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Periodic structures of the electron density in the F region cusp

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Structured plasma density in the dayside cusp is known to be collocated with ”soft” precipitating particles, that is, electrons with energy less than about roughly 500 eV. When the energy and flux change over time, the structured density becomes even more irregular. In this study, using high time resolution data from the EISCAT Svalbard radar, we understand whether or not some periodic features exist in the irregular density distribution in the cusp. First, we derived the raw electron density profile with the shortest time resolution (of 3.2/6.4 s) from the radar data. We then examined the electron density profile using wavelet analysis. The result of wavelet analysis shows that several periodic variations exist in the structured density, and that a variation of 40-80s is prominent. We will show the detailed result about this variation, and discuss why this is prominent.

Keywords: F region, electron density, cusp, plasma convection, IS radar observations