

## Electron density distribution around the lunar wake derived from KAGUYA LRS/WFC observation

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KAGUYA is a Japanese moon orbiter launched in September, 2007. The waveform capture (WFC) is one of the subsystems of the Lunar Radar Sounder (LRS) onboard KAGUYA to measure plasma waves and radio emissions around the moon. It measures two components of electric wave signals detected by the two orthogonal 30 m tip-to-tip antennas. The WFC consists of a fast sweep frequency analyzer(WFC-H) covering the frequency range from 1kHz to 1MHz and a waveform receiver(WFC-L) in the frequency range from 100Hz to 100kHz.

The observation of WFC-H was performed almost 24 hours a day at an altitude of 100km around the moon. It is found that electron plasma waves are almost constantly observed in the frequency range of 10-20 kHz in the sun-lit region while the frequency suddenly decreases in the shade (lunar wake) region when KAGUYA is located in the solar wind. We derived electron density from the frequency of electron plasma wave, which corresponds to the local plasma frequency, using the WFC-H spectrum data. Then, we statistically investigated electron density profile in the solar wind around the moon referring to the direction of the sun.

It was found that electron plasma frequency has varieties of frequency fluctuation at the boundary between sun-lit and shade region depending on the orbital condition of KAGUYA. Furthermore, we also found that the intensity of electron plasma wave sometimes suddenly weakened even in the sun-lit region. We studied the relationship between electron density profile and direction of interplanetary magnetic field (IMF) simultaneously observed by LRS/WFC and MAP/LMAG, respectively. We demonstrate that the variation of electron density strongly depends on the lunar wake structure and the direction of the IMF. It was also found that the intensity of electron plasma wave in the sun-lit region also depends on the direction of the IMF.