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Detailed study of some specific patterns in Jovian DAM emission spectrograms

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The study of unusual time-frequency structures in the dynamic spectra of the non-thermal sporadic Jovian decameter emission (DAM) provides important additional information on the physical processes, which can occur both in the radiation source and in the plasma environment along the radio waves propagation path to the Earth based receiver. Revealing such structures in spectrograms often encounters serious technical difficulties caused by data contamination with numerous radio frequency interference (RFI) signals originating from both human activities (short wave radio stations, satellites, radars, etc.) and natural sources like thunderstorms. In many cases the RFI power is comparable in intensity to the signals from Jupiter that brings into the forefront the problem of their separation. Here we present some specific spectral features of Jupiter's DAM emission, including various zebra patterns, absorption bursts, and quasi-periodic structures cleared up with a new multi-level statistical method for RFI mitigation. The considered effects had been recorded during several observation campaigns in 2004−2021 by using the huge effective area Ukrainian telescope UTR-2 equipped with the broadband and high dynamic range digital frontend receivers providing high time-frequency resolution in spectrograms. Some of them are reported here for the first time. Further verification and more detailed study of the presented phenomena can constitute a promising task for new ground based instruments (LOFAR, NenuFAR, GURT, etc.), as well as for space missions (JUNO, JUICE, etc.). Terrestrial network of new generation telescopes is a system of dozens small antenna arrays separated in space by thousands of kilometers, which common using provides a large field of view, high-precision broadband, polarimetry imaging with high sensitivity, time and frequency resolution.