ANNOUNCEMENT OF OPPORTUNITY FOR THE LAUNCH OF SMALL SATELLITES ON VEGA-C MAIDEN FLIGHT

Prepared by	**VEGA Team**
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European Space Agency
Agence spatiale européenne

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1 ACRONYMS

AO	Announcement of Opportunity
AVUM	Attitude and Vernier Upper Module
CSG	Centre Spatial Guyanese
FMA	Final Mission Analysis
ICD	Interface Control Document
LSA	Launch Service Agreement
MF	Maiden Flight
MOU	Memorandum Of Understanding
NoI	Notice of Intent
P/L	Payload
S/C	Spacecraft
SRM	Solid Rocket Motor

2 INTRODUCTION

Vega-C is an improved version of the Vega small launcher developed by ESA whose maiden flight took place in February 2012; Vega current record counts 13 consecutive successful flights.

Vega-C, like Vega, is composed of three solid propellant stages and a liquid storable propellants upper stage. Vega-C will enable Payload carrying capability of 2350 kg on reference low earth orbit mission (700 km circular polar), 800 kg more than Vega at the same reference orbit.

Vega-C development programme is running its final phase and its Maiden Flight is scheduled in the first quarter of 2020.

The main Payload selected for the Vega-C Maiden Flight is the LARES II spacecraft by the Italian Space Agency.

The Vega-C performance vs the LARES II mission gives a limited spare capacity which can be used to embark secondary payloads. The objective of this Announcement of Opportunity (AO) is to start the process to identify and down-select secondary payloads for the Vega-C Maiden Flight. The selection process is described at chapter 4.

3 DESCRIPTION OF THE OPPORTUNITY

3.1 General

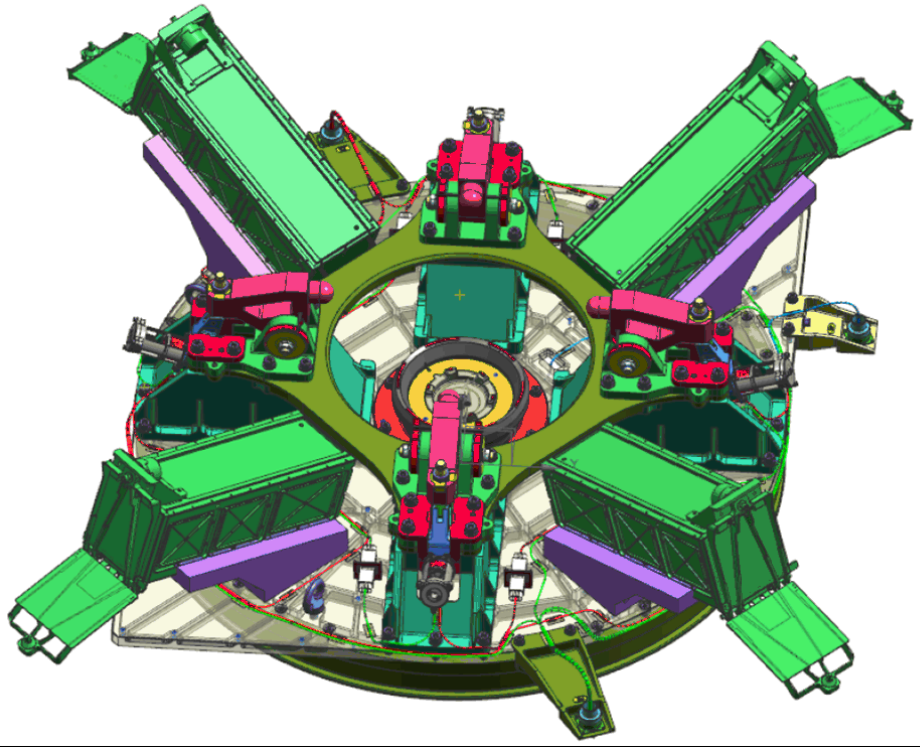
The AO is open to any economic operator belonging to an ESA Member State, with a preference for educational and or institutional satellites proposed by Participating States.

