

SPORADIC RADIO EMISSION CONNECTED WITH A DEFINITE
MANIFESTATION OF SOLAR ACTIVITY IN THE NEAR EARTH
SPACE

Dudnic A.V., Zaljubovsky I.I., Kartashev V.M.,
Shmatko E.S.

Kharkov State University, USSR.

Sporadic radio emission of near earth space at the frequency of 38 MHz is shown to appear in case of fast development of instabilities in ionospheric plasma. The instabilities are generated due to primary ionospheric disturbances occurring under the influence of solar chromospheric flares.

During the period close to 21st cycle maximum of solar activity the investigation of sporadic radio emission in the near earth space [1] was carried out at the frequency of 38 MHz using the experimental installation of Kharkov State University [2]. The results of the experiment confirmed the existence of sporadic radio emission in the meter radio wave range [3], in its long wave range in particular. All the types of noise radio emission mentioned in [1] were observed. Fig. 1 presents some examples of the short-time events (0,5 + 7m) detected at the frequency of 38 MHz. Attention was focused on existence of short-time cosmic noise absorptions with sudden onset and end (5,6). These phenomena are not observed at the dm and cm ranges and can't be identified as ionospheric disturbances of SCNA types [4]. Bursts and absorptions with fine oscillatory structure can also be attributed to the type of events unobser-

vable in [1].

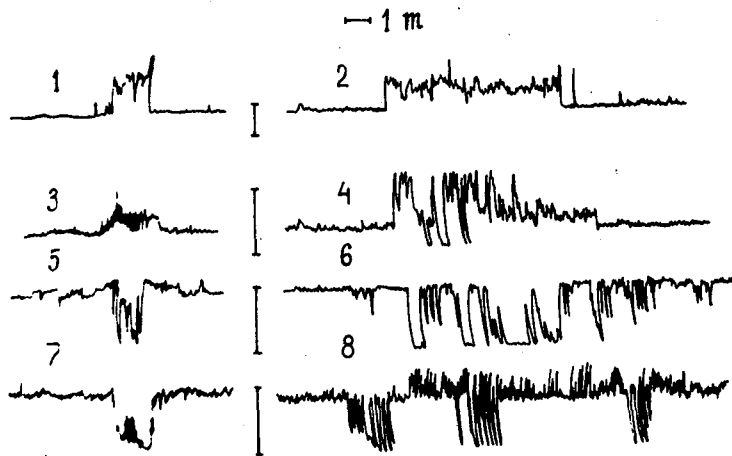


Fig. 1. Characteristic examples of radio emission bursts of near earth space and sudden short-time cosmic noise absorption (SCNA) detected at the frequency of 38 MHz. 1,2 - Sporadic bursts of overage power. 3 - Sporadic bursts with oscillating fine structure. 4 - Sporadic bursts with short-time cosmic noise absorptions. 5,6,7- Short-time sporadic of cosmic noise with oscillating fine structure. 8 - Series of sporadic absorptions of cosmic noise with oscillating fine structure.

Vertical intercepts show radio emission flow equal to $6 \cdot 10^{-22} \text{ W/m}^2 \text{ Hz}$.

The data about sporadic radio emission in near earth space at the frequency of 38 MHz obtained in spring and summer of 1981 were compared with solar data [5] in order to

find correlation with specific manifestations of solar activity. Figure 2 shows some examples of the comparison.

