

Ann. Geophys. Discuss., author comment AC2  
<https://doi.org/10.5194/angeo-2021-70-AC2>, 2022  
© Author(s) 2022. This work is distributed under  
the Creative Commons Attribution 4.0 License.

## Reply on RC2

Ricardo Yvan de La Cruz Cueva et al.

---

Author comment on "Temporal and altitudinal variability of the spread F observed by the VHF radar over Christmas Island" by Ricardo Yvan de La Cruz Cueva et al., Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2021-70-AC2>, 2022

---

We take this opportunity to 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 concerns raised and we made the suggested modifications. We have implemented numerous improvements to the paper. 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 2:**

**Line 69: sub-section title of 2.1: "Data measurements" to be revised as "VHF radar measurements".**

We thank the referee for this comment. We made the suggested correction.

**Line 83, "Mach": correct to "March"**

We thank the referee for this comment. We made the suggested correction.

**Line 87, "we had organized": correct to "we organized"**

We thank the referee for this comment. We made the suggested correction.

**Line 91, "Is": correct to "It is"**

We thank the referee for this comment. We made the suggested correction.

**Line 131, "The higher occurrence of echoes in altitude is compared with the density profiles provided by Digisondes": Please show the digisonde data for comparison.**

By curiosity we were trying to compare the profile of the figure with the usual digisonde density profiles from other stations like Sao Luis (Brazil). We removed this from the manuscript.

**Line 133, "June equinox": correct to "June solstice". In the next pages there are several phrases of "March solstice, September solstice" please correct them to March equinox and September equinox.**

We thank the referee for this comment. We made the suggested correction.

**Line 134 "even when its occurrence was the opposite": what does it mean ?**

Sorry for not being clear, but I meant that the Peak echoes altitude for solar minimum conditions, was slightly higher in altitude in June solstice than September equinox, however higher occurrence rates were higher in September equinox than in June solstice, also for solar minimum conditions.

We change the text as follows:

*"When analyzing solar minimum years (2006 and 2008) we can lay down our attention to the peak echoes altitude, it was slightly higher, in altitude, in June solstice than in September equinox. For the occurrence rates of peak time we observed being bigger in September equinox, and peak altitude occurrence before midnight (as in bottom panel), than in June solstice with peak altitude occurrence around midnight hours (as in bottom panel)".*

**Line 139, "The altitude distribution of echoes above 350 km also presents same behavior as below this threshold": what threshold ??**

We re-wrote the sentence by:

*"... Horizontal dashed lines were placed at 250 and 350 km height to assist observation (hereafter called altitude threshold)."*

*"During solar maximum period spread F echoes have less occurrence than in solar minimum period, reaching higher altitudes as observed in June solstice 2003 when the peak altitude was higher than the threshold altitude of 350 km".*

**Line 156, "September solstice": to be "September equinox"**

We thank the referee for this comment. We made the suggested correction.

**Line 315, Figure 2: If the authors plot ionospheric sunset hours in the figure, it would be useful.**

Dear referee, plotting the local sunset and the ionospheric sunset can pollute the Figure since the difference is small, around 1.1 hours. So, we plotted the ionospheric sunset in Figure 4.

**Line 326, Figure 4: please plot STD error bar for each plot, so that readers could evaluate the difference between them.**

Thanks to the referee for his observation. We prepared the Figure and add an explanation to the text.