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Reply on RC2

Dmitry Pokhotelov et al.

Author comment on "Polar tongue of ionisation during geomagnetic superstorm" by
Dmitry Pokhotelov et al., Ann. Geophys. Discuss.,
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We appreciate the referee comments. Below is the detailed response, with the referee's original comments included in *italic* typeface.

line 88: The authors use TIEGCM V2.0 which supports the 2.5deg resolution and ¼ scale height vertical resolution. TIEGCM-ICON is based on V2.0 but offers additional lower boundary forcing options.

Correct, we use TIEGCM V2.0. We clarified this in the text.

Line 105: I assume that the ExB drift components are expressed in geographic directions but it is not totally clear. Maybe it would be good to explicitly state it.

ExB drift components are expressed in geographic coordinates. We now stated this explicitly in the text.

Line 115: "given by a simplified version of the Whole Atmosphere Model" The word "simplified" does not add any value and I suggest to state what wave forcing is included to be more specific.

We have provided more specific description of the atmospheric forcing. "The atmospheric forcing is specified according to the Whole Atmosphere Model (WAM) (Akmaev et al., 2008). WAM fields (neutral temperature, zonal and meridional neutral winds) are averaged in every local hour sector of a given month and thus contain the monthly-averaged mean winds and tides." We also added an acknowledgment to Mariangel Fedrizzi and Mihail Codrescu from the NOAA Space Weather Prediction Center, who consulted us on the issue.

Line 120: Please double check if CTIPe is still operational or if WAM/IPE is the follow on.

We confirmed that CTIPe is still used for the NOAA SWPC operations as one of the tools for the total electron content forecast:

<https://www.swpc.noaa.gov/products/ctipe-total-electron-content-forecast>

WAM-IPE is currently used as the experimental test product:

<https://www.swpc.noaa.gov/products/wam-ipe>

Line 120: "computationally demanding" Why do the authors add this, because of the resolution? I would assume that the two models are similar- maybe CTIPe which includes a plasmasphere takes longer, but TIEGCM does not have this physics included.

The operational CTIPe model used in this study has resolution of 2 deg x 18 deg. On a single core it computes 24 hrs in ~10 min, which is substantially faster than TIEGCM V2.0 with 2.5 x 2.5 deg resolution used here. We agree that for the same resolution the two models should have comparable performance. The purpose here was to compare the features of TOI reproduced by the research run of TIEGCM with those produced by the operational run of CTIPe. We modified the text, to avoid the impression that we are comparing computational performance of the two models.

Line 138 uisng -> using

Corrected.