

## Reply to Anonymous referee #1

We would like to thank anonymous reviewer #1 for giving useful feedback on our manuscript. We have responded in red.

### General Comments:

Understanding the impacts of vegetation on the biogeochemical cycling of nutrients is important, especially in newly created systems, and this manuscript helps to examine how these cycles differ based on different substrates.

We thank the reviewer for this comment and for acknowledging the importance of our study.

When discussing the systems, the use of the term “building material” to refer to sediment seems a bit odd. Maybe something along the lines of “introduced substrate/sediment” or “donor substrate/sediment” would be more appropriate.

Although the term “building material” is used within the Building with Nature community, we agree with the referee that for a better understanding – and to comply with a more international standard – another term should be used. In our manuscript, we changed “building material” into “situated sediment”. This is changed throughout the manuscript.

The introduction, while it includes aims, is lacking clearly defined, testable hypotheses.

We added a paragraph in the introduction defining our hypothesis:

*“Changes in biogeochemical processes that are related to oxidation are expected to play a major role as P. australis is known for its high radial oxygen loss (Brix et al., 1996; Dickopp et al., 2011; Smith and Luna, 2013). Oxidation of the sediment will decrease the concentration of phytotoxins typically found in waterlogged soils, such as iron, and therefore will have a positive effect on plant development. This will be more pronounced in undisturbed mud, which is largely anoxic, than disturbed mud, of which the top layer is already oxidized and where bioturbation modified the sediment. The type of biogeochemical processes altered will depend on the intrinsic properties of the different sediment types, which will be examined in this study.”*

Overall, the entire manuscript needs more information on statistical analyses, particularly what tests were used to find the p-values listed (mainly in the tables), as well as additional p-values throughout the Results and Discussion section. Need a statistical analysis section within the Methods to outline the statistical program that was used, the statistical analyses that were performed and any data transformations that were necessary. Need to include more p-values within the text, even if they are not significant, when you mention a treatment being different from another. When writing p-values make sure you include some information on the test that you used for the analysis.

We added an extra section within the Methods (2.4) explaining the programs and tests we used to detect significant differences between sediment treatments:

“Statistical analysis was carried out using the programs R and SPSS. Differences in sediment, pore water and plant tissue concentrations between sediment treatments were determined using one-way ANOVA with a Tukey's honestly significant difference (HSD) post hoc test. No statistics could be applied to the mineralogical sediment composition (XRD analysis) due to absence of replicates.”

Throughout the ms we added p-values, especially in section 3.1 and 3.4.

Lines 191-195 (1st paragraph of Results and Discussion): Paragraph would be better suited for the Methods section of the paper.

This paragraph presents how the Results and Discussion sections is ordered and enhances the readability of the manuscript (acts as a reading guide). We prefer leaving that paragraph at the beginning of the Results and Discussion section.

The size of the pots used to grow *Phragmites australis* seems small for the size of the plant. Do you have any information on whether or not the plants had become pot bound, which could cause wilting, discoloration of leaves, and stunted growth?

We are aware that a root-bound effect can lead to stunted growth and damage to foliage (see Ray and Sinclair (1998) and Townend and Dickinson (1995) for a description of these effects). In our case, we are sure that *P. australis* did not become root bound: the roots did not stick to the walls, nor were they clotted (see photo of roots directly after harvest). The root biomass was in all cases lower than 4 gr dw with a pot volume of c. 1400 cm<sup>3</sup>. Moreover, Townend and Dickinson (1995) reported that root-bound effects of plants in pots with the same size do not occur in the first 150 days after transplantation, which is about the same as the duration of our experiment (176 days).



The text in the figures and some of the tables is difficult to read due to font size. Figures 1, 2, 3, 4, & 5: If possible, make the 3 soil treatment labels (above graph columns or in legends) larger. Figures 3, 4, & 5: Mudsand and Clay bars are difficult to distinguish in black and white, it may be better to choose a pattern or solid color that would provide more contrast.

The design of Figures 1, 2, 3, 4 and 5 are now changed. We took into account the recommendation made by referee #1.

**Technical Corrections:**

Line 95: remove “plants of” and make sure wording is either all singular or all plural;

Line 120: Typo, “form” in this sentence should be “from”;

Line 418: Make sure you are consistent in using either all singular or all plural words;

Lines 425-426: “in the future wetland” change to “in created wetlands”.

Thank you. The technical corrections above are all implemented in the manuscript.

**References used in this reply**

Ray JD, Sinclair TR (1998). The effect of pot size on growth and transpiration of maize and soybean during water deficit stress. *Journal of Experimental Botany* 325: 1381-1386.

Townend J, Dickinson AL (1995). A comparison of rooting environments in containers of different sizes. *Plant and Soil* 175: 139-146.