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Initial results of the Lunar Radar Sounder experiment on-board the Kaguya spacecraft

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The Lunar Radar Sounder (LRS) on-board the Kaguya (Selene) moon's orbiter is currently being equipped to provide the data of subsurface stratification and tectonic features in the shallow part (several km deep) of the moon's crust, by using a radar technique in HF (∼5MHz) frequency range (Ono et al. 2007). Knowledge of the subsurface structure is crucial to better understanding, not only of the geologic history of the moon, but also of the regional and global thermal history of the moon and of the origin of the earth-moon system. In addition to the subsurface radar experiment, LRS will provide the spectrum of plasma waves and solar and planetary radio waves in a wide frequency range from 10 Hz to 30 MHz. Kaguya spacecraft has been launched on Sept. 14, 2007. To provide necessary efficiency for transmission of RF pulses and detection of reflected echoes with 5MHz frequency, four Bi-Stem antennas of 15m are equipped. By using digital processing techniques for the RF waveform generation and on-board data analyses, it becomes possible to improve the S/N ratio and resolution, as well as capability of data handling for the subsurface sounding of the moon. The instrumental and theoretical studies showed that the observations on-board the Kaguya spacecraft will provide detailed information about the subsurface structures within a depth of 5 km from the moon surface, with a range resolution of less than 75 m for a region with a horizontal scale of several tens of km. The present state of the LRS passed the in-orbit initial test. The LRS experiment is now continuing the standard observation phase of the Kaguya spacecraft. This paper provides initial results from

the LRS function test and observation on-board the Kaguya.