RESEARTH OF GEOLOGICAL EVOLUTION OF SINUS IRIDUM AREA OF THE MOON BASED ON THE CHANG'E-I DATA OF CHINA. K. Y. Han[1] and X. Z. Ding[2], [1]Institute of Geology, Chinese Academy of Geological Sciences, Baiwanzhuang Road, Beijing 100037, China, kunyinghan@163.com, [2]Institute of Geology, Chinese Academy of Geological Sciences, Baiwanzhuang Road, Beijing 100037, China, xiaozhongding@sina.com.

Based on the CCD image, Imaging Interferometer (IIM) data and DEM data of the Chang'E-I lunar exploration project of China in 2007, we compiled a tentative geological map at1:2.5 M of the Sinus Iridum area of the Moon, set up a spatial database and integrated analysis of chronology and lunar evolution history.

The researth area is located at the northwestern part of the north hemisphere on the nearside of the Moon, and the center longitude and latitude is 30 °–65 °N, 0 °–60 °W. According to elevation difference and rocky distribution, three types of regional geological landforms are defined: (1) Mare basalt plains, including mainly Sinus Iridum, Mare Imbrium, Oceanus Procellarum, Sinus Roris and Mare Frigoris; (2) Crater accumulative hills, including mainly the region from Montes Jura in the northwest of Sinus Iridum in the central part of research area to Montes Alpes in the east; (3) Terra plagioclase plateaus, which mainly refers to the terra region in the northern area. Besides, there are more large impact craters in this area, such as craters Plato, Harplus, Sharp, Mairan, Bianchini, South, J. Herschel and Fontenelle, which constitute the major circular geological structure of the mapping area. The image synthesized with the 2c-class data of Chang'E-I CCD image was used as the base map for the geological mapping. The spatial resolution of the image is 120m. Multi-stage geological events took place in the preImbrian, Imbrian, Eratosthenian and Copernican periods in the study area. The division of strata or geological bodies reflects the topographical features (crater, et al), types of accumulative materials (ejecta, et al), relations of each other's coverage and spectral features of different regions. The geological times of strata and geological bodies include the pre-Imbrian (PI), consisting of the pre-Nectarian(PN) and the Nectarian (N); the Imbrian (I), consisting of the Early Imbrian (I_1) and Late Imbrian (I_2); the Eratosthenian (E) and the Copernican(C). This typically summarizes the evolutional history of the lunar regional geology.

As regards the age of Mare Imbrian, Liu et al(2010) performed high-precision zircon SHRIMP dating for the samples of impact melting debris in front of the southern part of the study area obtained by Apollo 12, 14 and lunar meteorites SaU169, and accurately ascertained the ages of some early events on the Moon. For instance, the age of strong impact event of Imbrian Period is 3.92 Ga. This conclusion was commonly accepted at the 32nd Lunar and Planetary Science Conference in Huston in 2010, so as to change the traditional cognition among scientists in the world that this event occurred at 3.85 Ga, thus making a significant contribution to the study of the early lunar evolution history (Liu et al., 2011). In the same way, SIMS Pb-Pb dating was conducted on zircons in impact melt breccia and fine-grained matrix of the most K-rich KREEP of lunar meteorite SaU 169 by Lin et al. (2012), The comprehensive petrographic, mineral chemistry and SIMS study analyses consider the main age peak at 3921±3 Ma and the smaller one at 4016±6 Ma represent the latter crystallizing age of KREEP magma and the age of a catastrophic shock event in Nectarian. As a sequence, this age (39.2 Ma) was adopted as the lower limit of the Imbrian Period for the geological mapping in this study.

Four evolution stages can be defined for the regional tectonics in the Sinus Iridum area according to the features and distribution of different faults, as well as the covering relationships of crater accumulative materials: (1)Formation stage of pre-Imbrian ring faults; (2)Formation stage of Imbrian regional effusive faults; (3)Formation stage of Eratosthenian regional faults and crater ring faults; (4) Formation stage of Copernican crater ring faults.

References

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