estec

European Space Research
and Technology Centre
Keplerlaan 1
2201 AZ Noordwijk
The Netherlands
T +31 (0)71 565 6565
F +31 (0)71 565 6040
www.esa.int

prospect

Announcement of Opportunity: PROSPECT Science Team

Prepared by **Elliot Sefton-Nash, James Carpenter, Richard Fisackerly, Roland Trautner**

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1 PURPOSE OF THIS DOCUMENT

This document details the Announcement of Opportunity (AO) for the PROSPECT Science Team. The PROSPECT Science Team will act as selected representatives and users of PROSPECT within the academic science community.

Note that there exist several related documents that provide highly relevant and complementary information to this document, which are not included here to avoid duplication. The overall PROSPECT project objectives and requirements are recorded in the PROSPECT Objectives and Requirements Document [RD0]. The PROSPECT User Requirements Document [RD1] provides a detailed list of the science questions to be addressed and the corresponding science requirements for the payload. An account of the science operations expected for PROSPECT is contained in the PROSPECT Science Operations Centre Interface Requirement Document [RD2].

2 REFERENCE DOCUMENTS

[RD0] PROSPECT Project Objectives and Requirements Document, ESA-LEX-PRO-ORD-0001, Issue 1.

[RD1] PROSPECT User Requirements Document, ESA-LEX-PRO-URD-0001, Issue 2.1.

[RD2] PROSPECT Science Operations Centre Interface Requirements Document, ESA-HRE-PROSPECT-IRD-0001, Issue 1.0.

[RD3] PROSPECT: ESA's Package for Resource Observation and In-Situ Prospecting for Exploration, Commercial Exploitation and Transportation. E. Sefton-Nash et al. (2018), *49th Lunar and Planetary Science Conference, Lunar and Planetary Institute*, Abs. #2740.

[RD4] ESA's Prospect Package for Exploration of Lunar Resources: Investigation Domains, E. Sefton-Nash, J. D. Carpenter, R. Fisackerly, R. Trautner, the ESA Lunar Exploration Team, the PROSPECT User Group and the PROSPECT Industrial Team (2018), *European Lunar Symposium*, Abs. #114.

[RD5] ProSPA: Analysis of Lunar Polar Volatiles and ISRU Demonstration on the Moon. S. J. Barber et al. (2018), *49th Lunar and Planetary Science Conference, Lunar and Planetary Institute*, Abs. #99.

[RD6] The European Exploration Envelope Programme, ESA, 2016: https://www.esa.int/About_Us/Ministerial_Council_2016/Human_Spaceflight_and_Robotic_Exploration_Programmes

[RD7] PROSPECT User Group Phase B Call: 'PROSPECTing the Moon: A call for members of the User Group of ESA's PROSPECT sampling and sample analysis package for the Luna-27 Moon lander mission.'

[RD8] PROSPECT ProSEED Sensor Utilization Requirements, ESA-HRE-PROSPECT-IRD-0002, Issue 1.0.

[RD9] List of Scientific instruments and Principle Investigators for Luna 25 (preliminary).

[RD10] List of Scientific instruments on Luna 27 (to be provided in future revision).

3 PROSPECT OVERVIEW

The Package for Resource Observation and in-Situ Prospecting for Exploration, Commercial exploitation and Transportation (PROSPECT) is a payload developed by ESA for application at the lunar surface as part of international lunar exploration missions. Establishing the utilization potential of resources found in-situ on the Moon may be key to enabling sustainable exploration and lunar habitability in the future. The purpose of PROSPECT is to support the identification of potential resources, to assess the utilization potential of those resources at a given location and to provide information to help establish their broader distribution. PROSPECT will also perform investigations into resource extraction methodologies that maybe applied at larger scales in the future and provide data with important implications for fundamental scientific investigations on the Moon.

PROSPECT aims to assess the in-situ resource potential of lunar regolith at a given location on the Moon. In order to achieve this PROSPECT is required to:

- Extract samples from depths of at least 1m.
- Extract water, oxygen and other chemicals of interest in the context of resources.
- Identify the chemical species extracted.
- Quantify the abundances of these species.
- Characterize isotopes such that the origins and emplacement processes can be established.

