

DOCUMENT

Announcement of Opportunity for European payload elements on the Surface Platform of the ExoMars 2018 mission

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Table of contents:

- 1 SUMMARY AND SCOPE 3**
- 2 APPLICABLE AND REFERENCE DOCUMENTS 3**
 - 2.1 Applicable documents..... 3
 - 2.2 Reference documents..... 3
- 3 INTRODUCTION TO THE EXOMARS MISSIONS 4**
- 4 SCIENCE OPPORTUNITIES FOR THE EXOMARS SURFACE PLATFORM 4**
 - 4.1 Surface Platform Science Priorities..... 4
 - 4.2 Surface Platform Model Payload 5
 - 4.3 Contributions Requested for the Surface Platform..... 6
 - 4.3.1 European Contributions to Russian-Led SP Instruments 7
 - 4.3.2 European-Led SP Instrument(s) 8
 - 4.4 Surface Platform Investigation Selection Process 8
- 5 PROPOSAL PREPARATION 9**
 - 5.1 Letter of Intent..... 9
 - 5.2 Proposal Content..... 9
- 6 FUNDING SCHEME FOR THE PROPOSALS..... 9**
- 7 SUBMISSION REQUIREMENTS..... 10**
 - 7.1 Electronic Submission of LOIs 10
 - 7.2 Electronic Submission of Proposals 10
 - 7.3 AO Documentation Package 10
- 8 CONTACT WITH ESA..... 11**

1 SUMMARY AND SCOPE

The European Space Agency (ESA) and the Space Research Institute of the Russian Academy of Sciences (IKI) invite the scientific community to submit proposals for instrument(s) and instrument contributions in the ExoMars 2018 Surface Platform (SP).

Given that this mission is part of the ESA-Roscosmos Joint ExoMars Programme, this Announcement of Opportunity (AO) is open to scientists in ESA Member States, Canada, and Russia.

Although this AO is being released through ESA, both agencies will take part in the proposal review process.

The ExoMars Science Management Plan (SMP) is an applicable document [AD-1] to this AO. The SMP defines the top-level scientific management of the ExoMars mission. It describes the modes of participation in the ExoMars Programme, including the selection process for the ExoMars 2018 SP payload.

The schedule for this AO is given in *Table 1*.

Date	Event
Date of AO Release	31 March 2015
Due date for mandatory Letters of Intent	15 April 2015 (12:00 CEST—noon)
Due date for Proposals	2 June 2015 (12:00 CEST—noon)
Announcement of Selected Proposals	November 2015

Table 1. Reference dates for the selection process

2 APPLICABLE AND REFERENCE DOCUMENTS

2.1 Applicable documents

[AD-1]: ExoMars Science Management Plan, Version 6, 31 January 2014, ESA/PB-HME(2014)2 and ESA/SPC(2014)7

2.2 Reference documents

Not applicable.

3 INTRODUCTION TO THE EXOMARS MISSIONS

The ExoMars Programme's scientific objectives are:

1. To search for signs of past and present life on Mars;
2. To investigate the water/geochemical environment as a function of depth in the shallow subsurface;
3. To study martian atmospheric trace gases and their sources;
4. To characterise the surface environment.

The ExoMars Programme consists of two missions, in 2016 and 2018.

The 2016 mission includes the Trace Gas Orbiter (TGO) and an Entry, descent and landing Demonstrator Module (EDM). The TGO will carry scientific instruments for remote observations, while the EDM will have a payload for *in situ* measurements during descent and on the martian surface.

The 2018 mission will land a Rover and a Surface Platform (SP). The Rover will be equipped with a suite of instruments. The Rover will include a 2-m drill for subsurface sampling and a Sample Preparation and Distribution System (SPDS), supporting the suite of geology and life seeking experiments in the Rover's Analytical Laboratory Drawer (ALD). The SP will contain a further suite of instruments, mainly concentrating on environmental and geophysical investigations.

4 SCIENCE OPPORTUNITIES FOR THE EXOMARS SURFACE PLATFORM

The 2018 mission will have two landed science elements: a Rover and a SP. The ExoMars Rover will carry a comprehensive suite of instruments dedicated to geology and exobiology research named after Louis Pasteur. The Rover will be able to travel several kilometres searching for traces of past and present signs of life. It will do this by collecting and analysing samples from outcrops, and from the subsurface down to 2-m depth. The very powerful combination of mobility with the ability to access locations where organic molecules can be well preserved is unique to this mission. After the Rover will have egressed, the ExoMars SP will begin its science mission.

