

Referee #1

Response: Thank you for your attention to the manuscript. the manuscript has been massively revised. We believe that the contents and the clarity of our paper are much improved in the revised version.

1. We improved the introduction by adding two main paragraph in the first of introduction to describe main goal of the research in order to emphasis on the importance of the study.

2.in estimation of zonal mean geographic latitude was considered because GNSS data are based on geographic data. But we emphasis it in all figures that are depicted in terms of geographic data in order to aware readers to avoid from probable mistake.

3. we don't have any wave analysis in the manuscript. Based on the results we just interpret our results that the oscillation on the zonal mean is due to planetary wave effect (different oscillation in different season). The wave spectral analysis is out of goal of the manuscript and can be done in another independent research and we wish to do as soon as possible.

We just deduce that stationary waves contribute on meridional TEC profile. The interpretation is rational consequence of figures (from comparison of at equinoxes and solstice) and along with Charney-Drazin criteria and "wind shear theory" and also compatible with other researches. We know that transient eddies effects are removed during time mean calculation (eliminate each other during time mean). There may be other question about how the wind shear theory can project PW effects on whole TEC values (more than lower ionosphere)? We don't know the clear answer and may other researches can reply to the question and describe the mechanism in future. We are also working on the data and trying to understand the probable mechanism.

There may be some other evidence and description in:

Forbes, J. M., Maute, A., Zhang, X., & Hagan, M. E. (2018). Oscillation of the ionosphere at planetary-wave periods. *Journal of Geophysical Research: Space Physics*, 123. [https://doi.org/ 10.1029/2018JA025720](https://doi.org/10.1029/2018JA025720).

4. TEC from GNSS data are in terms of 0.1 TECU so we prefer to present data with its original unites. Even though scientific committee prefer to present TEC data in terms of TECU, the precision of results get improved with 0.1 TECU presentation (Ionospheric irregularities are clearly depicted) and the units of original data are preserved.

5. figure 4, 5, 6

. We also try to clear labels and legends in each figure. There are many maps in the manuscript and we compact related maps in one figures. so one of the map may seems unclear. but we upload the figures separately in the site for readers to download figure separately and we can upload related eps files separately to achieve more clear figures.

6. the phrase "maximum diurnal of TEC location" was replaced with "maximum of zonal mean TEC" and highlighted in the manuscript.

7- The unclear sentence was rewritten again and was highlighted.