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The origin of small scale disturbances in the lower ionosphere of Mars

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The radio-science experiment MaRS (Mars Express Radio Science) on the Mars Express spacecraft (MEX) sounds the atmosphere and ionosphere of Mars since 2004. Approximately 800 vertical profiles of the ionospheric electron density have been acquired until today. A subset of the MaRS dayside observations contains small scale disturbances in the lower ionosphere. Those electron density profiles display unusual small scale features in the M1 altitude range, which appear either merged with or completely detached from the M1 layer. Possible explanations for this additional ionospheric electron density may be ionospheric NO+, meteoroid influx, solar energetic particle events or atmospheric waves. A 1D photo-chemical model of the Mars dayside ionosphere (IonA-2) coupled with a model of the ablation/chemical reactions of meteoroids with the atmosphere/ionosphere (MSDM) is used in combination with derived environmental parameters to investigate the origins of the small scale disturbances in the lower ionosphere of Mars.