Global distribution of the mesoscale disturbances at 95km altitude detected by a space-borne airglow observation

*Akinori Saito[1], Ryota Okada[1], Takeshi Sakanoi[2], Yuta Hozumi[3]

1. Department of Geophysics, Graduate School of Science, Kyoto University, 2. Planetary Plasma and Atmospheric Research Center, Graduate School of Science, Tohoku University, 3. University of Electro-Communications

Global distribution of the mesoscale disturbances at 95 km altitude was investigated with the 762nm airglow observed by International Space Station-Ionosphere, Mesosphere, upper Atmosphere and Plasmasphere mapping (ISS-IMAP) mission. The horizontal structures of the mesospheric disturbances have been widely investigated with ground-based all-sky imagers. It is reported that the horizontal wavelength of the mesospheric structures has maximum between 10 km and 30km. The structures whose wavelength is longer than 100 km are, however, difficult to be detected by the ground-based imagers because of their narrow field-of-view. The mesoscale structures on the topside of the mesosphere with a few hundred kilometers of horizontal scale are yet to be investigated. Visible and near Infrared Spectral Imager (VISI) of ISS-IMAP mission observed the mesospheric airglow structures with the airglow from the molecular oxygen in 762nm wavelength. The size of VISI’s field-of-view is 600km in the direction perpendicular to the ISS trajectory, and longer than 10,000km along the trajectory. The mesoscale structures at 95km altitude was investigated with the 762nm airglow data of VISI. By the comparison between the plasma bubble activities measured by the ground-based GNSS receivers, and the mesoscale structure activities in the mesosphere measured by ISS-IMAP/VISI, the relation between the plasma bubble and mesospheric disturbance is discussed. The classical “seeding” theory of the plasma bubble by the atmospheric gravity waves that vertically propagate from the lower atmosphere to the upper atmosphere was evaluated with the space-borne global observation.

Keywords: Ionosphere, Mesosphere, Airglow, Plasma bubble, Atmospheric Gravity Wave

