Comments on the paper "JuWavelet – Continuous Wavelet Transform and Stockwell-transform for gravity wave analysis " by Jörn Ungermann and Robert Reichert submitted for publication in GMD ($Paper\ gmd - 2024 - 207$)

First of all, I would like to congratulate the authors for developing a new and relevant tool for data analysis. Since this software package is freely available, many scientists will use it in the future. Consequently, the paper describing the application of this method needs to be more extensive and detailed.

In particular, the paper needs to provide details on all the parameters employed (for example, $s0$, dj, js, jt, *aspect*, etc.). For instance, in chapter 4.4, the authors introduce an optional *aspect* parameter which is set to 40 in their example. How am I supposed to determine this coefficient if my data, for example, consists of time on the x-axis and altitude on the y-axis?

Essential to this work are not only well-presented examples, but also clear instructions on how to apply this method to any new data.

A plain text explaining the algorithm is also desirable.

Last but not least, an explanation of the results obtained is important.

For example, Figure 7e shows some results of decomposition. The obtained horizontal wavelength is 381 km and vertical wavelength is 5.5 km. However, these parameters are not constant in time and altitude. Consider reconstructed fluctuations at 35 km altitude (Figure 1, blue line). Horizontal wavelength is shorter at the beginning than at the end. For orientation, a dashed line with λ_x =381 km is shown. In the range of 0 to approximately 500 km $\lambda_x < 381$ km and $\lambda_x > 381$ km after 500 km. At an altitude of 50 km (compare orange and red dashed lines) $\lambda_x < 381$ km.

Considering vertical cuts at 200 km and 600 km distances, an increasing λ_z is noticeable above around 40 km and below around 30 km (see Figure 2).

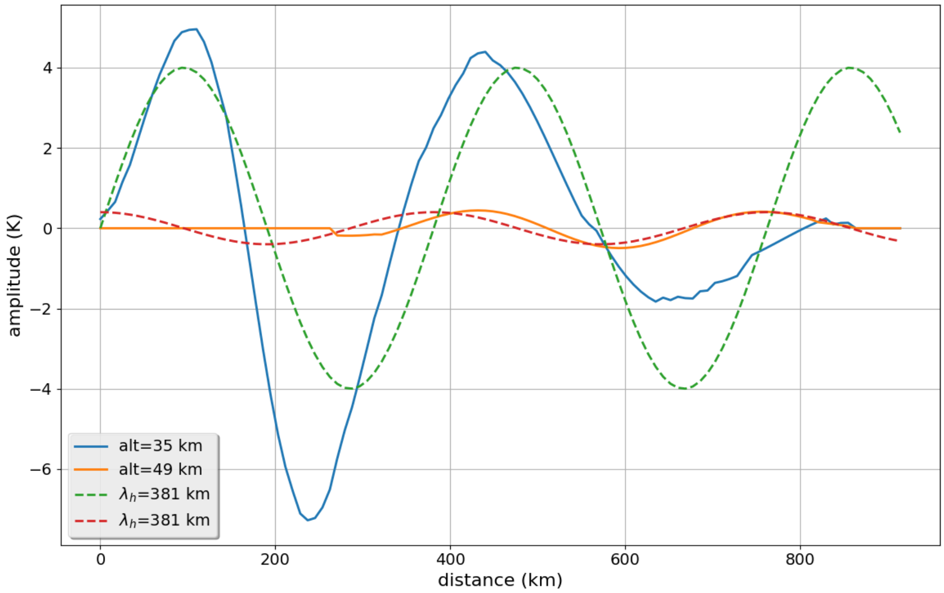

Figure 1. Perturbations at 35 km and 50 km altitudes are taken from Figure 7e of the manuscript. Dashed lines indicate λ_x =381 km.

