# Lunar surface magnetic field intensity in the solar wind inferred from electron reflectometry

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The Moon is classified as a nonmagnetized celestial body that does not hold a global, intrinsic magnetic field and atmosphere, and most of the dayside lunar surface is bombarded by the solar wind plasma. Therefore, most of the solar wind collides with the lunar surface and is absorbed. Meanwhile, some regions called magnetic anomaly of the lunar surface are locally shielded from the solar wind by magnetic fields of crustal origin. The interaction between the lunar crustal magnetic fields and the solar wind is an important topic relevant to the plasma environment around the Moon. Research on the interaction between the solar wind and the strong magnetic anomaly has been advanced so far, but it remains unclear how the magnetic field strength on the dayside lunar surface varies globally.

The global distribution of crustal magnetic field strength has been investigated by electron reflectometry, which remotely infers the surface magnetic field strength from the loss cone angle of reflected electrons from the lunar crustal magnetic field, using the magnetic mirror effect of the moon periphery electron. As the aim of the conventional electron reflectometry is measurements of the strength of the lunar crustal magnetic field itself, a standard practice is to use data obtained on the night side of the Moon and within the terrestrial magnetotail lobes with less influence of the solar wind plasma. Here we apply the electron reflectometry to the data obtained on the day side of the Moon in the solar wind, thereby investigating variations of the surface magnetic field strength caused by the interaction with the solar wind. By applying this method to the data of Kaguya when exposed to the solar wind on the lunar day side, the magnetic field became stronger globally.

We utilized data obtained by the electron spectrum analyzers (MAP-PACE-ESA) and magnetometer (MAP-LMAG) on board Kaguya. We investigated a surface magnetic field intensity by analyzing electron pitch angle distributions of each different energy band measured when the day side lunar surface was exposed to the solar wind. As a result, we revealed energy dependence on the pitch angle distribution of electrons. This suggests that the cutoff pitch angles are influenced by the potential difference between the lunar surface and the satellite and the electric field generated by decoupling of electrons and ions. We will discuss the solar wind dynamic pressure control of the lunar surface magnetic field intensity with energy dependence.

 