Lunar Exploration (3)
Lunar Analysis & Simulation (4)

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RESEARCH ON THE DISTRIBUTION OF WATER ICE BASED ON THE SVD METHOD USING CHANG'E-2 MRM DATA

Abstract

Interest in the Moon has been steadily raising since the beginning of the twenty-first century with the launch of Lunar Prospector, Clementine, LRO, Selene detector, Chang'E-1/Chang'E-2, and Chandrayaan-1, particularly on the lunar polar regions. The water ice is one of hot topics in current lunar science research. The existence of water ice in the regolith can apparently change its dielectric features. Therefore, in this study, the brightness temperature of microwave radiometer would be used to detect the water ice. The different time and frequency brightness temperature data from microwave radiometer were obtained by angle correction and kriging interpolation. The frequency of 19 and 37 GHz are chosen to detect the water ice by the corresponding detection depths. Then abnormal brightness temperature changes of 37 and 19 GHz channels were analyzed based on SVD model to look for some areas which has the low correlation with each other. Furthermore, we establish the mathematical model to study the polar illumination condition by DEM data. The permanently shadow regions mainly located in high latitudes with the relatively large and deep impact crater. The result shows that the quantity of permanently shadow in South Pole is more than North Pole. And the areas both in the Area of low correlation coefficient and the permanent shadow regions which is detected by DEM data may contain water ice. Based on SVD model and lunar illumination model, the areas with water ice may be found.