

Subsurface structures beneath Reiner Gamma on the Moon: constraint from the Kaguya Lunar Radar Sounder

Norihiro Nakamura[1]; Atsushi Kumamoto[2]; Yuichi Bando[3]

[1] Earth Science, Tohoku Univ; [2] Dept. Geophys, Tohoku Univ.; [3] Geology, Tohoku Univ.

Reiner Gamma is a sinuous feature in Oceanus Procellarum; it has a higher reflectance of the visible wavelength than the surrounding flat mare basalt, and displays a high crustal magnetic field, called 'mini-magnetosphere'. Contradictory depths of magnetic source bodies in the lunar crust have been proposed as either shallow origin or deep one of Reiner Gamma. If a shallow highly magnetized ejecta layer existed beneath the Reiner Gamma formation, a subsurface lithological boundary between the denser mare basalt and the less dense ejecta blanket would be expected. This presentation examines subsurface stratifications using the Lunar Radar Sounder (LRS) onboard the Kaguya spacecraft. Taking into account the LRS-determined dielectric constants, the influence of surface clutter, and the energy loss of the LRS radar pulses in the high frequency band (5 MHz), no evidence was found of subsurface boundaries down to a depth of 1000-m at Reiner Gamma. Given the LRS range resolution of 75-m, the source of the magnetic anomaly is considered to be either strongly magnetized thin breccia layers at depths shallower than 75-m, or less magnetized thick layers at depths deeper than 1000-m. This study was also able to determine the range of dielectric constants for surface regolith and mare basalt.