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Comment on angeo-2022-17

Anonymous Referee #2

Referee comment on "Effects of the terdiurnal tide on the sporadic E (E_s) layer development at low latitudes over the Brazilian sector" by Pedro Alves Fontes et al., Ann. Geophys. Discuss., https://doi.org/10.5194/angeo-2022-17-RC2, 2022

The topic of this paper is the observation of sporadic E (Es) layers with a low-latitude ionosonde station in Brazil. The authors focus on the terdiurnal tidal component that they extract from Es occurrence and other related parameters provided by the ionosonde. The topic is interesting and important to the community since until today there is still a lack of understand the iono-neutral coupling processes and the exact contribution of the tidal species to Es formation. However, I feel the presentation has to be improved before the paper can be published in Annales Geophysicae. Please find my detailed comments below:

Major points:

- It is interesting to see that different types of Es layers appear during different times of the day. However, from my point of view Fig. 1,2 and Fig.3 contain almost the same information. Only from figure 3 the reader can get a rough estimation on how frequent each Es type appears. Of course, it is also beneficial to present absolute numbers. I recommend to combine these Figures but keep Figure 3 and adjust the text accordingly.
- Same applies for Figure 4 and Figure 5. The information both plots contain are redundant and I recommend to delete Figure 4 because all necessary information are presented already in Fig. 5. You may think of adding a 4th line to Fig 5 representing the seasonal mean from Figure 4.
- Starting from line 126: You identified a 8-h structure in the Es data. But the rates during the night are very low and it is almost impossible to see a 3rd maximum in the morning hours (refers to Fig 1,2,3). In best case there a weak enhancement best visible in autumn. Therefore, I recommend not to call it "peak" in the text.
- I have one question concerning Fig.6. Is there a special reason why you choose the ftEs parameter? Do other parameters like fbEs or foEs show similar results?
- In Fig. 8, you present model results showing the electron concentration over the course of the day. When inspecting the right hand side plots,I see a large discrepancy to your Es observations from the ionosonde that I don't understand. E.g., during December conditions (upper right plot) there are two obvious ion concentration modes travelling downward. These two modes appear slightly higher and steeper compared to the upper left plot containing the dirunal and semidiurnal tidal component only which coincides

with the Esh observations in Fig 2, 3. But: Especially for December the morning mode of observed Esh in Fig 3 is much stronger compared to the afternoon mode. This is totally opposite to the model outputs of electron concentration.
Is this a problem from the model? Or is it a problem in the determination of the Es type? Please explain this contrary behaviour.

Minor comments:
- Please let the reader know in the text that you seasons refer to Southern Hemispheric conditions (sorry in case I missed it) only in order to avoid any misunderstanding.

- line 40: development of the sporadic E layers