

## ***Interactive comment on “Modelling the hydrological interactions between a fissured granite aquifer and a valley mire in the Massif Central, France” by Arnaud Duranel et al.***

### **Anonymous Referee #2**

Received and published: 10 June 2020

#### General comment:

The manuscript studies an interesting case site in French hill regions where a peatland is situated on a valley. The question is interesting: why is the peatland at this specific place? Can we understand the hydrogeological surroundings to better explain where the water to the peatland is originating from to better protect these kind of important ecosystems and possible sources of water to them.

The approach the authors have used is an integrated MIKE model combined with rather comprehensive field measurement campaign for model calibration and validation. The specific interest of the authors is to understand the role of the weathered granite for-

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mation in the catchment as the source of the water to peatland.

Considering that the main hypothesis that the authors are studying is the role of the granite fissures, the authors do not give enough geological details how they have ended up building their model layers. The saturated zone of the model comprises of two computational layers. At peatlands the layer was 1) the peat as top layer and 2) fissured granite below; At mineral soils 3) 2 meter thick layer on top and 4) fissured granite below. If I followed the information given in manuscript correctly all of the layer structures 2-4 had the same parameters (e.g. hydraulic conductivity). Given that there were some soil on top of the granite at least locally, all of the geological information outside the peat layer are within the parameters of layers 2-4. It would be crucial to explain more in details and show the geological formations in detail that this model structure is acceptable: are the soil formations above spatially neglectable. Even if no detailed information on the soil layers are available the approximations should be shown, rather than only explaining and referring to previous source as this is the key question in the article. Also there are information in the text on the previous drillings by nuclear company, these data in addition to the available details on soil should be represented in maps/conceptual cross-sections.

As the layers 2-4 are representing generally the whole surrounding geology of the peatland the authors have to give better explanation to the geology behind the model. Currently the text leaves a possibility for model equifinality: the same model end results can come either if i) granite is fissured and explains the flow to peatland or ii) within the same layer parameters for the whole catchment there is combination of soil layers with regionally higher  $k$  and granite fissures with lower  $k$ . This general problem in the article has to be resolved and would need some major revision e.g. explaining the geology and discussing the possible uncertainties considering the model structure.

Specific comments:

Even though this bit contradicts the general main comment above (as there is a need

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for more information on geology) there is a quite high amount of figures in the current manuscript. Are these all necessary and giving reader information that cannot be presented in the text or can some of the figures be combined? For example: - Is figure 9 needed in addition to figure 8?

- In figure 10 the two latter figures look identical, are both needed? Same with Figure 11, most of the months are identical and reader doesn't get a lot of information when looking them. For example: Could Figure 11 be combined to one map which shows maximum and minimum months considering seepage rate with different colors? Then moving last map away from figure 10 and combining condensed information from 10 and 11.

- Figure 12 is not opening up easily for the reader. Maybe marking a specific point in time of interest would help (e.g. with dashed vertical line)

Detailed comments:

page 4, line 29-30. Where are these boreholes on the map? Page 16, line 20: is the word evacuated the correct term? Figure 5. text. Explain what are the a-h standing for? Figure 13 text: explain abbreviations in x- and y-axes

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