

Interactive comment on “Combined wind measurements by two different lidar instruments in the Arctic middle atmosphere” by J. Hildebrand et al.

Anonymous Referee #3

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I concur with the first two anonymous reviewers that this paper contains valuable information worthy of publication. However, revisions to account for most of the queries raised would definitely improve the quality and credibility of the paper. With the benefit of first two anonymous reviews, without repetition, I should like to raise a different question that is the need for further discussions on temperature effect and possibly with a simultaneous temperature comparison. It is a major short coming without it. Although temperature comparison is not mentioned in the title of this paper, in my view, it is not out of the scope of this paper for at least the following two reasons: (1). Temperature and wind retrieval are coupled for both RMR and Na lidar. This coupling is clearly

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shown in Fig. 5 for the RMR lidar. Similar Doppler ratios for Na lidar also depend on both temperature and wind. The paper suggests for RMR lidar that an accompanying temperature profile of Fig. 4 is used to retrieve wind profile via calibration curves of Fig.5. Then, the accompanying temperature profile should be shown along with Fig.4. I believe, for Na lidar, temperature and wind profiles are determined simultaneously from the same measurements. Therefore the data for simultaneous temperature comparison exists, and it would be nice to see how they compare and to see how they affect the wind comparison. In any case, if there are reasons that the temperature comparison cannot be made, the readers would appreciate in knowing them. (2). The data presented in Table 1 covers a very interesting period of a major Sudden Stratospheric Warming (SSW) in 2009. The dramatic warming in the Stratosphere and cooling in the MLT, along with zonal wind reversal in both stratosphere and MLT is well known. Such big changes, if studied, can demonstrate the temperature effect [causing in part asymmetry of Fig.4?] on wind retrieval for this paper, and to ensure the range of Fig.5 is adequate for the wind retrieval in question. Such a study may advance our understanding of SSW in the polar region as a consistent simultaneous wind and temperature measurements during SSW are rare, leading possibly to a separate science paper. A recent simultaneous lidar zonal wind and temperature measurements have demonstrated the effects of SSW on midlatitude zonal wind and temperature [Yuan, et., J. Geophys. Res., 117, D09114, doi:10.1029/2011JD017142].

Minor points: Line 20, p. 4131: Is the black line in Fig. 4 without considering altitude dependent temperatures? Please state. Line 27, p. 4133: mean profile, over what temporal duration? Paragraph near line 10, p. 4135: Discussions on the correction of the SET channel suggest that the NET channel has no bias problem, why not? Paragraph near line 15, p. 4136: Statements appear speculative.

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