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Aurora triggering by high-power radio emission from the SURA facility as observed on board the International Space Station.

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A quantitative analysis is presented of the data on modification of the ionosphere by high-power radio emission from the SURA heating experiment run on October 2, 2007 (18:40 – 19:00 UT). In the experiment under discussion, the facility was working in the mode of periodic heating (meander with a period of 2 min) at the frequency of 4.30 MHz. The effective emission power was 10 MW. The modulation frequency was close to the frequency of natural Alfven oscillations of plasma in the local magnetic flux tube.
The effects of modification were observed onboard the Russian Segment of the International Space Station (RS ISS).The observations have provided more than 1500 images of a bright local glow, which appeared within the field of view of the TV camera as the ISS was passing close to the location of the Sura facility. The brightness of aurora reached some hundreds of kiloRayleighs. The compact bright aurora appeared North-East of the heating facility (150-200 km) and was moving East in the image plane. The analysis of helio-geophysical conditions did not reveal any significant anomalies during the experiment. The planetary index of magnetic activity did not exceed 3, the auroral oval was quiet, noticeable variations in the solar wind and interplanetary magnetic field were absent (data from GOES, SOHO, etc.).
A low power of the heating emission and high intensity of the observed aurora suggest that the local glow wasn't due directly to HF heating of ionosphere, but rather might be caused by the particle precipitation artificially stimulated by the heating effects, such as modification of the ionosphere over the SURA heating facility, which forms the base of the magnetic flux tube (and the standing wave node) and whose natural Alfven oscillations have a period close to the modulation period of the heating HF emission. The Alfven mode of the magnetic tube could be intensified during the experiment by a short (less than 1 min) and weak (amplitude of about 2 nT) pulse in the planetary geomagnetic field that occurred at 18:47:30 UT. The second possible scenario: the field aligned current inside this magnetic field tube is intensified by the magnetic pulse up to critical value and can result in formation of anomaly resistance area and aurora generation. The intensive F2- spread (along the SURA- Moscow- Kaliningrad trace) can be signature of the field aligned current (Ossakov S.L. et al., 1979) during experiment.