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Annales Geophysicae Discussions

Interactive comment on "A case study of the day-to-day occurrence of plasma irregularities in low-latitude ionosphere from multi-satellite observations" *by* Weihua Luo et al.

Anonymous Referee #1

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Manuscript: ANGEO-2019-128 by Weihua Luo et al. This paper investigated plasma bubbles and blobs in low latitudes and the roles of electric field, neutral winds, and neutral composition in the creation of them using various satellite observations. Reading the text and following the figures required a painful effort. This paper was like a department store with various miscellaneous stuffs. Results were a simple display of various observational data, and discussion was full of speculation and repetition of known facts. I did not find any scientific value from results and discussion.

Below are Conclusions of the paper. My response to these conclusions will be good enough.

(1) On a quiet day, 17 August 2003, after local sunset, the plasma bubbles in 180°E sector were detected by GRACE, ROCSAT-1 and DMSP F15 satellites. After about 100 minutes, the plasma blobs in 170°E sector were detected by ROCSAT-1 in low latitude region due to the westward motion of plasma irregularities. On 18 August 2003, during the main phase of the storm, the plasma bubbles in 180°E sector were firstly recorded, and the plasma blobs in 170°E sector were also detected after about 100 minutes by ROCSAT-1. (2) Observations from CHAMP and GRACE indicated that EIAs were enhanced significantly before the occurrence of plasma bubbles on the two successive days with respect to that on other days. EIA asymmetry also displayed remarkable variations.

: These two are just the description of observational data. I do not find any scientific message from these descriptions.

(3) [O/N2] ratio also showed the increase on 17 and 18 August 2003. The increase can be attributed to the downward wind, generating from the enhancement of EIA strength.

: The O/N2 ratio provided by GUVI does not purely represent thermospheric conditions. Because the radiative recombination of oxygen ions enhances the OI 135.6 nm emission, the O/N2 ratio enhancement can be caused by the enhancement of the oxygen ion density. Without any evidence, the argument of the connection of the O/N2 ratio change to vertical winds and vertical winds to the EIA strength are not a meaningful speculation.

(4) The remarkable enhancement of EIA strength under quiet condition can be attributed to the enhancement post-sunset eastward electric field, due to the factors from below, such as the gravity waves at the lower atmosphere, which need to be further studied. In result, the enhanced EIA give rise to a downward wind in equatorial region, which favor the initiation of R-T instability and occurrence of plasma bubble. The downward wind also lead to the enhancement of [O/N2] ratio. The enhancement of post-sunset eastward electric field is suggested to be the most important for the day-

to-day development of plasma irregularity, which could lead to the rapid rise of F-layer, EIA enhancement, and also the generation of vertical wind in equatorial region.

: I do not know how gravity waves can produce such a strong eastward electric fields. All the descriptions here are based on speculation which has no scientific value.

(5) Meridional wind plays an important role in the occurrence of the plasma blob in low-latitude ionosphere. Under the effects of the meridional neutral wind, in addition to the polarization electric field from the occurrence of plasma bubbles, the plasma blobs occurred on two successive days.

: The authors do not have the measurements of meridional winds. Blobs can be produced by the mechanism that the authors mentioned here, but this statement does not provide any constructive answer to the question of the origin of blobs.

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