Determination of the Type II radio emitting regions on interplanetary shock fronts

G. Barón-Martínez[1], E. Aguilar-Rodriguez[2], P. Corona-Romero[2], J. C. Mejia-Ambriz[2].

[1]*Posgrado en Ciencias de la Tierra, Universidad Nacional Autónoma de México. México.*

[2]*Instituto de Geofísica, Unidad Michoacán. Universidad Nacional Autónoma de México. México.*

Abstract:

Type II radio bursts are considered the characteristic signature of shock waves that propagate outward from the Sun, through the solar corona and the interplanetary medium. In the dynamic spectra is observed as slow drift emission bands towards low frequencies. There is a controversy concerning the region of the shock where the Type II burst is emitted. Some theories postulate that the emission originates in the compressed region, downstream. While other theories consider that it comes from the undisturbed plasma, upstream region. The motivation of this work is to determine if the problem of locating the source region of Type II radio emissions is reduced to these two scenarios or there is the possibility that both scenarios are valid but different conditions. We selected events with in-situ observations of the source regions of Type II bursts, using Wind data between the years 1997 to 2012. Seven events with Langmuir wave activity were found, considered as the emission region for Type II bursts. Subsequently, the location of the Type II radio emission is determined by comparing densities in these regions with the densities of the ambient solar wind. To calculate the densities in the ambient solar wind upstream from each shock, a density model was used to extrapolate the measured solar wind densities at 1 AU. Finally, the results of the density model were compared with in situ observations of the emission source region of Type II bursts.

References:

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