Solar Type III radio bursts at Saturn’s orbit: Case study of stereoscopic observations by Cassini/RPWS and Wind/WAVES experiments

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Type III radio bursts are produced by electron beams accelerated in active regions and following open magnetic field lines. Type III observed frequency is found to be nearly equal to the plasma frequency directly linked to the local electron density. The source regions of such solar bursts are the solar corona and the interplanetary medium where, respectively, higher and lower frequencies are generated. In this work, we consider specific Type III solar bursts simultaneously observed by Cassini/RPWS and Wind/WAVES experiments. Despite the distance of Cassini spacecraft to the Sun such Type III bursts have been detected at Saturn’s orbit, i.e. at about 10AU. Those considered bursts are covering a frequency bandwidth from about 10 MHz down to 100 kHz. We attempt in this study to characterize the spectral pattern, i.e. the flux density versus the observation time and the frequency range, and the visibility of the source regions to the observer (i.e. Wind and Cassini spacecraft). In this context, we analyze the evolution of the Type III bursts from the solar corona and up to Saturn’s orbit taking into consideration the Archimedean spiral which is the geometrical configuration of the solar magnetic field extension in the interplanetary medium. We principally discuss the physical parameters, i.e. solar wind speed and the electron density, which lead to constraint the location of the source region and its visibility to both spacecraft.