Extremely plagioclase-rich lunar upper crust: Results of the Multiband Imager for the SELENE mission

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The multiband imager (MI) is an instrument developed for the SELENE (KAGUYA) mission. SELENE was launched by an H-IIA Launch Vehicle on September 14, 2007. The MI is a high-resolution multiband imaging camera consisting of visible and near-infrared sensors. The spatial resolution of visible bands is 20 m, and that of near infrared bands is 62 m from the 100 km SELENE orbital altitude. In this study we estimated the composition of the lunar crust by analyzing MI data at basin rings, central peaks and crater walls.

We first conduct spatial and spectral analyses of 70 locations using MI images so that selected locations are randomly distributed across the moon according to its size, age and reflectance. We then chose fresh and regolith free (mixing free) areas based on estimates of low degree of optical maturity.

The results indicate that extremely feldspathic rocks with nearly 100% crystalline Fe-bearing plagioclase are exposed throughout the lunar highland. The original depth of these extremely feldspathic rocks ranges from 4 to 30 km.