Preliminary results of the SURA-DEMETER experiment

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The goal of the experiment was to study at the height of the DEMETER orbit (h = 710 km) features of artificial ionosphere turbulence produced by interaction of O-mode powerful radio waves with ionosphere F_2-region plasma. Modifications of ionosphere plasma were conducted by the Sura heating facility in April – September 2005. It was successfully carried out 11 heating séances. In each heating séance the Sura facility operated for 15 min starting 10 min before the time of the closest point of the satellite trajectory to the center of HF-disturbed magnetic tube.It should be noted that measurements, performed either under daytime conditions or when the satellite was over the conjugate point, did not show any sensible variations of the turbulence parameters studied. When ionosphere modifications were carried out during evening hours (T = 22:00 – 22:40 LT) under the condition when $f_0 \leq f_{0F2}$, the following HF-induced turbulence features were revealed by the satellite equipment:

1) It was unambiguously registered variations of temperature and velocity for ions in a region of about of $\pm$ 400 km around of the closest point of a satellite trajectory to the center of HF-disturbed magnetic tube. In some instances artificially produced variations of electron temperature and density were also observed.

2) The analysis of HF spectral data has not shown any HF-produced variations. It is most likely that the intensity of plasma noise, enhanced by electrons accelerated in the ionosphere disturbed volume, was below of an analyzer sensitivity level.

3) The analysis of VLF spectral data has shown that specific spectral structures are often observed for an electric field component in a frequency range of about of 10 – 15 kHz, and these structures are characterized, as a rule, by an increasing in time of their spectral peak frequency.

4) The analysis of ELF spectral data has shown presence of multiform structures, which are observed throughout a frequency range from 0 to 1200 Hz. Their duration is from a part of second till a few seconds.

Unfortunately, a limited number of experimental data as well as the weak repetition of the events registered, cannot allow us to carry out more detail classification of phenomena observed.