Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

PPS024-30 Room:103 Time:May 23 15:30-15:45

A current status of Lunar ElectroMagnetic Sounder (LEMS) proposed in the SELENE-2 mission

Masaki Matsushima[1*], Hisayoshi Shimizu[2], Hiroaki TOH[3], Ryokei Yoshimura[4], Futoshi Takahashi[1], Hideo Tsunakawa[1], Hidetoshi Shibuya[5], Ayako Matsuoka[6], Hirokuni Oda[7], Yuichi Iijima[6], Kazunori Ogawa[6], Satoshi Tanaka[6]

[1]Tokyo Institute of Technology, [2]ERI, University of Tokyo, [3]Kyoto University, [4]DPRI, Kyoto University, [5]Kumamoto University, [6]ISAS/JAXA, [7]AIST

Information of the internal structure of the Moon is a key issue to understand the lunar origin and evolution. Heat-flux, seismic, and magnetic field measurements made in the Apollo mission enabled us to estimate a thermal structure, an elastic structure, and an electric structure of the lunar interior, respectively. The electrical conductivity structure, which is independent of the elastic structure, is therefore important to give a crucial constraint on the lunar origin and evolution. Because of the low sampling frequency at which magnetic field data were obtained in the Apollo mission, estimates of the electrical conductivity contain significant ambiguity, larger than two orders of magnitude, for the outermost few hundred kilometers of the Moon. It is necessary to carry out electromagnetic sounding of the Moon at higher frequencies than before to accurately probe the shallow lunar interior.

In the SELENE-2 mission, we propose a lunar electromagnetic sounder (LEMS) to estimate the electrical conductivity structure of the Moon. Temporal variations in the magnetic field of lunar external origin induce eddy currents in the lunar interior, which in turn generates the magnetic field of lunar internal origin. We measure the primary magnetic field by two triaxial fluxgate magnetometers onboard a lunar orbiter and the primary plus secondary fields by two triaxial fluxgate magnetometers onboard a lunar survival module, which is a thermal control system for long-time scientific measurements under a temperature condition being variable in a very wide range at the lunar surface. Dual magnetometer technique is to be utilized to avoid strict electromagnetic compatibility requirements like those for the Kaguya spacecraft. Here we present a current status of the LEMS mission, such as its design, its development, and some results of feasibility studies on the lunar electromagnetic sounding.

Keywords: SELENE-2, electromagnetic sounding, lunar interior