

“Planetary Exploration by Plasma Imaging technique”

Ichiro Yoshikawa

*Department of Earth and Planetary Science,
University of Tokyo*

It is known that several of the minor ions species in the planetary magnetosphere, detected by in-situ technique, radiate photons through some energy transition process.

Photons radiated from charged particles mostly exist in EUV spectral range, unfortunately this spectral range had been un-developed due to its nature. The reflectivity and transmittance were very low.

In the '90, I have developed imaging technique in EUV optics and succeeded in phasmaspheric imaging. This technique enables us to know global plasma distributions in magnetospheres of planets.

The second generation in EUV is now in progress. Spectral diagnose is important tool to deduce plasma temperature by remote-sensing. This technique has been qualified by JAXA's current mission. The Sprint-A satellite (HISAKI) with the EUV spectrometer (Extreme Ultraviolet Spectroscope for Exospheric Dynamics: EXCEED) was launched in September 2013 by Epsilon rocket. Now it is orbiting around the Earth (954.05 km x 1156.87 km orbit, the period is 104 minutes) and has performed a broad and varied observation program for 1-year. With an effective area of more than 1cm² and well-calibrated sensitivity in space, the EUV spectrometer produces spectral images (520-1480 Å) of the atmospheres/ magnetospheres of solar planets (Mercury, Venus, Mars, Jupiter, and Saturn) from the earth-orbit.

In this talk, I will present the EUV imaging in the science and technical point of views.