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Interactive comment on "Subcritical water extraction to isolate kinetically different soil nitrogen fractions" *by* S. Sleutel et al.

Anonymous Referee #1

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General Comments The manuscript by Sleutel et al deals with the use of sequential subcritical water extraction to isolate N fractions based on bonding strength that could serve as a proxy for indigenous N supply. As the authors punctually describe in the introduction, to date most chemical methods used for extracting bioavailable N are not directly correlated to N supply capacity, and generally depend on soil types, land use, mineralogy etc... SCWE partly evaluates these factors. The manuscript is well written, has a well defined hypothesis, and provides a sound scientific approach.

Specific comments P9775 L6-10: The authors correlate sequentially extractable C and N to extraction temperature using an exponential function. However, this requires that both SCWE N or C and T are continuous variables, and therefore SCWE should refer to the cumulative extraction with increasing temperature and not the amount extracted

with each sequential step. Please correct text and calculations accordingly.

P9782 L4-14: As the authors outline the fact that bioavailable N is well correlated to all SCWE fractions suggest that relations could be indirect. In fact, the hypothesis that SCWE could extract different functional N pools was partly proven to be null. Does this tell us that, although labile N was present in all fractions, physical protection could be important in determining N availability? Moreover, the fact that no correlation was found between SCWE N fractions and anaerobic N mineralization for a series of paddy soils further confirms that N dynamics in these soils is rather complex and may depend on a number of interconnected factors such as fertilization, crop residues incorporation, presence of 2:1 type clay minerals and their role in retaining and releasing N under anaerobic conditions etc... Maybe these aspects could be briefly touched in the final discussion and conclusion. I personally think that summing up the work with the final comment "Perhaps SCWE does, however, hold potential to separate kinetically different SOM pools in upland soils" does not do justice to an otherwise excellent piece of work. I would prefer to read possible explanations that could be of use to future research initiatives.

P9788: It would be interesting to include fixed NH4+ in Table 1 since data is available. Footnote refers to cropping not soil type.

Technical corrections P9767 L19: What do the authors mean by "physical aspects of N bioavailability" in this context. I suggest expanding briefly. What about biological considerations? N supply does depend on microbial community structures. P9768 L1-4: I suggest dividing this sentence. P9768 L21: Correct citation style. P9769 L23: "previously collected" P9770 L4: Reword "...apart by hand, air-dried and ground..." P9770 L7: Please specify organic C and total N P9770 L10: Delete ";" P9770 L15: Replace "exists" with "consists" P9770 L16: Replace "treatment by" with "treatment with" P9770 L17: Replace "is used to decompose" with "dissolves", and I suggest using "fixed" instead of "non-exchangeable" to avoid confusion with organic N and since it is the term used later on in the manuscript. P9772 L12: I suggest moving "their N and

C contents" after "taking into account" on the previous line. P9774 L14: I think the authors mean "Fig. 2" instead of "Table 3". P9779 L4: I suggest adding "at 100°C" after "SCWE". P9783: Include C in the caption and reference to soils. Replace "remaining" with "leaving".

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