

***Interactive comment on “A novel analytical approach for the simultaneous measurement of nitrate and DOC in soil water” by Elad Yeshno et al.***

**Anonymous Referee #3**

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The Manuscript "A novel analytical approach for the simultaneous measurement of nitrate and DOC in soil water" by Elad Yeshno et al. presents a measurement setup which tests a combination of two analytical tools to demonstrate the potential of wavelength specific detection of soil water nitrate concentrations in carbon rich soils. The authors applied a combination of UV absorption spectrometry (around 300 nm) with fluorescence spectrometry (excitation/emission at 350/451 nm) to demonstrate the possible feasibility of this setup when applied with single banded LED technology. The study seems to be embedded in a research project or development program, which delivered already an interesting publication with regard to a possible application of the method (Yeshna et al. 2019, HESS (within the reference list this citation misses the journal

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name)).

The Authors present in a very straightforward manner what they have done due to which reasons and how the outcomes support the choice of the combined measurement techniques presented in this paper.

However, I have some points that need to be discussed prior to the editor's decision about a possible publication in HESS:

- Generally, as a reader I would really appreciate the demonstration of a (-n inexpensive) LED-based technology which is able to directly measure in-situ soil water concentrations of DOC and nitrate. But it needs to be discussed whether a feasibility study for the application of analytical tools fits into the scope of HESS or better into another journal format (e.g. the EGU Journal "Geoscientific Instrumentation, Methods and Data Systems").

- The presentation of the study does not follow the typical/expected structure and misses some details:

While the introduction section describes the background of the research problem and the linkage between DOC and Nitrate UV-absorption, it misses a review of other methods applicable to the problem presented in the paper. The interference of UV-absorption of nitrate and DOC is known and several studies (some of them are cited in the paper, but in a different context) use two different wavelengths within the UV-spectrum in combination with statistical models to overcome this problem. Even several commercial UV-Vis spectrometers for a parallel direct measurement of DOC and nitrate in aqueous solution are available on the market and widely in use e.g. in monitoring stations in wastewater treatment plants. The principle of this approach is at least similar to the one applied within this study and could be transferred to an application with LED-technology, likewise. The authors should explain how their approach improves the current state of the art technology (in their approach a second analytical tool is required).

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The description of the methodology regarding sampling and analytical procedures is very clear and to the point. The method development, e.g. the derivation of the 2D-Model, which is then applied to the data, is presented within the result & discussion section. Here I would expect a clear difference between method description and acquired parameter values. As mentioned by reviewer 2, I would have expected a larger data set, covering a broader range of possible DOC concentrations than 6 and 25 ppm DOC, respectively.

The specific results and the quality of the presented method are not presented in detail. In addition to the figures, there is only an overall description of the correlations between predicted and measured nitrate concentrations as well as the total range of RMSE. Since this is a new methodological setup, I would have expected at least a table, where the quality differences for the different field sites with regard to the differences in background DOC concentrations is presented to the reader.

The discussion section does not compare the acquired results to other studies in the field (the authors present not a single citation of other literature from the field within this section). Since the presented method needs a site-specific calibration (comparable to the UV-vis-approach), the advantage of this method over others is not clear to me, e.g. whether this setup provides a higher accuracy than UV-vis based spectrometers.

Overall, I recommend major revisions.

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