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A Third Layer in the Ionosphere of Mars

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Usually, the ionosphere of Mars consists of two layers, a main layer M1 at ca.135 km altitude and the second layer M2 at ca.110 km altitude, both formed by solar radiation in the EUV. The Mars Express radio science experiment MaRS discovered a third layer below the second layer at an altitude between 70 km and 110 km and an average electron density of 1/20 of the usual daytime main peak electron density. The third layer was predicted to be permanent and consisting of metal ions formed by the infall of meteorites in the atmosphere. The occurrence of the third layer in the MaRS data implies that the third layer is not permanent but when created has a long lifetime of at least 24 hours over a locally limited area of 30° longitude. Further observations from the fourth occultation season of Mars Express show cases of very pronounced third layers and also formations in the night, e.g. the local polar night.