

Analysis of kilometric type II radio emissions detected by Waves/TNR data and association with in-situ interplanetary structures

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Abstract: We use dynamic spectra from the WAVES/TNR (Thermal Noise Receiver) detector onboard the Wind mission to detect kilometric Type II (kmTII) radio emissions between 2000-01-01 and 2012-12-31, i.e. covering a period of time close to one solar cycle. Using information available at various catalogs of interplanetary coronal mass ejections (ICMEs) and magnetic clouds (MCs) we carefully examine temporal and spatial associations between these interplanetary structures and the low frequency radio emissions detected by TNR. We found a total of 105 radio events, with 46 cases associated with in-situ detections of ICMEs, out of which 36 were additionally classified as MCs. Our main result is the finding of 38 kmTII radio events that were not related to the Type II radio bursts reported in the official catalog of Wind/WAVES. Moreover, out of those unreported 38 kmTII events, 22 can be associated with interplanetary shocks at 1 AU, while 4 of the remaining 16 have at least ICME characteristics. Our work remarks the importance of using the low-frequency window provided by the TNR instrument, as well as its higher spectral resolution at the low frequencies of TNR. Its data proves to be valuable not only as complementary data for the analysis of kmTII events but also for forecasting the imminent arrival of a shock at 1 AU.

References:

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Session: 2

Oral or Poster: Poster