

## Altitude dependence of electron density around the moon 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 WFC-H mode covering the frequency range from 1kHz to 1MHz and WFC-L mode in the frequency range from 100Hz to 100kHz.

The WFC-H was operated almost 24 hours a day at an altitude of 100 km around the moon during the nominal operation period of KAGUYA. Electron plasma wave was almost constantly observed in the frequency range of 10-30 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. As the frequency of electron plasma wave corresponds to the local plasma frequency ( $f_p$ ), we have derived electron density along the trajectory of KAGUYA using spectrum data from WFC-H.

On the other hand, KAGUYA was descended to the 50 km altitude in the beginning of February, 2009, and was descended again to 10-30km in lower altitude (perilune) in the middle of April, 2009 in the extended mission. In the present paper, we also derived electron density during the extended mission. Comparing these electron density profiles with those obtained by ACE spacecraft, we studied the altitude dependence of electron density around the moon.

Keywords: KAGUYA, waveform capture, electron plasma wave, electron density, moon