Referee Comments for amt-2022-254 Submitted on 26 Sep 2022
Multistatic meteor radar observations of two-dimensional horizontal MLT wind
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GENERAL COMMENTS

This paper, "**Multistatic meteor radar observations of two-dimensional horizontal MLT wind**", introduces a bistatic extension of a traditional all-sky meteor radar system in an effort to estimate two-dimensional horizontal wind fields by relaxing the usual wind field spatial homogeneity assumption. The authors provide a good historical context for the work, and highlight recent developments in the field. The work is generally well organized, but could use additional grammar review. The manuscript meets basic scientific quality, is free from obvious major deficiencies, and is suitable for peer review.

SPECIFIC COMMENTS

Angle-of-Arrival

The Angle-of-Arrival calculations starting on Line 189 and following are well laid out.

1) **Line 192ff**: "AOA can be determined...": Include at least a reference or a brief description of the process, given that the bi-static case has unique challenges compared to the monostatic case. This will help substantiate the statement on Line 344" Through bistatic geometry, the coordinates of the meteor locations (x, y) can be deduced."

2) **Line 196**: "This small difference can be calculated...": Include an equation and/or a reference to the procedure.

3) Perhaps discuss any hardware-specific challenges encountered such a calibrating system phase biases.

Vertical Components

Line 334: Discuss the validity of setting the vertical component, w0 = 0 especially in light of the addition information that multistatic meteor radar brings (e.g. multiple viewing angles). Such a simplification is typical in traditional all-sky meteor radar processing, but perhaps discuss if and why this continues to be a valid and appropriate approach.

MLT Dynamics and Other Discussion

Line 425ff: any discussion on previous work, or specific opportunities for exploration over your geographic area?

Line 363: "In order to verify the reliability of our results, we compared the traditional all-sky results and the VVP results by calculating the correlation coefficients and the regional winds" If the overall aim of the paper is to relax the homogeneity assumption, presumably to model the true wind field with better accuracy, is it appropriate to use the correlation between the traditional method (which is defined as making certain simplifying assumptions) and the VVP method which in theory should be more accurate? In other words, is the traditional method an appropriate 'ground truth' metric? In the extreme case, the traditional method's simplifying assumptions are invalid, in which case validating a new method based on high correlation with the traditional method is inappropriate.

TECHNICAL CORRECTIONS

Line 346: centred -> centered

Line 374 might be out of place, the preceding paragraph talks about the correlation between mean winds calculated by the VVP and traditional all-sky method, while the concluding sentence mentions a semidiurnal tide in the polar region.

Line 420: This sentence does not flow, suggest a grammar revision: "Qualitatively, the zonal eastward/westward winds are like to corresponding to the positive/negative the horizontal divergence values."

Line 422: "shows more complicate" -> "shows more complicated"

Line 425: "needs more explored" -> Does not flow.

Line 450: "increase in the meteor number" -> Does not flow.