In the lunar polar regions PROSPECT is able to target water ice. At all locations on the Moon PROSPECT is able to extract solar wind implanted volatiles from the regolith through heating and aims to extract oxygen and other chemicals of interest as resources from minerals by a variety of techniques [RD3].

PROSPECT will enter the detailed design (Phase C) at the start of 2019, hence the functional breakdown and technical specification of all elements is already mature. This has been the result of preliminary design based upon the objectives and scientific measurement requirements, reviewed and endorsed by the PROSPECT User Group. The future PROSPECT Science Team shall therefore work within the framework of this already defined functional architecture and technical specification.

3.1 ProSEED

The PROSPECT Sample Excavation and Extraction Drill or ProSEED, will access the lunar subsurface to depths of at least 1m. Once at the required depth, a tool acquires small samples, whilst preserving their temperature below limits set to ensure volatile preservation. Potential modifications to the sample during the sampling process generate unique mission requirements, procedures and material properties. ProSEED then delivers samples either to the Russian robotic arm for passing on to Russian analytical instruments, or to the ProSPA Solids Inlet System.

ProSEED will include sensors and equipment for making measurements of sample temperature, sub-surface permittivity and recording images of the sampling operations. It will also acquire a comprehensive set of engineering data that will support analysis of subsurface soil properties and engineering parameters.

3.2 ProSPA

The functions of ProSPA are distributed across two physical units: 1) a Solids Inlet System (SIS) comprising a series of single-use sample ovens on a rotary carousel together with a sample imager and sample sealing (or tapping) station, and 2) a miniature (37 x 27 x 13 cm) chemical analysis laboratory incorporating two mass spectrometers and associated ancillary and control systems [RD4].

Various heating profiles may be applied to the ovens for the purposes of addressing different science and ISRU objectives. Volatiles released during a heating profile are passed to the ProSPA chemical laboratory for analysis. The laboratory comprises an ion trap device for analytical mass spectrometry (2 – 200 AMU), as well as a magnetic sector instrument for analysis of stable isotopes (D/H, $\delta^{13}C$, $\delta^{15}N$, $\delta^{18}O$). Measurements of Ar, Kr and Xe are also expected to be possible. Associated ancillary and control systems comprise gas handling and processing components, including open/close valves, metering valves, micro-reactors, pressure sensors and reference gases.

For a detailed account of the ProSPA payload please refer to [RD5].

3.3 Programmatic Setting

Within ESA's Directorate of Human and Robotic Exploration (D/HRE), the PROSPECT payload is an element of the European Exploration Envelope Programme (E3P) [RD6].

E3P mandates provision of ESA contributions to the Russian-led Luna-Resource Lander (Luna 27) mission, which aims at exploring for the first time the South polar region of the Moon, performing an assessment of volatile inventory in near surface regolith, and an analysis to determine the abundance and origin of any volatiles discovered. Furthermore, E3P mandates that PROSPECT will build-up a European lunar exploration user community to exploit the engineering and scientific data, and the other benefits generated during the project.

This opportunity refers to participation in the Science Team for the flight opportunity of PROSPECT aboard Russia's Luna 27 mission, but the team may participate in other related activities, or development and operation of payloads derived from PROSPECT for which other flight opportunities arise.

3.3.1 Luna 27

Russia's Luna 27 mission, 'Luna Resurs', is planned for launch in 2023. It seeks to address important scientific goals regarding the presence and nature of lunar volatiles, the specific

environment characteristics of the lunar polar regions, and to demonstrate key flight and *in situ* enabling technologies underpinning European and Russian ambitions for exploration missions. The Luna 27 mission is led by ROSCOSMOS, in cooperation with the European Space Agency (ESA) for specific contributions including PROSPECT. Within Roscosmos, Luna 27 is part of the Russian federal space programme and is supported by the Russian Academy of Sciences.

