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Decametric Emission as a Window in the World of Magnetohydrodynamic Waves Near Jupiter

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It is widely accepted that waves below the ion cyclotron frequency near the Jupiter can be studied only in situ with space probes. Only electromagnetic, mainly decametric (DAM), radio emission is observable from the Earth. However, modern theories connect the Jovian DAM with Alfven waves, which accelerate electrons and stimulate plasma instabilities with electromagnetic wave generation (e.g.: Ergun et al. 2006). Some signs of DAM modulations by the standing Alfven wave have been indeed found recently in Jovian ionosphere (Arkhypov & Rucker 2006). In this connection, the flux variability of Jovian DAM is analysed to search for its possible modulations by propagating magnetohydrodynamic waves. Such modulating waves are found in DAM dynamic spectra as a moving pattern (moire) on the background of S-bursts. Their frequency drift (˜55 MHz/s) corresponds to the wave motion to Jupiter with the Alfven velocity (˜40000 km/s). There are whistler-like drifting details in the dynamic power spectra of S-flux variations at fixed radio frequency. Their frequency drift rates are consistent with whistler dispersion which is formed mainly in the Io torus or Jovian ionosphere. Formally our analysis of S-emission reveals the specific 2s-modulation of S-emission corresponding to the known magnetic pulsations near gyrofrequencies of heaviest ions (SO2+ and SO+) in the Io torus. Apparently, such approach could open the way to earth-based studies of oscillations at ultra low frequencies in the Jovian magnetosphere.

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