4.1 Surface Platform Science Priorities

Science priorities for the SP payload have been established taking into account the long lifetime (target is 1 Earth year), stationary nature of the SP scientific measurements. Within each major category, each subcategory is also presented in order of priority.

Priority 1:

- Context imaging;
- Long-term climate monitoring and atmospheric investigations.

Priority 2:

- Studies of subsurface water distribution at the landing site;
- Atmosphere/surface volatile exchange;
- Monitoring of the radiation environment (and comparison with TGO measurements);
- Geophysical investigations of Mars' internal structure.

The selection process will seek to identify a payload that can cover as well and as many of these priorities as possible within the available resource envelope (mass, energy, data return, etc.).

4.2 Surface Platform Model Payload

Roscosmos/IKI have identified a preliminary list of Russian instruments (some of which foresee European elements to be completed). The Model Payload includes an allocation for European-led instrument(s) (Table 2).

Instrument	Description	Mass, kg
TSPP	Set of cameras to characterise the landing site environment	3.4
BIP	Instrument interface and memory unit	3.0
METEO	Meteorological package	3.4
FAST	IR Fourier spectrometer to study the atmosphere	3.5
ADRON-EM	Active neutron spectrometer and dosimeter (can work in tandem with the rover neutron detector)	5.6
M-DLS	Multi-channel Diode-Laser Spectrometer for atmospheric investigations	2.6
PAT-M	Radio thermometer for soil temperatures (down to 50-cm depth)	0.6
Dust Suite	Dust particle size, impact, and atmospheric charging instrument suite	1.6
SEM	Seismometer	1.5
MGAP	GC-MS for atmospheric analysis	7.0
MAIGRET	Magnetometer	1.7
<i>To be selected through this call</i>	European-led instrument(s) (or integrated suite of sensors)	3.5
TOTAL		37.4

Table 2. *SP Model Payload. The mass figures are best engineering estimates without instrument harness or margin.*

4.3 Contributions Requested for the Surface Platform

This AO requests proposals for:

- European contributions to Russian-led instruments;
- European-led instrument(s) (or integrated suite of sensors).

4.3.1 European Contributions to Russian-Led SP Instruments

The following European contributions to Russian-led instruments are envisaged:

Instrument	European Contribution
METEO	<ul style="list-style-type: none">- Humidity sensor- Pressure sensor- Optical depth sensor- Solar irradiance sensor- Magnetometer- Dust sensor
FAST	<ul style="list-style-type: none">- Interferometer unit
M-DLS	<ul style="list-style-type: none">- Spectroscopic support, procurement and characterisation of diode lasers, principal optical, vacuum, electronic parts and modules, laboratory M-DLS prototype characterisation, development of the inversion algorithms
Dust Suite	<ul style="list-style-type: none">- Aerosol particle counter- Electric field sensor
MGAP	<ul style="list-style-type: none">- Mass spectrometer
MAIGRET	<ul style="list-style-type: none">- Wave analyser module

Proposers are encouraged to contact the corresponding instrument Principal Investigator (PI) — please see the ExoMars Surface Platform Experiment Proposal Information Package (E-PIP).

If selected, the proposing team will become part of the corresponding instrument team. The proposal's European PI will be a Co-PI in the overall Russian and European team.

The time and manner of delivery of the specific contribution are explained in the accompanying E-PIP.

Each proposal shall clearly identify a Principal Investigator (PI) and a Lead Funding Agency (LFA) for the proposed contribution (see Section 6). Proposals will need to describe clearly the character and level of participation, together with the nature of the management structure and financial commitments, within each proposing team.

4.3.2 European-Led SP Instrument(s)

European-led instrument(s) (or integrated suite of sensors) addressing the scientific priorities specified above can be proposed for inclusion in the SP payload. A maximum of 3.5 kg (including 20 % mass margin) is available for the proposed European-led contribution(s). The science delivered by the proposed instrument must complement that produced by other SP or Rover instruments.

Roscosmos will control the development and integration process of all SP instruments. The mission resources needed to accommodate and operate the proposed instrument must follow the requirements specified in the accompanying E-PIP. The time and manner of delivery of the various SP instrument models, software, and simulators are also specified in the E-PIP.

Each proposal shall clearly identify a Principal Investigator (PI) and a Lead Funding Agency (LFA) for the proposed instrument (see Section 6). Proposals will need to describe clearly: 1) the scope of the proposed scientific investigation and its relationship to the SP science priorities; 2) the technical readiness of the proposed instrument, demonstrating that the various models, software, and simulators can be made ready in time for delivery to Russia as specified in the E-PIP; and 3) the nature of the management structure and associated financial commitments for each partner within the proposed Instrument Consortium.

