

An interpretation of formation process of the lunar highland crust using Th distribution map and crustal thickness data

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On the lunar highland area, correlation between spatial patterns of the surface Thorium abundance measured by SELENE gamma-ray spectrometer and the crustal thickness from GRAIL gravity field and LRO topography was investigated. Although several local minima areas exist in Thorium abundance map, each of these minima is not as significant as the others. On the other hand, in crustal thickness map, one of the areas has significantly large magnitude compared to others. To explain the discrepancy, we propose a two-stage process scenario of the crustal formation, i.e., formation of plural thin plateaux on the surface of the Moon, which correspond to the observed surface Thorium distribution, and following development to enlarge lunar dichotomic feature by downward growth of the plateaux. Our interpretation for the discrepancy is consistent with the previously proposed crustal formation scenarios that the dichotomy was developed during the crustal formation process.

Keywords: Thorium abundance, lunar crustal thickness, SELENE, GRAIL, lunar crustal formation