

**SCIENCE PROGRAM OF LUNAR LANDERS OF “LUNA-GLOB” AND “LUNA-RESOURCE” MISSIONS.** I. G. Mitrofanov<sup>1</sup>, L. M. Zelenyi<sup>1</sup>, V. I. Tret'yakov<sup>1</sup> and V. P. Dolgoplov<sup>2</sup>, <sup>1</sup>Institute for Space Research, 117997 Moscow, Russia [imitrofa@space.ru](mailto:imitrofa@space.ru), <sup>2</sup>Lavochkin Science and Industrial Association, Khimki, Russia.

**Introduction:** Two spacecrafts will head to the Moon in 2013 – 2014 time frame (see [1]), which are landing segments of Russian mission “Luna-Glob” and joint Russian/India mission “Luna-Resource”/Chandrayaan-2. In accordance with directions of Roscosmos, these two Lunar Landers (Figure) will have practically identical package of scientific instruments. This decision allows to optimize the development, manufacturing and verification process of these instruments, as well as minimize funds for supporting this work.

Both Landers are designed for polar landing. Lunar Lander of “Luna-Resource” will deliver Indian mini-rover on the lunar surface (see Figure). Lunar Lander of “Luna-Glob” will have boring system onboard. Both Landers have identical Manipulators for delivering samples to on-board analytic instruments.

In this talk the science program of two Landers will be presented, which will be based on capabilities of the selected package of the instruments. This talk will be done on behalf of Science Lead of the project, PIs of selected instruments and payload management in IKI and in Lavochkin association.

**Scientific Task of investigations on the lunar surface:**

(1) To study content of volatiles in the polar regolith, processes volatiles transport and accumulation. To study the content of soil constituting elements for comparison with well-known samples from the middle latitudes. To measure the key isotopic ratios of lunar material.

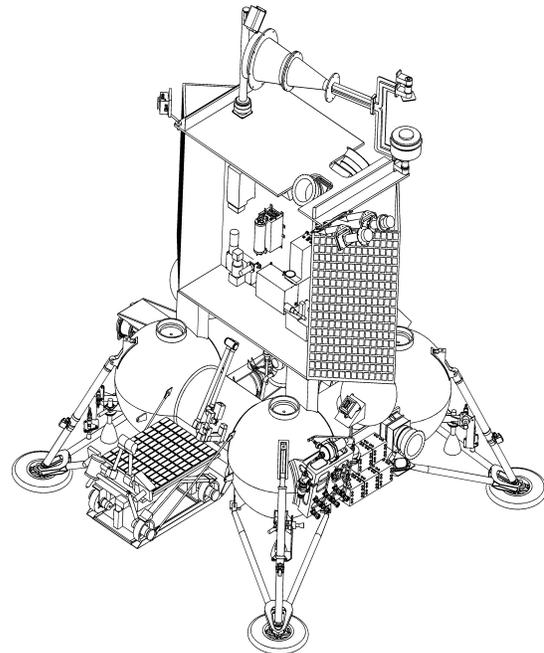
(2) To study lunar exosphere at polar region, including dust and neutrals, and also to investigate the interaction of solar wind with the surface. To study dynamic diurnal processes at lunar poles, including thermal variations of subsurface

**Instrument package of Lunar Landers:**

(1) *Complex of instruments on Manipulator.* Two small instruments will be installed on the Manipulator arm: IR spectrometer *LIS* and TV camera of operational field *TV-KRP*. Total mass of this complex is about 2 kg.

(2) *Complex of instrument for in-situ analysis of regolith samples.* The largest instrument of the mission is *Composition Analysis Complex*, which includes Thermal Differential Analyzer, Gas Chromatograph and Mass Spectrometer and has a mass about 10 kg. Second analytic instrument is Laser Mass Spectrometer (*LASMA-L*) (2.4 kg).

(3) *Instruments for remote sensing and contact measurements.* Imaging Spectrometer with UV excitation (*TV-CS*) will be measure mineralogical composition. *ADRON-L* is instrument for active neutron and gamma-rays analysis of nuclear composition and layering structure, Radiometer-Thermometer (*RAT*) will measure diurnal variations of subsurface temperature down to 1 meter with discreteness of 15 cm and accuracy of 1 degree. In parallel, Contact thermometer *THERMO-L* will measure temperature on the surface and in the hole made by boring system of “Luna-Glob” Lander. Instrument *PmL* will measure dust flux on the lunar surface, and two instruments *LINA* and *ARIES-L* will measure charge particles and neutrals at landing site. Instrument *SEISMO* will monitor seismic activity on the Moon with ability for cooperation in future with another seismic instruments on the lunar surface. Radio beacon unit (*Radio-Mayak*) will radiate constant radio signal for future navigation purposes and high-accuracy radio-metric measurements. Total mass of this complex is about 19 kg.



**Figure.** Concept view of Lunar Lander for “Luna-Resource” mission. Indian mini-rover is also shown onboard this Lander, which is replaced by boring system onboard Lander of “Luna-Glob”.

**Reference:** [1] Zelenyi L. et al. (2010) 42<sup>nd</sup> LPSC.