

CHANG'E-1 CCD IMAGE PROCESSING AND DATABASE CONSTRUCTION. Y. S. Dong, D. H. Huang, L. Xiao, J. Huang and J. T. Liu, Faculty of Earth Sciences, China University of Geosciences, Wuhan, 430074 China (ysdong@cug.edu.cn)

Introduction: The Chang'E -1 orbiter had successfully operated for more than 1 year since October 24, 2007[1]. A three-line array CCD stereo camera was designed to get the nadir, forward, and backward view of the moon[2]. As the spacecraft moves, three two-dimensional lunar surface maps will be acquired. After processed, a stereo image of the lunar surface could be obtained. The image spatial resolution of stereo camera is about 120 m and the swath width is about 60 km. These CCD images can be used to map the whole surface of lunar for topographical analysis, selenological research, etc.

The exploration data with different levels had been distributed to registered research institutes and universities after the pre-processing by the National Astronomical Observatories of China (NAOC)[3]. These distributed CCD level 2 images have about 40,000 lines along the scanning direction, and each line including 512 pixels [4,5]. These images can't be directly used in the further research, which makes it necessary to be reprocessed into acceptable format for the researchers. We reprocessed the image with Matlab and ENVI, converted the mosaic image to the geotif format and ISIS cub format. Based on our work, a preliminary database for the Chang'E-1 CCD images has been designed, which would be an importance part in the data share, not only in the university, but also for the internet user in the future.

Methodology:

Data processing. As the traditional remote sensing images, the processing for the orbital images including four parts: 1) data export, 2) radiometric calibration, 3) geometric correction and 4) images mosaicking.

For the first step, a Matlab script is used to read all the necessary information, including geometric information, acquired time and the imagery data, from the data file, which was in the Planetary Data System (PDS) format. In the next step, since we have no necessary information about the satellite, a simple radiometric model of the moon was applied to the level2 images to eliminate the effecting of attitude and solar elevation angle. Specially, the 'jump' of the pixel value on the scanning direction has been identified (Figure 1), and the whole image could be adjusted to the continual radiometric condition. In the following steps, the locations of each pixel have been calculated based on the longitude and latitude of the first and last pixel in each line. Finally, the data between 70°N to 70°S has been resampled in the Sinusoidal projection; the

data in polar region has been processed to Polar Stereographic projection. ISIS package and ENVI software were used to pattern matching, wrapping, equalizing and mosaicking the neighbor images.

Database construction. The database of the Chang'E -1 CCD images had been designed. All the received data from NAOC will be storage in this database. These re-processed images also will be storage in it with different projections and formats.

Web-based interface also makes easy use of database and powerful search facility. More functions of the web-based interface are also planned.

Result and Summary: The Chang'E-1 CCD image provides a new dataset for lunar research. A preliminary result were shown in figure 2. More than ten images were reprocessed from Level 2C data. Another mosaic image had been used to study the geology and age frame in Sinus Iridum.

In this study, data processing methodology and flow had been approved. This experience will apply on the Chang'E-2 data processing and following works.

References:

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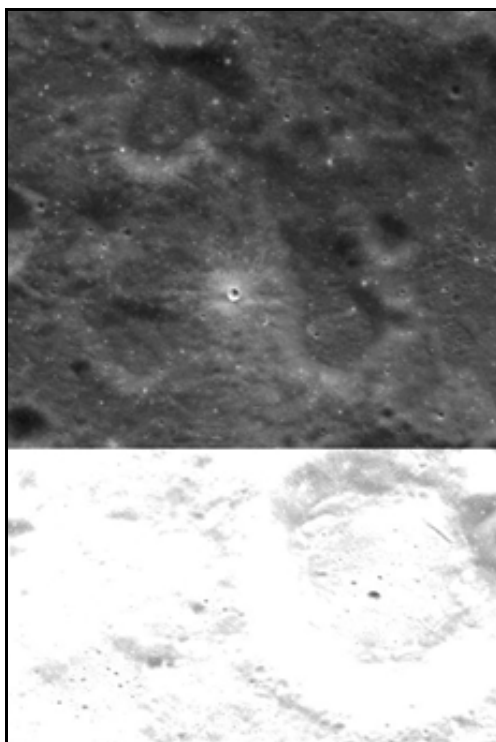


Figure 1. The value 'jump' in the Chang'E-1 CCD image

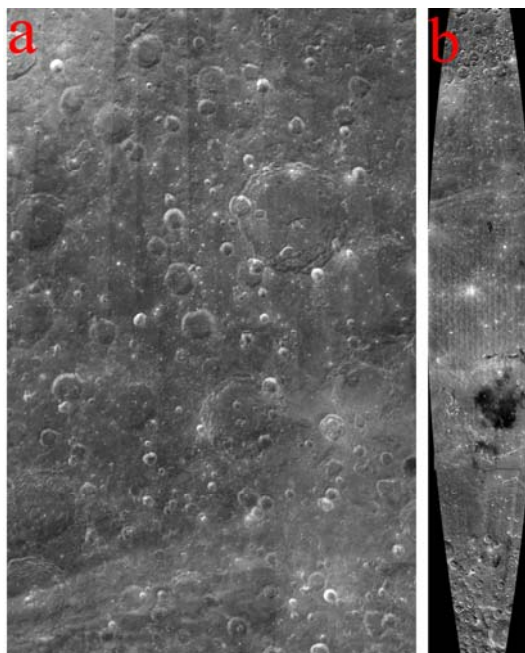


Figure 2. Mosaic image of the Chang'E-1 CCD data.
(a) The detail of the mosaic images, (b) The mosaic image in Sinusoidal projection.