P144-025 **Room: 304** **Time: May 17 10:45-11:00**

Observation of lunar sodium atmosphere using UPI-TVIS onboard Kaguya

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The Moon has been known to have a surface boundary exosphere (SBE) since the *in-site* measurements by Apollo missions [e.g. Hoffman et al., 1973; Hodges et al., 1973]. A major breakthrough was made by discoveries of D-line emissions of Na and K from the ground [Potter and Morgan 1988a; Tyler et al., 1988]. Optical remote sensing techniques enable us to investigate source mechanisms of Na atoms: thermal desorption, micrometeoroid impacts, sputtering by photons (also called photon-stimulated desorption) and by solar wind, and so on. Various release velocities and ejection rates at different surface regions for those sources produce characteristics distribution and dynamics of the lunar atmosphere. Especially for the solar wind sputtering, it does not work a few days before and after full moons due to an effect of shielding the lunar surface from the solar wind plasma by an Earth's magnetosphere. Moreover the source rate is supposed to vary before and after penetration of Earth's magnetosphere because the solar wind erosion stimulates diffusion of sodium to the surface from depth [Potter et al., 2000]. In order to test the effect of Earth's magnetospheric shielding from solar wind, we made an observation of resonant scattering emissions of the lunar sodium exosphere (589.3 nm) by a Moon polar orbiter SELENE (Kaguya). We will present the first result of the sodium exosphere measured from the Moon.

The observation was made from December 16 through 24, 2008 using UPI-TVIS (Telescope for VISible light in Upper-atmosphere and Plasma Imager component) [Yoshikawa et al., 2007, Yoshikawa et al., 2002, Yamazaki et al., 2002] onboard SELENE (Kaguya) [Kato et al., 2008]. UPI-TVIS was designed to measure the visible light from the upper atmosphere of the Earth [Taguchi et al., 2009], with an aperture of 136 mm and a field-of-view of 2.4 x 2.4 degrees. For our observation, narrow-band interference filters of Na (589.3 nm) and O I (630.0 nm) lines were used. Emission intensity of the sodium exosphere was 2 kiloRayleighs in a nightside looking toward an anti-sunward direction, which corresponds to Na column density of 6 x 10^9 atoms cm^{-2}. We also identified a dark region of the Na emission with an angular diameter of 19 degrees in the anti-sunward direction. Because the sodium exosphere emits photons by resonant scattering of solar radiation, the dark region corresponds to a shadow of the Moon. The size of the shadow region indicates that a scale-height of the neutral sodium densities was 4 Moon's radii, by assuming exponential density distribution of the sodium atoms as a function of radial distance from the surface. Then surface number density of Na was extracted as 50 atoms cm^{-3}.