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Dear Editor,

Please find enclosed my manuscript entitled *Weather explains interannual variability, but not the temporal decline, in insect biomass* that I would like to submit as a *Matter Arising* related to the paper *Weather explains the decline and rise of insect biomass over 34 years* published in September 2023 in *Nature*.

In their paper, Müller *et al.* re-analysed, in light of new data, the dataset of the highly cited paper of Hallmann *et al.* (2017), which showed a strong decline in insect biomass in Germany between 1989 and 2016. Müller *et al.* conclude from their analyses that “*temporal variation in weather conditions explained most of the temporal changes in insect biomass whereas temporal changes in habitat conditions played only a minor role*”. Here I argue that their methodological approach is unsuitable to draw such conclusion, because it relies on flawed statistical analyses. More appropriate analyses produce a pattern opposite to the main message of their paper: there is a significant temporal decline in insect biomass that is not explained by weather conditions.

My rationale to question the conclusions of Müller *et al.* is based on three points. First, they present and interpret a misleading figure (their Figure 1), which exhibits old (1989-2016) vs. recent (2016-2022) data collected from two different areas in Germany, as a unique and continuous time series. This figure cannot be interpreted without accounting for spatial differences. Second, in their statistical model they used habitat variables that were constant over time, thus modelling land use instead of land use change. They conclude that land use change plays a minor role in the temporal variation in insect biomass, although they did not estimate its importance whatsoever. Third, they argue that weather conditions were the only driver of temporal changes in insect biomass, because they did not find any remaining temporal trend in the residual of their model. However, they did not estimate both a temporal trend and the effects of climatic conditions simultaneously, which can bias their estimations. When re-performing their estimations simultaneously, I improved the fit of the model (lower AIC), and I found a significant temporal decline in biomass that is not explained by weather conditions.

I believe this work is of interest for the wide readership of *Nature* as it brings a new perspective on the results of Müller *et al.* and on the fate of insects, a topic of importance for human societies. Unravelling the causes of insect decline is at the heart of the debate on human impacts on biodiversity, not only in the scientific sphere but also in the public and political spheres.

The content of this paper is entirely original; it has not been published or accepted for publication, and it is not under consideration for publication, in another journal or book.

I hope that this manuscript will be of interest to you, and I look forward to your reply.

Sincerely yours,

François Duchenne