

# Review for manuscript “Technical note: Improved partial wavelet coherency for understanding scale-specific and localized bivariate relationships in the geosciences”

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**Journal:** Hydrology and Earth System Sciences Discussions

## General remarks

I think that the authors tried to include most of my previous comments. The introduction is now a bit more accessible even though I personally would probably even provide more background for the non-expert reader. The paper refocused on one instead of two practical examples which reduces its length and it provides a new discussion section that discusses both the weaknesses and advantages of the new method. Overall, the motivation and benefits of the new method seem much clearer now. However, I still think that the note would profit substantially from careful language editing and from a few clarifications now and then. The line numbers I use in my more detailed comments below refer to the ‘track-changes’ version of the revised document.

## Major points

- It is not entirely clear to me what you mean by ‘spatial series’ (e.g. l. 11-12 and many other instances in the text). Do you mean to refer to a ‘spatial field’ or to ‘spatio-temporal’ data sets? Please clarify.
- Please pay attention to the use of articles. They seem to be missing in some places (l.43 ‘as the spatial distribution’, l.53 ‘on the wavelet transform using a mother...’) and can be removed in others (e.g. l. 16. ‘detect relationships’ instead of ‘detect the relationships’, l. 38 ‘untangle scale-specific’).
- I understand now that you are trying to demonstrate that using the Mihanovic PWC with a complex instead of a real-valued component is crucial. I think that you should/could be even clearer about that in the introduction. I think line 110 would be a great spot to talk about the deficits of previous implementation of PWC (see l. 219-225). I.e. make it clear that PWC has been proposed by Mihanovic and used by others in a wrong way. What you are proposing is a correct interpretation rather than a new method. Did I understand this correctly?
- 79-83: Here, it might be good to provide an example for what such ‘other variables’ could be and why their influence can blur the relationship between a response and predictor variable.
- L. 128: I would keep the description of the complex wavelet transform a bit more general and mention that different types of mother wavelets can be used among which one is the Morlet wavelet. Also consider mentioning the properties of the Morlet wavelet that make it particularly suitable for the application in PWC.
- L. 199: I do not agree that ‘AR(1) can be used to simulate most geoscience data very well’. Indeed, many hydrological time series show long-range dependencies, which are not captured by AR(1)s. What does this mean for your Monte Carlo experiment? Should it be rerun using a more appropriate dependence structure? Maybe, this is also just something for the discussion section where you may want to discuss what type of autocorrelation structures other may want to use of AR(1) if long-range dependence was an issue.

- In Section 3.1, you introduce variables  $y_1$  to  $y_5$  and  $z_1$  to  $z_5$ . Subsequently, you only seem to use  $y_2$ ,  $y_4$ ,  $z_2$  and  $z_4$ . Why is it necessary to introduce all of them if just some of them are used? Seemed confusing to me. Could you just remove all the other (unnecessary) variables?
- L.261-272 talks about the case where one variable is excluded and L.273-280 about the case when two variables are excluded. This could be made clearer by starting the paragraphs e.g. with First,... Second,...
- L. 273-280: I guess I do not fully understand what you are trying to say in that paragraph. What I understand is that you are saying that excluding one or several variables does not make a difference, i.e. it is sufficient to exclude one variable. If so, why is the proposed method necessary given that one of its biggest advantages is that it can exclude several variables? Please clarify.

### Minor points

- In the abstract, the reader does not yet know what ‘the previous PWC calculation’ is (l. 30), which means that some alternative phrasing is needed there.
- L. 57: what do ‘these wavelet methods’ refer to? Please specify.
- L. 67: ‘the negative one’
- L. 69: ‘can be misleading.
- L.106: ‘provides phase information’
- L. 108: ‘an extension of’
- L. 133: what does ‘itself’ refer to?
- L. 139: instead of ‘elsewhere’ I would write ‘e.g. in ...’
- What do the different R terms refer to if you had to describe that in one summary sentence?
- L. 196: what does ‘sufficient’ mean in terms of the number of iterations?
- L.283-284: rephrasing needed
- Figure 1 and others: I would add some labels for the stationary and non-stationary case. The arrows mentioned seem really tiny and are hardly visible.
- L. 601-603: indicate that your method corrects for this. Furthermore, there is a problem with the brackets.
- L. 675: what do you mean by ‘multiple-testing problem’?
- L. 723: rephrasing needed
- L. 726: ‘analyze’ instead of ‘detect’