3.3.2 Luna 25

Russia's Luna 25 'Luna Glob' lander mission is scheduled for launch in the 2019 timeframe. ESA's contribution to Luna 25 includes PILOT-D, a demonstrator terrain relative navigation system that acts as a precursor to PILOT, which is the navigation and hazard detection & avoidance system included on Luna 27. Participation in the Luna 25 instrument teams [RD9] by PROSPECT Science Team members is also envisaged, for the purpose of enabling scientific collaboration, and preparation for PROSPECT scientific operations on board Luna 27.

3.3.3 PROSPECT Derivatives

Nominally, the activities of the PROSPECT Science Team will be directly applied to the development and flight opportunity for the PROSPECT payload aboard the Luna 27 mission, but should other development or flight opportunities arise for a derivative of the payload, or a closely related package, then the PROSPECT Science Team may be invited by ESA to participate on those packages.

4 PROSPECT EXPERTISE DOMAINS AND DEFINITION OF INVESTIGATIONS

The PROSPECT payload contains scientific instrumentation and system elements designed collectively to prepare future exploration activities and address top level science questions [RD1]. Investigation of in-situ resources, and characterisation of the nature and abundance of those resources is a key driver for PROSPECT and will provide answers relevant to the preparation of future exploration missions and payloads. While the overarching scientific themes of PROSPECT may be said to lie firmly within lunar exploration and science, in-situ planetary geology, and analysis of samples and volatiles, there exist a number of specific expertise domains [RD4 and below] in which scientific contributions could be focussed in order to realise the science objectives of PROSPECT.

The expertise domains identified will be used to delineate and focus science participation in PROSPECT by defining a number of ***Investigations***. The following domains will act as guidance for the selection of these Investigations during the selection process, and may evolve during the Science Team tenure according to the science needs of PROSPECT and any derivative payloads.

4.1.1 Drilling, Geotechnics and Sample Handling

Data will be returned from the ProSEED drill system (section 3.1) that can be used to derive regolith physical properties. Sample behaviour during handling, as evidenced by relevant sensors may also be relevant information sources. The focus is therefore firmly targeted at retrieving and analysing mechanical and other relevant physical properties of lunar regolith at the landing site, to provide both context to the other measurements made and to support development of future exploration systems targeting similar lunar polar landing sites.

4.1.2 Imaging, Surface Modelling and Spectral Analysis

The PROSPECT payload has two cameras: 1) a drill camera to image the landing and drill site in several spectral bands, monitor drilling operations as well as robotic sample transfer operations to ProSPA's Solids Inlet System (SIS) and the Russian robotic arm, and 2) a sample imager that will provide multi-spectral images and allow generation of depth-maps of sample deposit surfaces after they have been deposited in ovens.

An imaging investigation with regard to the sample camera would focus on sample properties that may be derived using images obtained under various illumination wavelengths, to derive spectral and morphological data. Data from the drill camera will provide contextual information regarding the drill work area, boreholes and drill cuttings, as well as the landing site, allowing interpretation of local geology and local morphology/illumination conditions.

4.1.3 Permittivity

The ProSEED drill rod shall accommodate a permittivity sensor, which allows determination of the electrical permittivity of materials in contact with the sensor electrode, via a comparison of the electrode current measured for air/vacuum and for contact with the material of interest. Permittivity measurements of borehole materials at specific drill rotation azimuth and depth will be made during drilling operations, at periodic measurement intervals during which the drill will be stopped and non-rotating.

This will allow reconstruction of permittivity properties as a function of borehole depth and azimuth, leading to retrieval of profiles of H_2O content and other relevant geologic properties. Technical details of the permittivity investigation are available in [RD8].

4.1.4 Thermal Environment and Volatile Loss

The ProSEED drill includes a set of temperature sensors which provide information on sample temperature as well as mechanism temperatures. Together with engineering data on the energy used in the drilling and sampling process, the temperature data will allow the modelling of the thermal environment, and – most importantly – support the modelling and quantification of volatile losses during the sampling and sample transfer processes.

