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Anomalous structures observed in the nightside Martian ionosphere with the Mars Express topside radar sounder

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We present the initial results of studies of anomalous structures observed in the shadowed Martian ionosphere, using data from the Mars advanced radar for sub-surface and ionospheric sounding (MARSIS) instrument on board Mars Express. Operating in the active ionospheric sounding mode, MARSIS is able to simultaneously measure both the plasma density profile of the topside ionosphere, as well as the electron plasma density and magnetic field local to the spacecraft. Data from the Analyser of space plasma and energetic atoms (ASPERA) instrument is also presented. We study these events for possible signatures of the ionisation source sustaining them, along with their repeatability in both space (their connection to features in Mar's crustal magnetic field) and time (their connection to solar wind disturbances, where suitable data is available). The results are discussed in the wider context of the dynamics of the induced Martian magnetosphere.