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Earth System Dynamics
Discussions

Interactive comment on "Evaluating the dependence structure of compound precipitation and wind speed extremes" *by* Jakob Zscheischler et al.

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We thank Carlo de Michele for his constructive comments on our manuscript.

The manuscript titled "Evaluating the dependence structure of compound precipitation and wind speed extremes" aims to estimate the likelihood of compound precipitation and wind speed extremes. In particular the Authors use metrics (the coefficients chi, chibar, and KL measure of divergence) to measure the tail of bivariate distributions, and if it is similar between different datasets. The Authors use data from one reanalysis product (ERA5) and three model simulations (ERAI-WRF, CESM-WRF, CESM-WRF-fut) over a period of 20 years.

General comment: The manuscript is well written. The methodology is well grounded and of interest also for other compound events. The conclusions concerning the ERA5, which is considered as state-of-the-art dataset, are of value. Thus, I think that the manuscript should be accepted after minor revision.

Thank you.

Here you have some specific questions/comments:

- Application of the methodology to real data: Have the Authors an idea about the minimum number of data necessary to obtain a reliable estimate of the proposed metrics? Some details about this could be very useful.

This depends in general on the distribution of the data. For the chi coefficient we provide confidence intervals. For the KL statistics confidence interval can be obtained via simulation studies depending on the underlying distribution. In the revision we will add a comment in this regard.

- Please give details about how you have calculated the KL measure of divergence, similar to the information given for the calculation of the coefficients chi, chibar.

For computing the KL divergence, equation 1 and the one above provide the necessary equations to compute it.

- A reference for the risk function could be useful.

The sum is a classical way of looking at extremes, which treats all variables equally. If one projects all points that are large in this risk measure on the sphere $r(x) = 1$, then one obtains the so-called spectral measure, a popular object in extreme value theory. The minimum on the other hand excludes the axes and is therefore also suitable for asymptotically independent data. We will add some explanation regarding the choice of risk functions in the revision.

- I think that in Figure 7 "K=3" should be substituted with "W=3", to be coherent with

the text. Similar comment applies to the caption of Table 1.

Thanks.

- Line 261 change “bivarate” with “bivariate”.

Thanks.

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