Geophysical Research Abstracts,
Vol. 11, EGU2009-4386-1, 2009
EGU General Assembly 2009

Analysis of the Jovian sporadic decameter emission features on the base of the new data obtained with the high frequency-time resolution waveform receiver.

G. V. Litvinenko (1), V.V. Zakharenko (1), A.A. Konovalenko (1), V.V. Vinogradov (1), and H.O. Rucker (2)

(1) Institute of Radio Astronomy, Kharkov, Ukraine (gallitv@rian.kharkov.ua), (2) Space Research Institute, Graz, Austria (helmut.rucker@oeaw.ac.at)

The Jovian sporadic decameter radiation (DAM) represents a phenomenon which is still fully unstudied. The dynamic spectrum has a very complex structure with many unclear properties. The details of how decameter radio bursts are generated in the magnetosphere of Jupiter are still a matter of debate. One of the possible way to understand the physical features of S-bursts as well as mechanism responsible for generation is to increase the temporal and frequency resolutions and look at the S-burst signal from macroscopic viewpoint to a microsecond timescale. Modern progress in electronics and computer technologies allows creating the super effective registration systems with high frequency and temporal resolutions (Digital Signal Processors (DSP) and the Waveform Receiver (WFR)). In the present time in the Ukraine was realized the combination of telescope (UTR-2) and equipment (WFR) with the possible best parameters for the Jovian decameter emission investigations: sensitiveness (antenna effective area is near 100 000 m2), frequency resolution (12 kHz), time resolution (less than 200 ns), dynamic range (70 dB). In November 2008 it was continuous registered 4 hours of Io-B S-burst strong storm with UTR-2 and waveform receiver. The obtained data of the Jovian S-burst radio emission were processed as with Fourier as well as with wavelet transform methods. The main goal of these investigations was to detect and analyze the "superfine" internal content of the individual S-burst as well as macroscopic properties of radiation. Fine structure was investigated on the base of two possible physical mechanisms: 1) the narrow-band random noise process; 2) the wide-band pulse process with frequency and time modulations. For the last case the "de-dispersion" methodology was successively used. The statistical examinations (including the correlation analysis) of the fine internal structures were carried out on a broad basis of the different simple and complex S-burst events. The features of modulation effects of macroscopic scales were also considered in details.