

## ***Interactive comment on “Climatology of intermediate descending layers (150 km) over the equatorial and low latitude regions of Brazil during the deep solar minimum of 2009” by Ângela M. Santos et al.***

**Ângela M. Santos et al.**

angela.santos@inpe.br

Received and published: 17 July 2019

Reviewer comments on the paper entitled " Climatology of intermediate descending layers (150 km) over the equatorial and low latitude regions of Brazil during the deep solar minimum of 2009" by Santos et al. and our responses.

Dear Editor, I have reviewed the paper by Santos et al. titled "Climatology of intermediate descending layers (150 km) over the equatorial and low latitude regions of Brazil during the deep solar minimum of 2009". The paper describes digisonde observations

C1

of the intermediate layers (IL) over two Brazilian stations: Cachoeira Paulista and San Luis. The IL or the "150 km echo" is of great interest to the aeronomy community, it should be considered for publication. However, I have some issues with the paper in the current form. 1. I would like to have the term '150 km echo' somehow included in the title, which will be useful to many readers who are more familiar with that name. 2. When we get into discussion, we should be talking about things already shown. Yet, we see new things in the discussion. While they may be interesting, they should have been mentioned earlier. 3. There is a discussion about the tidal influence on the IL, but there is no discussion on regional difference and seasonal variations of tides at the two stations. Are the ILs affected by the in-situ tidal force or MLT tides via dynamo effects? There should be more discussion on this topic. Including some tide observation papers will be very useful. Minor issues 1. What is color code for data in Figure 4? 2. P27, L20, 'some studies have mentioned about this ...' need to add references 3. P3, L5 to L10 'At 17 UT ...' what is the local time? 4. I think the abstract can be shortened to a list of short statements.

We thank the reviewer for careful reading of our manuscript and finding it worthy for publication after minor revision. Our responses to the specific comments are given below:

1. I would like to have the term '150 km echo' somehow included in the title, which will be useful to many readers who are more familiar with that name. The term "150-km echo" was included in the title as suggested by the reviewer. The new title is: "Climatology of intermediate descending layers (or 150-km echoes) over the equatorial and low latitude regions of Brazil during the deep solar minimum of 2009".

2. When we get into discussion, we should be talking about things already shown. Yet, we see new things in the discussion. While they may be interesting, they should have been mentioned earlier. We thank the referee for this suggestion. We create a new section in which the results and discussions are presented together. See P5, L5.

C2

3. There is a discussion about the tidal influence on the IL, but there is no discussion on regional difference and seasonal variations of tides at the two stations. Are the ILs affected by the in-situ tidal force or MLT tides via dynamo effects? There should be more discussion on this topic. Including some tide observation papers will be very useful. A discussion about the variability of atmospheric tide with the latitude and seasonality was included in the manuscript in the P17, L1 to L12 and some references were added as suggested by the referee. With base in our data analysis, we believe that the ILs formation is primary control by driven meridional and zonal wind shear forces and that the day-to-day variability can be due the variations in tides, gravity waves, electric fields and metallic ions population.

Minor issues

1. What is color code for data in Figure 4?

Different colors in the panels of Figure 4a and 4b were used to represent the days of each month (P10 to P11).

2. P27, L20, 'some studies have mentioned about this ...' need to add references. References were added as suggested. See P22, L6 to L8.

3. P3, L5 to L10 'At 17 UT ...' what is the local time? The local time was included in this part of the text (see P3, L6). The local time over the Brazilian sector is given by  $LT = UT - 3h$ . This information was included in P3, L25.

4. I think the abstract can be shortened to a list of short statements. Some changes have been done in the abstract as to meet the referee's suggestion, see P1.

Please also note the supplement to this comment:

<https://www.ann-geophys-discuss.net/angeo-2019-74/angeo-2019-74-AC1-supplement.pdf>

---

Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2019-74>, C3

2019.