

Call for Letters of Application for Membership in the ExoMars 2018 Landing Site Selection Working Group (LSSWG)

1 November 2013

The European Space Agency (ESA) and the Space Research Institute of the Russian Academy of Sciences (IKI) [on behalf of the Russian Federal Space Agency (Roscosmos)] invite the scientific community to apply for membership in the ExoMars 2018 Landing Site Selection Working Group (LSSWG).

The LSSWG will support ESA and Roscosmos in: preparing the call for landing sites proposals, evaluating the proposals, consulting with the wider scientific community, and identifying candidate site(s) for more detailed studies. The LSSWG will then formulate a recommendation to ESA and Roscosmos for the mission's landing site(s).

INTRODUCTION TO THE EXOMARS 2018 MISSION

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 2018 mission includes two science elements: a Rover and a Surface Platform (SP). The ExoMars Rover will carry a comprehensive suite of instruments dedicated to exobiology and geology 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 Surface Platform will begin its science mission to study the surface environment at the landing location.

From a science point of view, a landing site satisfying the Rover mission's search-for-life requirements is also expected to be extremely interesting for the Surface Platform science.

For the ExoMars Rover to achieve results regarding the possible existence of biosignatures, the mission has to land in a **scientifically appropriate setting**:

1. The site must be **ancient** (older than 3.6 Ga) — from Mars' early, more life friendly period: Noachian to Noachian Hesperian boundary;
2. The site must show abundant morphological and mineral evidence for long-term, or frequently reoccurring, **aqueous activity**;
3. The site must include numerous **sedimentary outcrops**;
4. The outcrops must be **distributed** over the landing ellipse to ensure the rover can get to some of them (typical rover traverse range is a few km);
5. The site must have **little dust** coverage.

The following two main areas of expertise need to be covered by the collective scientific members of the LSSWG:

1. Martian aqueous sedimentary geology (processes, image spectral data analysis, integration into overall mission goals);
2. Long-term preservation of relevant molecular biosignatures in mineral matrices (what are the best mineral targets the mission should aim for and why).

TASKS OF THE LSSWG

The LSSWG will have the following scientific tasks:

- Support ESA and Roscosmos to write the Call for LS proposals, including the definition of the evaluation criteria.
- Assess the candidate LS proposals received in response to the Call.
- Support ESA and Roscosmos in the organisation of open scientific workshops and in interactions with the interested scientific community.
- Produce a prioritised list of candidate landing sites compatible with the applicable science, engineering, and planetary protection requirements.
- Recommend the top four candidate landing sites for more detailed studies.
- Produce a final recommendation for the ExoMars 2018 landing site(s).

More detailed information about the LSS process can be found in Annex 1.

PROPOSAL CONTENT

The response to this Call will be in the form of a *Letter of Application*, not longer than ten pages (A4 format, 11-pt character size), which must include the following parts:

- Scientific background and expertise in areas highly relevant to the evaluation of the scientific suitability of Mars terrains for accomplishing the 2018 ExoMars mission's scientific objectives (6 pages max).
- Curriculum Vitae, including contact information (3 pages max).
- A list of maximum ten selected papers in scientific peer-reviewed journals that the applicant has published on pertinent subjects (1 page max).
- Letter(s) of support, if applicable (see Scope).

PROPOSAL SUBMISSION

The Letters of Application, in pdf format, shall be submitted to the following e-mail address:

exomars_landing@rssd.esa.int

and must be received within **Monday, 25 November 2013 (12:00 CET)**.

SCOPE

This Call is open to the international Mars science community. Twelve (TBC) investigators will be selected.

The members of the LSSWG cannot propose landing sites or be part of landing site proposals.

ESA and Roscosmos will cover only travel costs incurred in relation to the participation to meetings of members of the LSSWG from ESA Member States and Russia, respectively. Scientists from other countries wishing to apply should ensure the financial support of their relevant funding institution before applying, and should attach to their proposal a letter from their institution confirming their support.

The members of the ExoMars 2018 LSSWG will be appointed for a period of three (3) years, renewable.

EVALUATION PROCESS AND CRITERIA

The responses will be competitively screened by an ESA and Roscosmos appointed group of experts based on the scientific expertise required to support the mission's landing site selection activities.

Letters of Application will be evaluated according to the following criteria:

- Scientific expertise required to support the mission's landing site selection activities. In particular, its relevance to the scientific requirements of the ExoMars 2018 landing site.
- Relevance of the applicants' experience in scientific fields relevant for ExoMars.

