NEW MODEL AGES OF MARE MATERIAL IN SINUS IRIDUM, MOON. J. Huang, L. Xiao, J. Yang and Y. S. Dong. Faculty of Earth Sciences, China University of Geosciences, Wuhan 430074 China (longxiao@cug.edu.cn)

Introduction: Sinus Iridum (centered at 44.10°N, 31.50°W, with a diameter of 236km) lies northwest of Mare Imbrium, and its partly exposed rim crest is the Montes Jura. The Iridum crater is suggested to form by a Imbrium age impact event, and its materials bury terrain of an outer Imbrium basin ring [1]. It is one of the most interesting places on the nearside of the moon. There are extensive lava landforms in and around Sinus Iridum, such as ridges and rilles, which can provide important information of the magmatic activities. It is also a KREEP-rich terrain and would be a good candidate landing site for future lunar mission. Therefore, the geology of Sinus Iridum should be carefully studied, and age frame of this area should be set up first.

Previous geologic mapping of Sinus Iridum was done by Schaber (1969) from Lunar Orbiter(LO) images. In his report, mare materials in it and its nearby Imbrium basin were divided into four units (Elm, Im3, Im2, Im1) by stratigraphic superposition, albedo, and crater density [1]. However, the model ages of flow units in this region was studied by crater degradation [2] and crater size-frequency distribution (CSFD) using LO images [3]. Here we present new absolute model ages by CSFD method derived from data of Chinese first lunar orbiter Chang'E-1 (CE-1).

Methodology: The panchromatic image (500~750nm) of Sinus Iridum (Figure 1) is created from CE-1 level 2C CCD Camera data with Mercator's Projection, and the spatial resolution is about 120m/pix. We input the image into a software titled "SAOImage ds9" to draw terrain boundaries, note craters and record their diameters.

Previous study shows unit sequence from old to young is Im1, Im2, Im3, Elm. The former three are mare materials with an Imbrium age, and the last one is suggested to be Eratosthenian [1]. We draw the unit boundaries according to previous geologic map (Figure 1), and record diameters of craters (diameter>1.2km). Finally, the model ages are obtained by a software titled "Craterstats" [3], which adopts Chronology function in Neukum et al. (2001) [4] and Production function in Ivanov A. (2001) [5].

Results: For unit Im1, Im2, Im3, and Elm, the mode ages are 3.08/3.61Ga, 3.65Ga, 3.59Ga, and 3.34Ga respectively (Figure 2). So unit Elm is not Eratosthenian, but upper Imbrian. In addition, the three unit Im1, Im2, and Im3 are almost the same age within acceptable errors, and there seems to be another younger unit above Im3, but its albedo is higher than unit Elm.

Discussion: This area contains what may be the best exposures of mare flow structures on the Moon [1]. Abundant mare ridges and rilles can be identified. One of the longest rilles alone the northeast boundary of Sinus Iridum extends over 100km. There are about 50 mare ridges identified, some extends nearly 100km, and some prefer to occur alone while the others prefer to get together. The prominent features prove that the mare material are doubtless of volcanic origin.

There is no obvious boundaries between unit Im1, Im2, and Im3, except for albedo difference. With combination of the model ages, we prefer two units in this region, that is unit Im1 for the old unit Im1 & Im2 & Im3, and unit Im2 for the old unit Elm. Unit Im1, with higher albedo, has dozens of clustered satellitic crater material (Ccsc) patches (most are secondary craters) and plenty of ray materials (fresh materials and smaller craters like Ccsc). Rilles are often found in this unit. In unit Im2, mare ridges are more clear and often extends longer than those in Im1.

So we infer unit Im1 occurred in the lava filling event after Mare Imbrium and Sinus Iridum impact event. After that, there was another prominent magmatic event at about 3.34Ga, that is unit Im2. Superposed on unit Im2, there might be another one at about 3.08Ga.

The absolute ages by CSFD [3] are different from this study, and they are younger than ours, both for unit Im1 and Im2. We interpret the difference is due to: 1) regions for their CSFD measurements are smaller due to higher spatial resolution of LO images; 2) definition of crater diameter is not quite clear.

