REVIEW OF THE 2-3 KHZ RADIO EMISSIONS OBSERVED IN THE OUTER HELIOSPHERE

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The Voyager spacecraft have observed episodic bursts of radio emissions at 2-3 kHz in association with global merged interaction regions (GMIRs) reaching the vicinity of the heliopause. This paper reviews both the observations and theory of the emissions. The relative timings of the radio onsets and GMIRs passing the Voyagers, and the observed GMIR speeds, are consistent with the radio emission turning on after GMIRs cross the heliopause. Direction-finding observations imply that the time-varying source location is perpendicular to the plausible direction of the magnetic field in the local interstellar medium (ISM). The standard theoretical model has two parts. First, a shock wave in front of the GMIR accelerates electrons, which produce Langmuir waves via a beam instability, and then radio emission near the electron plasma frequency fp by various linear and nonlinear Langmuir wave processes. Second, the radio emission turns on when the shock crosses the heliopause and enters a region primed with an enhanced superthermal electron tail, itself produced as a result of pickup ions driving lower hybrid waves which then produce the tail via wave-particle interactions. The theory places significant constraints on the magnetic field strength of the local ISM, requiring it to be larger than 0.4 nT. Recent work is summarized and the outstanding observational and theoretical issues are identified.

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