ESA and Roscosmos will notify all applicants of the outcome of the selection procedure. Selected LSSWG members should forward the ESA/Roscosmos confirmation letter to their national or other funding agencies.

ANNEX 1: LANDING SITE SELECTION PROCESS

ESA and Roscosmos release this *Call for Letters of Application for Membership in the ExoMars 2018 LSSWG* to select members of the LSSWG from the scientific community. The responses will be competitively screened based on the scientific expertise required to perform the mission's landing site selection activities. In addition to the selected, international science experts, the LSSWG will include, representatives from the ExoMars Science Working Team (ESWT), the ExoMars Project Scientists (PSs), and members from the ExoMars Project and the Industry teams. The Project Scientists' role will focus on ensuring the compliance of candidate sites with the mission's scientific objectives and requirements. The Project and Industry team members will have the task to evaluate the compliance of the considered sites to the mission's technical, operational and safety constraints.

After the LSSWG is established, ESA and Roscosmos will issue a first call open to the international community to propose landing sites suitable for accomplishing the 2018 ExoMars mission's scientific objectives. The call will include information on applicable engineering and planetary protection constraints that the sites must satisfy. Proposers will be requested to take these into account. The LSSWG will analyse the proposals received in response to the call to assess their compliance with engineering, science, and planetary protection requirements. Sites deemed to be non-compliant will be rejected and proposers informed accordingly.

Next, the LSSWG will support ESA and Roscosmos to organise a first open scientific workshop, to take place at ESTEC on 26–28 March 2014, to discuss each of the landing site proposals considered viable. The LSSWG will present the information compiled on all proposals: Sites will have received a preliminary classification in terms of science and safety interest. Proposers will be invited to present their candidate site, which will be discussed by all participants. The result of the workshop will form the basis for prioritising and narrowing down the list of candidate landing sites.

Following the workshop, the LSSWG will take into account the information presented at the workshop, plus the outcome of discussions for the various proposed sites, and the interest of participants as expressed during the workshop to produce a ranked list of candidate landing sites. No more than four sites will be recommended for further, detailed evaluation. The four sites must be scientifically compelling, and all four sites must be safe for landing (based on the available information). The LSSWG will aim to make this first recommendation for landing sites to be studied in more detail in time for the mission's System Preliminary Design Review (S-PDR), planned for June 2014.

Following this first recommendation, the LSSWG, Project Team, and Industry will perform a very detailed assessment of the sites' landing safety. Likewise, the proposers and the LSSWG will continue to study the sites' science interest.

Other landing site workshops will follow. A desirable goal would be to complete the certification of a suitable (science, engineering, and planetary protection) landing site by the mission's Critical Design Review (CDR), presently planned for September 2016.

The final landing site(s) recommendation for the 2018 mission will be produced by the LSSWG prior to the mission's Flight Acceptance Review (FAR), presently planned for October 2017. This recommendation will be delivered to ESA's Director of Science and Robotic Exploration and the appropriate Russian authorities. Roscosmos and ESA will present the landing site(s) recommendation to their Advisory Bodies for endorsement (for ESA: SSEWG, SSAC, and HESAC). Thereafter, the Agencies will elaborate a proposal to be submitted for evaluation and approval to their Governing Bodies (for ESA: the Programme Board (PB-HME) and the Science Programme Committee (SPC)).

Table 1 presents a tentative schedule for the entire LSS process.

Date	Activity
1 Nov 2013	Call for <i>Letters of Application for Membership in the 2018 Landing Site Selection Working Group (LSSWG)</i> .
25 Nov 2013	Letters of Application due.
Early Dec 2013	Review of Letters of Application and appointment of LSSWG members.
Dec 2013	Release of Call for Landing Site Proposals.
Feb 2014	LS Proposals due.
Feb/Mar 2014	Screening of candidate LS proposals by LSSWG.
26–28 Mar 2014	First ExoMars 2018 LSS science workshop at ESTEC.
Apr/May 2014	LSSWG prioritisation of candidate LSs (based on science, engineering, and Planetary Protection requirements).
Jun 2014	Four top landing locations identified by LSSWG for further, more detailed study. Aim to complete prior to PDR closure.
...	Characterisation work continues. Other science conferences help to further refine findings. Aim to have at least a site certified by CDR (planned for Sep 2016).
Oct 2017	Final LSSWG recommendation to D/SRE and appropriate Russian authorities prior to mission's FAR.

Table 1: Tentative schedule for ExoMars 2018 Landing Site Selection process.