

Response to Referees' Reports

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Referee I

Note: Original comments in **red**; replies in black.

General:

The paper presents a novel method, WaveL2E, for denoising non-stationary time series through dynamic multivariate complex wavelet thresholding. It decomposes time series into scale-specific wavelet coefficients using a continuous wavelet transform and a specific multivariate minimum distance partial density estimation (L2E). The choice of the distance criterion helps in determining the outliers. The presented method, in some cases, outperforms standard techniques. Authors use the context of financial time series to show the advantage of their method, which, in short, lies in the ability to capture the inter-scale dependencies.

I would like to point out only a few minor issues

L 162: “an the” fixed in new appendix

Sec 2.2 is somehow challenging to follow; maybe an appendix with more detailed calculations would help with that see new appendix

- * almost all Figures overlap captions fixed
- * the majority of plots are hard to read; please increase the font size used on plots improved, but looking at enlargements of individual figures better

The paper emphasises increasing dynamic adaptability by generalising the WaveL2E method and shows how to implement these thresholds in practice. Also, developing an R routine (CoFESWave) is helpful. The package mentioned in section 2.3 and in section 6 is hard to find. The work mentions the Supplementary Materials, but as the reviewer, I did not have access to these materials, and, in turn, I cannot state the usefulness of the actual code.

Now on github; see links in Section 7.

The practical implementation and accuracy of the method need further investigation. Nonetheless, the work is precise, well written and deserves publication in Entropy, which I recommend. Thank you.

Referee II

General:

Authors presented a novel method based on wavelets to denoising non-stationary signals in multivariate complex time series. Simulation and applications illustrate the performance of the method. I think that paper has merit to be published in Entropy journal. However, some technical difficulties and typos errors were detected during my review. Thus I recommend to authors to address these issues and other suggestions, before I could recommend publication of the manuscript:

1. L34: in "([2], [3], and [4])", authors could add the reference: "Nicolis, O., Mateu, J., Contreras-Reyes, J.E. (2020). Wavelet-based entropy measures to characterize two-dimensional fractional Brownian fields. Entropy, 22(2), 196", because increment the literature about wavelet estimation in random fields. done; thank you
2. L126: ω_0 is the frequency? if yes, please add it. done
3. Eq. (7): is this equation only presents an integral. I recommend to add something like $ISE(f, h) = \int \dots$. Also, add the support of the integral. created a new appendix containing a clearer derivation

4. L158: $\hat{\int}$ is a weird notation. Thus I recommend $\hat{I}SE(f, h)$. Then fix the equations of (8). Also, it is not clear what is the estimator of the integral. It is related to Riemann integral? in appendix, the estimation notation is removed; what needs to be estimated follows; no approximation is required – just use an unbiased estimator of the expectation (2nd integral)
5. Eq. (10): w could be confused with frequency of Fourier transform. Use another letter such as α . Also add that $\alpha \in [0, 1]$. in mixture modeling, w is universally used for the proportions; not likely to be confused with the frequency w_0

6. After Eq. (12): you mean gaussian densities about the result in [25]? yes; now after eqn 17 in appendix
7. Eq. (17): $100 < - > 1$? fixed the confusion
8. L399: Also, another further work could be wavelet estimation for temporal random fields (Nicolis et al., 2020). agree

Typos errors:

1. L14: remove "Supplementary materials for your article are available online" (this could not be mentioned in abstract). done
2. L34: "Chaudhuri [5], who...". done cite gives both authors
3. L42: "A recent paper by" – "Reményi and Vidakovic". done
4. L53: "He et al. [13] designed". done
5. L72: "we develop and describe" < – > "proposed". yes, propose
6. L81: "normal (Gaussian)" < – > "Gaussian". done
7. L162: "the" appears as strikethrough. opps, fixed in new appendix
8. L228-232: Put these lines with normal font size. done
9. Table 2 (and other ones): It is not necessary to put these number in red because you described these results in lines 298-304. done
10. L343 & 368: "Raath and Ensor [18]". done