THE SURFACE ROUGHNESS OF THE MOON: A QUANTITATIVE METHOD TO REPRESENT IMPACT CRATER MATERIALS' CHARACTERISTIC. J. T. Wang[1,2] and J. Z. Liu[1,2], [1]Center for Lunar and Planetary Sciences, Institute of Geochemistry, Chinese Academy, Guiyang 550081,China (e-mail for first author: wjtao27@163.com), [2]University of Chinese Academy of Science, Beijing 100049, China.

Introduction: On the terrestrial planets, their surface are mainly modified by endogenic and exogenous geological process[1]. So the impact crater materials, resulted from exogenous processes (impact cratering), have a wide distribution on the moon. They reflect the history of the transformation of the lunar crust. It is an important work to identify them when mapping the global lunar geological maps. Unfortunately, they are only described by qualitative language, such as reflectivity and texture, in before USGS lunar geological maps, which will generate bias by our subjectivity. So we want to research which indictor can be used to quantitatively manifest crater materials' feature. There are two most possible indexs, namely surface roughness and the rock block size population, according to the mechanism of crater material forming. But there is a correlation between them. In this article, we only fist concert on the surface roughness. We will introduce several calculation method of surface roughness and give the expected method we may be used in the feature study.

Data and Method: We use data form the laser altimeter LOLA Reduced Data Records which is available from the NASA Planetary Data System. The vertical precision is 10 cm[2]. The formulas of calculating surface roughness are listed as follow.

1) RMS (root mean square) Height[3]

$$\xi = \sqrt{\frac{1}{\mathrm{n}-1}\sum_{i=1}^{n}(z_i - \bar{z})^2}$$

2) RMS Deviation[3]

$$\mathrm{v}(\Delta \mathrm{x}) = \sqrt{\frac{1}{n}\sum_{i=1}^{n}[z(x_i) - z(x_i + \Delta x)]^2}$$

2) Median Differential Slop[4]

$$S_d(L) = \frac{\left(z_{\frac{2}{L}} - z_{-\frac{2}{L}}\right) - \frac{1}{2}(z_L - z_{-L})}{L}$$

4) Interquartile Range of Profile Curvature[5]

$$c = \frac{z_{2/L} + z_{-2/L} - 2z_0}{L^2}$$

Outlooks for the result: We anticipate that the Median Differential Slop and Interquartile Range of Profile Curvature can be identified the inner and outer crater materials respectively. When the surface roughness maps are obtained, the surface roughness of crater materials will be compared along to the crater size, age and different terrain. And then give the range of surface roughness for different crater material. That will improve the scientificity and accuracy of mapping the global lunar geological maps.

References: [1] Kreslavsky M. A., Head J. W. et al. (2013) *Icarus*, 226(1), 52-66. [2] Smith D. E., Zuber M. T. et al. (2016) *Icarus*, 283, 70-91. [3] Shepard M. K., Campbell B. A. et al. (2001) *Journal of Geophysical Research Atmospheres*, 106(E2), 32777-95. [4] Rosenburg M. A., Aharonson O. et al, (2011) *Journal of Geophysical Research Atmospheres*, 116(E2), 1161-72. [5] Kreslavsky M. A., Head J. W. et al, (2014) *Geophysical Research Letters*, 41(23), 8245-51.