

Ann. Geophys. Discuss., author comment AC1  
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## Reply on RC1

Johann Stamm et al.

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Author comment on "Observing electric field and neutral wind with EISCAT 3D" by Johann Stamm et al., Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2021-31-AC1>, 2021

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We thank the referee for his review and comments. We will answer the comments in the order they appear.

>> This is a comprehensive and well-written effort to quantify the uncertainties in measuring the electric field and neutral winds to be observed by the new EISCAT-3D ionospheric radar, which is not yet operational.

Thank you.

>> I have only a few relatively minor corrections to suggest:

>> Joule heating is a common phenomenon during geomagnetic storm times at high latitudes. From Figure 1, it seems that the authors do not address Joule heating directly. The authors may wish to comment on this, or at least make clear that Joule heating is not a priority for this study.

The phenomenon of Joule heating is indeed outside of the scope of this study. However, the method and framework will be useful for future measurements of Joule heating, as it provides improved measurements of electric field and neutral wind, which are needed in order to calculate Joule heating rates (see e.g., Aikio et.al. 2012, and references therein).

In Figure 1, we are plotting typical background ionospheric parameters which are used to calculate the uncertainty of the ion velocity measurements and the collision frequency between ions and neutrals. The main contributing factor to ion velocity measurement uncertainty is electron density, and we feel that the three cases we are investigating cover most of the typical situations encountered with the radar.

In the revised manuscript, we will add a discussion of how our results would help with measurements of Joule heating. We will also add more discussion about Figure 1.

>> L191: "the ion" appears twice.

We will correct this.

>> Figure 3: The different lines are hard to see. Please re-plot more clearly.

We have appended the figure with a larger linewidth. It is hopefully easier to see the line

now.

>> Figure 4 caption: The third sentence mentions solid, dotted and dashed lines, which do not appear in the figure. This sentence should be removed.

We will correct this.

>> L411: "fast antenna scanning" should be "fast beam scanning". A phased-array radar does not have a dish which can scan.

This is true. Thank you for pointing out. We will carry out this change.

Please also note the supplement to this comment:

<https://angeo.copernicus.org/preprints/angeo-2021-31/angeo-2021-31-AC1-supplement.zip>