

LFRS onboard the Chang'e-4 Mission and Its Method to Suppress RFI

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Keyword: Deep Space Exploration, Lunar Far Side, Chang'e-4, Very Low Frequency, Payload

Chang'e-4 mission is consisted of three parts --lunar lander, lunar rover and relay satellite. The relay satellite nicknamed QUEQIAO was launched to the halo orbit of the Earth-Moon Lagrange Point L2 at 21:25 UTC ,May 20, 2018, and the Chang'e-4 lunar lander and rover successfully landed in Von Karman crater on the far side of moon almost 7 months later. The LFRS (Low Frequency Radio Spectrometer) is a scientific payload on board Chang'e-4 lunar lander by Chinese. LFRS shown as Fig.1 consists of three 5m long antenna, one 20cm correct antenna, low noise amplifiers, an electronic box, and the cables.

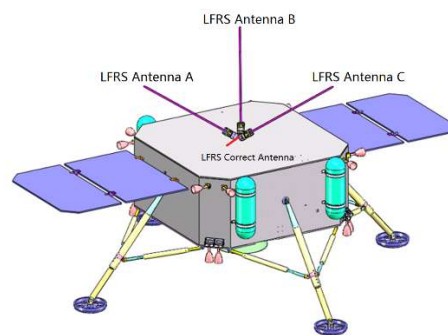


Figure 1. LFRS on the Chang'e-4 lunar lander

The primary motivation for LFRS is to learn about the universe through VLF spectral window which is the only part of the electromagnetic spectrum yet to be completely explored. Moon can be utilized as a shield against unwanted radiations from the earth. By taking advantage of the unique environment, LFRS is to explore and to study radio emission from the Sun and lunar surface at very low frequency (100KHz~40MHz).

The noise from the Chang'e-4 lunar lander itself is very intense, thus all target's radio emissions are hidden in this noise. A method is proposed in order to suppress the significance interference from the lander. A short correct antenna was installed very close to the Lander near the 5m long LFRS antenna. The signals received from the correct antenna are almost the noise from the lander, because the short correct antenna is not so sensitive as the 5m long antenna to the target's radio emissions. The signals received from 5m long antenna will be corrected by the signals received from short correct antenna to suppress the interference from the lander.