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Plasma acceleration in the Martian magnetotail

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Since November 2014, the Mars Atmosphere and Volatile EvolutioN (MAVEN) spacecraft has been collecting data from Mars's upper atmosphere and induced magnetosphere (Jakosky et al., 2015). Evidences of escaping planetary ions have been reported from earlier missions as Mars-Express (Barabash et al., 2007) and more recently from MAVEN (e.g. Dong et al., 2015, Brain et al., 2015). Our goal is to determine the acceleration mechanism responsible for the energization of planetary ions in the Martian plasma sheet. MAVEN has a full plasma package with a magnetometer and plasma particles instruments, which allow to address the question of plasma particle acceleration.
According to Dubinin et al. (2011), the j x B force due to magnetic shear stresses of the draped field lines is expected to play a major role in such energization process. On MAVEN data, we have first identified and characterized current sheet crossings taking place in Mars' magnetotail and then tested the Walén relation to infer the significance of the j x B force in the particle's energization. To characterize the plasma sheet crossing we have worked with MAVEN magnetometer (MAG, Connerney et al., SSR, 2015) and mass spectrometer (STATIC, McFadden et al., SSR, 2015) data, focusing on a particular event. We have performed a minimum variance analysis, on the magnetic field observations which allows to characterize the current sheet. We present results of the Walén test and our conclusions on planetary plasma acceleration in the plasma sheet region.