4.1.5 ProSPA Sample Analysis

Volatiles released during oven heating (section 3.2), and optionally following reaction with reference gases, are passed to the ProSPA chemical laboratory for analysis. Volatiles could originate from ices, chemisorbed volatiles, cosmogenic volatiles, and implanted solar wind. This domain concerns analysis of the chemical composition and abundance of volatiles (using gas pressure determination and ion trap mass spectrometry) as well as isotopic analysis (using magnetic sector mass spectrometry).

4.1.6 ProSPA ISRU

During ProSPA's ISRU experiment operation mode an oven may be heated to temperatures of up to 1000°C and fed with H_2 or CH_4 in order to reduce the molecules in the regolith and extract oxygen. These experiments are intended to provide an in-situ reference for terrestrial investigations into oxygen extraction processes that could be applied in future ISRU plants at the lunar surface. PROSPECT's ISRU objectives therefore require expertise in mineralogy and sample processing, to quantify the resource potential of lunar regolith with respect to future human and robotic missions.

5 PROSPECT SCIENCE TEAM

The PROSPECT Science Team is the core body of expert individuals appointed by ESA via a selection process who are responsible for maximizing the extent to which the PROSPECT payload meets or exceeds its science objectives.

The Science Team engages in scientific development (i.e. research, calibration, testing), supports operations of PROSPECT on the lunar surface, and the scientific exploitation of its data. Team members make synergistic use of data delivered by PROSPECT's Investigations and instruments to address issues relevant to the science objectives of PROSPECT. Team members may employ laboratory studies, theoretical, or numerical investigations to pursue the science objectives of the payload, in the context of the overall mission objectives. It is also expected that the Science Team engages effectively with Russian science and payload teams where opportunities arise for collaboration, for exploitation of synergies, and for optimization of the overall science results.

Building on the responsibilities and scope of the PROSPECT User Group selected for phase B (2015-2018) [RD7], PROSPECT Science Team members will be appointed with the expectation and obligation that they will participate throughout phases C, D, E, and beyond, i.e. development, launch, mission operations and the post-operations period, when the returned scientific data will continue to be exploited.

Science Team members will be given the opportunity to support development and testing/calibration, support operations planning, and will be granted a proprietary period for data exploitation, during which major science results could be published before archive products are made publically available on the Planetary Science Archive.

5.1 General Scope of PROSPECT Science Team

In general, membership of the PROSPECT Science Team is concomitant with the following activities and responsibilities. Some of these may be implicit to scientific researchers, while others constitute functional duties specific to PROSPECT science operations:

- Establish, develop and maintain the required competencies in operating the PROSPECT science payload on ground in preparation for surface science operations.
- On request, commit availability to be present at the SOC during operations (IKI SOC, European SOC), or remotely, for operational decision making during lunation-based science operations schedules.
- Participate in collaborative scientific activities related to PROSPECT science with international colleagues.

- Perform scientific analysis of data from PROSPECT and relevant sources to contribute to and enhance the body of scientific knowledge addressed by PROSPECT's science objectives.
- Publish results in peer-reviewed scientific journals.
- Present PROSPECT and the Luna-27 mission to the wider scientific community via conferences and electronic means.
- Participate in relevant outreach and education activities.
- Contribute to any landing site study and selection activities, and represent PROSPECT and its objectives, if participating in any landing site selection working groups related to the host mission.

5.2 Investigation Leads

Science Team members are expected to contribute their expertise whenever appropriate and to the benefit of the science objectives [RD0, RD1], in any relevant area of payload development, testing, operation and data exploitation, throughout their tenure. With this general egalitarian modus operandi for Science Team members established, the PROSPECT payload also demands specific expertise and responsibilities for each of its Investigations (section 4).

For each Investigation, a Lead will be appointed. This may occur as part of, or after, the selection process (Section 5.3). A Lead may be designated as part of a consortium proposal for Science Team membership.

Investigation Leads have specific responsibilities bound to their Investigation, which is inherently pre-defined by the existing scientific hardware elements of the PROSPECT payload.

