



Lunar Mare Dome Identification and Morphologic Properties Analysis Using Chang'E-2 Lunar Data

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Identify the lunar mare dome and study the morphologic properties to know more knowledge about the structure will enhance the study of lunar volcanism. Traditionally, most lunar domes are identified by the scientists from exploring the images or topographic maps of the lunar surface with manual method, which already found out a bunch of lunar domes in specific local areas. For the purpose of getting more knowledge about global lunar dome, it is necessary to identify the lunar dome from the global lunar mare. However, it is hard to find new lunar domes from the global lunar mare only with manual method, since in that case, the large volume lunar data is needed and such work is too time consumed, so that, there are few researchers who have indentified and study the properties of the lunar dome from the perspective of lunar global scale. To solve the problem mentioned above, in this approach, CE-2 DEM, DOM data in 7m resolution were used in the detection and morphologic analysis of the lunar domes and a dome detection method based on topographic characteristics were developed. We firstly designed a method considering the morphologic characteristics to identify the lunar dome with Chang'E2(CE-2) lunar global data, after that, the initial identified result with properties is analyzed, and finally, by integrating the result with lunar domes already found by former researchers, we made some maps about the spatial distribution of the global lunar mare dome.

With the CE-2 data covering the former lunar domes and the new found lunar domes, we surveyed and calculated some morphologic properties, and found that, lunar domes are circular or eclipse shaped, obviously different from background in topography, which has a average diameter between 3-25km, circular degree less than 1.54, with a average slope less than 10° , average height less than 650m and diameter/height less than 0.065. Almost all of the lunar domes are located in the extent of $58^\circ\text{N}\sim 54^\circ\text{S}$, $167^\circ\text{W}\sim 180^\circ\text{E}$, and nearly all lunar mares have lunar domes, the majority of the lunar domes are near the lunar equator between the latitude of 30°N to 20°S , which represents a aggregation phenomenon, and nearly all of them are in the geologic layer of Eratosthenian System, Imbrium System and Nectarian System.