

JOINT HF INTERFEROMETER AND RADIO TOMOGRAPHY OBSERVATIONS OF THE ARTIFICIALLY MODIFIED IONOSPHERE

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High frequency (HF) ionospheric modification experiments were carried out in Russia on 15 August 2005 and in Norway on 6 October 2005, using the Sura and EISCAT HF heating facilities. Simultaneous radio tomography electron density observations and stimulated electromagnetic emission (SEE) interferometer measurements performed during the heating sessions are discussed. Both transmitters operated at 4544 kHz and the main lobes of the Sura and EISCAT antennas were inclined by 12° and 8° south of vertical, respectively. The data analysis shows that both small-scale plasma enhancements and large-scale density irregularities can be generated by the HF waves either at mid- or high latitudes. A zone of reduced plasma density is induced by the heating facilities in the heated region at heights from ~ 200 km up to much higher altitudes than the position of the ionospheric F2-region maximum. Wavy latitudinal density structures propagating out of the heated area are also observed. The satellite records show that the scintillation peaks caused by anisotropic irregularities in a plane orthogonal to the geomagnetic field are deviated relative to the magnetic zenith direction. The interferometer data also show disagreements between the SEE origin location, the magnetic zenith direction and position of the heating antenna main lobe. The events reveal different electron density changes due to heating. SEE signals are detected during both experiments but their spectral features are different. The patch of the SEE spatial positions is smaller when the electron density changes are greater.