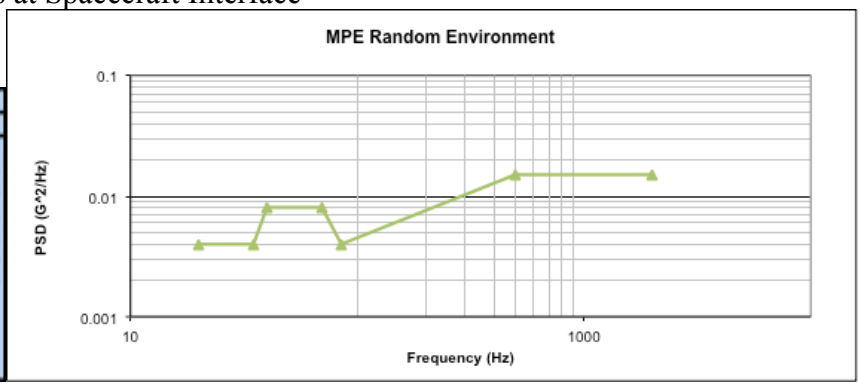
3.b Equivalent Sine MPE Level at Spacecraft Interface (Q=10)

Frequency (Hz)	Axial	Frequency (Hz)	Axial	Lateral
5	0.56	5	0.56	0.37
40	0.56	40	0.56	0.37
70	1.85	70	1.85	0.37
100	1.85	100	1.85	0.37



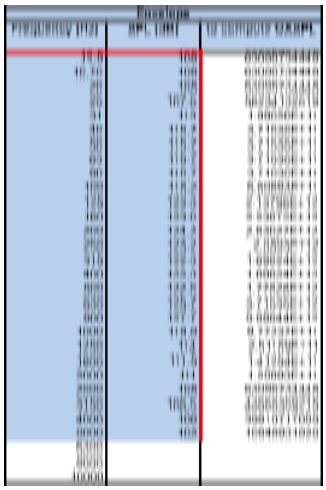
3.c Random MPE Levels at Spacecraft Interface

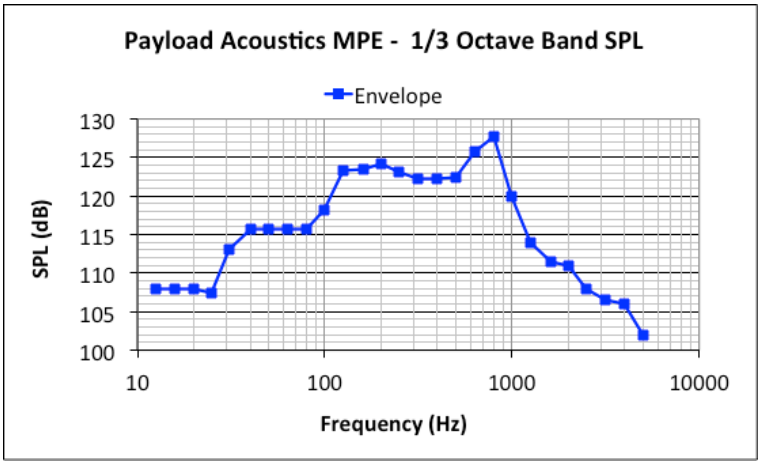
Frequency (Hz)	PSD (G^2/Hz)
20	0.004
35	0.004
40	0.008
70	0.008
85	0.004
500	0.016
2000	0.016



3.d Acoustics

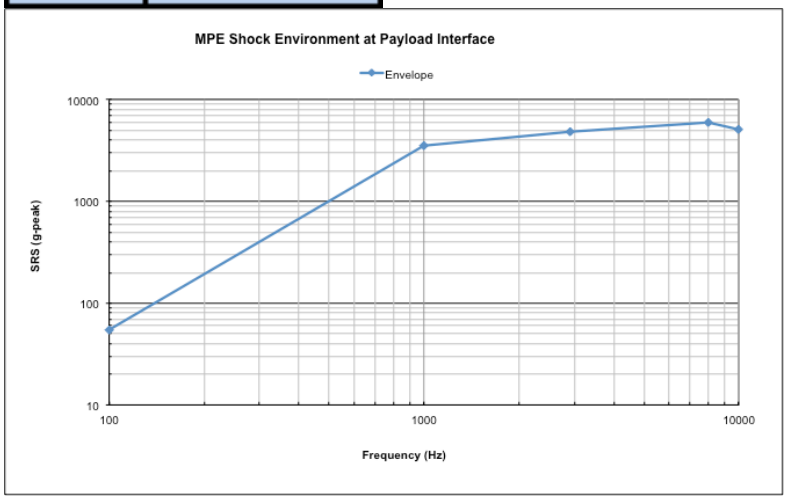
Frequency (Hz)	Envelope
20	120.5
25	120.5
31.5	120.5
40	120.5
50	120.5
63	120.5
80	120.5
100	120.5
125	120.5
160	120.5
200	120.5
250	120.5
315	120.5
400	120.5
500	120.5
630	120.5
800	120.5
1000	120.5
1250	120.5
1600	120.5
2000	120.5
2500	120.5
3150	120.5
4000	120.5
5000	120.5
6300	120.5
8000	120.5
10000	120.5





3.e Shock MPE Levels at Spacecraft Interface

Envelope	
Hz	SRS (g-peak)
100	55
1000	3500
2900	4800
8000	6000
10000	5100



Attachment 2

NASA-LSP Standard Launch Services

This list provides an overview of the standard services that the spacecraft customer receives with NASA-LSP as their launch service provider.

Integrated Services:

- Range support and services
- Payload processing facility and support
- Contractor Engineering support
- Base Support contractors
- Logistics
- Hazardous support

Launch Vehicle:

- Launch vehicle that meets customer's performance needs
- Payload Fairing with approximately 2 access doors with thermal and/or acoustic blankets
- Standard LV-provided Payload Separation System
- Standard Payload Adapter
- Standard Test Payload adapter availability
- Spacecraft Spin/De-spin capability for separation (if required)
- Single-Spacecraft Collision/Contamination Avoidance Maneuver (CCAM) capability if needed
- Electrical interface connectors (approximately 3 sets)
- Mission Unique Reviews (approximately 3)
- Readiness Reviews (approximately 4)
- Risk Management
- Launch Vehicle insight and approval
- Mission integration management & engineering support
- Launch campaign management
- Down range telemetry assets for LV data

Nominal Non-Standard/Mission Unique Services included for SMEX 2016

- Mission Unique payload isolation system
- T-0 GN2 or pure air Purge
- Class 10K integration environment

The following list provides examples, but not limited to, non-standard/mission unique 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 Principle Investigator Managed Mission Cost.

- Spacecraft to Launch Vehicle integration @ alternate launch sites
- Custom Payload Adapters
- Auxiliary Propulsion for target orbit achievement
- Deployable Telemetry Tracking Assets for multiple spacecraft missions
- LV mods/analyses for non-separating interface with multiple SC deployments

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 unique 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 Unique 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 NPD 8610.23? (☐Yes or ☐No)

Does the proposal identify elements of the launch service in which the PI will have insight per NPD 8610.23? (☐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 unique 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