

## ***Interactive comment on “Lignin oxidation products in soil, dripwater and speleothems from four different sites in New Zealand” by Inken Heidke et al.***

### **Anonymous Referee #1**

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This paper presents a quite interesting dataset comparing lignin phenol products (LOPs) in the dripwater, speleothems and the overlaying soil layers at four different sites in New Zealand, aiming to test if LOPs in speleothems may loyally record the local vegetation information. There is so far very limited information on LOPs in speleothems and dripwater and this study is a nice complement to related studies published by the authors recently. The data and information carried herein are important for future potential applications of LOPs in speleothems for paleo-reconstruction. However, I think some of the conclusions are too strong and the authors need to further address several concerns to have a robust conclusion.

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1. As briefly acknowledged in the paper, the resin method of collecting dripwater organic matter needs to be tested for (i) potential fractionation of lignin monomers; (ii) loading capacity of DOC; (iii) effects of potential degradation for the one-year sampling time.
2. Although particulate lignin may not be completely solubilized and analyzed in the study, the authors should try to estimate how much particulate lignin may contribute to the record in speleothem (ratio of dissolved versus particulate lignin and how different are they in composition).
3. Page 11, Line 4: I don't quite understand this sentence “the relation between the different cave sites is similar”. I do see variations in the magnitude of change from soil to dripwater to speleothem among sites. What is the likely cause? Variability is also high for the same site. This needs to be considered. The conclusion is too strong.
4. Same page, Line 18: Microbial degradation often leads to decreasing C/V and S/V ratios. Hence, it can be ruled out. Also, the C/V ratio increases from LL to A horizon in Fig. 5a. Why? Do you think that plant roots may contain more C (it does happen for some species)?
5. Have you considered to analyze LOPs in soil solution (or WEOM from soils)? They seem to be more appropriate or relevant for dripwater comparison than soils.
6. Conclusions: How would mineralogy of bedrocks affect the sorption and change of LOPs along their vertical transport?

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