On the identification of Electron Diffusion Regions at the magnetopause with an AI approach

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MMS has already been producing a very large dataset with invaluable information about how the solar wind and the Earth's magnetosphere interact. However, it remains challenging to process all these new data and convert it into scientific knowledge, the ultimate goal of the mission. Data science and machine learning are nowadays a very powerful and successful technology that is employed to many applied and research fields. During this presentation, I shall discuss the tentative use of machine learning for the automatic detection and classification of plasma regions, relevant to the study of magnetic reconnection in the MMS data set, with a focus on the critical but poorly understood electron diffusion region (EDR) at the Earth's dayside magnetopause. We make use of the EDR database and the plasma regions nearby that has been identified by the MMS
community and compiled by Webster et al. (2018) as well as the Magnetopause crossings database compiled by the ISSI team, to train a neural network using supervised training techniques. I shall present a list of new EDR candidates found during the phase 1 of MMS and do a case study of some of the strong candidates.