



Automatic detection of martian plasma boundaries: use of machine learning techniques

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The planetary environments have been or are being visited by different space probes whose measurements make it possible to understand the dynamics of these environments and their evolution. Researchers spend much time to go through the spacecraft instruments time series to detect "events" or "boundaries" that are characterized by variations of one or more parameters. Depending on their nature, empirical or theoretical models can help predicting their occurrence more or less precisely, but still the identification "by eye" almost always remains the most efficient way.

In this paper we report a tentative use of machine learning techniques, widely used in other fields (e.g. image recognition, sound analysis...), to automatically detect plasma boundaries at Mars (such as the shock, the photoelectron boundary or the magnetic pile-up boundary). Such an identification will ease statistical studies of the boundaries dynamics or provide added value to the users of planetary data visualisation systems (such as the CDPP - Plasma Physics Data Center) with a direct labeling of the plasma data in terms of boundaries/regions.