Incompatible elements in and near Procellarum KREEP Terrane

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A Ge detector with the excellent energy resolution onboard the SELENE (Kaguya) spacecraft was used for the first time as a main detector of Kaguya Gamma Ray Spectrometer (KGRS) in order to observe elemental abundances on the lunar surface[1]. The KGRS precisely identified and globally mapped abundances of major elements and natural radionuclides such as K, Th and U on the lunar surface, providing precious data for understanding of lunar formation and evolution as well as the future utilization of lunar resources. Those nuclides are concentrated around the Procellarum KREEP Terrane (PKT) and intermediately concentrated in South Pole–Aitken Terrane. The PKT region must have been largely resurfaced by geologic activity such as the Imbrium impact event and subsequent emplacement of voluminous mare-forming lavas. Measurements of incompatible elements such as K, Th, and U are important, because they mark the spatial distribution of KREEP materials, which is thought to have formed in a relatively late stage during the evolution of the Moon [2]. An estimation of the surface distribution of rare earth elements (REEs) becomes possible through KGRS measurements of natural radionuclides. We compare the abundance distribution in the PKT between radioactive elements observed by KGRS and the REEs of Gd and Sm derived by Elphic et al. [3]. The features of distinct abundances of incompatible elements and the relationship between natural radioactive elements and the REEs in the rocks and soils in the PKT are discussed.
Keywords; Moon, Gamma Ray Spectrometer, SELENE, incompatible element.

References

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