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Interplanetary coronal mass ejection and Saturn kilometric radiations

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Abstract

Saturn Kilometric Radiations (SKR) were observed for the first time during the flyby of Saturn by the Voyager spacecraft in 1980. These radio emissions, in the range of a few kHz to 1 MHz, are emitted by electrons travelling around auroral magnetic field lines. Their study is useful to understand the variability of a magnetosphere. Previous studies have shown a strong correlation between the solar wind pressure and the SKR intensity. However, up to now, the effect of an Interplanetary Coronal Mass Ejection (ICME) has never been examined in detail, due to the lack of SKR observations at the time when an ICME can be tracked and clearly identified. In this study, we take advantage of a large ICME that reached Saturn mid-November 2014 (Witasse, O. *et al.*, JGR, 2017). At that time, the Cassini spacecraft was fortunately travelling in the solar wind for a few days, and provided a very accurate timing of the space weather event. A survey of the Cassini data for the same period indicated a significant increase in the SKR emissions. This presentation reports on the correlation between the ICME disturbances and SKR emissions.

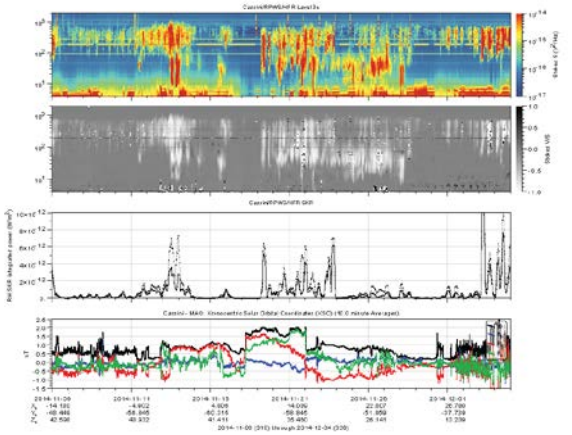

Figure: Cassini radio emissions (top 3 panels) and magnetic field (bottom panel) measurements in November 2014. There is a correlation between an ICME impact and SKR emissions: two main SKR bursts occur after the passage of the ICME shock (with a delay of ~16 hours) and of the magnetic cloud (with a delay of ~28 hours). In between, a smaller SKR burst could be correlated with a proton flux peak occurring during the passage of the ejecta of the ICME.