

Preliminary report of a sounding rocket experiment to elucidate electron heating in the Sq current focus

- Observations of DC Electric field and VLF band plasma wave -

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The Sq current system occurs in the lower ionosphere in the winter daytime. The center region of the Sq current system is appeared the specific plasma phenomenon such as electron heating, strong electron density disturbance. S-310-44 sounding rocket equipped with each scientific instrument and is launched toward the center of the Sq current system. The rocket observe the physical quantity for the investigation of the specific phenomenon. As similar experiment, S-310-37 sounding rocket had been performed in the past, however it was not possible to observe the electric field component of the magnetic field-aligned direction. It is one of the reasons that the photo electron caused by the sunlight that is irradiated to the rocket body, and affect the electric field observations. It is very difficult to remove the influence of the photo electron from the observed data. If it is possible to put the electrode of the electric field sensor outside of the region where there become the photo electron around the rocket body, the influence of the photo electron can be reduced.

Therefore, the antennas need a length as long as possible to observe the electric field.

Accordingly, the antennas of S-310-44 sounding rocket is 4m tip-to-tip that is twice as length than the antennas of S-310-37 sounding rocket. The purpose is to reduce the influence of the photo electron moreover to measure the electric field more accuracy.

It was carried out the S-310-44 sounding rocket experiment at Uchinoura Space Center (USC) at 12:00 LT on January 15, 2016. This rocket passed through near the center of the Sq current system. In addition, scientific observation instruments that are equipped on the rocket also operated normally. In Electric Field Detector (EFD), the antennas have started extension after 67 seconds (altitude 81km) from launch. After 81 seconds (altitude 97km) the full extension, the observation was started. There was not seen the effect by photo electron in observed the electric field data. Here we analyze the electric field data obtained in the S-310-44 sounding rocket. And we describe the derivation result of the electric field that it is important for the investigation of the Sq current system generating mechanism.

Keywords: electric field , sounding rocket experiment, Sq current system