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Shapes of magnetically controlled electron density structures in the dayside ionosphere of Mars

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Non-horizontal localized electron density structures are regularly observed in the dayside Martian ionosphere above regions of near radial crustal magnetic fields. These observations are made via radar oblique echoes with the ionospheric sounding mode of the MARSIS radar onboard the Mars Express spacecraft. Previous studies mostly investigated these structures at a fixed plasma frequency and assumed that the structures are standing higher than the normal surrounding ionosphere, based on considerations of apparent altitude. However, the signal is subjected to dispersion when it propagates through the plasma. Thus interpretations of the shape of these structures based on the apparent altitude may be unreliable. We go further by using time series of MARSIS electron density profiles corrected for signal dispersion, to investigate the frequency dependence (i.e. the altitude dependence) of the shape of 48 density structure events. The results suggest that transport processes are a key driver for these structures.