4.4 Surface Platform Investigation Selection Process

The guidelines for the selection process, including the terms of reference of the Payload Review Committee (PRC) and the evaluation criteria are described in Sections 4.3 of [AD-1].

All proposals received will be initially screened to determine their completeness and compliance to requirements and technical and programmatic constraints of this AO. Proposals deemed to be incomplete or non-compliant could be rejected at this stage without further review.

Complete, compliant proposals addressing the science opportunities identified above will be evaluated by a PRC formed by independent scientists.

ESA will provide a written summary of the evaluation results to all proposing teams.

By responding to this AO proposing teams accept that some selected instruments may be taken out of the mission were descoping to become necessary to guarantee the 2000-kg DM entry mass limit is not exceeded. ESA and Roscosmos will inform the corresponding instrument teams and Lead Funding Agencies as soon as possible of any such case.

5 PROPOSAL PREPARATION

5.1 Letter of Intent

A Letter of Intent (LOI) to propose is mandatory and must be submitted by the date indicated in *Table 1*

The LOI should be prepared according to the ExoMars LOI Template (see AO Documentation Package).

5.2 Proposal Content

Proposals must be submitted by the date indicated in *Table 1*.

Proposals not preceded by a Letter of Intent submitted according to the indications in Section 5.1 will be rejected.

The response to this Call must be in the form of a *Surface Platform Investigation Proposal*, which must be compiled using the *ExoMars Surface Platform Proposal Template*, following the instructions included therein. The contents of the proposal must conform to the guidelines set forth in this AO and in the applicable E-PIP. These documents are part of the AO Documentation Package.

6 FUNDING SCHEME FOR THE PROPOSALS

Each proposal for an instrument must identify a single PI heading the instrument consortium. The PI must receive full financial support from the national funding agency of his/her country, referred to as Lead Funding Agency (LFA) for the instrument.

Letters of Endorsement (LOE) confirming the financial commitment from the proposal's Lead Funding Agency (LFA) must be included in the proposal.

In some instances, various organisations or institutions may contribute resources for the instrument project; in all cases, it will be the LFA representing the instrument consortium vis-à-vis ESA and Roscosmos. The LFA is expected to provide the major portion of the instrument's funding and have prime science and industrial responsibility in the instrument's development and exploitation. The LFA must be in a position to deliver all instrument models according to the need dates specified in the E-PIP.

Instrument proposals will have to include Letters of Endorsement (LOE) from each participating funding agency, collectively committing to fund the entire instrument development, as well as its operation, data reduction, and product submission to the appropriate planetary science archives. In its LOE, the instrument LFA will summarise the contributions from all instrument partners, will commit to fund on behalf of the consortium. This LOE will constitute a preliminary agreement between the

LFA and ESA/Roscosmos until an Instrument Multilateral Agreement (IMA) between all participating LFAs can be formalised.

7 SUBMISSION REQUIREMENTS

7.1 Electronic Submission of LOIs

The LOI must arrive electronically no later than the date indicated in *Table 1*.

Please use the *ExoMars Surface Platform LOI Template* included in the AO Documentation Package to provide the requested information.

The LOI must be submitted as an attachment, in PDF format (file size limit 20 MB), according to the instruction specified at the following site:

<http://exploration.esa.int/exomars-sp-ao/>

Please use as filename for the LOI attachment: **(Investigation Name)---LOI**.

ESA will confirm the reception of LOIs by e-mail.

7.2 Electronic Submission of Proposals

Complete Proposals must arrive electronically no later than the date indicated in *Table 1*.

Please use the *ExoMars Surface Platform Proposal Template* included in the AO Documentation Package to provide the requested information.

The proposal must be submitted as an attachment, in PDF format (file size limit 40 MB), according to the instruction specified at the following site:

<http://exploration.esa.int/exomars-sp-ao/>

Please use as filename for the proposal attachment: **(Investigation Name)---PROPOSAL**.

ESA will confirm the reception of proposals by e-mail.

7.3 AO Documentation Package

- ExoMars Science Management Plan;
- ExoMars Surface Platform Letter of Intent Template;

- ExoMars Surface Platform Proposal Template;
- ExoMars Surface Platform E-PIP.

8 CONTACT WITH ESA

Requests for further information and clarification should be addressed to:

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