

Interactive comment on “The effect of bias adjustment on impact modeling” by Jakob Zscheischler et al.

Anonymous Referee #1

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This manuscript provides a valuable contribution to the literature on bias correction, focusing on the issue of ‘handling’ inter-variable dependencies and consequences for derived impact metrics (here a heat stress index and a fire index). Overall the paper is well written and figures are of good quality. My comments are minor in nature and often addressed by technical edits.

My comments are as follows: 1. It would be meaningful to see an argument for why you are focusing on a global scale here (using GCM output) rather than output from regional climate models, that typically provide outputs used for impact models. I can see motivations for this, e.g. spatial (global) completeness, addressing the source of the change signal (as provided by the GCM – and then translated to a finer resolution by a RCM). I have no objection to the GCM focus but given that bias correction is typically

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a problem for impact studies, and many of these use downscaled data, you might want to provide a motivation for the experimental setup. I think it is also noteworthy that in the context of downscaling, some argue for bias correcting the input fields to the RCM – so to avoid propagation of error in the RCM. You might also want to talk to/refer to the issues of dealing with spatial dependencies – if corrections are applied to grid cells, how is spatial dependencies (and indeed temporal dependencies) preserved/modified. 2. I think you need a more detailed description of the model simulation datasets used in this study. I don’t think it is enough to list what projects they are associated with, it would be meaningful to have details such as ensemble configuration, range of model resolutions, use of initial condition members (or not) etc. Under ‘data’ you could provide details on the re-analysis dataset as well as on model ensembles (if you wanted to keep obs from model simulations you could use different sub headings). As it currently reads, different model names crop up in various places of the text and figures, which causes a bit of confusion upon reading. 3. I think it would make sense to explicitly state (in an appropriate place in the introduction) that we assume that bias correction to stationary, i.e. that it is valid to develop a correction under current climate and apply this in a warmer world. 4. I would consider putting the bias correction methods into the manuscript as mathematical formula – this would enhance clarity in terms of understanding the methods, and it makes the paper self-contained (rather than pointing to another paper for understanding the specifics of the method). 5. In section 15, instead of writing ‘We then’ I wonder if you should start with ‘firstly’ (or similar) – to reflect that this is the first step of the analysis? Or perhaps I have misunderstood. 6. In the same section as above, I think it would be helpful to be more specific about what you mean with ‘all other runs’, all other CMIP5 current climate runs – all of them? Also, do you bias correct towards all of the CanESM ensemble members - all five? I wonder for this type of paper if you might want to think about some form of infographics, illustrating your experiment setup, what comparisons are made etc.

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