

Dear Aninda,

first of all many thanks for your efforts on making our manuscript better.

We would like to reply to your request for a normalization to the soil with some points that we think must be considered:

- 1) As already replied to reviewer 2, the Weierbach Catchment regolith is a polygenetic system composed of a Pleistocene Periglacial Slope Deposits (PPSD), which was formed by aeolian deposition and in which the soil is developing, and a saprolite deriving from the weathering of a slate bedrock. Here, we do not know from where the trees uptake the nutrients/water and this put constraints on the choice of the most suitable material for the normalization. This is linked due to differences in REE composition between the different regolith layers. Please also refer to the answer to reviewer 2 reported below:

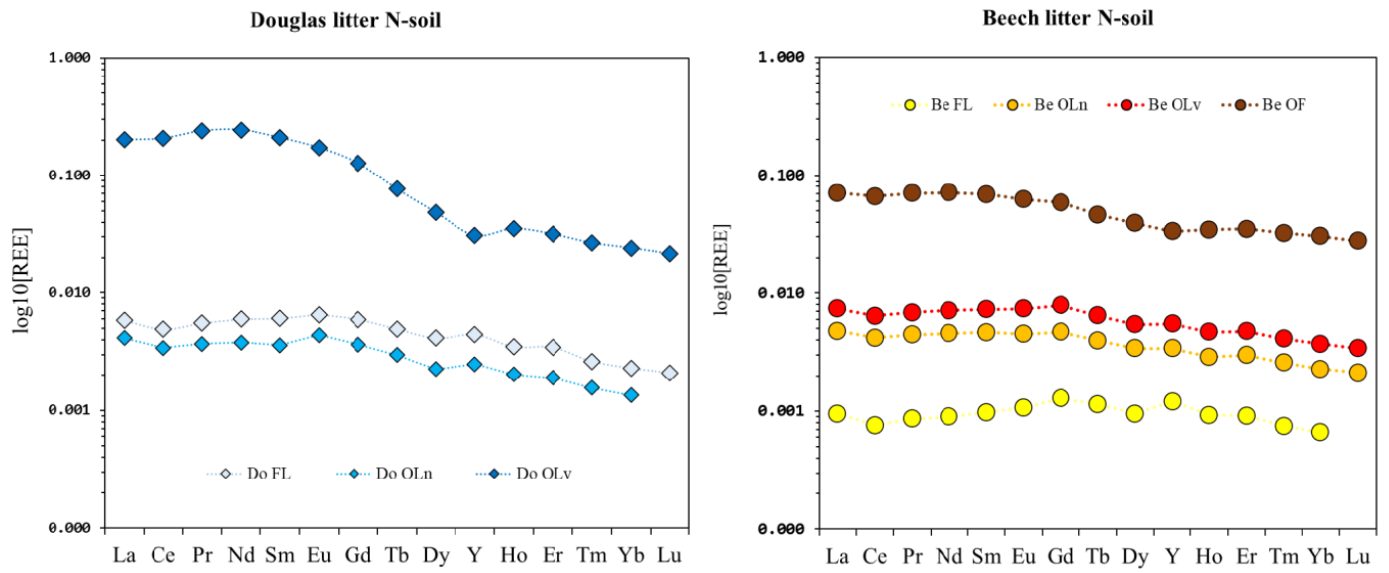
“It is not usual from a literature point of view, to normalize REE concentrations to dust. Nonetheless it must be said that the normalization by a specific material can usually be done according to given processes to be highlighted (for example Stille et al. 2009 - <https://doi.org/10.1016/j.chemgeo.2009.03.005> - who normalised soil leachates to soil solutions). As explained in lines 217-220, atmospheric deposition is an important input of cations and nutrients and we expected it to be also in terms of REE supply as previously suggested by Censi et al. (2017- <https://doi.org/10.1016/j.chemosphere.2016.11.085>). Therefore, this normalization is (also) a way to observe whether or not the atmospheric deposition has an impact on the REE composition (and thus on patterns) of leaves and litter. Indeed, if we obtained flat litter REE patterns when normalizing to the dust, we could have argued that most of the REE in the solid fraction of litter was delivered by the dust and not by the litter itself.”.

- 2) It is true that plants mobilize and absorb REE from soils. However, preliminary results obtained for this soil proved that only a little fraction of REE are mobilized via organic acids leaching (results not shown in this manuscript). Moreover, non all the REE mobilized in this way are uptaken by trees and part of this “available” REE are removed by hydrological processes, such as percolation.

Also, the normalization by bulk soil is not representative of what REE are mobilized and uptaken by trees. Indeed during water-rock and organic acids-rock interactions REE fractionate with respect of the bulk soil composition according to the literature. Moreover, it has been demonstrated that also during the root water uptake REE fractionate in roots, changing their concentrations (and patterns) in the xylem.

Accordingly, we believe that normalizing by the average soil composition would create a bias in the interpretation of the REE patterns of the litter which do not have contact with the below soil (due to our sampling approach) and which during the living period were nourished by water with already fractionated REE signature (xylem water). On the contrary, we expected atmospheric dust to be an active part of the different litter fractions, in terms of REE composition due to its potential direct contact with the collected samples.

- 3) The addition of a paragraph treating the normalization by soil, we believe would not fit the scope of the manuscript as we do not treat the REE mobilization from the soil particles.
- 4) Nonetheless, by normalizing to soils, we do not see differences in the REE patterns of our samples. The only noticeable difference is related to an emphasis of Eu anomaly in Do OLn already observed and treated in the manuscript (please see pictures below reporting the fresh leaves and litter samples normalized by average soil REE composition, you can compare with the figures in the manuscript). The resulting patterns would not then add anything impactful, which may justify an additional paragraph in the manuscript.



Rare earth elements patterns of fresh leaves and litter samples of Douglas-fir and European beech, normalized to the REE average composition of the local soil.

Additional corrections applied to the manuscript:

- 1) Figure 2: fixed a typo in the measuring unit from “ug/g” to “μg/g”
- 2) Line 610: fixed a typo from “occur” to “occurs”

Best regards,

Alessandro Montemagno