

Interactive comment on “Auroral ionospheric E region parameters obtained from satellite-based far ultraviolet and ground-based ionosonde observations: Effects of proton precipitation” by Harold K. Knight

Anonymous Referee #2

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This study focuses on effects of the proton precipitation on auroral E-region signatures. In reality, auroral particle precipitations include both electrons and protons. However, most previous studies on this topic used to assume pure electron precipitations except for some specific events. From this view point, it is considered that issue of the proton effect is important.

This article, however, is hard to follow its logic. One of the conclusions is summarized at lines 224-227 (at the top of Section 4.1). Based on results shown in Figure 1a, these sentences state that "it is expected that FUV-derived auroral NmE (i.e., derived under

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the assumption of pure electron aurora) will be too high for pure proton aurora by a factor of ~ 1.22 ". This is the case for $\kappa = 3.1$, and for the other two cases $\kappa = 6.2$ and 100 , this conclusion cannot meet individual results because the estimated values are in a same level as the estimated for the pure electron case. The article should explain the reason to focus on the case of $\kappa = 3.1$ alone in more detailed. Furthermore, it is unclear for me why NmE is the appropriate parameter to evaluate the proton/electron contributions. The article should mention this point clearly.

Discussion related to the LBHL emission is also unclear for me. Line 148 tells that "... LBHL values are $\sim 50\%$ higher than for electron spectra with the same precipitating energy flux and LBHS/LBHL values." According to Figure 1c, this is the case for LBHS/LBHL from about 0.5 - 0.8 . For the LBHS/LBHL outside of this range, this is not the case or even LBHL intensity for the pure electron case can be higher than that for the proton cases. Discussion written at Lines 215-216 has been developed taking into account "50% higher" case alone, and there is no consideration on ambiguities of the ratio of the proton case to the electron. Since a part of conclusions in this study has been made by discussion at Lines 215-216, that no consideration is serious lack for making the conclusion.

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