To better understand the geological information of the area, we are undertaking detailed geological mapping using higher quality image and spectral data, such as TC data of Selene-1, and IIM data of CE-1.

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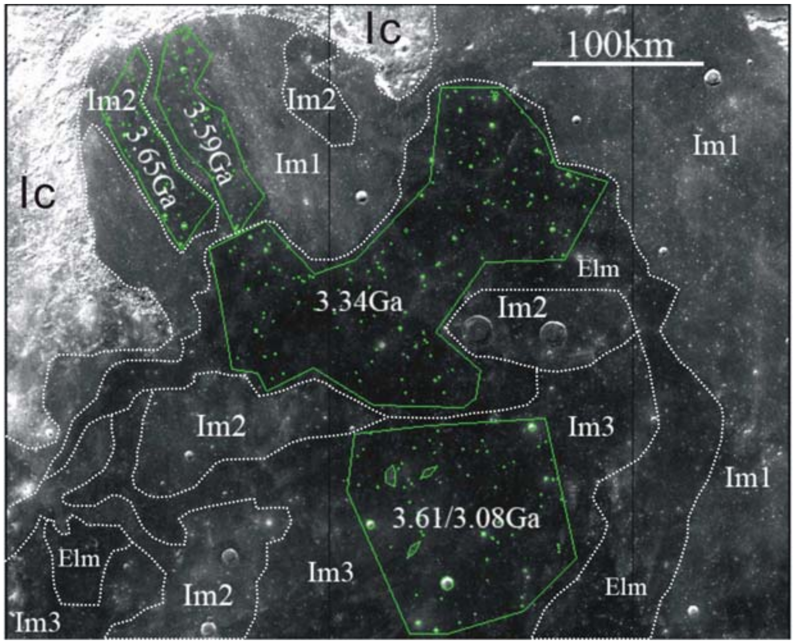

Fig.1 Panchromatic image of Sinus Iridum with geologic boundaries (white dash line, simplified after Schaber (1969)) & CSFD boundaries (solid green line) & model ages. Im1, Im2 and Im3 are Imbrian mare materials; Elm is Eratosthenian mare material; Ic are Imbrian crater material. The level 2C data of CE-1 CCD Camera is provided by National Defense Science and Technology Industrial Development Bureau Lunar Exploration Project Center

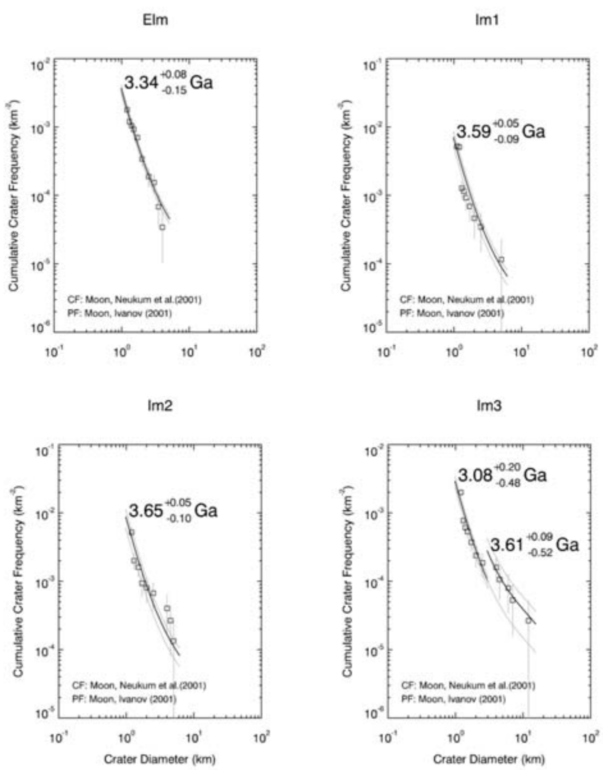

Fig.2 CSFD model ages for the selected regions of Sinus Iridum and nearby Imprium basin