

Response to anonymous reviewer 3

The authors thank the reviewer for their positive comments and helpful suggestions for improvements. Our response to each individual point can be found below marked in red.

General comments

This manuscript is well written with clearly stated objectives and hypotheses. Some specific and technical comments are below. I recommend acceptance of the manuscript for Biogeosciences after addressing the comments below.

Specific comments P16610 L7-10: What could be the reason for no NO₃ production. Please elaborate.

The most likely explanation is time, the experiments were carried out over a period of less than two hours. In this time, the soil went from having low soil moisture (around 8%) to be saturated by the rainfall. Both moisture limitation and potential oxygen limitation (due to waterlogging later in the experiment) can inhibit rates of nitrification. It is likely that after the end of the experiment, as the slope began to drain that rates of nitrification would increase. Text explaining this can be added to the manuscript to clarify this point.

P16617 L5-8: This statement is unclear. Revise it.

The sentence will be clarified to read: "There were no significant increases in 270:360 nm fluorescence from any of the vertical percolated flow pathways in the experiment run at 5° and 120 mm h⁻¹ rainfall, or from the base of the slope (outlet 4) in the 10°, 60 mm h⁻¹ experiment."

P16617 L19: Suggest including the data as a table/figure

We would prefer to add the median value of each of the tested datasets into the text rather than add as a figure or table. As a result, the data is then visible to the reader but space in the manuscript is not taken up by data which was not statistically significant, as we already have 9 figures in the manuscript.

P16618 L28: Suggest including the data as a table/figure

A table can be added to display this data to support the text.

P16621 L20-24: Can the same result be expected in the natural field situation? If not, please add some insights on these lines.

This result would be also expected in a field scenario, providing that the measured material was transported rapidly from the application area. As more time passes or with increasing distance from the application area (i.e. longer transport times), it is more likely that transformations will occur altering the slurry material. Text can be added here to clarify that this could apply in a natural scenario as well as in our experimental setting.

P16624 L9-12: Does this dilution effect also reflect in the C and N content of the slurry reported in Table 1

The dilution effect is not reflected in the bulk C and N data presented in Table 1 as this analysis was carried out on freeze-dried samples of the slurry and so all of the data in table 1 is expressed on a dry-weight basis. Conversely, the fluorescence measurements were carried out on the slurry its original form and so any extra water in the samples could influence the results.

Technical corrections

P16605 L20: Replace 'environmental' with 'environment'

Will be changed as suggested

P16608 L13: Change 'is was' to 'was'

Will be changed as suggested

P16615 L24: It appears that 'is' doesn't fit well in this sentence.

Agreed sentence will be amended to "This plot highlights that the difference between the fluorescence spectra of the slurry and the control soil is the magnitude of the peak at excitation wavelength 270 nm...."

P16617 L2: Change 'raised significantly above' with 'significantly higher than'

Agreed, this will be amended to "significantly greater than"

P16619 L1: Something is missing between 'pattern' and 'the'

Agreed, this sentence will be amended to "Results showed a spatial pattern in the distribution of the ratio..."

P16619 L16: Table 1 or Table 2?

Thank you, this should refer to table 2, this will be corrected.

Fig. 4, 5, 6, 8: Suggest increasing the font size of the axis labels and legends.

Font size will be increased as suggested.