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Title: An investigation of the ionospheric F - region near the EIA crest in India using OI 777.4 and 630.0 nm nightglow observations
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Interactive comment on "An investigation of the ionospheric F-region near the EIA crest in India using OI 777.4 and 630.0nm nightglow observations" by Navin Parihar et al.

The atomic oxygen 777.4 nm and 630.0 nm nightglow emission intensities are important to study structural changes and dynamical processes in the thermosphere and ionosphere F2 region under various helio-geophysical conditions. In my opinion, the method of deriving NmF2 (Nm) and hmF2 parameters over Allahabad (25.5º N, 81.9º E, geomag. lat. ~ 16.30º N) using simultaneous ground-based observations of the 777.4 nm and 630.0 nm nightglow intensities, described in the manuscript, is interesting but rough.

The volume emission rates of 777.4 nm and 630.0 nm lines and corresponding behavior of ground-based observed intensities are largely determined by the ionosphere F2 region electron density height profile and its temporal changes, which are not always fully specified by Nm (NmF2) and hmF2. Using simple Chapman's layer, specified by Nm and hmF2, for estimation of 777.4 nm and 630.0 nm lines nightglow intensities is possible for some region and certain time intervals (Makela et al., JGR, 2001).

Main comments:

1. In the manuscript it is noted: "Assuming the quasi-neutral ionospheric plasma to be mainly composed of O+ ions and electrons, its intensity can be seen depends on $n_e(h)^2$ where ne(h) is the electron density at height h. Now $n_e(h)$ is related with Nm through well-known Chapman's function (Tinsley et al., 1973)" (P.5, lines 23-26).

As I understand, here the importance of electron density decrease caused by ions recombination in the nighttime ionosphere F2 region electron density $n_e(h,t)$ is not considered. But these processes should be taken into account, since in this study the 6-8 hours of nighttime observational interval is used: "Mostly, the duration of continuous observation on each night was typically 6 – 8 hours" (P. 7, line 19). The tendency of decrease in the 777.4 nm and 630.0 nm lines intensities, demonstrated in Figure 2, could be coupled with the electron density nighttime decrease.

2. Which nighttime intervals correspond to the COSMIC electron density profile on October 14 and 11 December 2009 (Figure 1)?

Figure 1 shows that for different nights of the considered dataset (September-December 2009) the electron density height profile and hmF2 can be sufficiently different. Actually, changes in hmF2 (also in NmF2) occur during any night of year which gives uncertainties to calibrate the 777.4 nm and 630.0 nm intensities, even for the single considered night.

3. The authors noted, that " Consequently, good quality data of 14 nights only were available for a meaningful study. " (P.7, lines 18-19). In this case the demonstrated results of the airglow derived Nm and hmF2 for all observations during September-December 2009 (Figures 3 and 4) need more clarification.

Other comments:

1. In equations (2) and (3) the dimensions of Nm parameter are different.

2. The cited equation (7), "equation (3) and (7),..." (P. 8, line 29), "using equations (2), (3) and (7) ..." is not presented in the manuscript.

3. The written form of the values of the planetary geomagnetic indices Ap "Ap=01, Ap=02, ..." (Figures 5 an 6) is not convenient, because the cases of Ap≥100 are also possible.

4. In Figure 7 a comparison of airglow derived hmF2 with ionosonde measurements is not given.

5. Why was not used the ionosonde electron density height profile on 9 January 2016 to calibrate 777.4 nm and 630.0 nm? It could be more precise over Allahabad, than the COSMIC electron density profiles.