



Fluxes of energetic oxygen atoms impacting the Martian exobase and their associated effects

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Some part of the energetic oxygen atoms produced during the interaction of the solar wind with the Martian exosphere penetrate below the exobase. A global three-dimensional hybrid code is used to compute the production and acceleration of oxygen pickup ions which produce energetic oxygen atoms through charge exchange reactions with the Martian neutral coronas of atomic hydrogen and oxygen. The 3-D hybrid code describes the Martian plasma environment resulting from the interaction of the solar wind with Mars by considering H^+ and He^{2+} solar wind and O^+ , H^+ and O_2^+ planetary ions. All the relevant processes of formation of the planetary ions from the neutral Martian exosphere are taken into account. Such an approach provides for the first time a complete 3-D spatial distribution, intensity, energy spectrum of the impacting flux into the Martian atmosphere. We used these computed flux as input for a 3-D Monte Carlo model which describes the sputtering effect of the impacting particle on the Martian atmosphere (Leblanc and Johnson, *Plan. Space Sci.*, 2000). The incident flux produces a significant loss of atmosphere but also an enhanced neutral population in the Martian corona. This approach allows to propose a whole image of the coronal 3-D structure. Such result will be later used as an input for the 3-D hybrid code. Results of this coupled approach will be discussed in the frame of the previous results on that subject. New results taking into account the short term variability of the solar wind, especially of the IMF and of the bulk velocity will be presented.