

## ***Interactive comment on “Spread F occurrence features at different longitudinal regions during low and moderate solar activity” by Abimbola O. Afolayan et al.***

**Abimbola O. Afolayan et al.**

obafolayan@gmail.com

Received and published: 6 May 2019

Referee 2 1. The authors are requested to highlight what is new in this work. We have presented an extensive statistical analysis of the RSF occurrence across different longitude sectors during the low and moderate solar activity period. Our results have highlighted and discussed factors contributing to the relevant features observed at these longitudes during the solstice and equinox months, which includes;

The observed longitudinal variation in the observed equinoctial asymmetry pattern and peak during both epochs.

C1

The anti-solar dependence of the RSF occurrence at the South American sector during the S-equinox season.

This observation and other related analysis presented in our study further highlight the seasonal variation of the ionospheric density as a major factor influencing the observed equinoctial asymmetry in the RSF occurrence.

A large RSF occurrence percentage was observed at the ILR station across all the seasons during LSA period and a brief discussion about the probable factor responsible for the observation was included.

Apart from providing a supporting result to the earlier theoretical analysis of the zonal drift reversal effect to the reduced spread F occurrence percentage at the 150o – 170o longitude range during the June solstice. Our result has also shown that similar asymmetric effect might also exist during the equinoctial seasons of the low solar activity period. Where a significant onset delay and smaller occurrence percentage was observed at the March equinox of the LSA and a corresponding equinoctial asymmetry is observed in the monthly mean vertical plasma drift at this region.

Finally, we also analyzed the probable role of the GW from tropospheric source on the observed solstitial asymmetry in the spread F occurrence in the low declination angle longitude region. We have attempted to demonstrate the complementary role of the gravity wave (GW) in the solstitial asymmetry observed at the low declination angle region using OLR measurement as a proxy for the seasonal distribution of the GW activities at each region. We assume your reservation about this approach might be connected with the results from Su et al., (2014). However, a recent study has attributed the poor correlation at some of the regions with the averaging of OLR value over a wide longitude range (Li et al.,2016). Furthermore, our result showed that the suggested approach does not increase the correlation coefficient at CPN. Hence, we have presented a brief analysis of the major factors that could have contributed to the small ESF occurrence percentage at the CPN longitude in spite of the large OLR

C2

frequency.

We believe that the presented result and analysis have summarized the prominent features related to the seasonal variation of the irregularity initiation and occurrence across different longitudinal regions. These could provide the relevant to the improvement of the empirical modelling of the RSF occurrence distribution.

2. In Fig. 4, one can see high occurrence of Spread F at Ilorin in all seasons, which is clearly different to the other longitudes. No clear discussion can be found in the text. To my point of view, this is a new result and worth to discuss further. a) Thanks, this has been included in the discussion.

Minor comments: Pages 13, 15-21: There are several paragraphs with the length more than one page, which made readers confused to understand. Concise description or to divide it in sub-paragraphs will be better. a) Thanks for your observation. This has been corrected

In Fig 4, the authors showed occurrence rate at Ilorin during Low solar activity. But, in Fig 7, the authors showed monthly averaged virtual height at Ilorin during Medium solar activity. Why they are different period ? a) Thanks. We will make the necessary correction to the figure caption (Figure 7b should represent the LSA).

Page 18, line 360, "GW": Gravity waves ? a) Yes, this was shown in the statement where it first appears

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Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2019-24>, 2019.