ON THE METHODOLOGY OF LUNAR LITHOLOGICAL CLASSIFICATION BASED ON SPECTRAL CHARACTERISTICS AS EXEMPLIFIED FROM APOLLO16 MOON LANDING AREA. Jianping Chen[1] Xiang Wang[1,2], Guangda Wang[1,2] and Meijuan Yao[1], [1] The Institute of High and New Techniques Applied to Lad Resources, China University of Geosciences (Beijing), 29 Xueyuan Road, Beijing, 100083, China [2]Development and Research Center ,China Geological Survey, 45 Fuwai, Beijing 100037,China [3] School of information Engineering, China University of Geosciences(Beijing), 29 Xueyuan Road, Beijing, 100083, China (3s@cugb.edu.cn).

Introduction: Spectral analysis is a effective method to study the geochemical composition of the moon. The latest lunar explorations have obtained multispectral data [1] and hyperspectral data [2, 3]which have a global coverage. However, almost all of the spectral analyses are based on mineral absorption features. Here we carried out a trial to do spectral analysis directly using spectral features of lunar samples.

Data: This article gets the sampling line coordinates by using the NASA planetary data system to provide the Apollo Moon landing point image data sampling route, with the correction of data interferometer of Chang'e-2 interference imaging [4] and India M^3 data [2]. We carry out a data fusion of Chang'e-2 CCD data and India M^3 MAP (Maximum A Posteriori) data. We select Apollo 15, Apollo 16 62231 standard of LSCC measured rock bidirectional reflectance spectrum and M^3, Chang'e-2 to calibrate the cross[5-8].

Methods: We adopt the analysis methods of the Moon rock type spectrum characteristics. Spectral of 87 lithologic classes, 285 pieces of rock samples of the 36 stations covered by the Apollo Moon landing site are collected. We analysise the typical rock absorption reflection characteristics of each sample by using the corrected M^3 data, and establish the typical rock standard spectral library (Figure 1). Bordered by Descartes crater, the studied area surrounding Apollo16 landing area are covered by melted anorthosite (55%) in the north, breccia in the south (with dissipating of pink spinel troctolite) and granitic basalts distributed zonally from north to south. Then results can be obtained by comparing Apollo 623 rock samples, then complete lithology profile around Apollo16 landing sites can be completed.

Results: Based on the spectral of the samples collected, we get the rock distribution in the Apollo 16 region through band matching of all the bands (Figure 2). The main rocks in this region is anorthosite with melt, oriented and glass-coated impact melt rock, glass-coated and high-shocked anorthosite, and vesicular glass with anorthosite clast, while other rocks are distributed sparsely. The distribution of the rock types indicates a complex impact history in this regon. The methods of this paper have implications in understanding the lunar rocks classification and the Moon of magma evolution and the following impact events.

References:

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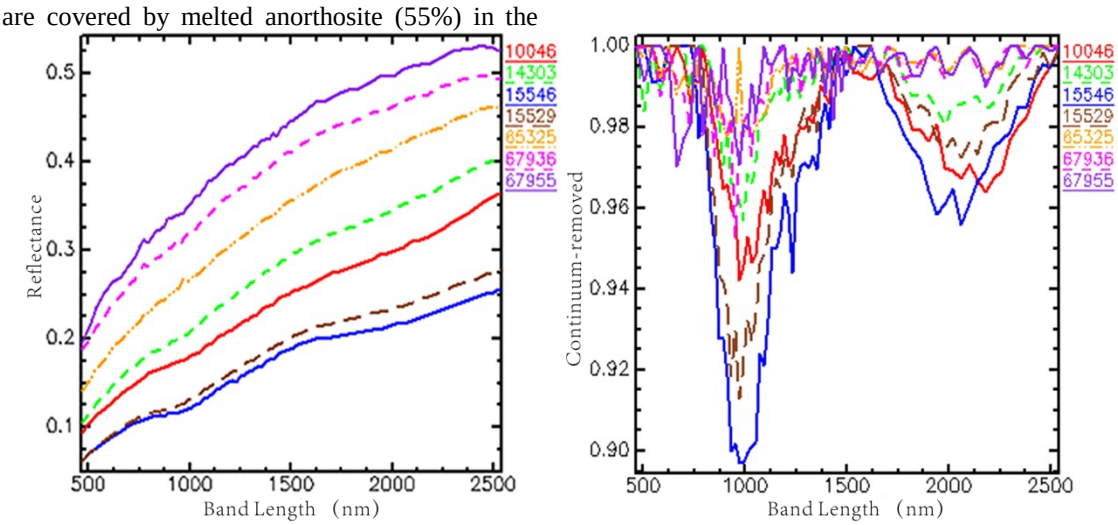

Figure 1 Seven typical rocks image spectrum curve.

