

Science Objectives of TOPS

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The Tele-Observatory for Plasma Science (TOPS) is an earth-orbiting space EUV telescope mission to be launched in 2012 and injected into the sun synchronized orbit. TOPS will observe planetary airglows in the spectral range of extreme ultraviolet (EUV). The TOPS mission will address various fundamental scientific questions pertaining to planetary plasma science. In this paper, we will present two main scientific objectives in the TOPS mission, (1) plasma escape rates from the terrestrial planets, (2) Jovian hot plasmas near Io.

One of the unresolved problems in the frame work of the terrestrial atmospheres is escape of the atmosphere to space. There were many in-situ observations done by orbiters, but our knowledge has still been severely limited, especially for escape rate. TOP observation will enhance our knowledge on the outward flowing plasmas (composition, rate, dependence of solar activity) in the vicinity of each planet (Mars, Mercury, Venus, etc).

The Io plasma torus which is located in the inner magnetosphere of Jupiter is one of the primary science target of the TOPS mission. The Io plasma torus is the main source of plasma for the Jovian magnetosphere and characterizes shape and dynamic of the rapidly rotating magnetosphere. Major ion species such as sulfur and oxygen ions have a lot of allowed transition lines in the spectral range of EUV from 65nm to 130nm, and they radiates the energies outward. The EUV observation enables us to measure radial distribution of the ion density and hot electron temperature in the inner Jovian magnetosphere and to discuss about unresolved electron heating process associated with unsteady plasma transport.