

中規模伝搬性電離圏擾乱発生時における中緯度電離圏中のDC電場観測

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DC Electric Field measurement in the Mid-latitude Ionosphere during MSTID

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In the middle latitude ionospheric F region, mainly in summer, wave structures of electron density that have wave length of 100-200 km and period of one hour are observed. This phenomena is called Medium Scale Traveling Ionospheric Disturbance; MSTID. MSTID has been observed by GPS receiving network, and its characteristic were studied. In the past, MSTID was thought to be generated by the Perkins instability, but its growth ratio was too small to be effective so far smaller than the real. Recently coupling process between ionospheric E and F regions are studied by using two radars and by computer simulations. Through these studies, we now have hypothesis that MSTID is generated by the combination of E-F region coupling and Perkins instability.

S-520-26 and S-520-27 sounding rocket experiments on E-layer and F-layer was planned in order to verify this hypothesis. S-520-26 sounding rocket was launched at 5:51 JST on 12th January, 2012 from JAXA Uchinoura Space Center. And S-520-27 sounding rocket was launched at 23:57 JST on 20th July, 2013 from the same place. These sounding rockets payload were equipped with Electric Field Detector (EFD) with a two set of orthogonal double probes to measure DC electric field in the spin plane of the payload. The electrodes of two double probe antennas were used to gather the potentials which were detected with high impedance pre-amplifier using the floating (unbiased) double probe technique. As a results of measurements of DC electric fields by S-520-26 sounding rocket, the natural electric field was about 1mV/m, and varied the direction from east to southwest. Then the case of S-520-27 sounding rocket, the natural electric field was about 5mV/m, and varied the direction from southeast to east. Next the electric field was mapped to the horizontal plane at 280km height along the geomagnetic field line.

In this presentation, we show the detail results of DC electric field measurements by S-520-26 and S-520-27 sounding rocket and then we discuss about the correlation between the natural electric field and TEC variation by using the GPS-TEC.