



Kilometer Scale Irregularities at Swarm and Scintillations on the Ground

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Irregular ionospheric density variations are frequently seen using the faceplate current of the Swarm EFI instruments. The sampling is at 16 Hz corresponding to about km scale irregularities. The observations of irregularities are compared with amplitude scintillations recorded by the Global Positioning System-Scintillation Network and Decision Aid (GPS-SCINDA) receiver installed in Mbarara, Uganda, at magnetic latitude of -10.2 deg. For the majority of Swarm passes, there was a good agreement between the increase in level of amplitude scintillation index (S4) and the depth of electron density perturbations. Cases where scintillation was seen without clear variation in electron density suggests that irregularities can be effective quite locally, horizontally or in height. Also, irregularities with no associated scintillation event were noted and this was attributed to a low background electron density. Initial results from this study indicate the capability of in situ density fluctuations observed by Swarm satellite passes over Mbarara of being used as indicators of ionospheric radio wave scintillation. An attempt is made to model amplitude scintillation using Swarm electron density measurements by applying the power law phase screen model developed by Rino [1979]. A spectral analysis procedure carried out to aid the model revealed that the power spectrum follows a power law with spectral index ranging mainly between -1.8 and -2.2. The results also indicate that the Swarm satellite in situ measurements of electron density fluctuations may be used to model scintillation over the low latitude, but with an expected significantly better outcome when using the lower pair at below 460 km altitude.