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

Anonymous Referee #3

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This is an interesting work in which the authors analyse the spread F occurrence in different longitudes and attempt to explain their seasonal variations. The present version of the manuscript is not suitable for publication due to the reasons mentioned below. The revised version might be a worthy contribution. During the revision, the authors can focus on grammar corrections as well. Particularly in many places singular and plural wordings are misrepresented. I point out few of the cases in the comments below.

Major comments:

1. Why the authors consider 2013 as MSA? It is almost the solar maximum of the

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present solar cycle. It should be HSA, right? For ionospheric studies the solar cycle has to be considered based on sunspot numbers and 2013 may well be considered as maximum period.

2. Equation 1 is confusing and probably wrongly typed. Proper explanation on how Figures 4 and 5 are calculated has to be given. I wonder why the authors cannot simply take '(no. of 15 (or 10) min points with RSF/total no. of 15 (or 10) min points for that local time)x100' to get the occurrence percentage.

3. For March equinox, why the authors select April instead of March. Isn't it more appropriate if they select March, June, September and December? Anyhow, I believe the results may not vary considerably between March and April. They may cross check and explain.

4. Line 184 – 186. Ilorin data is unavailable during MSA. So this sentence is not appropriate and there may be variations in local time of occurrences over Ilorin between MSA and LSA.

5. Line 187 – 188. But from Figure 4, during LSA, September was higher than March over Fortaleza, and also at Kwajalein.

6. Figure 7. Check panels a and b. Are they interchanged? As per statistics Ilorin do not have data during MSA but as per this plot, it does not have during LSA.

7. Line 291 – 296. Not acceptable based on result. Figure 7 shows that there is no PRE over Kwajalein except for S-equinox of MSA. How it can be an example for control of PRE?

8. Line 296 – 301. The authors explain based on results of Su et al., (2009). However, with Figure 7 the effect of PRE and associated PSSR can be directly compared and studied. Instead of such an approach why the authors explain the previously reported results herein? May be previous observations can be moved to the introduction.

9. Figure 8. Is the dip equator for Ilorin correct in this Figure?

10. The text sizes in the Figure labels are small. Enlarge them so that they will be easy to read.

Minor comments:

11. Line 18. The authors mention 2009 or 2010 and 2011 or 2013. What do they mean? Is it like '2009 to 2010' or '2009 and 2010'?

12. For all the locations, include quasi-dip latitudes also.

13. Lines 47 – 50. While PRE is an important parameter for spread F occurrence, recent works indicate that lack of PRE do not preclude formation of spread F. Spread F forms without PRE as well. This need to be discussed and the identification of late night spread F in many of the previous works have to be cited. Some relavent references are Sastri, Ann. Geophys., 1999; Stoneback et al., JGR, 2011; Candido et al., JGR, 2011; Narayanan et al., EPS, 2014.

14. Line 53 – 55. Distortion of HF signal quality does not affect GPS frequencies. During spread F times, quite often the L band signals themselves get affected. Rewrite accordingly.

15. Lines 57, 58, 417. Singular to plural: 'ionopsheric conditions', 'deliberate efforts', 'charged particles'.

16. Lines 75 – 77. Initiation depends on seeding also. Though authors are aware of it as discussed in later part of the paper, this statement needs to be rewritten.

17. Line 82. The references here are not complete. The first works where STBA hypothesis had originated are not given. Give Maruyama and Matuura, 1984 and Tsunoda, 1985.

18. Line 83. Polarization field or PRE field?

19. Line 116. Remove initials of Dr. Galkin in the reference.

20. Figure 1 caption. What is shown is geographic latitude longitude map, while the captions claim ‘geomagnetic location’.

21. Line 208 – 209. ‘..both stations..’. Which ones? Give the names.

22. Line 214 – 215. But Figure 6(b) shows differences between MSA and LSA in S-equinox and D-solstice period. Particularly during S-equinox. Justify or modify the statement.

23. Give expansion of PSSR in first place of occurrence.

24. Line 229. ‘..the generation of post-midnight ESF events’.

25. In Figure captions either give full station names or give abbreviations, consistently.

26. Line 252 – 255. How zonal wind affect the vertical plasma drift? Explain briefly.

27. The explanation of terms L and gamma are missing in Equation 2.

28. Line 332 – 334. Give references for the sentence ‘post-sunset vertical drift was established to have a directly proportional relationship with the neutral density’.

29. Line 363. I disagree. There are indications that ITCZ may influence ESF activity. It is not established yet. More research is required in this regard.

30. Line 368. Briefly explain GWBA hypothesis herein. In the course of discussion the authors mention it, but some rearrangement is needed to make the flow of paper proper.

31. Figure 8. Explanation of how the plot is made have to be given. How many years of OLR data are used?

32. Lines 436 – 443. The description is confusing. May consider rewriting more clearly.

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