Response to the comments of the reviewers

Dear Reviewer 1,

we are very grateful to the reviewer for the helpful comments and suggestions. In the following we address individually the comments to the manuscript 'URANOS v1.0 - the Ultra Rapid Adaptable Neutron-Only Simulation for Environmental Research' submitted to GMD. Reviewer's comments on the manuscript are bold, our answers italic and the latexdiff of the submitted paper indented in quotation.

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Reviewer 1

The authors present an excellent overview of the URANOS code in great detail. Given the continued use of CRNS this streamlined neutron transport code will be of great use to the community for evaluating and designing future experiments. The paper is well written and acceptable following some minor revisions. My only moderate comment is the need for more complex field data for validating the results (say irrigated row crops). These data would be greatly supported by URANOS model simulations to help untangle the complexity of this system. There have now been a number of papers developing this code (L600-620). Please see below for a few minor comments to address.

A full publication list has also been published in the GitHub repository:
https://github.com/mkoehli/uranos/blob/main/doc/PUBLICATIONS.md
Such validation studies are very time consuming both in terms of the simulation but also in terms of implementing representative validation measurements within the CRNS footprint and such evaluations require step-by-step simulation scenarios to properly understand the signal interpretation in the multidimensional parameter space. Adequate CRNS data for more complex irrigation situations are hardly available so far. In collaboration with FZ Jülich we are currently working on a paper on validating transport simulations in the context of irrigation on the sub-footprint scale. This manuscript summarizes the code structure and features and presents field data as examples of the working principle of the code, but does not intend them to be validations.

L58: Use of ontop is a bit awkward, please revise.

We simply deleted that word.

General comments:

L126: is l the path length, please define here as well as sigma.

The information was unfortunately not provided in that context, we added it.

> (a) the path length l, sampled from the probability of an interaction on a distance dx in a homogeneous material of cross section Σ using the random variable r, $l = -\ln(r)/\Sigma$, or (b) the thermal neutron velocity distribution.

L252. „in a converter takes place". I don't follow this statement please revise.

We have rephrased that sentence.

This process is called 'scoring'. It can be invoked when passing a specific volume or the track is terminated.

L440. A space is needed between the words to start sentence.

That is a problem of font kerning of this template. It actually only optically appears to have a missing space character. There is one.

L498: Replace „As far as" with „If".

We have changed it.

L520: Figure 11 is discussed before figure 10.

We removed that sentence containing the reference in the introduction as the material for Fig. 11 is anyway discussed in the respective section.

L522: Neutron paths not neutrons paths.

We have changed it.

L585: For more than 50 years …

We have correct it.

L604: fine tune.

We have correct it.

L600-620: I think a table summarizing the various studies with URANOS would be easier to read and reference for the reader. Please consider changing.

We agree with the reviewer that the current presentation does not provide the best overview possible. However, the published literature likewise is just a snapshot and does not qualify for representativeness. It represents the contexts in which URANOS has been used up to now, the list is simply currently expanding, even during submisson an revison of this manuscript.

L627. I don't follow this sentence about the evaluation of cross sections. Think there may be a missing word somewhere?

Thank you, there was one 'like' too much.

Additionally, the performance depends on the chosen materials and energy range, as for elastic scattering or absorption only a few cross sections are evaluated.

Thank you very much for the review of our manuscript.

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