

## ***Interactive comment on “Denitrification in soil as a function of oxygen supply and demand at the microscale” by Lena Rohe et al.***

**Anonymous Referee #1**

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This manuscript investigated the effects of aggregate size and water saturation on N<sub>2</sub>O and N<sub>2</sub> fluxes in two soils with contrasting SOM content by repacked soil cores based 15N tracer incubation in combination with X-Ray computed tomography. The main outcome was that N-gases emissions could be well predicted by considering proxies for oxygen supply (anaerobic soil volume fraction, i.e., ansvf) and demand (CO<sub>2</sub> emissions), which linked the change of soil structure with N-gases emissions. Generally, this manuscript is well prepared and written, and the conclusions were supported by the results of the experiments. One of my major concerns was that how could one time point (at the end of the incubation) microstructure analysis for the repacked soil cores represent the change of ansvf during the 192 h lasting incubation. In addition, why the aggregate size exhibit no obvious effects on CO<sub>2</sub> and denitrification product

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stoichiometry should be discussed. Specific comments Introduction The challenge for direct measuring soil borne N<sub>2</sub> from soil cores should be mentioned. This info may also provide rational for the authors to use <sup>15</sup>N tracer to estimate N<sub>2</sub> flux. Results I suggest move the resulting regression equations from SI to text so that the reader could easily capture the key point of explanatory variables for denitrification. Line 23,567 oxygen should be O<sub>2</sub> Line 24, I suggest change the order of “ansvf” and “CO<sub>2</sub>” since “CO<sub>2</sub>” is more important in terms of explanatory based on the author’s results. Line 119, comma in the sentence should be deleted. Line 151, why additional nitrate solution was sprayed in the last two treatments? if the N substrates differed among the three treatments, how could the author compared the N<sub>2</sub>O and N<sub>2</sub> flux among the tree treatments? Line 222, clearly Line 444-445 the order of the sub figures for the two tested soils was reversed Line 545 is?

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