



Ionospheric plasma structuring investigated using Swarm 16 Hz data

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We use the roughly 2 years of 16 Hz electron density measurements from the Swarm advanced data set to investigate plasma structuring in the terrestrial ionosphere. We find that small-scale (1 km) structure can be quantified by looking at the (unnormalized and normalized) standard deviation of density measurements in discrete data bins (in time and space). At high latitude the structures are shown to be significantly more numerous when there are strong field-aligned currents flowing into and out of the polar regions than otherwise. We identify a set of strong current events by integrating current density measurements from the AMPERE project. We discuss whether these events, and the corresponding rise in small-scale plasma structures in the ionosphere, are caused by the current convective instability. We also identify dayside magnetic reconnection events by considering polar cap magnetic flux data (from the AMPERE project), and investigate the resulting small-scale plasma structuring. We go on to discuss the ramifications of small-scale plasma structures for GPS signals, and the use of field-aligned current surveillance as a predictor of plasma structuring.