Luna-space science with SELENE mission

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The research of the lunar atmosphere and the surface material is one of the aims of PACE on SELENE. Vigorous investigations showed that the major constituents of the ambient lunar atmosphere are Ne, H, He, and Ar. Ne and H are derived from the solar wind. He is also mostly from the solar wind, but 10% may be of radiogenic and/or lunar origins. The most component of Ar consists of 40Ar that is derived from the radioactive decay of lunar 40K, and the residual component (10%) of Ar is 36Ar of solar wind origin. The constituents of the lunar atmosphere and surface are subject to ionization processes by three types of radiation on and under the lunar surface and in the space near the moon: large fluxes of low-energy solar-wind particles, smaller fluxes of high-energy galactic cosmic rays, and rare but occasionally intense solar-flare particles. After the ionization by the particles hitting the moon as listed above, the lunar atmospheric atoms and/or molecules would be accelerated by the solar wind electric field in the lunar coordinates around the interplanetary magnetic field, and the accelerated charged particles are transported basically with the solar wind. These ions are generally called pick-up ions. When the lunar-origin ions are measured by ion energy-mass spectrometer with adequate energy, mass, and angular resolutions onboard satellite orbiting around the moon, we could obtain information on the lunar atmospheric constituents and the lunar surface materials. The acceleration and transport processes of the pick-up ions would also be able to be examined with the ion spectrometer data by combining magnetic field data. These investigations are essential for the knowledge concerning the lunar atmospheric environment and the surface condition.

Imager group will plan to observe the O II images of the polar wind using the Telescope for Extreme ultraviolet light, which is an upgrade version of the instrument for the sounding rocket, in the Upper atmosphere and Plasma Imager component (UPITEX) on the SELenological and ENgineering Explorer (SELENE). We present the feasibility of the O II imagery from the lunar orbiter.