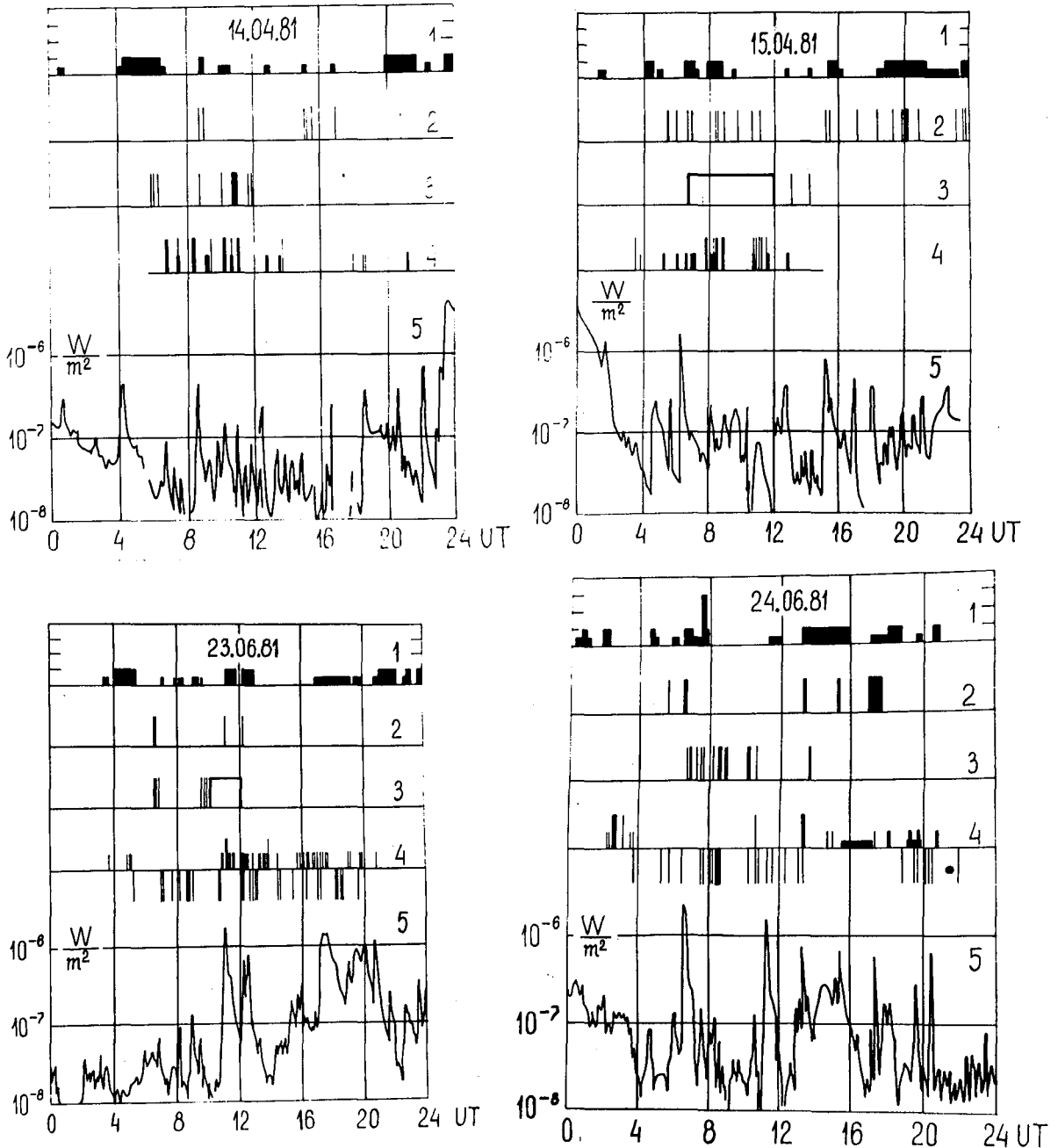


Fig. 2. Time run of solar activity and near earth space sp-

radic bursts and sporadic absorptions during a single day and night period at the frequency of 38 MHz. UT - universal time.

1 - Chromospheric flares on the sun 1 + 3 balls. Small flares - 0.5 div. [5]. 2 - Solar radio emission bursts in cm wave range with intensity more than $1 \cdot 10^{-20} \text{ W/m}^2 \text{ Hz}$ [5]. 3 - Distinctive events on the sun in meter radio wave range [5].

4 - Sporadic radio emission bursts (at the top) and absorptions (at the bottom) at the frequency of 38 MHz. Short vertical intercepts at the top part corresponds to radio emission bursts with signal/noise ratio less than 2. Long intercepts corresponds to radio emission bursts with signal/noise ratio ≥ 2 . Horizontal black rectangle corresponds to noise storms. 5 - X-Ray solar emission intensity is in the spectral interval of 0.5 + 4.0 Å [5].

The main peculiarities of the events observed at the frequency of 38 MHz are the following:

1) the number of events is increased with the growth of solar activity as is shown in [1]; 2) the rise of chromospheric flares and X-ray bursts at the Sun but there was no full coincidence in all details; 3) there is no detailed coincidence with distinctive solar events in radio frequency range; 4) probability of short-time sporadic absorption occurrences in winter is lower than in summer; 5) series of quasiperiodic cosmic noise absorptions and quasiperiodic bursts with small signal/noise ratio are observed; 6) at day-time the probability of event occurrences is higher than at night.

A detailed analysis of all peculiarities of the phenome-