Secondary payload owners will be responsible for the delivery of flight hardware (S/C and relevant separation system) to ESA at the appropriate integration site.

3.2 Available spare capacity

As a baseline, the LARES-II dispenser can accommodate up to 4 secondary Payloads as passengers. They shall be equivalent in form, shape and mass to 4 3U-standard CubeSat's as shown in the following sketch:

LARES2 SYSTEM possible accommodation of 4 3U cubesat dispensers. The ejection direction is radial (inclination of 70deg wrt the launcher velocity vector)



3.3 Orbital parameters

The Vega-C Maiden Flight main Payload LARES-II is released on the following orbit:

Apogee	5892 km
Perigee	5892 km
Inclination	70° +/- 1°
Argument of Perigee	Free
Right Ascension of Ascending Node	Free
True Anomaly	Free

In principle, secondary payloads will be released after the main payload, on a similar orbit (slightly different to avoid collision risks). However, separation during the elliptical transfer orbit (apogee 5892 km, perigee typically around 200 km) is not excluded and could be evaluated in detail provided it does not endanger the injection of the main payload in its orbit.

3.4 Requirements and constraints

The accommodation of secondary payloads on the Vega-C Maiden Flight shall ensure full compliance with the objective and constraints of the Vega-C Maiden Flight.

The following rules are applicable to secondary Payload(s), including their carrying structure, if any:

1) Any development costs of the secondary Payload(s), S/C including relevant separation system, if any, shall be borne by the payload owners.

2) The secondary Payload(s) shall be compliant with the environment requirements of Vega-C, as reported http://www.arianespace.com/wp-content/uploads/2018/07/Vega-C-user-manual-Issue-0-Revision-0_20180705.pdf
The qualification process demonstrating that the secondary Payload(s) meet the requirements above, shall be entirely under the responsibility of the payload owner. A Qualification and Acceptance Report to demonstrate the compliance shall be produced by the payload owner.

3) The development schedules of secondary Payloads must be compliant with the Vega-C Qualification Flight schedule.
Within the Launch Service Agreement (LSA) the payload owners shall commit to provide ESA with a dummy payload structurally representative of the flight model in case they would be unable to meet the launch schedule requirements due to any reasons.

4) Due to the nature of the flight, ESA is not taking any insurance and no compensation may be claimed by the payload owners in respect of delays, modifications, cancellations or

unsatisfactory flight results, such as underperformance or launch failure, potential subsequent payload development costs being borne by the payload owners.

The secondary payload owners, answering to this AO, shall provide:

- a preliminary compliance matrix versus the Vega-C environmental requirements as indicated above,
- their response to the questionnaire in Annex 1, in order to properly perform the necessary mission feasibility analysis and to run the Passenger Payloads selection process,
- the following programmatic information:
  - objectives of the proposed secondary Payload mission,
  - progress status of the development/manufacturing of proposed payload with relevant Gantt chart outlining the main milestones (past and future),
  - financial status of the proposed payload project, including description of development funding mechanism/organisation,
  - technical, programmatic, financial criticalities (if any).

Secondary payload owners shall finally confirm in their response to this AO their readiness for a flight in the first quarter of 2020. They shall also confirm their availability to ship 45 days in advance to the Launch date their payloads to integration site.

4 SELECTION PROCEDURE

4.1 General scheme

The following steps will be undertaken for the selection of the secondary payloads:

- Issue of this Announcement of Opportunity;
- Submission of applications from payload owners;
- ESA selection;
- For selected secondary payloads, conclusion of MoU or LSA, between ESA and the relevant payload owners.

4.2 Selection criteria

ESA shall assess the feasibility of the proposed secondary payload missions and shall select those meeting the following criteria:

Compatibility with the Technical Constraints

- Ability to couple the secondary payload with the main payload and other secondary payloads (e.g. no-harm conditions to the launch of the main spacecraft);
- Secondary payload orbital parameters flexibility (e.g. compatibility with the Vega C Maiden Flight mission).

Compatibility with the Programmatic Constraints

- Planning (e.g. compatibility with Vega-C MF preparation and launch date);
- Current Spacecraft's development status;
- Operability (launch campaign operations, safety aspects...).

