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THE STRUCTURE OF THE IONOSPHERE OF MARS AS OBSERVED BY THE MARS EXPRESS RADIO SCIENCE EXPERIMENT

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The Mars Express Radio Science Experiment MaRS sounds the ionosphere of Mars at microwavelengths and covers altitudes from the base of the ionosphere at 80 km to the ionopause at altitudes between 300 km and 800 km. So far, more than 400 electron density profiles have been observed mainly at northern latitudes, covering day- and nighttimes and the polar nights of both northern and southern winter poles.

The Mars ionosphere is seen to consist of a lower secondary layer M1 at about 110 km, and the main layer M2 at about 135 km altitude, both formed by solar radiation at X-ray and EUV, respectively. The precise and detailed observations of the Mars Express radio science experiment indicates the presence of another layer M3 in the topside above the main layer M2 with a shape of a Chapman function as the transition region between the photochemically induced and Chapman-like M1 and M2 layers and the transport dominated highly dynamical topside region above 200 km altitude. A region of enhanced ionisation below the M1 layer can be observed sporadically and at certain recurrent solar longitude values which is caused by the infall of meteor showers in the atmosphere.