5.2.1 Additional Activities & Responsibilities

Building on the scope of selected Science Team members (section 5.1), Investigation Leads will also be expected to act as a Science Team and community point of contact for their Investigation and corresponding field of research. They will also need to ensure their Investigation's readiness for science operations and data exploitation. A number of further key responsibilities for Investigation Leads are defined as follows:

- Coordinate the identification, development and verification of any calibration procedures/data required by instruments in their Investigation. These should adhere to any standards and schedules required for operations-readiness, and be compliant with the development schedule of the PROSPECT project.

- Work to ensure that adequate reference data is generated, available and accessible by the Science Team, to allow effective and timely scientific interpretation, such as spectral libraries or compositional standards.
- Act as a first point of contact and representative within the Science Team and to the external community for their Investigation, its scientific objectives and outputs.
- Be responsible for defining, developing and verifying data pipelines and data products for their Investigation in compliance with PROSPECT project needs. Data products are required to be submitted to ESA's Planetary Science Archive (psa.esa.int). It is expected that technical support will be provided from the Science Ground Segment (SGS), beginning during the initial tenure of the Science Team (phase C/D1). Investigation Leads or a nominated representative will be able to seek support on archiving and data matters from the archive or instrument scientist who is appointed to PROSPECT from the Science Ground Segment (SGS).
- Act as an administrator for membership of and collaboration with the Investigation sub-team. The Investigation Lead should be the point of contact regarding any additions to the Science Team that may be requested to fill gaps in knowledge or expertise, and regarding Investigation-level collaborations with the external community.
- Frequently report on status, progress, problem areas and other relevant topics related to the Investigation to the PROSPECT Project Scientist and the PROSPECT project team.

5.3 Tenure and Timeline

PROSPECT Science Team members and Investigation Leads will be selected with the intention that they are available for science activities and that their participation is fully incorporated into the science planning for the entire mission timeline. This refers to phases C, D and E, i.e. throughout development, launch, cruise, mission operations (nominally, 1-year of lunar surface activities) as well as a 1-year post-operations period, when the returned scientific data will continue to be exploited and require to be archived. The Luna-27 mission, with launch currently planned for 2023, means that this period would last until 2025. Any extension of the Science Team's tenure beyond the timeline detailed above will be subject to approval by ESA.

The Science Team appointed as a result of this call will be involved in PROSPECT project-related activities in phases C and D1. Phase C is expected to commence by at latest early 2019 from which the project will move through C and D1, to D2 (final development) and E (launch and utilisation on the lunar surface). The transition between these phases from the perspective of the Science Team is expected to be relatively seamless. During Phase C, the

teams' activities are expected to focus more on science support of development and testing. During Phase D they will focus more on preparation for science operations. During Phase E the Team will support science operations, data analysis and interpretation of results.

With the exception of unlikely circumstances detailed in section 5.6, participation of the Science Team in all future mission phases is guaranteed after their selection, and no further proposals to ESA or appointments will be required for their participation.

After appointment, if changes to the team membership are required for any reason, ESA's advisory structure will be accordingly notified or consulted.

5.4 Participation from Luna-27 Instrument Teams: GAP and LASMA-MR

The Russian-provided science payload for the Luna 27 spacecraft contains two instruments [RD10] that have direct relevance to ProSPA objectives:

- The Gas Analytic Package (GAP) performs chromatographic and mass spectroscopy analysis of volatile content and chemical composition.
- LASMA-MR performs laser mass spectrometry.

Consequently, the Russian Mission/Project Scientist is invited to nominate representatives from teams of these instruments to interface with PROSPECT to coordinate on science operations, and to participate in joint science activities.

5.5 Terms of Reference

The Terms of Reference (ToR) of the Science Team are defined collectively by this document (and subsequent approved updates) and any additional material referred to.