4.3 Responses to the Announcement of Opportunity

In response to this AO, the payload owners are invited to submit by April 22, 2019 a Notice of Intent (NoI) identifying the contact point:

- **Name:**
- **Mailing address:**
- **Telephone:**
- **Fax**
- **E-mail:**

including the questionnaire provided in Annex 1, as requested at paragraph 3.4 of this document.

Any written communication shall be addressed to:

ESA Space Transportation Directorate

Mr Fabio CARAMELLI
VEGA Exploitation and Future
Missions Project Manager
ESRIN
Via Galileo Galilei, 64
Casella Postale 64
00044 Frascati Italy
Tel.: +39 06 94180646
Fax: +39 06 94180802
Mail: Fabio.Caramelli@esa.int

Frascati 20 March 2019

Mr Renato LAFRANCONI
VEGA Exploitation Programme Manager

Mr Giorgio TUMINO
VEGA Development Programme Manager

ANNEX 1

Questionnaire

VEGA-C MAIDEN FLIGHT - SECONDARY PASSENGER

		Range	Uncertainties	
Passenger Payload Name				Mission Description
Country of Operator/Owner				
Operator/Owner				
Users and Mission Scope	e.g.: EO, SCI			
Mission description	for info			
Planning and Current Project phase	schedule to Acceptance review **(Gantt Chart if available)**			
Planned Launch date confirmation to fit Vega-C MF end Dec. 2019				
S/C Delivery confirmation to AIT site in Europe (TBD) by 1 October 2019 (in order to be at CSG 45 days in advance planned launch date)				
Flight Lifetime	years, months			
Attitude control concept	3-axes, spin			
Mission specific constraints	e.g.: solar aspect angle			
S/C sketch in stowed state including reference frame				
Confirmation about Vega-C maiden flight orbit acceptance				
Launch Mass [Kg]				Physical characteristics
Dry Mass [Kg]				
Dimensions excluding protrusions				
Protrusions positions and dimensions	**CAD model if available (STEP file)**			
C.o.G. position w.r.t. the S/C separation plane (nominal and dispersed values)	wrt a ref. system centered at intersection between SC long axis and separation plane			
MoI w.r.t. S/C reference coordinate system where the S/C CoG is the origin (Nominal and dispersed values)				
S/C Interface ring sketch, dimensions, characteristics				
Longitudinal modes frequencies (all modes up to 125 Hz) and relevant participating mass (in % w.r.t. the launch mass)	**FEM model if available (NASTRAN files)**			Mech. Prop.
Lateral modes frequencies (all modes up to 125 Hz) and relevant participating mass (in % w.r.t. the launch mass)				
Preferred Separation system concept (if applicable)	pyro/non-pyro			Separation
Separation constraints (if applicable)	e.g.: solar aspect angle			
Needed visibility, duration for commissioning [s] (if applicable)				
Max. angular rate and delta velocity range (if applicable)				
Total Power [W]	to indicate the total power generated by S/C equipment during SB on ground and			Thermal characteristics
Critical elements acceptance temperature limits [C]	Min and Max			
# of electrical links S/C - EGSE	to provide the number of pins for each needed connector **(Lines configuration if available - Excel file)**			Electrical interfaces
# of electrical links S/C - Launcher				
RF interface requirements				
Level of cleanliness and contamination	required level of clean room cleanliness and related contamination constraints			AIV
Accessibility requirements/constraints				
Propellant [Y/N]				
Propellant identification	to indicate the type of propellant used			Propulsion
density of liquid [Kg/m^3]				
volume of tank [l]				
fill factor				
liquid volume [l]				
liquid mass [Kg]				
CoG of propellant loaded tank w.r.s. to S/C coordinate system				
Pressurant identification	to indicate the type of pressurant used			
MEOP				
In flight Electromagnetic Environment	to indicate the RF emission in flight			EMC
On ground Electromagnetic Environment	to indicate the RF emission on ground			
Ground station network requirements	list of needed GS in relation to separation and acquisition phases			Misc.
Launch campaign requirements	specific needs during campaign, e.g.: logistics, comms, clean room provisions			