Response to Reviewer #2

We would like to thank the anonymous referee for his/her interest and the comments on our manuscript. Below, reviewer comments are in italic font and our replies are in plain blue font.

This paper presents a python library to implement RoGer hydrological model. The main reason behind developing this library was to provide an-easy-to-use, reproducible and modular code. The library itself can be quite useful given that it also tries to simulate water isotope data.

We thank the reviewer for his/her helpful comments.

A major limitation of the paper is that it does not represent a real-world application of the code; we do not learn much by the synthetic example shown. The real challenge in implementing a distributed hydrological model is estimating the parameters that should be used for simulations, especially given the uncertainties in already limited hydrological data. Therefore, I suggest that the authors present a real-world case study in the paper. Also, a brief discussion of the calibration problem might benefit the paper; is there any plan to include calibration modules in the package?

We present now a real-world application in chapter 4. Instead of calibrating the model, we used a soil map, LIDAR data and land cover date to derive the model parameters (see lines 424 ff.). Therefore, we do not discuss the model calibration. However, in the GitHub-Repository of the toolbox, we provide an example how model parameters can be estimated using a Monte Carlo approach.

Another reason for the lack of reproducibility is a lack of calibration standards and lack of standards for dealing with uncertainties in hydrological modeling.

We agree that such standards would help to improve reproducibility and include it in Chapter 1.

This, in my opinion, might be a real advantage of RoGeR package. But one question that needs to be addressed is how good is this model compared to several other models available (tRIBS, VIC etc.)?

A model comparison would be very interesting. However, the main focus of this manuscript is to describe and present the toolbox. We suggest, that such a model comparison should be addressed by another study. We add this suggestion to Chapter 5.

Which routing scheme? There are many routing methods, so please be specific.

We specified the routing schemes (see lines 534 ff.).

Not quite clear. Is this the finest resolution the model accepts? If so, why? On the other hand, if this is the coarsest resolution, then the model is not useful for several watersheds around the world where precipitation is available as hourly or daily.

The 10 minutes time step is required for the detailed representation of the runoff generation processes (i.e. infiltration, surface runoff and lateral subsurface runoff). Averaging the input flux for longer time steps leads to an overestimation of infiltration and underestimation of overland flow and preferential flow. Hourly precipitation or daily precipitation datasets can be used with the model and resampled to 10 minutes, however, losing the required temporal variability to correctly simulate the runoff generation processes. We added the justification for the input requirements to section 2.1.3 and refer to resampling methods to generate sub-daily precipitation from daily precipitation.

But does this really ensure a physically meaningful quantities. The soil properties may vary at scales smaller than 25 m2.

Here, we recommend a resolution for which we assume a consistent representation of the processes, but this can be different in different environments. And of course, soil properties may vary.

Not necessarily regular. There are models where irregular grids are used.

We describe the spatial discretization of RoGeR in section 2.1.3. Polygons can be used for RoGeR-1D (i.e. no lateral transfer between grid cells) as well. We clarified in the text that RoGeR models are meant.

It is unclear whether this implementation of the model adds any new processes to the already existing model structure or not. Please clarify.

Define \omega and T.

We added the missing definition.

These variables should be italic.

We changed the variables to italic.

is it hydrologically sound? You should provide some guidance on distributing the model parameters? How convenient is it to distribute modeling parameters?

So, this is a hypothetical area? Why not show an application for a real small watershed?

We show now a real-word application.

Some guidance on how these parameters can be generated in real watershed application will be useful. Note that model calibration is perhaps the most difficult part in hydrological modeling, especially given the uncertainties in available hydrological data.

We show now a real-word application.

What is the reason for this assumption.

Unfortunately, it is not clear to us which assumption is meant by this comment. We would like to ask the reviewer to refer to the lines in the manuscript. This would help us to locate the assumption-

So, the colored areas bound the 25th and 75th percentiles.

Yes, we changed now the percentiles to 10^{th} and 90^{th} percentiles.

Write something about calibration of the model parameter in this section.

Chapter 4 includes information how we derived the model parameters

Why not do this in this paper itself. The example with artificial data is not very helpful.

Again, we show now a real-word application.

However, the important question is to figure out which model is good or bad for a given watershed. You have not discussed this problem at all in the paper. Why should a modeler choose RoGer over several other models?

We agree that this question is important. However, the question is very watershed-specific and should be evaluated for each watershed individually. Moreover, a robust evaluation of the simulated variables requires the corresponding measurements. A robust evaluation of RoGeR has already been conducted in Schwemmle et al. (2023), Steinbrich et al. (2016) and Weiler (2005). Future work should address the evaluation of RoGeR at the catchment scale. We focused on the usability of the model to facilitate the usage by other modelers. Another reason for using RoGeR is that a little number of model parameters are required. Moreover, if environmental information is available, model parameters can be derived from such information instead deriving the model parameters by calibration.