

EGU21-1601

<https://doi.org/10.5194/egusphere-egu21-1601>

EGU General Assembly 2021

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Automatic Detection and Classification of ICMEs in Solar Wind Data

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Interplanetary coronal mass ejections (ICMEs) are one of the main drivers for space weather disturbances. In the past, different machine learning approaches have been used to automatically detect events in existing time series resulting from solar wind in situ data. However, classification, early detection and ultimately forecasting still remain challenges when facing the large amount of data from different instruments. We attempt to further enhance existing convolutional neural network (CNN) models through extending their possibilities to process data from multiple spacecraft and to include a post processing step commonly used in the area of computer vision. Additionally, we make an effort to extend the previously binary classification problem to a multiclass classification, to also include corotating interaction regions (CIRs) into the range of detectable phenomena. Ultimately, we aspire to explore the suitability of several other methods used in time series forecasting, in order to pave the way for the elaboration of an early warning system.