Third Review

This revised manuscript (v3), entitled "Implementation of a multiresolution Analysis Method to Characterise Multi-Scale Wave Structures in Lidar Data" by Trémoulu et al., presents a substantially improved and technically robust version of the application of Multiresolution Analysis (MRA) using an 8th-order Daubechies wavelet to characterise multi-scale gravity waves in lidar temperature and wind profiles. The study has benefited significantly from guidance provided by Referee 1, resulting in clearer methodology, an expanded scope, and more disciplined physical interpretation.

The extension of the analysis to gravity wave kinetic energy (GWKE) and the inclusion of the kinetic-to-potential energy ratio (ER) enhance the physical relevance of the work. The added sensitivity studies on wavelet order and vertical resolution justify the choice of the db8 wavelet, although some results remain dependent on this configuration. Independent comparison with ERA5 and radiosonde data provides useful support for the wind perturbations, primarily in a qualitative sense. Overall, the MRA approach shows clear advantages over conventional methods, particularly in noise handling and performance in the upper mesosphere. The manuscript in general needs some attention to details, which I consider as minor revisions from my side and those are below.

Minor revision:

L13: GWPE not defined.
Done
L15: GWKE not defined. It is mentioned everywhere, but explained for the first time in L215.
Done

L35: Lidar observations are capable of inferring => can be used to infer long-term trends of the middle atmosphere.
Done

L79-L81: move before, to L69. for a better flow.
Done

Figure 1) increase the font in the figures and the resolution. Consider that the zonal and meridional winds have different magnitudes, moving the colorbar to the bottom/above the plot and avoiding saturation, unless your objective is to show the small-scale differences. Also, using a divergent colorbar for winds helps to identify the zero visually.
Our objective is to show the small scale differences, in that case we can't avoid saturation. We increased the font, changed the resolution.

Figure2) D6 is the order of the noise A6. Is D6 necessary, or is it just for showing purposes? Could you add a comment on this to clarify to the reader?
The noise observed in d6 is indeed of the same order as in a6, which is expected given that both correspond to the same level of the dyadic decomposition. As a result, they share the same noise magnitude. d6 is shown in Figure 2 because it represents a distinct scale in the decomposition. While it is considered background in the rest of the analysis, including it here

is important for a complete representation of the noise behavior. More generally, the noise level is dependent on the decomposition level, increasing with finer scales.
We added a comment in the text : "We observe that a6 and d6 exhibit noise of similar amplitude, as both belong to the same level of dyadic decomposition. This highlights that in multiresolution analysis, noise is distributed equally between the detail and approximation components at a given decomposition level."

L99: Methods
Done

Section 2 Materials and method) This section is missing a brief and basic description of ERA5 used in the manuscript.
We added a brief description of ERA 5 and its characteristics to characterize GWs.

L262: Fig. B1? If it refers to the appendix section, please mention it while referring to the figure.
We changed to : Fig. B1 in the appendix B

L273-274: 1543 UTC and 2028 UTC => 15:43 UTC and 20:28 UTC
Done

Figure 4) starts with "(", please remove.
Done

Figure 5) Please add the starting point of 0 min
In the description of the figure we added : "Time 0 min corresponds to the beginning of the measurements at 15:43 UTC." And we did the same for figure 7)

L332: Previous results: Whose?
We changed the sentence to :"The results presented in the previous section demonstrated the effectiveness of the MRA approach for analyzing GWs in temperature profiles, showing better agreement with the variance method than conventional techniques."

L374: 15:43
Done

L397: remove 'th' after 29 and 25.
Done