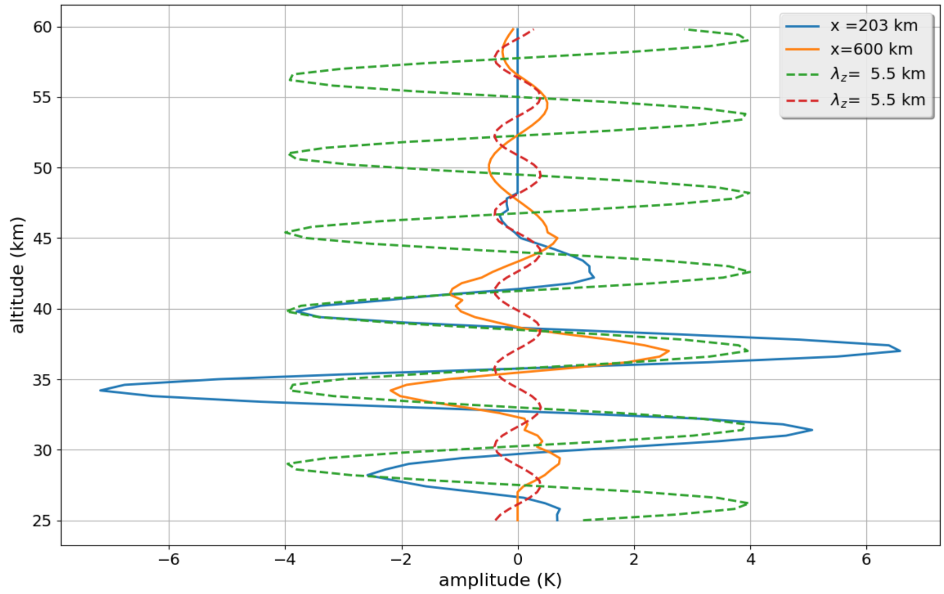

Figure 2. Perturbations at distances of 200 km and 600 km. Dashed lines indicate λ_z =5.5 km.

Waves with defined fixed parameters can be reconstructed using the inverse 2D-FFT. See examples in Fig. 3 c-f. A broader range of λ_x and λ_z is needed

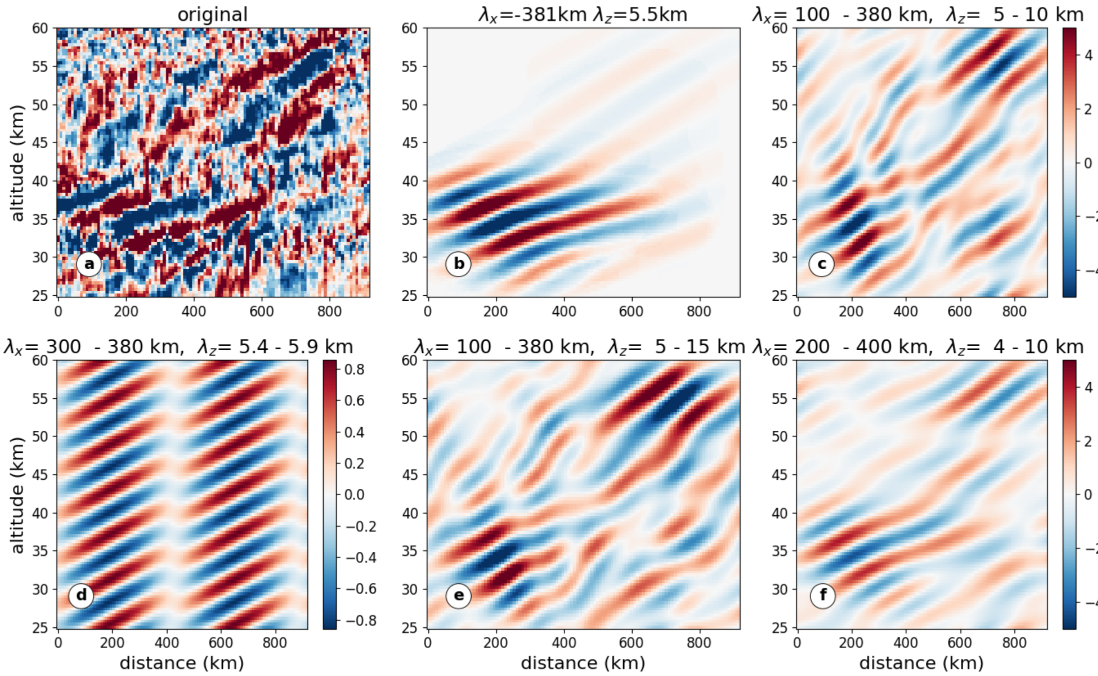

Figure 3. a,b: Figure7 (a, e) is taken from the manuscript. c-f: 2D-FFT reconstructed fluctuations with parameters as labeled in the titles.)

for the explanation of results from Figure 7 of the manuscript. Hopefully, after a clear description of the method, the interpretation of results will be more obvious.

This comment addressed a specific example. The manuscript, however, requires the authors to offer a broader explanation of potential outcomes, demonstrating its applicability not just through examples but also for users working with different data.

Minor comment: Almost all examples shown in the manuscript can be found in the software package ”juwavelet-v01.00.00/examples/”, with the exception of Figures 6 and 8. Could these examples also be added to the repository?