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Observation of ions from the Moon by SELENE(KAGUYA)

Shoichiro Yokota[1*], Yoshifumi Saito[1], Kazushi Asamura[1], Takaaki Tanaka[1],
Masaki N Nishino[1], Hideo Tsunakawa[1]

[1]ISAS/JAXA, [2]Tokyo Institute of Tech.

KAGUYA is a Japanese lunar orbiter which was launched on 14 September 2007 from
Tanegashima Space Center in Japan. The scientific observation had been conducted for about 1.5
years. MAP-PACE (MAgnetic field and Plasma experiment-Plasma energy Angle and
Composition Experiment) is one of the scientific instruments onboard KAGUYA. One of the
scientific objectives of MAP-PACE is to observe ions originating from the Moon. The Moon
maintain very thin atmospheres called `surface-bounded exosphere' because it is thin enough to be
regarded as an exosphere and it bounds on the solid surface. The exospheric particles, which are
ionized by solar photons, are transported by the solar wind. Some of the ions picked-up by the
solar wind hit the lunar surface and are reabsorbed, the others are driven into space. MAP-PACE
have observed the ions from the Moon. It is confirmed that the ions include carbon, oxygen,
sodium, potassium and argon, and that they originate from the Moon. The measurements of ions
from the Moon enable us to continuously monitor the lunar exospheres. The 1.5-year observation
of KAGUYA shows that the ions from the Moon have been detected both when the Moon is
exposed to the solar wind and when it is in the Earth's lobe region. The observation suggests that
the solar wind is not the dominant source mechanism for the lunar exospheres. Moreover, the
MAP-PACE IMA shows the dependence on the solar zenith angle and the dawn-dusk asymmetry.
We report the features of the lunar exospheres obtained by the KAGUYA observation and discuss
the structure and source mechanism of the lunar exospheres.

Keywords: Moon, surface-based exosphere, mass analysis