

Ann. Geophys. Discuss., referee comment RC2
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Comment on angeo-2022-12

Anonymous Referee #2

Referee comment on "Arecibo measurements of D-region electron densities during sunset and sunrise: implications for atmospheric composition" by Carsten Baumann et al., Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2022-12-RC2>, 2022

This paper reports D-region electron density measurements from the Arecibo incoherent scatter radar being performed during sunset and sunrise conditions at Puerto Rico and the asymmetry of the electron density. The electron density observations are compared to the one-dimensional Sodankylä Ion and Neutral Chemistry (SIC) model and WACCM-D. Authors have made the efforts to explain/discuss asymmetry. I found the subject of the paper of scientific importance and worthy of the publication after addressing the following suggestions.

- Page 1 Para 20: The relevant citations be added to rocket borne in situ measurements (citations),

interpretation of VLF radio wave reflections (citations) and its sensing by means of incoherent scatter from free electrons and Faraday rotation. For the VLF following citations are suggested:

- Han, F., & Cummer, S. A. (2010a). Midlatitude daytime D region ionosphere variations measured from radio atmospheric. *Journal of Geophysical Research*, 115, A10314. <https://doi.org/10.1029/2010JA015715>
- Kumar, A., & Kumar, S. (2020). Ionospheric D region parameters obtained using VLF measurements in the South Pacific region. *Journal of Geophysical Research: Space Physics*, 125, e2019JA027536. <https://doi.org/10.1029/2019JA027536>
- Maurya, A. K., Veenadhari, B., Singh, R., Kumar, S., Cohen, M. B., Selvakumaran, R., et al. (2012). Nighttime D region electron density measurements from ELF-VLF tweek radio atmospheric recorded at low latitudes. *Journal of Geophysical Research*, 117, A11308. <https://doi.org/10.1029/2012JA017876>.
- Thomson, N. R., Clilverd, M. A., & McRae, W. M. (2007). Nighttime D region parameters from VLF amplitude and Phase. *Journal of Geophysical Research*, 112, A07304.

<https://doi.org/10.1029/2007JA91227>

- Page 12-13, Para 270: Other studies using MF radar and VLF observations (Coyne and Belrose, 1972; Laštovičková, 1977; Li and Chen, 2014, e.g.). None of the citation is from VFL study. Please check.
- The VLF is the most coseffective and forms a novel tool to study D-region under the normal and natural Hazards which I think needs to be given bit more emphasis.