E040-024 Room: 101B Time: May 29 16:45-17:00

Feasibility study of EUV imaging of the Venusian ionosphere

Atsushi Yamazaki[1], Ichiro Yoshikawa[2], Naoki Terada[3], Miho Kanao[4], Takumi Abe[2], Masato Nakamura[2]

[1] CRL, [2] ISAS, [3] STE Lab., Nagoya Univ., [4] Earth and Planetary Sci.Tokyo Univ.

The Venusian ionosphere directly interacts with the solar wind plasma because of the weak intrinsic magnetic field. It is well known that the velocity shear at the boundary layer produces the vortex structure due to Kelvin-Helmholtz (K-H) instability. The mechanisms of momentum and mass transfer across the ionopause, of convection in the upper atmosphere and ionosphere, and of atmospheric and ionospheric escape depend on the vortex scale, which is essential to understand the dynamics in Venusian ionosphere [1].

The 2-D imaging observation is effective to measure the global wave structure of the vortex produced by K-H instability. The target for the measurement is the resonance scattering emission (O II:W/L 83.4nm) of oxygen ions, which is main component in the Venusian ionosphere. For the observation of the O II emission it is essential to reduce the resonance scattering emission of hydrogen atom in the vicinity of the O II wavelength (e.g., Ly-alpha:W/L 121.6nm, Ly-beta:102.6nm). We succeeded the development of the eXtreme UltraViolet (XUV) scanner, which has the reduction rate of Ly-alpha to be about 10^6, for the sounding rocket SS-520-2 [2]. The band-pass filter made from indium for the XUV scanner has not enough property to reduce the Ly-beta line because of the metal optical characteristics. So we consider that the contaminated intensity of Ly-beta is estimated from the simultaneous spectrum observation in the band-pass region and the noise is substrate from the 2-D imagery of the O II emission.

We propose the small-size extreme ultraviolet imager to take global 2-D O II imagery and the Extreme ultraviolet spectrometer to measure the intensity of other emissions (e.g., Ly-beta) for Japanese Venus Climate Orbiter (Planet-C) mission. The intensities of these emission lines are estimated and the requirement for the specification of the imagers and the available temporal and spatial resolution is discussed. Especially we emphasize that sequential images of the O II emission illustrate temporal evolution of the vortex produced by K-H instability. At the Venusian ionopause oxygen ions have enough density to detect the resonance emission, i.e., the Venusian ionosphere plays a role as a space laboratory for plasma physics.

1. Terada et al., JGR, 2002.
2. Yamazaki et al., GRL, 2002.