

## Imaging of the Terrestrial Plasmasphere and Upper Atmosphere from a Lunar Orbiter

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The two dimensional imaging has been known to be a powerful tool to see the magnetospheric and atmospheric plasma and netral perticles in perspectives. We propose a imagery of the terrestrial upper atmosphere, ionosphere and plasmasphere from the Lunar orbiter, SELenological and ENgineering Explorer (SELENE), which will launch in 2007. Our instrument, named Upper-atmosphere and Plasma Imager (UPI), has the gimbal system (UPI-G) to follow the earth from the Moon, and has two telescopes for the visible and the extreme ultraviolet (EUV) light (UPI-TVIS and UPI-TEX). UPI-TVIS detects the visible light from the upperatmosphere, such as aurora and atmospheric airglow, and UPI-TEX is sensitive to resonantly scattering emissions from He+ and O+ ions in the EUV region. SELENE is a three-axial stabilized satellite, and one of axes tracks the Moon surface. So the field-of-view (FOV) of the telescopes rotate with the satellite motion, UPI-G is used as the rotate canceller. The system has two-axis control; One axis is parallel to the rotating axis, and always moves during observational periods. The other is the perpendicular, and revolves by 360 degrees every a month. UPI-TVIS is a catadioptric system with an aperture of 136mm, a focal length of 320mm and a FOV of 2.4 degrees, and has a CCD device to detect the photons. It has a filter turret composed of one shutter and five filters with band-pass at 427.8nm, 557.7nm, 589.3nm, and 630.0nm and above 730nm. The main science targets are the simultaneous observation of the aurora at both polar regions, and the atmospheric airglows at the equatorial region. UPI-TEX is a prime focus optics with an aperture of 12cm, a focal length of 168mm, and a FOV of 10 degrees. It has a multilayer-coated mirror, a band-pass filter parted into two area for He+ and O+ emissions, and a detector of MCPs. The main tartgets are the global distribution of the plasmaspheric He+ ions and the overall picture of O+ ions escape from the polar ionosphere.