Ann. Geophys. Discuss.,
https://doi.org/10.5194/angeo-2018-35-SC2, 2018

Annales Geophysicae Discussions
Open Access
EGU

Interactive comment on "Solar eclipse induced perturbations at mid-latitude during the 21 August 2017 event" *by* Bolarinwa J. Adekoya et al.

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Received and published: 21 May 2018

Dear Dr. Q. LI, Thank you very much for your interest in our work. Since the paper is still at discussion stage, your comments on improving the standard of the manuscript are highly appreciated. Below are the responses to your questions.

SC1: I cannot understand the figure 3, it shows the deviation of NmF2 and hmF2 magnitudes during the eclipse, why is it a contour rather than line?

Response to SC1: Although observing the variation of NmF2 and hmF2 alone can be used, if properly analysed, for observing the changes in the behaviour of the thermospheric compositions and wind, but it is more convenient to describe these mechanisms by standardizing the original variable during the event. The normalization effort

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(with the use of DNmF2 and DhmF2) presents the original variation of NmF2 and hmF2 onto directions which maximize the variance. Then, the result can be used for analyses of any mechanisms that drive the ionospheric plasma, if properly related.

The contour plot is to control the information about the mechanisms we are reporting. Using line plot is not bad either, but contour plot is preferable better than line plot.

SC2: Line 229-230: How could you assure the direction of the wind and its reversal?

Response to SC2: To identify the direction of the wind the DNmF2 colour legend was used, the negative values represent a westward wind contribution and the positive values is for the eastward wind. Looking at the marked eclipse region in the figure, one will see that the DNmF2 started decreasing from the first contact of the eclipse and maximized few minutes after the totality mark and started increasing again. It has been established that at daytime, the peak height of the plasma will be reduced due to lost in recombination, but at nighttime, equatorward neutral wind drives the F2-layer plasma to higher altitudes where ion loss rate is slower. The behaviour of the F2 plasma during solar eclipse cannot be completely related to the nighttime period due to the fact that all the processes controlling the nighttime variation are not completely actualised but can be related to partial nighttime/sunset period (see Adekoya et al., 2015). Thus, the slight increase in the peak height and equatorward neutral wind flow drives during the solar eclipse. The neutral wind acts jointly with the plasma flows from the topside ionosphere, resulting in F2 region plasma density variation. Therefore, the westward/eastward neutral wind flow was related to the depletion/enhancement in the deviation, which was clearly shown in the marked eclipse region of the figure. This makes the use of the deviation an important factor in analysing the thermospheric composition and neutral wind flow.

Reference: Adekoya, B. J., Chukwuma, V. U., and Reinisch, B. W.: Ionospheric vertical plasma drift and electron density response during total solar eclipses at equatorial/low latitude, J. Geophys. Res, 120, 8066-8084. doi:10.1002/2015JA021557, 2015

Thanks Adekoya, B. J. (for the authors)

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