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Comment on angeo-2021-38

Yuichi Otsuka (Referee)

Referee comment on "Influence of the semidiurnal lunar tide in the equatorial plasma bubble zonal drifts over Brazil" by Igo Paulino et al., Ann. Geophys. Discuss., https://doi.org/10.5194/angeo-2021-38-RC2, 2021

By analyzing the all-sky airglow images taken in Brazil from 2000 to 2007, zonal drift velocity of plasma bubbles are estimated. Based on these velocity data, the authors investigate semidiurnal lunar tide component. This is the topic studied for a long time. This study could provide valuable data. Therefore, this paper is worth publishing in this journal. However, the interpretation and discussion is not enough. Minor revision is needed before its publication. Details are shown below.

-- In the discussion section, explanation of definition for geomagnetic tide and ionospheric tide is needed. This reviewer considers that this terminology is not suitable because this reviewer understand as follows. "The geomagnetic tide" is the tide in the E region. The neutral wind variations caused by the tide in the E region generate polarization electric field through the E region dynamo to keep divergence free of the electric current. The polarization electric field generated through the E-region dynamo is transmitted to the F region, causing the ExB drift in the F region. On the other hand, "the ionospheric tide" is the tide in the F region. The neutral wind variation caused by the tide in the F region generates polarization electric field through the F region dynamo. The F-region plasma moves by ExB drift due to the polarization electric field. Therefore, this reviewer considers that "the geomagnetic tide" is the tide in the E region, and that "the ionospheric tide" is the tide in the F region. The authors need to explain the mechanism of the geomagnetic and ionospheric tides.

-- During daytime, E-region conductivity is higher than the F-region conductivity, so that the polarization electric field through the dynamo mechanism is generated mainly in the E region. However, during nighttime, the plasma density in the E-region disappears due to the recombination. The polarization electric field is mainly generated in the F region and the polarization electric field generated in the E region is negligible. The authors need to argue this point.

Minor comment
- first line in abstract, "36.5oW": "o" should be a superscript.