

Interactive comment on “Statistical climatology of mid-latitude mesospheric summer echoes characterised by OSWIN radar observations” by Dimitry Pokhotelov et al.

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Received and published: 11 March 2019

We are grateful to the Referee for the careful review. Below are point-by-point responses. Referee's original comments are in [square brackets]. Attached is a revised version of the article, with changes highlighted in green.

[The correlations (or uncorrelation) between MSEs and solar and geomagnetic indices or meridional winds are not rigidly characterized. Figures 5-6: better analysis could be performed, e.g., scattering plots between occurrence and v , Kp, F10.7, AE. What are the correlation coefficients? How significant they are?]

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Following the suggestion, we computed linear Pearson correlation coefficients between v , Kp, F10.7, AE, V_{sw} , and the occurrences of MSEs. All the coefficients (R^2) are now shown in the respective panels of Fig. 5 and 6. We also commented on the significance of correlation in the text (Section 3.2 and 3.3). The scatter plots between occurrence and v , Kp, F10.7, AE, suggested by the referee, are not needed in our opinion, as they would show very similar information as the existing bar plots in bottom panels of Fig. 5 and 6.

[What new sciences this paper brings with a few more years of data?]

Proper characterisation of geomagnetic and solar dependencies of MSEs requires observations over a period of at least one solar cycle, especially since the MSE statistics at mid-latitudes is generally poor. This is already discussed in the paper. The paper signifies much greater importance of meridional transport over the entire solar cycle, relative to geomagnetic and solar activity.

[Most importantly, Kuhlungsborn has famous long-term NLC observations. To test the theory of southward cold air advection, can some correlative study be carried between MSEs and NLCs at Kuhlungsborn?]

The correlative study of simultaneous observations of MSEs and NLCs over Kuehlungsborn has been recently published in the same special issue of ACP and is referenced in this manuscript (Gerding et al., ACP, 2018, doi:10.5194/acp-18-15569-2018). However, the statistics of such simultaneous observations is very low, e.g., for the period of 2010-2016 only 67 hrs of simultaneous NLC - MSE observations were obtained (Gerding et al., ACP, 2018).

[How about mesopause temperature at Kuhlungsborn?]

Connections between NLCs and mesopause temperatures measured by daylight-capable lidar in Kuehlungsborn has been explored in many articles (e.g., Gerding et al., GRL, 2013, doi:10.1002/2013GL057955; Herrvig et al., JASTP, 2016,

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doi:10.1016/j.jastp.2016.09.004), as well as connections between NLCs and MSEs. The statistics of simultaneous observations will be very poor (see previous comment). We believe this is outside the scope of current study.

[Page 1, line 23 "cold mesosphere", mesopause might be a more accurate word.]

Also following the suggestion of another referee, "cold mesosphere" has been replaced with "cold upper mesosphere".

[Page 2, line 1, "advect the existing PMSEs" can it be "NLCs" advected from north and ionized at mid latitudes?]

We prefer not to speculate on the topic. This should be addressed by simultaneous NLC-(P)MSE observations.

[page 2, line 20: suggest "a specular meteor radar", "which factors", "play significant roles".] Corrections accepted.

[Figure 2. The summer wind could be zoomed in by removing winter months. And contour lines can be added. It's difficult to tell the difference between June and Aug, which is a main point in this paper.]

We added an extra panel to Figure 2, showing meridional winds during summer months only, with contour lines.

Please also note the supplement to this comment:

<https://www.atmos-chem-phys-discuss.net/acp-2018-1027/acp-2018-1027-AC2-supplement.pdf>

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-1027>, 2018.