

## ***Interactive comment on “Fallacies and fantasies: the theoretical underpinnings of the Coexistence Approach for palaeoclimate reconstruction” by G. W. Grimm and A. J. Potts***

**G. W. Grimm and A. J. Potts**

guido.grimm@univie.ac.at

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The reviewer raised two main concerns regarding our ms: the overly confrontational and aggressive tone and that we do not give alternatives or workarounds.

We wish to point out that the purpose of this manuscript is to stop the use of an essentially not (or even in-)validated, non-statistical (as explicitly stated in the original paper), pseudo-precise, and fundamentally flawed method. Our in-depth (as both reviewers agree) theoretical assessment follows up two earlier papers (Grimm and Denk, 2012; Grimm et al., 2015) that looked into the application of the Coexistence Approach (CA) and its primary database as far as this is feasible from the outside. In the light of

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the practical and theoretical problems, there is no point in using the Coexistence Approach. We are confident that any other nearest-living-relative, taxon-based method is less problematic. However, we cannot do an in-depth comparison of alternative methods, which surely is needed at some point, within the scope of this paper.

The tone needs to be strong. It is true that some issues are long known, but there is no real visible effort to counter them (aside recent statements issued in Utescher et al. 2014). Others, more important issues have never been formulated. Some issues cannot be overcome at all. Nevertheless, the method has cornered the market of taxon-based palaeoclimatic reconstructions in one part of the Northern Hemisphere (western Eurasia, and more recently East Asia), and effectively stalled the application, exploration and development of better validated, documented, and probably less fallacious and potentially more robust methods. One cannot ignore (see specific comment SC2 of reviewer 2 and our response R9 in the supplementary PDF) that many authors report and discuss minute climate changes based on CA results, although it is argued that such precision is "beyond the resolution" of the primary tolerance data (Utescher et al. 2014). We also cannot agree with reviewer 2 that a method should be applied just because it allows "the production of data" (see GC6 in the supplementary PDF). Not all results of CA are necessarily wrong, but it is impossible to distinguish between possible and arbitrary estimates. And it is also safe to say that for the most, if not all, of the rather precise CA reconstructions are inaccurate.

Hence, our original conclusion stands as it is.

Nevertheless, we added a new last section, "Where to go from here?", where we give suggestions how (quantitative) nearest-living-relative methods should be validated, with examples from the literature. We also outline in more detail what we consider the most expedient avenue for nearest-living-relative methods: robustness of estimates and not high precision.

We responded to all critiques of the reviewer, the details are provided in the supple-

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mentary PDF. The revised ms including the new last section and changes highlighted in edit mode can be found at the end of the supplementary PDF.

#### References

Grimm, G. W., and Denk, T.: Reliability and resolution of the coexistence approach - A revalidation using modern-day data, *Rev. Palaeobot. Palynol.*, 172, 33-47, 2012.

Grimm, G. W., Bouchal, J. M., Denk, T., and Potts, A. J.: Fables and foibles: a critical analysis of the Palaeoflora database and the Coexistence Approach for palaeoclimate reconstruction., *bioRxiv*, doi, 10.1101/016378, 2015.

Utescher, T., Bruch, A. A., Erdei, B., François, I., Ivanov, D., Jacques, F. M. B., Kern, A. K., Liu, Y.-S. C., Mosbrugger, V., and Spicer, R. A.: The Coexistence Approach-Theoretical background and practical considerations of using plant fossils for climate quantification, *Palaeogeogr. Palaeoclimat. Palaeoecol.*, 410, 58-73, 2014.

Please also note the supplement to this comment:

<http://www.clim-past-discuss.net/11/C2936/2016/cpd-11-C2936-2016-supplement.pdf>

Interactive comment on *Clim. Past Discuss.*, 11, 5727, 2015.