Interactive comment on "Soil properties impacting denitrifier community size, structure, and activity in New Zealand dairy-grazed pasture" *by* Neha Jha et al.

Anonymous Referee #3

Summary:

They sampled soils from 10 different geographical locations in New Zealand. They did an ordination of soil characteristics and found that the 10 sample locations could be grouped into 3 groups based on soil characteristics. These groupings were used in the further analysis of T-RFLP, qPCR and DEA data.

General comments:

The study attempts to find how various pasture management (soil water, carbon and fertility) will affect the denitrifier community, which increase our knowledge on denitrification in different soil types, and maybe improve our ability to promote complete

denitrification and avoid N2O emission. This is a relevant question within the scope of BG. They find that fertile soil with high microbial biomass promote complete denitrification, whereas allophanic saturated soil is a source of N2O production

I found it hard to get a good overview of the results and discussion, maybe because of poor flow and clarity in writing. I agree with RC1 that the discussion resembles a result section. In general every section sums up observations and have some explanation with a reference. I don't think it reaches a high enough level of discussion. I'm also not confident that the data is strong enough to answer the question sufficiently. qPCR on RNA would be more reliable. To my knowledge the nir genes are very ubiquitous and not necessarily experessed.

Both title and abstract are descriptive and clear, reflecting the study well.

Specific comments:

The whole introduction argumentation for this study (P2, L11 – P3, L2) makes a good background, but somehow it's a bit vague. The idea of the study is very good and this framework can make it more visual with clearer and stronger formulations.

P3, L22-23 I would mention which physicochemical characteristics were used in this study here, otherwise you only see it when reading the statistical analysis.

Regarding methods for physicochemical characteristics, DEA and qPCR, they refer to Morales et al. (2015). This seems to be another study of the very same soil sampling, and this manuscript is reusing data from Morales et al. (2015), right? It should appear more clearly that this study is an extension of Morales et al. (2015) with reuse of data. It would also seem natural to refer more to the earlier study since it's the same topic. There should be references to this in the introduction and/or discussion, not only for methods description.

P10, L25-29 Suddenly in the end of the conclusion this new stuff about allophanic soils comes up, this should have been included earlier on. The conclusion should instead

round and wrap up. New stuff should not be introduced like this.

Technical corrections:

Inconsistent use of water content terms and abbreviations: "Moisture"/"soil water"/"soil water content"/"SWC" and also "% SWC at field capacity"/"% FC SWC"/"high moisture at FC". Also "Field fresh" (P3, L20) and "field-moist" (P3, L22). This was all quite confusing to me.

Figure 2 have too many abbreviations in caption, the figure itself should be more descriptive.

In caption for Figure 4, SEM should first be defined and then used. not the other way around.

P1, L3 There should not be a dot in the end of the manuscript title. This also occurs in the titles in the references.

P2, L34 With enhanced structure, do you then mean diversity?

P3, L19 "2 depths" not "2 depth". I can't find which depths you chose (mm/cm?), should be stated in the methods.

P4, L7-8 "2.5 ul of 10xPCR buffer (1 mM MgCl2), 0.5 mM MgCl2". Final concentrations in reaction mix should be stated, this looks weird to me.

P4, L24 I would specify that the qPCR was performed on DNA

P5, L19 Isn't the right abbreviation NMDS? Not NMS