# Study of Medium-Scale Traveling Ionospheric Disturbances in Low-Latitude Ionosphere Using an Automatic Algorithm

*Pin-Hsuan Cheng[1], Charles Lin[1], Hanli Liu[2]

1. Department of Earth Sciences, National Cheng Kung University, 2. University Corporation For Atmospheric Research

This study investigates the medium–scale traveling ionospheric disturbances (MSTIDs) and plasma bubbles statistically at the low–latitude equatorial ionization anomaly (EIA) region. To distinguish and categorize the MSTID and plasma bubble features, we apply both the three–dimensional fast Fourier transform (3D–FFT) and support vector machine. Statistical results together with COSMIC–1 RO data and the high–resolution Whole Atmosphere Community Climate Model (WACCM) indicate the following characteristics. First, the southward (equatorward) MSTIDs are observed almost every evening and morning during spring and winter. On the contrary, southward MSTIDs are more discernible at midnight in summer, majorly propagate from Japan, but least observed in autumn. Second, northward (poleward) MSTIDs are detected more frequently from noon to midnight in spring and summer with secondary occurrence rate peak in spring likely caused by atmospheric gravity waves (AGWs). Third, the occurrence rates of equatorial plasma bubbles in descending order are Spring, Fall, Summer, and Winter.

Keywords: Poleward MSTID, Plasma Bubble, Machine Learning, Atmospheric Gravity Waves

 