Geophysical Research Abstracts
Vol. 16, EGU2014-655, 2014
EGU General Assembly 2014

ANGULAR STUDY OF THE III TYPE SOLAR BURSTS BY UKRAINIAN DECAMETER HELIOGRAPH OF UTR-2

Artem Koval, Aleksander Stanislavsky, and Aleksander Konovalenko
Institute of Radio Astronomy of NAS of Ukraine, Kharkiv, Ukraine (koval2211@rambler.ru)

Solar radio bursts are attractive manifestations of solar activity. They contain useful information about physical processes in solar corona. The type III radio bursts are the most frequent events among many different types of solar bursts studied since middle of the last century. The type III bursts are generated by beams of fast electrons (beams velocity $\sim 0.3c$) ejected into the corona and propagated through coronal plasma to interplanetary medium. It is assumed that such an electron beam passing coronal plasma generates plasma waves that converse to electromagnetic waves registered as type III radio bursts. They are observed in a wide frequency range from 1 GHz to tens kHz. In particular, the decameter emission (10-30 MHz) of III type bursts arises at heights about 2-3 solar radii from the center of the Sun. In the last decades the various ground-based, satellite and spacecraft observations have provided detailed information about features of the bursts. Due to non-thermal emission mechanism their intensity can be very high that allows ones to record the bursts even by amateur radio astronomers with help of elementary antennas (for example, half-wave dipole) and simple radio equipment. At dynamic spectra the type III radio bursts are characterized by very fast frequency drifts. Usually, the analysis of such two-dimensional spectrograms reveals also duration and intensity of the events in time and frequency; if the antenna facilities permit, as well as degree of polarization.

It should be noticed that the observations of angular three-dimensional structure of the burst source are also of great interest. Our knowledge about angular structure of type III radio bursts in decameter wavelengths was very restricted because of the absence of appropriate radio astronomy instruments. Recently, the difficulty has been overcome by means of the UTR-2 radio telescope (Kharkiv, Ukraine) in heliographic modes. It was successfully used for heliographic observations of solar corona at decameter wavelengths during low solar activity.

We present new results of decameter measurements of type III bursts obtained by the radio heliograph in the frequency range 16.5-33 MHz. The series of such observations were carried out in the summer of 2013 accompanied by numerous type III solar bursts. We report about the angular structure evolution of type III burst sources in frequency and time, i.e. UV-plane viz. heights of corona in dependence of time. The heliograms clearly show directions of the source motion for type III bursts. The results open new perspectives to establish the position and the motion of radio sources of any type in solar corona. This is especially important, for example, for the study of coronal mass ejections to determine immediately directions of their motion in upper corona. New improvements and recent development of this instrument are discussed.