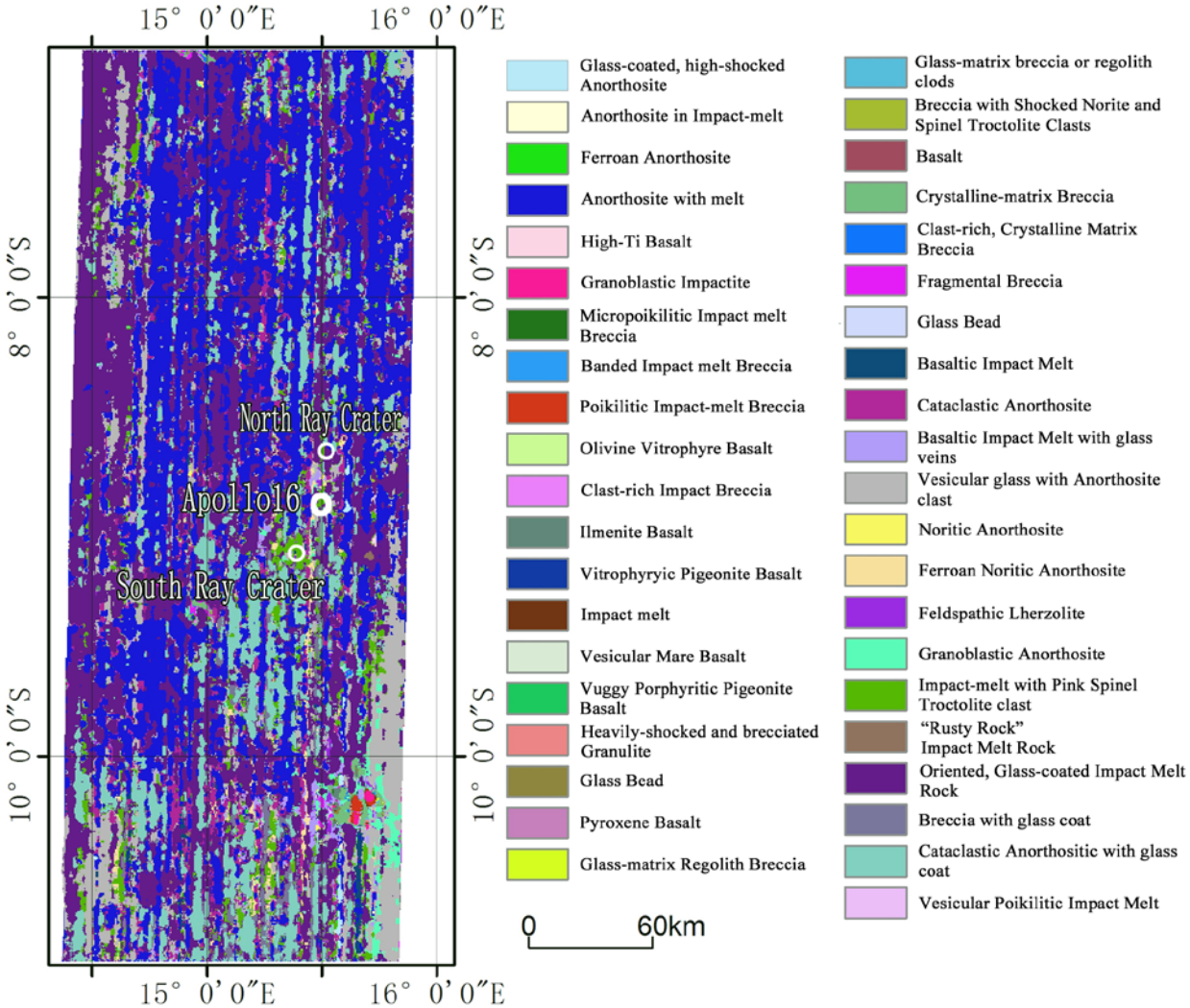

Figure 2 Apollo 16 regional lithology profile