

## ***Interactive comment on “Paleosols can promote root growth of the recent vegetation – a case study from the sandy soil-sediment sequence Rakt, the Netherlands” by M. I. Gocke et al.***

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We would like to thank both anonymous reviewers for their constructive comments. These will help to considerably improve the quality of this paper.

Response on comments from referee #1:

Page 1274, line 9: Thank you for the hint. We will rephrase the passage in the revised version: “. . .covering a Plaggic Anthrosol that accumulated on a relict Podzol. . .“

Page 1274, line 17: We will rephrase the passage in the revised version for easier understanding: “. . .living roots were most abundant. . .“

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Page 1274, line 22: The sentence will be rephrased in the revised version: “The approach demonstrated the benefit of comprehensive root investigation to support interpretation of the record of a soil profile, . . .“

Page 1275, line 1-3: Of course we acknowledge that paleosols developed in any kind of sediment are valuable archives. However, we did not want to expand the scope too much, but stay focussed on eolian sediment-paleosol sequences, which are the object of this study.

Page 1275, line 6-9: It would be good if more soil studies would comprise also the soil parent material below 1 m depth, but to the best of our knowledge this is scarcely the case. We would appreciate references reviewing this.

Page 1275, line 28: With the term “period“, we did not mean a chronologic/historic period. We will rephrase the sentence to avoid misunderstandings.

Page 1276, line 1: Thank you for the hint. The passage will be corrected.

Page 1276, line 22: Self-restoration means renaturation of the ecosystem without anthropogenic intervention. We will add the information in the revised version.

Page 1277, line 3: By the term “scale“, we meant the soil volume which is utilized by plant roots, but we see that this might be misleading. We will rephrase the sentence.

Page 1277, line 9-10: We will skip the word “diverse“ in the revised version.

Page 1280, line 10-12: Prior to XRF measurement, the milled sample is poured into a plastic cup, the bottom of which consists of 4  $\mu\text{m}$  thin prolene foil. To obtain a sample layer thickness in the cup as regular as possible, the cups are gently hit on a hard surface. We will add this information in the revised version. Concerning the overall sample preparation, it was mentioned earlier that all samples were sieved to 2 mm (page 1279, line 19 and page 1280, line 5). Moreover, it was also explained that sample aliquots were milled prior to carbon analysis and XRF measurement (page 1280, line 5). Results from XRF measurement are bulk element contents. This is the

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reason why we write about “nutritional elements”, as we are aware that XRF results do not represent nutrient contents.

Page 1281, line 25: The passage will be corrected.

Page 1282, line 24-27: We are aware that this is speculative, and therefore indicated this with the term “potentially”.

Page 1283, line 4: We are sorry for this mistake. The low  $b^*$  values in PA express its blue color.

Page 1283, line 6-7: We will rephrase the sentence in the revised version.

Page 1285, line 9-10: The mentioned downward transport refers specifically to the fact that the relative enrichment of molybdenum occurred not only in the lower part of PA but also in the upper part of rEP. The topsoil of the former Podzol was reworked into the PA.

Page 1288, line 13-14: We guess the reviewer refers to page 1286, line 13-14, as the term “general assumption” occurs there. With “restricted to the topsoil” we rather meant that roots do mainly (not exclusively) exploit the topsoil (plowing layer in agricultural soil, A and B horizon in forest soil). There is no study saying exactly this, but according to our experience, it is commonly assumed that roots are negligible below the mentioned depths. It is a fact that, although large maximum rooting depths are known, soil studies focussed for decades on topsoil.

Page 1290, line 6: Based on the pollen record in several nearby profiles, it was concluded by van Mourik et al. (2012) that the rEP formed under deciduous trees. The reference will be added.

Response on comments from referee #2:

Page 1278, line 27: The size classification of the roots refers to the root diameter. The information will be added in the revised version.

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Page 1280, lines 14-22: i) We agree that the prerequisite for one-way ANOVA is not met because the samples are dependent. After careful consideration, in our opinion a one-way ANOVA of the regression residuals is the most appropriate statistical approach to interpret the data set. We will do this in the revised version. Further, the reason why we chose two different levels of significance (0.1 “significant” and 0.01 “highly significant”) was to give a more detailed / differentiated view in the data set. We will set the level “significant” to 0.05, which is more common.

ii) We are sorry for this error. In the revised version, we will recalculate the coefficients with the existing data set. Concerning the replicates, we agree in theory with the reviewer that real replicates would have to be taken from individual soil pits. However, this is usually not done, even less if a soil pit in the dimension like in our study is prepared, which means considerable time and effort. As the horizontal levels, from which the replicates were taken, had dimensions of 0.8 x 1.4 m, it was possible to collect the four replicates always in distances of  $\gg$  0.5 m distant from each other. In our opinion this approach leads to considerably higher representativeness than many other studies which also investigate only one soil pit and even mix the pseudo field replicates (if taken at all) as one pooled sample.

iii) We are sorry for this mistake: We did not mean correlation coefficient but coefficient of determination, obtained by regression analysis.

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Interactive comment on SOIL Discuss., 2, 1273, 2015.

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