

Interactive comment on “Sensitivity to species selection indicates the effect of nuisance variables on marine microfossil transfer functions” by Lukas Jonkers and Michal Kučera

Anonymous Referee #2

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This manuscript uses the methods developed by Juggins et al (2015) to determine the importance of each planktic foraminifera for the performance of transfer functions calibrated against sea-surface temperature. These results are used to make models with a greatly reduced set of species which perform almost as well as models based on the full set, however, the reconstructions were different.

The manuscript is generally well written.

I found some of the results surprising. In particular, the low importance of *N. pachyderma* with the modern analogue technique (MAT). This is an abundant (up to 100%) and common taxon with a clearly defined thermal niche. I found the explanation in

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the manuscript reasonably persuasive for transfer function performance, but not for importance.

Intrigued, I re-implemented the method and, with a smaller training set, and found *N. pachyderma* to be among the most important taxon for MAT. Subsequently, I was given access to the authors' code which gave the same result. The authors blame a glitch and now get the same result. I encourage the authors to adopt the techniques described in the British Ecological Society guide to reproducible code.

At least some of the subsequent results will be affected by this glitch.

The manuscript gives some consideration as to why some taxa are not important, but it would be interesting to see this expanded. I can think of several reasons. Taxa with low importance might be nuisance taxa, these should have negative importance. Taxa with poorly defined niches, or broad tolerances will have low importance and may be good to exclude from transfer functions. In contrast, taxa with low abundances or occurring in only a small number of sites may have low importance as the analysis will give these low weight even though they might be valuable indicators. It would be useful to try to quantify how much these factors contribute to low importance.

Whereas importance can be evaluated objectively, the effect of species inclusion rules on reconstructions cannot be as the truth is not known. Adding more taxa to the reconstruction will obviously tend to make the reconstruction more similar to the all-taxa reconstruction. But any individual taxa could make the difference larger. Contrary to line 192, I do not regard the increase in difference with the inclusion of *G. glutinata* as evidence that it is a nuisance taxon. It might be more powerful to run this analysis on the calibration set.

I am not sure we need to see the reconstructions with in 3A with fewer than the "minimum number" of taxa, as no one should be using these.

The bias observed in for MAT in figure 3B looks much like what I would expect given *N.*

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pachyderma had been omitted.

It would be interesting (line 210) to compare the sensitivity of WA and MAT on the same range of models to identify the inherent variability of each.

Line 268. "that reconstructions that are highly sensitive to species pruning may indicate that the observed assemblage changes cannot be attributed solely to the environmental variable that is to be reconstructed"

This is an interesting idea, but I don't think this conclusion is justified given the results in the current version of the manuscript.

Whereas the manuscript demonstrates that only a few taxa are important for temperature reconstructions, I would hope that micropalaeontologists continue to count the full assemblage so that a range of questions can be addressed with the data. Only for routine analyses (for example water quality monitoring) is identifying only the important taxa justified.

Minor points

Line 176. Celsius not centigrade

Capitalisation of axis labels in all figures needs to be checked.

Figure 2. Might be better to use `scale_fill_continuous(trans = "log", breaks = ...)` than to log transform the percent.

The authors report (line 312) that the code is available on request. It would be much better to archive the code on, for example, github, or better still a permanent archive such as zenodo.org, ideally before review.

Interactive comment on Clim. Past Discuss., <https://doi.org/10.5194/cp-2018-107>, 2018.