

Kaguya 衛星によって月地殻磁気異常付近で観測された広帯域ホイッスラーモード波動

Broadband whistler-mode waves detected by Kaguya near the lunar crustal magnetic anomalies

津川 靖基^{1*}, 寺田 直樹¹, 加藤 雄人¹, 小野 高幸¹, 綱川 秀夫², 高橋 太², 渋谷 秀敏³, 清水 久芳⁴, 松島 政貴¹
TSUGAWA, Yasunori^{1*}, TERADA, Naoki¹, KATOH, Yuto¹, ONO, Takayuki¹, TSUNAKAWA, Hideo², TAKAHASHI, Futoshi²,
SHIBUYA, Hidetoshi³, SHIMIZU, Hisayoshi⁴, MATSUSHIMA, Masaki¹

¹ 東北大学理学研究科地球物理学専攻, ² 東京工業大学大学院理工学研究科地球惑星科学専攻, ³ 熊本大学大学院自然科学研究科, ⁴ 東京大学地震研究所

¹Department of Geophysics, Tohoku Univ., ²Department of Earth and Planetary Sciences, Tokyo Institute of Technology, ³Department of Earth and Environmental Sciences, Graduate School of Science and Technology, Kumamoto, ⁴Earthquake Research Institute, University of Tokyo

Broadband magnetic waves with frequency range of 0.03-10 Hz in the spacecraft frame were observed by Kaguya near the Moon [Nakagawa et al., 2011]. The waves were not propagating parallel to the ambient magnetic field direction and had a compressional component. There was neither peak frequency nor preferred polarization. Nakagawa et al. [2011] identified them as whistler-mode waves because of their large group velocity compared with the solar wind velocity as well as the observed frequency range. Although the generation mechanisms of the waves were suggested to be associated with ions reflected by the Moon, precise process has not been clarified yet.

Recently we have revealed the statistical properties of narrowband whistler-mode waves near the Moon [Tsugawa et al., 2011]. There would be a link in the generation mechanism of narrowband and broadband whistler-mode waves. In the present study, we perform statistical analyses to reveal the properties of the broadband whistler-mode waves near the Moon. The results reveal that the waves are mostly observed just near the lunar crustal magnetic anomalies in dayside. It suggests that most of the waves are generated by the solar wind interaction with the magnetic anomalies. Furthermore, we investigate the velocity distributions and fluxes of reflected ions by the magnetic anomalies and lunar surface. We also discuss other possible generation mechanisms of the waves based on the measured plasma parameters around the Moon.

キーワード: 磁気異常, イオン反射, 上流ホイッスラー波

Keywords: magnetic anomaly, reflected ions, upstream whistler waves