

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 #1

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Summary

This manuscript presents an integrated hydrological modeling study for a small wetland in France. The wetland is located in a weathered granite bedrock basin. Groundwater flow in the weathered zone is described using an equivalent porous medium approach. There is limited novelty in the applied modeling techniques. It seems that the authors see the main generic contribution of the study as a demonstration of the limits of the “impermeable bedrock paradigm”. However, if that is the main purpose of the study, I feel that wetland processes should have been simulated with a multiple model approach, using different and competing conceptualizations of hydrologic processes. I do

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not recommend publication of this article in HESS in its current form.

Review comments

1.) The modeling work presented in this study is technically sound but does not go beyond the state of the art. The focus of the article is clearly the simulation and improved understanding of this local wetland, which may be of limited interest for a broad international readership. Authors provide more generic context in terms of the “impermeable bedrock paradigm”. However, in order to systematically analyze the importance of groundwater processes and investigate the impact of representing groundwater processes in different ways, I feel that authors should have chosen a multiple model approach and should have compared different (and competing) conceptual models of this wetland.

2.) Calibration and validation periods are fairly short. Also, a manual trial-and-error calibration is used. Are the authors confident that the calibration result is robust, i.e. performance will be comparable for new periods and scenarios? For instance, p 10 line 10 ff points out that the assumption of uniform hydraulic conductivity throughout the fissured zone may be overly simplistic. . .

3.) Section 3.2. It is important to stress that what is described here is a local sensitivity analysis (around the starting parameter values?). Sensitivity may be quite variable across the parameter space, for a complex integrated hydrological model.

Details

- p. 4, line 22ff: land elevation was measured manually on a 5x5 m grid? This sounds quite time consuming. . . maybe UAS lidar or photogrammetry would have been an efficient alternative? Also other elevation data sources seem to be quite coarse and low accuracy. Is there no highres, high quality DEM available for this region?

- p. 5, line 13ff: ERT can probably not directly map fissures, due to insufficient spatial resolution? I guess the fissuring was interpreted from lower bulk resistivity in the ERT

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sections?

- p. 7: It may make sense to briefly introduce the terms acrotelm and catotelm.

- p. 11, line 27: A water balance error of 9.9% is quite high – maybe the convergence criteria should have been set tighter?

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