

## ***Interactive comment on “A model based on Rock-Eval thermal analysis to quantify the size of the centennially persistent organic carbon pool in temperate soils” by Lauric Cécillon et al.***

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We thank David Sebag for his Short Comment on our manuscript.

However, we disagree with his comments.

We think that all Rock-Eval 6 (RE6) parameters (both temperature parameters and indices corresponding to the integration of the gas flow curve) are fully eligible as potential predictors of the centennially persistent soil organic carbon (CPsoc) proportion in a non-parametric multivariate regression model. Indeed, even RE6 parameters associated to a thermally labile soil organic carbon (SOC) fraction, such as the I-index

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and the TLHC-index, could have significant negative correlations with the CPsoc proportion. They would thus have been important predictors in the random forests model.

We thus argue that we did not “misuse” or “wrongly applied” any of the 30 RE6 parameters in the multivariate regression model.

Furthermore, we do not agree with David Sebag when he states that similarly to the I-index and the TLHC-index, the R-index takes “into account the most labile thermal fraction (i.e.  $T < 400\text{--}450\text{ °C}$ )”. The R-index has been designed to represent the thermally stable SOC fraction (i.e.  $T > 400\text{ °C}$ ): the “R-index [is] highlighting the contribution of the most refractory fraction or persistent SOM” (Sebag et al., 2016). Therefore, we think that it was particularly appropriate to use the R-index as a predictor of the CPsoc proportion in the random forests model.

Reference:

Sebag, D., Verrecchia, E.P., Cécillon, L., Adatte, T., Albrecht, R., Aubert, M., Bureau, F., Cailleau, G., Copard, Y., Decaens, T., Disnar, J.R., Hetényi, M., Nyilas, T., and Trombino, L.: Dynamics of soil organic matter based on new Rock-Eval indices. *Geoderma*, 284, 185–203, 2016.

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