If it is deemed that a Science Team member is in breach of their Terms of Reference, via e.g. dereliction of duties or non-compliance with mandatory issues, then the Project Scientist should work with the relevant Science Team member to identify and implement a resolution. If necessary, the Project Scientist is permitted to make a formal recommendation to the Director of Human and Robotic Exploration (D/HRE) for rescinding membership.

In the very unlikely, but unfortunate eventuality that a Science Team member is no longer able to participate for the above reason or any other, the Project Scientist would be responsible for assessing the impact on the potential science return of PROSPECT, and if necessary, identifying a suitable replacement candidate or redistribution of responsibilities.

6 CALL FOR SCIENCE TEAM MEMBERSHIP

6.1 Announcement of Call

Suitably qualified experts are invited to submit a proposal to this call.

Applications are encouraged from consortia to specific expertise domains to help define Investigations during the selection process. It would be advantageous for a potential Investigation Lead to be identified in the proposal. An Investigation Lead candidate would possess suitable experience and a position from which it would be possible to coordinate the responsibilities associated with the Investigation (section 5.2.1). Team members also proposed in the consortium application should be committed to work on well-defined aspects of the proposed Investigation, such that required expertise and knowledge gaps are well covered.

ESA would select one of the proposing consortia per Investigation, and will reserve the right to complement any proposing team with specific expertise, or if appropriate, merge proposing teams.

Proposals for Science Team membership from individuals will also be accepted, and in such cases, involvement in a particular Investigation should be denoted.

Investigation Leads should be from ESA member states, but ESA reserves the right to add Science Team members from IKI/Russia as part of a possible future mission-level Luna 27 Science Team.

6.2 Proposal Content

Proposals should contain the following elements:

- A compelling proposal of scientific research that the candidate means to carry out that will be enabled by their membership of the PROSPECT Science Team. The proposed research should align with one or more of PROSPECT's science objectives and should be in line with the candidate's experience, potential and expertise **[maximum 5 pages].**
- Details of the provision of workforce within the proposing consortium or individual application for activities in each relevant mission phase/activity: development/verification/calibration, operations planning, operations support, data exploitation and archiving.
- Confirmation of support from relevant funding sources to guarantee as much as is possible, funding commitments to support the proposer's participation in Science Team activities, including support for travel.

- Details of any research infrastructure elements that could contribute to Science Team research activities, such as laboratory facilities, data processing facilities, and tools for data analysis, data archiving, modelling, and ground-based experiments in support of the Investigation.

6.3 Proposal Review Criteria

Proposals for Science Team membership will be evaluated based on:

- The scientific excellence of the proposed science research case and how it addresses PROSPECT science objectives.
- Understanding of the scientific objectives and operational requirements of the PROSPECT payload.
- The quality of the applicant/consortium in terms of experience, expertise and scientific background.
- The proposed implementation of the science research proposal, in the context of the Investigation applied to.
- The level of resources and support that is able to be guaranteed for the proposed activities.

7 SCIENCE MANAGEMENT

7.1 The ESA Project Scientist

The ESA PROSPECT Project Scientist (PS) works in the Science Team and is responsible for overall scientific coordination. The PS constitutes ESA's main interface with the PROSPECT Science Team, with the science community, and vice-versa. The PS will chair Science Team meetings and coordinate its activities.

During all mission phases, and during post-operations, the PS is responsible for all issues within the project that affect scientific return. The PS provides input to the ESA Project Manager and Mission Manager (depending on mission phase) on technical matters affecting scientific performance. The PS participates in the critical analysis of hardware design, performance, and operations, at various milestone reviews, aiming to verify that the mission/payload scientific objectives can be fulfilled.

The PS will work with the Investigation Leads and Team in coordinating with the Science Ground Segment and Planetary Science Archive to create scientific products. The PS will monitor archiving progress as well as data distribution and use within the scientific community. The PS will encourage an orderly, prompt, and fair implementation of the data exploitation phase and will foster cooperation, collaboration while maximizing PROSPECTs science return.

A scientific interface exists between the ESA PS and PS appointed for the host mission. For Luna-27, the Roscosmos PS will be invited to participate in relevant PROSPECT Science Team meetings and interactions, and coordinate on science planning and data exploitation to best serve the PROSPECT Science Team, Luna-27 instrument science teams, and wider lunar science community.

