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Spectral Properties of Kilometer-Scale Equatorial Irregularities as Seen by the Swarm Satellites

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The three Swarm satellites have crossed the equator close to 80000 times each, and a large database of plasma density measurements at spatial resolution up to 500 m is available. This allows to investigate spectral properties of often seen irregularities at scale sizes of kilometers and tens of kms at heights between about 410 and 480 km above sea level. In this range of altitudes electrons are nearly completely magnetized, and ions slightly demagnetized. Therefore the irregularities could be anisotropic with a tendency to be aligned with respect to B. The satellite crossings are close to the geodetic north-south direction. Consequently the tracks of density measurement/satellite orbit have an angle with B between 0 and up to 60 deg within magnetic latitudes +/-30 degrees. Spectral properties that we have investigated are the slope of the power over wavelength, index p, and the structure function of the density. The spectral index p indicates more shallow spectra at larger angles with respect to B, in agreement with the expectation above. The spectra are also more shallow near the crests of the equatorial ionization anomaly at +/-15-20 deg magnetic latitude. This could be caused by a larger linear growth rate at these locations, which might in turn be caused by a less horizontal B.