GLOBAL LUNAR DOME IDENTIFICATION AND ANALYSIS USING CHANG'E-2 DATA. X.G. Zeng[1], W. Zuo[1], C.L. Li[1],Y.L. Zou[1], Z.B. Zhang[1] and G.L. Zhang[1], [1]Key Laboratory of Lunar and Deep Space Exploration, National Astronomical Observatories, Chinese Academy of Sciences, Beijing 100012, China. zengxg@nao.cas.cn, zuowei@nao.cas.cn, licl@nao.cas.cn,zouyl@nao.cas.cn, zhangzb@nao.cas.cn and zhanggl@nao.cas.cn

Introduction: Lunar dome is a domical like structure mainly distributed in the lunar mare, and many lunar scientists think that it is the result of the lunar volcanism several billion years ago[1]. Traditionally, most lunar domes are identified by the scientists from exploring the lunar images or topographic maps in very low sun elevation angle with manual method, which has found out some lunar domes in specific local areas. However, it is hard to find new lunar domes from the global lunar mare only with manual method, because in that case, much larger volume lunar data is needed and such work is too time consumed. To solve this problem, in this approach, we designed a automatic method considering the morphologic characteristics to identify the lunar dome with Chang'E2(CE-2) lunar global data, after that, this method is implemented in the real work and the initial identified result with properties is analyzed. The method and result of this approach could be a guide for the lunar dome identification and also might be useful for the lunar vocalism study.

Data and Method: DOM and DEM from CE-2 global lunar data with a resolution of 7m is used in the work of lunar dome identification[2]. Based on the data, we calculated the morphologic properties of the lunar domes provided by the former research[3], and get the initial parameters for lunar dome identification, such as, the diameter of the domes is ranged from 3m to 25km; the average slope of dome is about 5 degree, and normally lower than 10 degree; the shape of lunar dome is similar to circular or eclipse, the circular degree is normally less than 1.57 degree; the height of lunar dome is normally lower than 1km; the profile of a lunar dome is presented as positive land form, pan-cake like and sometimes vent appears in the center place; the height/diameter is normally no more than 0.07. After that, topographic contours on with the CE-2 DEM data are generated, by selecting the closure contours and neglecting those disclosures, irregular ones and craters; input the initial morphologic parameters then the possible lunar domes are roughly selected.

Initial Result: With the CE-2 data and dome detecting method, 57 new lunar domes were found from the global lunar mare, and 7 of which are found to be located on the lunar far-side. After that, the new found lunar domes and the available lunar domes were named and located on a CE-2 global lunar map, the spatial distribution of the lunar domes are shown as Figure 1.

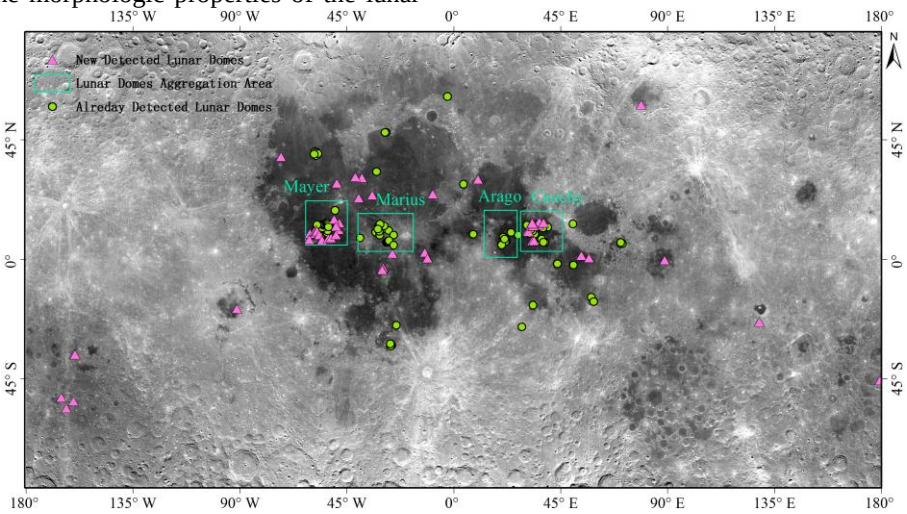

Figure 1 Result of the detected lunar domes

References:

[1] Lena R, Phillips J, Wohler C, et al.(2013) Lunar Domes[M]. Springer Praxis Books.

[2] Li C.L. et.al.,Chang'E 2 High Resolution Lunar Imagery Atlas[M],(2012), China Cartographic Publishing House.

[3] Wohler, C., et al. (2006), A combined spectrophotometric and morphometric study of the lunar mare dome fields near Cauchy, Arago, Hortensius, and Milichius. Icarus. 183(2): p. 237-264.