Geophysical Research Abstracts
Vol. 20, EGU2018-4597, 2018
EGU General Assembly 2018

Lunar basin ejecta as the sources of materials within the Luna-Glob landing zone

Mikhail Ivanov (1), Harald Hiesinger (2), Jan-Hendrick Pasckert (2), Carolyn van der Bogert (2), James Head (3), and Eugenia Guseva (1)

(1) Vernadsky Institute, RAS, Moscow, Russia (mikhail_ivanov@brown.edu), (2) Westfälische Wilhelms-Universität Münster, Germany, (3) Brown University, Providence, USA

Landing zone of the Russian Luna-Glob (LG) mission is near the southern portion of the rim of the South Pole-Aitken (SPA) basin. This structure and the other lunar basins are the main sources of materials that form the lunar megaregolith including the LG landing zone. In order to facilitate interpretation of the results of the LG in-situ analyses, it is important to assess the potential contribution of ejecta of the lunar basins to the materials that may be encountered in the landing zone.

A range of models of the material transport and ejecta emplacement have been developed in the past. In our study, we used the theoretical model by [Housen et al., JGR, 88, 2485, 1983], which relates the ejecta thickness, T, and the distance from the impact point, r, by the following formula: T=0.0078*R*(r/R)-2.61, where R is the radius of the crater transient cavity. The results of our model calculations show that the major contributor of materials to the LG landing zone is the SPA basin. The model thickness of its ejecta at the southeast corner of the LG landing zone (the closest to the SPA) is ∼5.5 km. For the most distant, northwest, corner of the LG landing zone the model thickness is ∼1.8 km. The mean model thickness of the SPA ejecta within the LG landing zone is ∼3.2 km, which is ∼96% of the total thickness of ejecta of all lunar basins in this region. All the pre-Nectarian basins have added a small fraction, ∼3.6%, to the total thickness of the basin ejecta within the LG landing zone. Among these basins, Australe appears as the most important source of materials (mean thickness of its ejecta is ∼70 m within the LG landing zone). Both the Nectarian and Imbrian basins have delivered a negligible amount (a few tens of meters) of materials to the LG landing zone.

In the framework of the no-mixing model, ejecta of the post-SPA basins form the upper portion of the composite layer of ejecta of the basins in the landing zone. The crater gardening, however, locally would tend to change the regional stratigraphy of the basin ejecta and an analysis of local geology is needed in order to estimate the most probable sources of material at each specific landing site.

Acknowledgements: The work was supported by the DFG grant HI 1410\12-1 and the RSF grant № 17-17-01149 to MAI and ENG.