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Discussions

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Interactive
comment

Interactive comment on "Semimonthly oscillation observed in the start time of equatorial Spread-F" *by* Igo Paulino et al.

Igo Paulino et al.

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Reviewer #1:

REVIEWER:"**In this study, the authors investigated the start time of equatorial spread-F (ESF) by using the long term dataset (2000-2010) from an all-sky airglow imager and a coherent backscatter radar at the two stations Sao Joao do Cariri and Sao Luis, respectively. They reported that the semimonthly oscillations were seen in the start time of ESF dur- ing the periods September 2003, September-November 2005, January and November 2008. It was suggested that the ESF semimonthly oscillations could be associated with the 16-day planetary waves and/or lunar semidiurnal tides which affected the pre- reversal enhance-**

ment of eastward electric field (PRE) around sunset. The result of ESF semi-monthly oscillation is interesting and deserves to be published."

AUTHORS: We are grateful for the dedicated time revising our paper. We have revised the manuscript according to the reviewer's comments. We thank also for the language revision.

"Although the authors stated that a long term dataset was used in this study, it is not clear how often the semimonthly oscillation was observed. Whereas the weather could cause lack of data from all-sky airglow imager, VHF radar should not be affected. It would be better if one more figure can be included to provide both the periods with data (all-sky airglow imager and VHF coherent, respectively), and the periods when semimonthly oscillation were detected."

AUTHORS: The reviewer is right! As requested by the second reviewer as well. We have included the statistical analysis for the all period of observations of the all sky imager (Page 8 line 11 - page 9 line 11).

REVIEWER:"On the possible cause of ESF semimonthly oscillation, the authors suggested that the planetary waves and/or lunar semidiurnal tide modulated the PRE which can play an important role on the ESF generation. This can be investigated further and demon- strated by using the simultaneous F layer height measurements from the SAO Luis digisonde. And also please explain in more detail on how lunar semidiurnal tides affect the PRE."

AUTHORS: We have requested those data to the INPE's colleagues. However, there were coincident data only in three periods (Oct 2003, Oct 2005 and Nov 2005). Only in early November there was observed a clear oscillation with such period in the time of maximum vertical drifts of the F layer. We have included it in the manuscripts (Figure

3). Maybe the temporal resolution of the ionograms (10 min) is not enough to observed easily the oscillations aways. The lunar tide can change the start time of EPBs by modulating the wind that act driving the EXB vertical drift of the F region (Page 7 Lines 11-17).

REVIEWER:"**Regarding the identification of ESF start time, examples from both the airglow imager and VHF radar are suggested to be given. Further, as shown in Figure 1, the ESF structure is not obvious in the images taken at 23:48-00:21 UT. Please use arrows or other symbols to mark the ESF region.**'

AUTHORS: Thank you for the suggestion. We have tried to improve the visualization of Figure 1, but in the supplementary movie, the appearance fo the bubbles is clear.

REVIEWER:" **'equatorial spread-F' and 'equatorial plasma bubble' were used in the title/abstract and text respectively. For consistency please use 'equatorial spread-F' or 'equatorial plasma bubble'.**"

AUTHORS: Thank you for the suggestion.

REVIEWER:"**How the oscillation amplitude was calculated, peak to trough? From Figure 3, the difference of ESF start time during the period is more than 2 hours, but the amplitude is ?57 min.**"

AUTHORS: We have calculated it using the approach $start\ time\ =\ A\cos(\omega t + \phi)$, where A is the amplitude, $\omega\ =\ 2\pi/14.5(days)$ and ϕ is the phase. The reviewer is correct, the difference between the minimum and maximum in Figure 3 is ~ 2 hours, which correspond to the amplitude of ~ 1 hour as shown in the chart.

REVIEWER:**"There are some misprints in the manuscript. For example ?did not allowed to?, ?it is well know that ?. Please check the whole manuscript."**

AUTHORS: Thank you for the suggestion. We have revised the language as well.

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