Studies of the geomagnetic field disturbances in the range of 0.001 - 0.03 Hz under influence on the ionosphere by powerful radio emission of SURA facility

Kotik D. (1), Ryabov A. (1), Ivanov V. (2), Esin V. (2), Myazdrikov D. (2)

(1) Radiophysical Research Institute of the Federal State Autonomous Educational Institution of Higher Education «National Research Nizhny Novgorod State University. N.I. Lobachevsky», Nizhny Novgorod, Russia

(2) Scientific Production Association «Typhoon» Roshydromet, Obninsk, Russia

e-mail: dmitry.kotik@nirfi.unn.ru

This paper presents the results of an experiment on the possible reaction of the geomagnetic field to the modification of the ionosphere by powerful radio emission from the SURA facility. The SURA facility operated with power 500 kW, the antenna array beam was directed 16 ° to the south (magnetic zenith). The time for the experiments was chosen from 21:30 to 23:30 MST in July 2015. The modulation frequency and the polarization of the radiation varied by day, the carrier frequency of the SURA was chosen 0.5-1 MHz below the critical frequency of the F-layer. Magnetometric measurements were carried out at two points spaced 56 km apart. The first point was located in the area near village Yurino, 24 km to the North from SURA and, the second point in the area of the village Ilyina Gora, 36 km to the South. The results of recording the variations of the geomagnetic field in the frequency range under study and their spectral analysis are presented. The main feature is almost complete identity of both the waveforms of the geomagnetic field variations and their spectra in both points. Pulsations appeared at the end of the session and lasted about another 25 minutes after the end of it in the first session 07/05/15 with SURA modulation period of 15 seconds. The frequency of the maximum in the spectrum was 16 mHz (T = 62.5 s). In the second session of July 9, 2015, at a stand modulation frequency of 5 mHz (T = 200 s), Pulsations appeared during the session approximately 75 minutes after its start and lasted until the end of the session. Two frequency maxima in the spectrum at 7.5 and 1.6 mHz were observed (T = 133 and 62.5 s). In the third session on July 21, 2015, with SURA modulation frequency of 2 mHz (T = 520 s), the pulsations appeared during the session approximately 75 minutes after its start and lasted until the end of the session. There were also two frequency maxima in the spectrum at 5.5 and 1.45 mHz (periods T = 181 and 69 s). An interpretation of the observed phenomenon based on the mechanism of application of ionospheric RF heating for the excitation of the so-called ionospheric instability with feedback is given.

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References

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