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Investigation of the volatile species in the lunar soil

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Two spacecraft, Luna-Glob and Luna-Resource of Roskosmos (Russia), will be landing on the lunar south pole in 2016 and 2018, respectively. These spacecraft will carry a complex scientific payload. Part of the scientific instrumentation is the gas-chromatographic mass-spectrometric complex, which combines a Thermal Differential Analyser (TDA), a Gas Chromatograph (GC), and a mass spectrometer (MS). This instrument is dedicated to the investigation of the volatiles in the lunar soil, its chemical composition, the fraction of water and organic species, and the identification of noble gases. Measurement of isotopic composition will be performed of CHON elements (^{13}C/^{12}C, D/H, ^{17}O/^{16}O, ^{18}O/^{16}O, ^{15}N/^{14}N) and noble gases.
We developed a prototype GC-MS instrument for these missions where the GC part is heritage from the Phobos Grunt mission of Roskosmos and the MS part is a complete new development for the Luna missions. We have carried out several GC-MS measurements on calibration gas mixtures that demonstrate that this instrument fulfills the scientific requirements for the Luna missions.