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Interactive comment on "Retrieval of intrinsic mesospheric gravity wave parameters using lidar and airglow temperature and meteor radar wind data" *by* Robert Reichert et al.

Anonymous Referee #2

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Comments on 'Retrieval of intrinsic mesospheric gravity wave parameters using lidar and airglow temperature and meteor radar wind data' by R. Reichert et al

This paper describes a method to combine temperature observations made by a lidar (in the vertical) and a temperature mapper (horizontally over the hydroxyl layer) to obtain gravity-wave parameters. The method enhances its outputs by including meteor-radar winds which allow for the extraction of some intrinsic parameters. The method is applied to two days of observations and the results are interpreted.

The paper as presented is well thought out, communicates its ideas well and demonstrates a strong knowledge of the observing techniques and the gravity waves it seeks

to understand. Some global comments made below may improve the manuscript and some grammatical notes are included.

It is notable that there is no mention of tides in the paper, despite them having a major influence on the background environment in the height regions being considered. It is reasonable to consider the tides as simply a background environment for the gravity waves but they should still be mentioned in the context of the work.

One of the challenges that the authors have to meet is the observation of different wave characteristics using the two instruments at similar places and times. They discuss the limited knowledge of the OH layer height and profile on P23 and note in the conclusions that improvements in this area are needed. Temporal and spatial variations in the wind field are also noted as strong influences on the measurement and evolution of the gravity waves characteristics. I have a concern that the wind speeds obtained by the meteor radar, which use all-sky detections and thus average over a large area of the sky, may also introduce some discrepancies. Consideration of this should be included in the discussion.

The authors do a good job of aligning the instrumental filter functions of the instruments (using the OH layer weighting) so that the sensitivity of the instruments to the GW spectrum is matched. This a strength they should note explicitly in the context of the work of Alexander (1998). (Re P23 L23.)

Technical and grammatical comments:

I think the inclusion of a diagram showing the form of the wavelet function would improve section 3.1

P8 L22 Delete 'times'

P8 L24 change 'standard deviation is shown as dashed line' to 'one standard deviation range is shown with dashed lines'

P9 L2 'If GWs with periods tau_j are present in the data set'... What criterion are you

using to say a GW is present?

Fig 5: the 'a)' label is too large.

P11 L7 Are OH layer weightings included in the weightings for the linear fits against height? If not, should they be?

P13 L3 insert 'projected onto the wind direction' after 'background wind'

P13 L 10 Suggest replace 'uniform' with 'no horizontal gradients in the'

P13 L13 – Insert a capital omega after 'intrinsic frequency'. Personally I would prefer you used the nomenclature in Fritts and Alexander (2003) and had an omega hat here. The u_o would also be changed.

P15 L7 'Figure 4b' should be 'Figure 4d'

P15 L8 'Figure 4bcd' should be 'Figure 4bce'

P23 L16 suggest change 'comprised' to 'included'

P23 L27 Thank you for introducing me to the word 'adumbrates' but I am afraid it is not a good fit here. It should be replaced by 'supports the presence of'

P23 L32 Suggest insert 'in propagation direction' after 'rotating'.

P23 L33 replace 'frequency' with 'change'

P25 L7 insert 'a' before 'few'

P26 L17 Change 'This is an' to 'This provides'

P26 L24 change 'automatise' to 'automate'