Geophysical Research Abstracts
Vol. 21, EGU2019-11518, 2019
EGU General Assembly 2019

Decrease of IMF strength on the lunar dayside and above the polar region observed by Kaguya

Masaki N. Nishino (1,2), Yoshifumi Saito (2), Hideo Tsunakawa (3), Yoshiya Kasahara (4), Yuki Harada (5), Shoichiro Yokota (6), Futoshi Takahashi (7), Masaki Matsushima (3), Hidetoshi Shibuya (8), and Hisayoshi Shimizu (9)

(1) ISEE, Nagoya University, Nagoya, Japan (mnishino@isee.nagoya-u.ac.jp), (2) JAXA/ISAS, Sagamihara, Japan, (3) Tokyo Institute of Technology, Tokyo, Japan, (4) Kanazawa University, Japan, (5) Kyoto University, Japan, (6) Osaka University, Japan, (7) Kyushu University, Japan, (8) Kumamoto University, Japan, (9) ERI, The University of Tokyo, Japan

Interaction between the Moon and solar wind plasma is the important issues of the planetary plasma sciences. The Moon is an obstacle large enough to interact with the incident solar wind plasma, and most of these interactions are accompanied by variations of the interplanetary magnetic field (IMF) around the Moon. A decrease of the IMF takes place around the wake boundary due to the diamagnetic effect, while no IMF decrease on the lunar dayside has been reported so far. Here we report decreases of the IMF strength observed at 100 km altitude on the lunar dayside and over the polar region, comparing upstream solar wind data from ACE with Kaguya data. We note that the magnetic field decreases are observed above non-magnetized regions or very weakly magnetized regions. In one event the IMF is weakened in the dayside northern hemisphere when the IMF is roughly anti-parallel to the solar wind flow. We estimate that the decrease in the magnetic pressure can be partly compensated by the thermal pressure of the back-scattered solar wind protons, which suggests that the magnetic field decrease is interpreted as diamagnetic effect by the back-scattered protons. In another event an IMF decrease is continuously detected from the northern polar region to the dayside mid-latitude region, which is not fully explained by the thermal pressure of the back-scattered protons. The Kaguya LRS/WFC data show a slight increase in the electron density around the northern pole, which suggests an increase in the positive ion density. The density increase might be attributed to the back-/forward-scattered solar wind protons as well as heavy ions originating from the lunar surface and/or exosphere, while the heavy ions may not contribute to an increase in the thermal pressure because their temperature is very low. We also discuss the diamagnetic current system in the upstream (fore-moon) solar wind.