

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1
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Comment on nhess-2022-127

Jakob Zscheischler (Referee)

Referee comment on "Time of Emergence of compound events: contribution of univariate and dependence properties" by Bastien François and Mathieu Vrac, Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-127-RC1>, 2022

François et al present a very thorough analysis of the time of emergence of compound events. The paper introduces the concept and illustrates it for two types of compound events, compound wind and precipitation extremes and false spring events. Overall this is a timely and useful study and proposes convincing ideas how to disentangle the contribution of marginals and dependence in trends of compound event occurrence. I find it particularly interesting that in the first example changes in the dependence matter (for some models) for ToE, whereas in the second model dependence changes are irrelevant/do not occur. While the paper is very thorough, it is also somewhat lengthy, so the authors might want to consider shortening some aspects to improve readability.

I have a few (mostly minor) comments that should be considered before publication.

Line 65: "Recently, Abatzoglou et al. (2020) even showed, using reanalysis data, that changes in dependence properties have been more important than changes in univariate properties in the recent decades." Not sure that was really shown in that study

Fig. 5: it looks like the chosen window length is a bit too small to obtain robust results (there is very high variability in the time series, leading to large uncertainties regarding the ToE). 30 years is very limited for studying compound events. I would be interested to know whether you get smoother curves if you increase the window length and thus sample size.

Fig. 6: What is the effect of sample size on the shown patterns? More extreme values are more uncertain, and bivariate exceedances are more uncertain than univariate one, hence ToE should be shifted back in time. Interesting that one gets a generally relatively rich, non-trivial structure here.

For all figures: the colour scales for the years are not very intuitive. One continuous colour would make more sense

Section 6 should be entitled: "Discussion and conclusion" or similar and then maybe "Summary" in Section 6.1