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Full title: A note on predator prey dynamics in radiocarbon datasets.

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This paper discusses the use of information from radiocarbon datasets to reconstruct predator-prey population dynamics in past ecosystems for which we have limited information, using the Summed Probability Distribution (SPD) to relate the presence of predator and prey species. This approach can be applied to remains up to 50,000 years old, and in this case the authors applied it to Late Pleistocene mammalian megafauna recovered from gravel near Fairbanks (Alaska) and the Holocene southern Judean Desert (Israel). The authors use Kullback-Leibler divergence to compare the distributions of prey and predator species in the samples studied and suggest that the divergences are unlikely to be random.

I found the work very interesting, but I am not an expert on the radiocarbon techniques or the statistical analyses used. Therefore, I would like to make some suggestions to the authors so that readers unfamiliar with the subject can better understand it.

The study is based on the Summed Probability Distribution (SPD), which is first mentioned by the authors in line 68. I think it is necessary for the authors to explain what SPD consists of, what its applications are, and what its limitations are. Regarding the limitations, Williams (2012) proposed various recommendations for using the summed radiocarbon probability distributions, such as a minimum sample size to obtain reliable distributions. It would be interesting for the authors to comment on these issues in relation to their study.

Although the authors state the hypothesis of the paper, I believe it should be explained in more detail why this hypothesis is proposed and what the implications would be if the results showed less or more divergence than a random sample of SPDs. My understanding is that if the results show less divergence than expected, it would indicate that the predator-prey species were coexisting, and if the divergence is greater, that they were coexisting to a lesser extent. As I mentioned above, I am not an expert on the techniques used by the authors of the paper, so I think it is important that the authors expand on this part and clarify possible misinterpretations.

Regarding the sample used, I was attracted by the fact that in Fairbanks there are more samples of predators (wolves) than of prey (horses and reindeer). Why is this? The Late Pleistocene Rancho La Brea tar seeps site came to mind, where there is a greater representation of carnivores than herbivores (Spencer et al., 2003). Readers may be interested in taphonomic issues and interpretations of the deposit-accumulating agents analyzed. In the analyzed assemblages, prey species appear that are not in the analysis. What is the reason for this? Are they non-preferred prey for the predators? Another aspect that may be interesting to explain is the preferred prey of the predator species in the regions analyzed.

The authors talk about calibrating radiocarbon dates before converting them to Summed Probability Distributions (SPDs) in lines 95-97. I find it interesting that the authors explain why this calibration is necessary and what it consists of.

Regarding the Kullback-Leibler (KL) divergence analysis, I think it would be interesting if the authors could explain how the results should be interpreted. A summary of the KL divergence statistics between predator and prey SPDs in the Fairbanks and Judean Desert datasets is given in Table 1. In the case of the Fairbanks, the KL value (1.7174) is close to the minimum of what is expected between the random and prey distributions (1.559), and in the case of the Judean Desert, the KL value (5.0741) is close to the maximum of the divergence between the random and prey distributions (5.24). In both cases, however, the authors say that the results have the same trends, being less than 98 and 94% of the divergences measured for (random) predator-(real) prey distributions, respectively. Because of the interpretation problems that can arise, I think it would be useful to explain how to interpret the results of Kullback-Leibler divergence analysis, including figures 1 and 2, and when two distributions can be considered not different.

Minor comments:

In the title, the authors could use the words predator and prey, separated by a hyphen: A note on predator-prey dynamics in radiocarbon datasets.

Line 77: Change to *Panthera pardus nimr.*

Line 78: Change to *Capra ibex nubiana* or *Capra nubiana.*

Figures 1 and 2 show two parts, so they could be distinguished as A and B.

In the caption of Figure 2, the Kullback-Leibler divergence analysis is missing.

Table 2 could be organized by genus as Table 1 to better visualize the specimens of each genus and their dating.

Line 192. Change to Evaluating Bayesian radiocarbon-dated event-count [REC] models for the study of long-term human and environmental processes.

Lines 208-209: Change to Climate change and cyclic predator-prey population dynamics in the high Arctic.

Line 225: Remove [1974].

References

Spencer, L.M., Van Valkenburgh, B., Harris, J.M., 2003. Taphonomic analysis of large mammals recovered from the Pleistocene Rancho La Brea tar seeps. Paleobiology 29, 561-575.

Williams, A.N., 2012. The use of summed radiocarbon probability distributions in archaeology: a review of methods. Journal of Archaeological Science 39, 578-589.