Measurements of DC electric field and propagation characteristics of VLF/MF radio waves in ionosphere using the sounding rocket

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Two sounding rocket experiments, which are S-310-37 rocket experiment and S-520-23 rocket experiment, will be carried out at Uchinoura Space Center (USC) in 2007. The purpose of S-310-37 rocket experiment is an integrated observation of the high electron temperature layer in the Sq current focus during the winter daytime over USC. In order to measure the field-aligned electric field due to the Sq current, we develop the three-dimensional electric field detector (EFD). The EFD measures three components of electric field by using 3 pair of probe antennas. In order to obtain the electron density profile in the ionosphere, the MF band radio wave receiver (MFR) measures the intensities and the Doppler shift of radio wave from NHK Kumamoto broadcasting station (873 kHz, 500 kW). We estimate the electron density profile using the observations and the full wave method.

The purpose of S-520-23 rocket experiment is the investigation of the process of momentum transportation between the atmospheres and the plasma in the thermosphere during the summer evening time at mid latitudes. The Electric filed and VLF/MF band Receiver (EVMR) is loaded on the sounding rocket. The EVMR measures the two components of electric field by using 2 pair of probe antennas in order to obtain a dynamics of plasma particle in the ionosphere directly. The EVMR measures the intensities and the Doppler shift of JJY signal from Haganeyama LF station (60 kHz, 50 kW) and MF radio wave (873 kHz), too. The electron density profile and the collision frequency in the ionosphere are estimated by the VLF/MF band radio waves measurement and the full wave method.

In presentation, we report on the present status of developments of the instrument onboard the both sounding rockets.