[EJ] Evening Poster | P (Space and Planetary Sciences) | P-PS Planetary Sciences

[P-PS05]Lunar science and exploration

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Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
Scientific data sets acquired by not only Japanese lunar mission SELENE (Kaguya), but also other countries' missions, have become new standard for lunar science. Analyses of these data have been providing several new knowledge and changing some hypotheses into the truth of the Moon. In concurrence with these studies, some countries including Japan are planning future lunar missions. In this session, we will discuss scientific results based on newly acquired lunar data, strategy for future missions including SLIM, and theoretical and experimental studies for lunar science.

[PPS05-P05]Compositional Estimation of the lunar olivine exposures

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Keywords:moon, mantle, Mg#

Recent remote-sensing data obtained by the SELENE (Kaguya) Spectral Profiler (SP) found exposures with olivine-rich spectral features, globally distributed on the lunar surface [1]. And it is suggest that these olivine-rich exposures possibly originated from the mantle that is excavated from depth by basin-forming impacts. Previous lunar sample analyses indicate that olivine-rich rocks on the Moon have three major origins: 1) mantle material, 2) olivine-rich volcanic material, and 3) olivine-bearing crustal intrusion (troctorite) [2], but our recent work [3] revealed that roughly 60% of the olivine-rich sites are mantle origin, 5% are volcanic, 30% are crustal, and 5% are of unclear origin based on their iron content, geologic setting, and distribution.

In this study, we tried to estimate Mg# (Mg/(Mg+Fe) in mole per cent) for these olivine-rich spectra to further asses their origin and to discuss Mg# of the lunar material.

About 150 SP reflectance spectra were dentified as having unambiguous olivine-rich absorption features. In this study, we assumed pure olivine composition for all of the identified spectra. We tried to adapt spectral fitting with correlational constraints developed by [4] (for example, the center wavelengths of three olivine absorptions are coupled as observed in the previous laboratory measurement [5]). In this new approach, modal abundance of olivine, pyroxene, and plagioclase were estimated with Mg# of olivine and pyroxene. When we compared the results having smaller errors, Mg# of the volcanic origin is much lower than that of the mantle origin. The estimated Mg# range of the volcanic origin is consistent with the sample analyses of the returned lunar basalt samples [6]. Spectra of the possible crustal intrusion origin tend to have greater fitting errors and need more detailed analyses. Therefore, comparing Mg# between the crustal and mantle origin is currently difficult, though crustal origin spectra with lower fitting errors appear to be lower than that of the possible mantel origin.

References: [1] Yamamoto et al. (2010), *Nature GeoSci.* 3, 533-536. [2] Shearer et al. (2015), *Meteorit.*

Planet. Sci., 50, 1449-1467. [3] Ohtake et al. (2017), *48th LPSC, abstract* #1651. [4] Nimura et al. (2006), *37th LPSC, Abstract* #1600. [5] Sunshine and Pieters (1998), *J. Geophys. Res.*, 103, 13675-13688. [6] Kato et al. *49th LPSC abstract*.