EPSC Abstracts
Vol. 10, EPSC2015-393, 2015
European Planetary Science Congress 2015

Explore Chang 'E Lunar dataset by Interactive Integration of Multiple Imagery Maps with Visual Variables

Xingguo Zeng , Lingli Mu , Wei Yan and Xingye Gao

Key Laboratory of Lunar and Deep Space Exploration, National Astronomical Observatories, Chinese Academy of Sciences, China (zengxg@nao.cas.cn / Fax: +86-010-64888703)

Abstract

In the Chang' E lunar exploration program of China, a lot of lunar exploration dataset were captured. Explore the dataset to find out specific topographic and geologic features would be useful for the lunar scientific research. In this approach, a new method for lunar dataset exploration was developed and applied in the Data Management System of China Lunar exploration Program. The method was taken measure by interactive integration of the lunar imagery maps with map visual variables such as color, brightness, and pattern et.al. With this method, topographic or geologic information would be enhanced and could be detected more convenient for the lunar research scientist.

1. Introduction

Discovering the lunar topographic, geological tectonic such as boundary or layer information is of great value to lunar research. However, there are still many difficulties in extracting the complex lunar tectonic information with available lunar data exploration method. Lunar imagery map is one of the major visualization media for the lunar scientist to acknowledge the lunar dataset to fetch the information, and map visual variables defined by Bertin in reference [1] are the vital elements of the imagery map for representing the lunar information.

In this approach, firstly, the general information about the Chang' E lunar data is discussed, after that, a lunar data exploration method by interactive integration of visual variables in imagery map based on multi-source lunar data mainly from Chang 'E(CE) dataset is introduced, the following paragraph is about the application of the method, and the last part is a short summary and conclusion.

2. Data and Method

2.1 CE lunar dataset

China started the Change'E(CE) lunar exploration program in 2007, and until now, there has been 3 missions which include CE1 in 2007, CE2 in 2009 and CE3 in 2013, the captured data were used in creating the global topographic map and imagery map of the moon. Tab. 1 shows some detail information about the captured exploration data.

Table 1: CE dataset

Space craft	Date	Dataset
CE1	2007.11	Global 120m DOM, 500m DEM
CE2	2010.10	Global 7m DOM,7m DEM
CE3	2013.12	High resolution images, geologic radar data of the CE3 landing site

Besides the CE lunar data, we also collected other lunar exploration data originated from NASA and ESA, such as the global lunar geologic map et.al.

2.2 Method

The method generally takes 3 steps to explore the lunar dataset.

First, get the multi-sources data and create to different imagery map such as shaded relief map, DOM map et.al;

Second, change the imagery maps into different channels in RGB, CMYK, or CIELab, overlay and integrate the channels into a new map;

Third, adapt the weight of each channel from different maps, interactive change the map visual variables such as color, brightness, pattern, transparency et.al, to enhance the hidden topographic or geologic features.

3. Application

The method was implemented in the detection of the complex crater edge of the CE3 landing area, by interactive integration of Shaded Relief Map, DOM map, the shape of the complex crater was extracted, see Fig. 1.

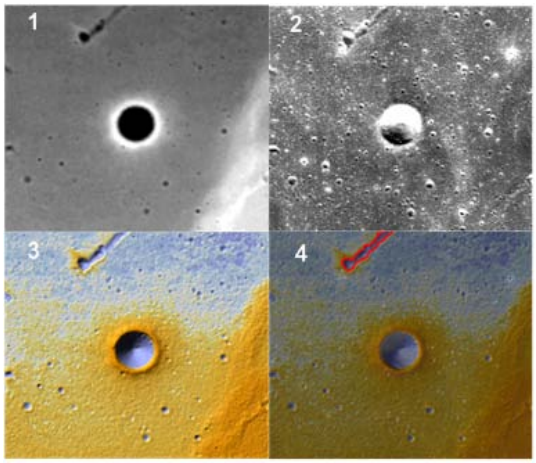

Figure 1: Complex crater edge detection.

4. Summary and Conclusions

An initial method by interactive integration of the lunar maps with map visual variables for exploring the CE lunar dataset to detect the topographic or geologic data was discussed in this approach. The method was implemented in the work of detect the complex shape of the crater and some other work and the experiment result show that the method was applicable. In the future study, we would pay more attention to find more visual variables and get the parameters for integration.

Acknowledgements

This approached was Supported by the Young Researcher Grant of National Astronomical Observatories, Chinese Academy of Sciences, the Lunar dataset for experiment were provided by Laboratory of Lunar and Deep Space Exploration of China, thanks for the scientist and engineer of the lab.

References

[1] BERTIN J. Sémiologie graphique. Les diagrammes, les réseaux, les cartes [M]. Paris: Mouton, 1967.

[2] Li C L, Liu J J, Ren X, et al. The global image of the moon by the Chang'E-1:Data processing and lunar cartography[J], Sci China Earth Sci, 2010 (3): 294-306.

[3] Mu L, Li C, Liu J, et al. A New Mapping Method for the Moon With the Chang'E-1 Data.The 26 INTERNATIONAL CARTOGRAPHIC CONFERENCE, Germany,2013