

Statistical characteristics of mesospheric bore observed by IMAP/VISI

*Yuta Hozumi¹, Akinori Saito², Takeshi Sakanoi³, Atsushi Yamazaki⁴, Keisuke Hosokawa¹

1. University of Electro-Communications, 2. Kyoto University, 3. Tohoku University, 4. JAXA

Mesospheric bore is a propagating sharp front in the mesopause region. It is believed to be a moving disturbance trapped in a ducting region. Mesospheric bore has been observed as a sharp jump or drop of airglow brightness by ground-based airglow imagers at various longitude from low latitude to high latitude. However, the statistical characteristic and the global distribution of mesospheric bore are hardly understood because the occasions of ground based measurements are very limited in time and space.

Space-borne airglow imaging is a strong tool to study mesospheric bore with a wide field of view and global observational coverage. Geographical and seasonal variations of mesospheric bore were derived from space-borne airglow imaging observations by the Visible and near Infrared Spectral Imager (VISI) of Ionosphere, Mesosphere, upper Atmosphere and Plasmasphere (IMAP) mission onboard the International Space Station. 307 mesospheric bores were observed by VISI in its operation period, from September 2012 to August 2015. The latitudinal distribution of mesospheric bore had occurrence peaks at the equator and the winter mid-latitude ($\sim 40^\circ$). The occurrence peak at the equator is especially high in the equinox seasons (more than 0.1 event/observation time[hour]). In the solstice seasons, the dominant propagating direction of bore was winter to summer hemisphere. Very few westward propagating bore was observed. The preferential latitudes and seasons of mesospheric bore are same as the locations where the diurnal and semidiurnal tides have a large amplitude at mesopause altitude. This coincidence suggests that majority of mesospheric bore occurred in a ducting region caused by tidally induced mesospheric inversion layer.

Keywords: Mesospheric Bore, Airglow Imaging, Atmospheric Tide, Mesospheric Inversion Layer, ISS-IMAP