7.2 The ESA Project Team

The PROSPECT Project Team during the development phase comprises the Project Manager and lead System Engineer as well as other engineering and administrative support. The PS is a member of the Project Team. ESA, via the Project Manager (and after launch, Mission Manager) retain the overall responsibility for the PROSPECT payload through all mission phases.

8 OPERATIONS OVERVIEW

A detailed account of the science operations concept for PROSPECT is contained in the PROSPECT Science Operations Centre Interface Requirement Document [RD2], and readers are referred to that for details of mission and science operations. For context and relevance to science management issues discussed here, a list of points pertinent to PROSPECT, as a payload operated aboard Luna 27, is presented below:

- The Mission Operations Centre (MOC) and the Russian Science Operations Centre (SOC) will both be located in Moscow, at NPOL and IKI, respectively. Control of the PROSPECT payload will be via two dedicated terminals at the SOC.
- There will also be a European SOC, with location to be confirmed. A secure connection between the Russian and European SOC will allow remote participation of the Science Team in operations.
- The PROSPECT Ground Reference Model (GRM) is expected to be available to the science and operations teams for testing and validation of science operational sequences.
- Nominal operation on the lunar surface of the Luna-27 mission is expected to last 1-year.
- Lunation-based science operations cycles will accommodate daytime science activities (~7—14 Earth days) as well as spacecraft battery health activities required for preservation during the lunar night.
- PROSPECT science operations are part of the overall Luna 27 science operations strategy and scheduling. PROSPECT will be able to perform its functions as part of daytime activities according to time and power budgets.

During nominal operations, Science Team activities during the lunar night will include processing and analysing data from the previous lunation's operations, and planning PROSPECT operations sequences for the following lunar day.

9 DATA-SHARING POLICY

The ownership, access, use and dissemination of raw and calibrated data resulting from all scientific instruments in the PROSPECT payload shall be governed by Chapter III, Section II, Paragraphs 1 through 3, of the Rules on Information, Data and Intellectual Property, ESA/C/CLV/Rules 5 (Final), as adopted by the ESA Council Resolution on the Rules concerning Information, Data and Intellectual Property, ESA/C/CLV/Res. 4 (Final). The duration of the agreed prior access period, as mentioned in Par. 3(b) of the referenced document, shall be six months after reception and distribution of the data by the SOC. Thereafter, all data products will be made publicly accessible via ESA's Planetary Science Archive (PSA), and may be mirrored on the appropriate Russian science archive.

During the proprietary period, Science Team members will have exclusive use of PROSPECT data. Publication and press release embargoes will be mutually agreed on and respected by the Science Team. As a general rule, publications will only be authorized after the underlying data has been accepted and archived at the PSA, noting that the data will not be made publically accessible until after the proprietary period is completed.

ESA reserves the right to use selected PROSPECT data for the purposes of communications and press releases. ESA will work with the Science Team to coordinate announcement and publication of major science results with communications and media activities.

10 LIST OF ACRONYMS AND ABBREVIATIONS

E3P	European Exploration Envelope Programme
GAP	Gas Analysis Package
GRM	Ground Reference Model
HESAC	Human Spaceflight and Exploration Science Advisory Committee
IKI	Institut Kosmicheskih Issledovanyi ('Space Research Institute')
ISRU	In-Situ Resource Utilisation
LASMA-LR	Laser Mass Spectrometer
MOC	Mission Operations Centre
NPOL	(NPO Lavochkin) 'Lavochkin Research and Production Association'
PROSPECT	Package for Resource Observation and in-Situ Prospecting for Exploration, Commercial exploitation and Transportation
ProSEED	PROSPECT Sample, Excavation and Extraction Drill
ProSPA	PROSPECT Sample Processing and Analysis
PSA	Planetary Science Archive
SIS	Solids Inlet System
SOC	Science Operations Centre
ToR	Terms of Reference