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Correlations between iron distribution and morphology of crater Kepler area

Ya. Lu (1), V. Shevchenko (1)

1. Sternberg State Astronomical Institute, Moscow University, Moscow, Russia

(marsplus@gmail.com / Phone: +7-926-576-9093)

Distribution of the iron abundances on the Moon's surface is important for addressing many lunar science problems. Global measurements of iron abundances on the lunar surface were made using the Lunar Prospector Gamma-Ray Spectrometer and Neutron Spectrometer data. We used the data (spatial resolution $\sim$ 45 km^2 per pixel) [1, 2]. We found large expanses of mare basalt in the western mare regions that have very high iron abundances (22–23 wt. % FeO). These features are unusual for mare soils, which typically contain a significant amount of highlands contamination. It may be demonstrated that the lunar crust formed by a relatively simple magma ocean process. Crater Kepler has depth a few kilometers (not more than 5 or 6 km). The material inside this depression has iron content about 13 – 14 wt. %, that is typical for a number of basalts. According to these data it can be suggested that formation around crater Kepler may be fragment of an old premare basaltic structure. Using 1 km/pixel FeO abundances from Clementine and Lunar Prospector GRS spatial footprint information, authors of [3] have been able to obtain plausible thorium distributions around Kepler crater at a resolution of 1 km/pixel. The materials around Kepler crater appear to be a relatively simple mixing of thorium-rich mafic impact-melt breccias compositions and high-thorium mare basalts. Do lunar mare basalts indeed occur in areas with Fe abundances greater than 25 wt. % in the regolith? What does this apparent limit means both about how mare basalt is formed in the more mixed with local mature soils. As note authors of [4] one is certainly the thickness of the ejecta deposit, which decreases with increasing distance from the crater rim. In the case the process

of the local material and ejecta material mixing will be very intensive. In northwestern and southwestern regions of the studied area we can see two anomalies of iron contents where iron abundances are more than 25 wt. %. We suggest these anomalies are places of the volcanic centers – sources of young basalts. Volcanism in the investigated region was active over a long period of time from 3.93 to 1.2 billion years. Is it source regions and how basalts with different age were erupted to the surface? References: [1] Lawrence D. J et al. (2002) *JGR, 107*, NO. E12, 5130. [2] Lunar Prospector Reduced Spectr. Data. http://pds-geo-sciences.wustl.edu/missions/lunarp/rediced _sciences_ special.html.2006. [3] Lawrence D. J. et al. (2003) *JGR, 108*, NO. E9, 5102. [4] Grier J.A. et al. (2001) *JGR, 106*, NO. E12, 32,847.