



## **Localized ionization patches on the nightside of Mars and their effects on radio wave propagation**

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We investigate the effect of ionization due to electron precipitation on the electron density and total electron content (TEC) in the nightside ionosphere of Mars. As input we use recently reported auroral-like peaked electron spectra that appear to have undergone an acceleration process. The nominal electron density in the nightside ionosphere is very low, so the electron precipitation creates a significant increase in the TEC. The regions of ionization are localized in space and correspond to magnetic cusps formed by the interaction of the Martian crustal sources with the interplanetary magnetic field. The most energetic accelerated spectra, hence the largest nightside electron densities and TECs, appear correlated with solar energetic particle (SEP) events and may represent a previously unknown SEP effect at Mars. The horizontally inhomogeneous regions of ionization will likely distort radio waves used for orbit-to-surface communication and for precise positioning calculations on the nightside of Mars which have not previously been taken into account.