

Temporal and altitudinal variability of the spread F observed by a VHF radar over Christmas Island

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MS No.: angeo-2021-70

MS type: Regular paper

Special Issue: From the Sun to the Earth's magnetosphere–ionosphere–thermosphere

We thank the editor and reviewers of our paper for their kind collaboration in the improvement of this manuscript. We have taken into account all the minor comments raised and we made the suggested modifications. Below we justify our replies to the suggestions made by the respected reviewers of this paper. So, in the following, we include our answers point-by-point.

### **Answers to reviewer 01:**

Second review to the manuscript “Temporal and altitudinal variability of the Spread F observed by the VHF radar over Christmas Island”

General comment:

The authors attended the minor comments I noted, but did not reply on my general comment. “The data and the statistical analyses are interesting and worth to publish. However, the authors did not try to explain, quantitatively or qualitatively, why it occurred”.

If this present manuscript is to be considered as a full research paper, the discussion of the physical explanation of what they observed will be necessary.

The Chapter 4 (Conclusion) is necessary to revise, making to be concise.

### **We had reorganized chapter 4.**

Language corrections are necessary before to be accepted.

My review conclusion: the present manuscript is necessary to have a major revision and language editing.

Minor comment are follows:

Line 13, “Raileight” : correct to “Rayleigh”

Line 37, “recently”: newly

Line 58, “low solar conditions”: low solar activity conditions.

Line 102, “eastward vertical plasma drift”: eastward electric field and vertical plasma drift ??

Lines 109-110, “The solstice is when the Sun reaches the most southerly or northerly point in the sky, while an equinox is when the Sun passes over Earth’s equator. For example, June solstice, or June 21, is the longest day of the year in the northern hemisphere. “: This sentence is obviously not necessary, I guess.

*Thanks to the reviewer for his observations, so, we agreed and made the suggested corrections.*

Line 120: I could not find any explanation of Figure 2, which is the main observational result of the present paper.

*We had highlighted the explanation for Figure 2 as:*

*“We can observe, in Figure 2, a significant difference in time of occurrence and duration between the spread F events at solar maximum and minimum. According with the data during solar maximum the spread F events were observed to occur near the time when upward drift is large which is promptly after local sunset and lasting few hours, while during solar minimum the upward drift is usually short, the spread F were observed usually throughout the whole night....”*

Line 136, “top panel”: upper panel,

*Thanks to the reviewer for his observations, só, we agreed and made the suggested corrections.*

Line 148 “observed being bigger”: please revise this English phrase.

*After correcting we end up with: “As observed in the Figure 3, we found a more prominent peak time/altitude occurrence in the September equinox (before midnight) than in the June solstice (around midnight hours).”*

Line 177 “The variability over seasonality”: seasonal variability ?

*Thanks to the reviewer for his observations, só, we agreed and made the suggested minor comment.*

Line 203-205, “We can clearly observe the peak time echoes occurrences being closer to the time of PRE during high solar activity years (see 2003, 2004 and 2011 and 2012) and around midnight during solar minimum conditions (see years 2007 to 2009).”: this is what the authors found in the data analysis.

*Yes, and we move this paragraph to the Discussion section.*

Line 175 “Conclusion”: This chapter has 6 paragraphs, too long. Some parts are to be in the “Discussion”. Only two paragraphs, Lines 203-205 and lines 215-217, are mentioning some finding.

*We re-organize the discussion and conclusion paragraphs.*

## **Answers to reviewer 02:**

The authors addressed my concerns and the manuscript was improved. In my opinion, it can be published after technical correction.

The text written from the lines 188 to 220 seems to be part of the discussion and not conclusions.

*We re-organize the discussion and conclusion paragraphs.*