

Electron density perturbations observed with Fixed Biased Probe on board S-310-37 sounding rocket

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On the basis of the sounding rocket measurements launched from Uchinoura, it has been reported that, in mid-latitude ionosphere, the electron temperature profile has the local increase by several thousand degrees with respect to the background, suggesting anomalous heating of thermal electrons. Such a temperature increase tends to be observed at 11 LT at an altitude of 105 to 110 km in the winter hemisphere. Subsequent study indicates that the temperature increase seems to exist in the center of the Sq current focus.

In order to investigate anomalous increase of the electron temperature in the Sq current focus, the sounding rocket S-310-37 was launched at 11:20:00 JST on January 16 2007. A suite of scientific instruments was installed on the rocket to perform a comprehensive measurement of the plasma in the lower ionosphere. Initial analysis of the observed data represents that an altitude profile of the electron temperature has the local increase by several hundreds degrees at about 100km altitude during the rocket's ascent, similarly to the previous reports.

The FBP (Fixed Biased Probe) was installed to measure electron density perturbation along the rocket's trajectory.

Through the rocket flight, the FBP was successfully continued to make a reliable measurement, and a strong perturbation of the electron density was observed above 90 km altitude.

This may suggest that the plasma instability is generated in this region, and a possible connection with the thermal electron heating.

In this presentation, we present an initial analysis of FBP data and will discuss a possible relationship to the electron temperature increase.