# Seasonal and spatial variation of $He^+$ column density in the evening topside ionosphere observed by ISS-IMAP/EUVI

*Yuta Hozumi[1], Akinori Saito[2], Ichiro Yoshikawa[3], Atsushi Yamazaki[4], Go Murakami[4], Kazuo Yoshioka[3]

1. University of Electro-Communications, 2. Kyoto Univ., 3. The University of Tokyo, 4. Institute of Space and Astronautical Science / Japan Aerospace Exploration Agency

The seasonal, longitudinal and latitudinal variations of $He^+$ distribution in the evening topside ionosphere in 2013 - 2015 are elucidated with data of $He^+$ resonant scattering obtained by Extreme Ultra Violet Imager (EUVI) onboard the International Space Station (ISS). EUVI provides a data set of the column density of $He^+$ in the topside ionosphere. The data set provides a unique opportunity to study $He^+$ distribution in the topside ionosphere from a different perspective of past studies using in-situ measurement data. During the solstice seasons, an enhancement of $He^+$ column density in the winter hemisphere is observed. The magnitude of this hemispheric asymmetry shows a longitudinal variability. Around the June solstice, the hemispheric asymmetry was greater in the longitude sector where the geomagnetic declination angle is negative and smaller in the longitude sector where the geomagnetic declination angle is positive. Around the December solstice, on the other hand, this longitudinal variation of the asymmetry magnitude had opposite tendency. The hemispheric asymmetry of the effective neutral wind well explains this behavior of $He^+$. The field-aligned component of neutral wind in the F-region is varied in longitude under the presence of finite geomagnetic declination angle and large zonal wind. We examined the seasonal and longitudinal variation of the effective wind with HWM14 model. In the equinox seasons, two longitudinal maxima were observed at around 140ºE and 30ºE. The longitudinal variation of the effective neutral wind is a candidate of these two maxima of $He^+$ concentration. These results suggest that the transport of ions in the topside ionosphere is strongly affected by the *F*-region neutral wind.

 