EGU21-10997
https://doi.org/10.5194/egusphere-egu21-10997
EGU General Assembly 2021

Conditions needed for generation of type II radio emission in the interplanetary space

Immanuel Christopher Jebaraj[1,2], Athanasios Kouloumvakos[3], Jasmina Magdalenic[1,2], Alexis Rouillard[3], Vratislav Krupar[4,5], and Stefaan Poedts[2,6]

[1]Solar-Terrestrial Centre of Excellence – SIDC, Royal Observatory of Belgium, Avenue Circulaire 3, 1180 Uccle, Belgium
[2]Center for mathematical Plasma Astrophysics, Department of Mathematics, KU Leuven, Celestijnenlaan 200B, B-3001 Leuven, Belgium
[3]IRAP, Université Toulouse III - Paul Sabatier, CNRS, CNES, Toulouse, France
[4]Goddard Planetary Heliophysics Institute, University of Maryland, Baltimore County, Baltimore, MD 21250, US
[5]Heliospheric Physics Laboratory, Heliophysics Division, NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA
[6]Institute of Physics, University of Maria Curie-Skłodowska, Lublin, Poland

Eruptive events such as Coronal mass ejections (CMEs) and flares cangenerate shock waves. Tracking shock waves and predicting their arrival at Earth is a subject of numerous space weather studies. Ground-based radio observations allow us to locate shock waves in the low corona while space-based radio observations provide us opportunity to track shock waves in the inner heliosphere. We present a case study of CME/flare event, associated shock wave and its radio signature, i.e. type II radio burst.

In order to analyze the shock wave parameters, we employed a robust paradigm. We reconstructed the shock wave in 3D using multi-viewpoint observations and modelled the evolution of its parameters using a 3D MHD background coronal model produced by the MAS (Magnetohydrodynamics Around a Sphere).

To map regions on the shock wave surface, possibly associated with the electron acceleration, we combined 3D shock modelling results with the 3D source positions of the type II burst obtained using the radio triangulation technique. We localize the region of interest on the shock surface and examine the shock wave parameters to understand the relationship between the shock wave and the radio event. We analyzed the evolution of the upstream plasma characteristics and shock wave parameters during the full duration of the type II radio emission. First results indicate that shock wave geometry and its relationship with shock strength play an important role in the acceleration of electrons responsible for the generation of type II radio bursts.