Response to Reviewers JCGS-23-428

A Tidy Framework and Infrastructure to Systematically Assemble Spatio-temporal Indexes from Multivariate Data

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Below is a point-by-point explanation of how we have changed the paper. The reviewer comments are in black and our responses are in red. Reviewers' comments are in black and **our responses are in red**.

Editor and Associate Editor

Two referees, an Associate Editor (AE), and I have reviewed your paper. The two referees hold significantly different views on the paper. As you will see, the first referee's assessment is rather negative, whereas the second is more positive. As recommended by the AE, it is essential to incorporate or highlight your methodological contributions in the paper to address the concerns raised by the first referee. Therefore, I would like to extend an opportunity for revision. However, the decision for the revision will depend on whether you can adequately address the reviewers' concerns.

To be addressed

Reviewer: 1

I commend the authors for their work in the tidy index library. Certainly, a user friendly and unified approach to indices is useful across many fields. My main concern about the paper is that it doesn't seem to fit within the aims and scope of JCGS. A perusal of recent JCGS papers shows that a novel statistical component is needed for publication in addition to the software. This paper, while certainly useful, doesn't necessarily propose new statistical methods but rather proposes a great tidy framework for handling index calculation. As such, for JCGS, I think the authors need to highlight the statistical contributions more than the library. However, I don't think the authors statistical contributions (even if highlighted) are

sufficiently novel to warrant publication in JCGS. As written, I think the paper is more suited for publication in, say, Journal of Statistical Software than JCGS.

We have highlighted the methodology contributions this framework makes in the conclusion: While indexes are widely constructed and used to inform decision-making, such as on resource allocation, little effort is made to justify choices made during indexes construction and to experiment with alternatives. The pipeline proposed in the paper allows confidence interval to be calculated in the pipeline and sensitivity analysis to be incorporated in the index construction process.

Reviewer: 2

This paper proposes new pipeline work for index development, including index generation, validation, and sensitivity analysis. The authors develop a new R package, "tidyindex" including all functions in the pipeline to produce a new index. This package will be beneficial for developing new indices. The central part of this paper is the development of the R package and the explanation of its usage. However, this package needs to be fixed.

The authors explain their functions briefly in Chapter 5 and use examples with R code in Chapter 6. However, the code in Chapter 6 does not work. Also, the demo in the R package (CRAN version 0.1.0) did not work (see attached R-output.html). Please check the package, including demos and examples in this paper. It would be great if all R codes for the example in Chapter 6 were provided, including generating plots.

Fixed. We were expecting that readers worked from the vignettes folder. The problem was that the demo folder had some irrelevant code. We've removed these now. We have also re-organised the code for the paper as follows.

- **The main file tidyindex.R, reproduces the content in the paper from saved data objects, available in the data folder.**
- **New scripts have been provided in the scripts folder which completely generate each of the examples. There is a README.md, that instructs the reader how to set their environment up to reproduce all of the analyses.**
- **The GitHub repo is listed in the Acknowledgements section, and any further updates needed for future versions to run will be made there.**

minor comments

- In Table 1, it would be great if there were a line between items. Because the name of the module is in two lines, it is not easy to match the other information (input, operation, and output)

Fixed. The table layout has been modified accordingly..

- On page 19, " The output contains the original data, index values (.index), parameters used (.scale, .method, and .dist), and all the intermediate variables (.pet, .agg, and .fitted)." However, the output has no .index, .pet, .agg, and .fitted. Please check.

Fixed. The output has been written in a way that all variables are visible now (using dplyr::glimpse())..

- Figure 7 shows the sequence of screenshots from the animation to explore the sensitivity of the GGGI. It would be helpful to understand "what Frame 12 is" if the authors should explain this between " Figure 7 illustrates doing sensitivity analysis for GGGI, for a subset of 16 countries" and "Frame 12 shows the dot plot of the original index values sorted from highest to lowest",

Frame 12 is described in more detail now, and additional explanation of the information being communicated by the figure is provided.

- Figure 8 on page 27 also shows the relatively wide confidence interval around 2004. It would be great if the author mentioned it, too.

Added. This wider confidence interval is interesting and corresponds to the millennium drought in Australia.

- reference for "SPEI package" on page 4 should be (Beguería and Vicente-Serrano 2017), and reference for "the Standardized Precipitation-Evapotranspiration Index (SPEI)" on page 12 should be (Vicente-Serrano, Beguería, and López-Moreno 2010)

Fixed.