



Waves at the proton cyclotron frequency at Mars revisited

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The presence of waves measured by the Mars Global Surveyor magnetometer and electron reflectometer (MAG/ER) at the local proton cyclotron frequency in the solar wind revealed the presence of an extended exosphere at Mars. However, the large amplitude of these waves even at large distances and their non linear nature make the pickup ion rates from local exospheric hydrogen deduced from classical quasi-linear theory sometimes unrealistically high. In this work, we present new analyses of high resolution measurements of Mars Global Surveyor magnetometer and electron spectrometer during the aerobraking hiatus (science phasing orbits). The statistic of wave amplitude in 3D space will be shown. Comparison with observations by Mars Express SPICAM instrument will help to obtain new insights in the connection between the spatial distribution of these waves and the geometry of the Martian hydrogen exosphere. Some previous studied cases have shown intermittent observations which have been interpreted as consistent with the crossing of a disc distribution of energetic neutral atoms formed by recombination or charge exchange with pickup ions produced closer to the planet. This disc distribution is supposed to depend on the local IMF direction where the ENAs have been created. However there are numerous cases showing continuous waves along many orbits with the same orientation in space while the IMF obviously can be very different. This makes the possibility for the spacecraft to remain inside the hypothetic ENA disc very unlikely. Implications for the future Maven mission will be discussed.