**Biogeosciences
Discussions**

Interactive
Comment

Interactive comment on "Modelling and quantifying the effect of heterogeneity in soil physical conditions on fungal growth" *by* R. Pajor et al.

Anonymous Referee #2

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In summary, this is an intelligent piece of research that combines excellent experimental and theoretical work to beign to explore a very relevant and interesting area. The comments below are minor, largely relating to clarity and flow of the text.

Introduction

Overall, the introduction contextualises the paper well and indicates the focus of the work. There is a jump in the flow of the paper at the link between experiment and theory that needs some attention, and the final paragraph could be a clearer statement as to the questions explored.

Paragraph 2: line 12 – please clarify what is meant by 'parental materials' line 17 –

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Interactive Discussion

Discussion Paper

replace 'even within the micro-organisms' with 'even at the scales of micro-organisms'

Paragraph 3 line 30 – replace 'whereas' with 'while' line 32 – is visualisation relevant / too specific an analysis here? line 1 – remove the word 'do' line 2 – should read 'Only recently, the development of techniques' line 4 – will readers understand the term 'soil sampling ring'? line 13 - ' cm's ' should read ' cms ' The final sentence is misleading – CT offers a way to characterise non-destructively the complexity of soil at prescribed resolutions, but does not directly offer a way to explore colony growth. This seems a slightly clumsy link sentence and should be rephrased.

Paragraph 4 Can either of the first two sentences be supported by reference to areas of inquiry by other researchers (to give a perspective on the scope of the problem faced)? Also, these two sentences should be located at the end of the previous paragraph.

The bridge of 'The use of mathematical modelling offers a way forward' (lines 11-12) is very terse. The authors should explain how models can be used to address – in part – experimental limitations. These two or three added sentences would ease the reader into the mini-review of models providing it with some context. Note, in this mini-review two models are stated as having 3D capacity, but why the work of Meskauskas et al. is not appropriate for this study should be made clear.

Paragraph 5 The main aim is stated as a protocol; the paper more describes a (valuable) first step toward this – as the authors allude to later. The aim should be more focused here. Also, the final sentences here should indicate the specific issues explored in sections 3.1 to 3.3.

2 Methods there are no real issues here – just a couple of points of clarity in the earlier sections

2.1 Does 'the aim' relate to Harris et al. and/ or this work? Does Harris et al. give you confidence that different packing densities leads to different pore space characteristics?

2.2 Was cropping done around a midpoint fixed across all samples? Regarding pore space connectivity the authors focus on the largest cluster as 'this was the only connected pore volume large enough to spread over the entire width of the sample'. Is this known or an assumption? Regarding pore space distribution, it doesn't matter how it was worked out (expanding sphere) – just that it was...

2.3 line 31 – 'have not been collectively in any other' ... collectively what? Line 33 – line 2: repeated text here line 5 – assume → assumed

2.4 between → among (line 15); in → into (line 16)

3 Results A clear write up of well structured experiments broken down into 3 sensible sections.

3.1 The sentence starting in line 28 is confusing and should be rewritten – is there a difference here between modelled and simulated? 'Table.1' → 'Table 1' (lines 1 and 3); '1,4' → '1.4' (line 18)

3.2 'got' → 'were'

3.3 'till' → 'until'

4 Discussion Generally, this is an intelligent attempt to link the results from this approach so far to experimental data – there are just a few minor points / corrections

line 15 – 'determined' is too strong a word ... 'contributed to' is more suitable line 22 – 'constraint' → 'constrained' line 29 – typo: determinant line 34 – 'whereas' → 'while'

line 8 'loosing' → 'losing' line 9 'loose' → 'lose' line 10 'sample sizes too small' → 'sample sizes to be too small'

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