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Influence of EUV flux variations on the precipitating ion flux from MAVEN observations

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At present epoch, the efficiency of Mars' atmosphere sputtering by precipitating heavy ion to induce atmospheric escape is expected to be negligible under actual solar wind conditions. It is presently difficult to directly measure its current influence on Mars atmosphere. However, it is possible to better understand the potential importance of this process along Mars' history by further constraining the precipitating ion flux thanks to MAVEN instruments.

In this work, we study the influence of the solar Extreme Ultraviolet (EUV) flux on the precipitating ion fluxes as seen by MAVEN/SWIA, an energy and angular ion spectrometer. We defined three periods with significant different EUV flux (High EUV: 0.42 $mW\,m^{-1}$; Medium EUV: 0.21 $mW\,m^{-1}$and Low EUV: 0.13 $mW\,m^{-1}$) and compare the average values of precipitating ion flux measured by MAVEN during each period. At low energy [30, 650] eV, we find that the precipitating flux during the Medium and Low EUV periods are respectively 2 and 3.5 times more intense than the flux during the High EUV period. At High energy [650, 25000] eV, a similar change in the intensity of the precipitating flux is observed but with an increase by 50% and 70% respectively. The EUV flux seems therefore not to favour the ion precipitation contrary to most of the modelling prediction.