

The comparison of bistatic Doppler radar and EISCAT UHF radar data sets obtained during Tromsø heating experiments with varied radiation zenith angle

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The EISCAT HF facility was used to modificate high-latitude F-region in quiet geomagnetic conditions. The direction of the HF beam was switched between 3 fixed positions: 0° (vertical), 6°, and 12° (field-aligned).

HF diagnostic radio signals emitted from London, scattered from striations produced by heating above Tromsø, and received in St. Petersburg, were analyzed by Doppler spectral method. The spectra had the maximal frequency shift when the heater antenna beam pointed in the field-aligned direction. The EISCAT UHF radar data show that in field-aligned position the heater had produced the dramatic strong modification of ionospheric plasma parameters at altitudes up to 600 km. The electron temperature T_e increased up to 4000K from 1000K, the T_e/T_i ratio reached 4 from 1. The ion outflows appeared, with velocities increased with height, beginning from 350 km, from 0 up to 300 m/s.

We suppose that ionospheric irregularities, produced by the heating, were responsible for field-aligned potential drop development, and, as a sequence, for ion acceleration.