

Sounding rocket/ground-based observation campaign to study medium-scale traveling ionospheric disturbance (MSTID)

Mamoru Yamamoto[1]; Susumu Saito[2]; Tatsuhiro Yokoyama[3]; Takuya Tsugawa[4]; Keigo Ishisaka[5]; Masa-yuki Yamamoto[6]; Hiroto Habu[7]; Shigeto Watanabe[8]; Takumi Abe[7]; Gopi Seemala[1]; Paul A. Bernhardt[9]; Miguel Larsen[10]

[1] RISH, Kyoto Univ.; [2] NAV Department, ENRI; [3] NICT; [4] NICT; [5] Toyama Pref. Univ.; [6] Kochi Univ. of Tech.; [7] ISAS/JAXA; [8] CosmoSciences, Hokkaido Univ.; [9] NRL; [10] Clemson Univ.

We have been studying ionospheric irregularities in mid-latitude region by using radars, GPS receiver network, etc. The mid-latitude ionosphere was considered much stable than those in the equatorial or polar region in the past, but our studies have revealed that there are much active variabilities in the region. An interesting phenomenon is medium-scale traveling ionospheric disturbance (MSTID) in the F-region. The MSTID is the wave structure with a wavelength of 100-200 km. These horizontal structures can be observed by using the total electron content (TEC) from GEONET, Japanese dense network of GPS receivers. We planned to study generation mechanism of the MSTID by the combination of sounding rockets and ground observations. The experiment was just recently succeeded on July 20th, 2013. We monitored horizontal structures of the MSTID by using GPS-TEC real-time monitor system. While active MSTID region appeared over south Kyushu, Institute of Space and Aeronautical Science of JAXA (JAXA/ISAS) launched sounding rockets S-310-42 and S-520-27 from Uchinoura Space Center (USC) at 23:00 JST and 23:57 JST, respectively. Ionospheric parameters, i.e., plasma density, electric field, density fluctuations, were measured by in-situ instruments on board of the S-520-27 rocket. TMA (Tri-Methyl Aluminum) and Lithium were released from the S-31-42 and S-520-27 rockets, respectively, for measurement of the neutral winds. Their luminescent clouds were imaged from the JAXA experimental jet "Hisho" and from three ground sites. The Lithium experiment under the moonlight was the world first trial, and was successful. Both rockets transmitted dual-band beacon signal which was received at five ground sites and one boat over the sea. In the presentation we will overview of this experiment and the preliminary results.