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Hydrology and Earth System Sciences
Discussions

Interactive comment on "A hydrography upscaling method for scale invariant parametrization of distributed hydrological models" *by* Dirk Eilander et al.

Anonymous Referee #2

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I am sorry I took so long for reviewing this paper. This is not due to the topic the paper deals with but the way the paper is organised. I do not want to appear definitive, however, if the topic, of adapting the representation of a river network at certain resolution to be the more effective as possible, is of geographical interest, I am still not convinced it is also of hydrological importance. The Authors should work a little more to make the paper more appealing, instead they buried the good ideas under a lot of technicalities which are, certainly, important but secondary to the reasons why they do it. Finally some light came in with Figure 7 and 8 that clarified to me that the major errors can be caused in local contributing area estimation causing a subsequent wrong estimation of

hydrograph. To this respect the paper shows that its method brings in quite an improvement in some simulations. Therefore my overall judgment is that the matter is good, but the organization of the paper highly improvable. I suggest to move in evidence the results and let the details to Appendix or to the final part of the paper. To simplify, I suggest to exchange the position of section 4 and section 2, after a preliminary, but brief discussion, of the methods. I understand that this may sound quite a violation of the traditional organization of papers, but I feel that probably in this way the paper should be more appealing to the reader. The epitome if it is the Caption of Figure 1. The phrase "for each cell the representative river pixel (dark red square) inside the effective area (shaded area) and subsequently the outlet pixel (orange square) is identified, and 1B) based on the fine-resolution flow path downstream of the outlet pixel (black lines)," should become: "for each cell, based on the fine-resolution flow path downstream of the outlet pixel (black lines), the representative river pixel (dark red square) inside the effective area (shaded area) and subsequently the outlet pixel (orange square) is identified". The latter form of the phrase makes me understand what they are doing, not the reverse. The explanation in the text, indeed is much more clear than the caption of the Figure, but because I tried to understand first the procedure from the Figure, I had to read more times all of it to understand what was the point. For what regards the errors they find in flood forecasting, while I find interesting the idea that the coarse graining of the river network topology should be made to preserve the main characteristics of the flood wave, It is not clear to me how the errors (except maybe for those connected with the estimation of the contributing areas which bring with them a proportional error in rainfall inputs) were not corrected, at least partially, by a calibration. In my experience, the standard procedure for any hydrological modelling run follows the procedure of calibrating the model parameters and then validating them. The process of calibration, I am sure, introducing effective quantities for instance in those parameters related to flow velocities, can correct delays or anticipations of the flood wave due to a wrong estimation of stream length. Differently would be a problem, since the fractality of rivers. To say in another way, their argument to favor their method of river network representa-

tion, could be not so relevant at the end, for modelling. A last note regards the subgrid representation of the networks. I found the paper by V. Casulli (2019) of real interest for the issue.

In summary I believe the paper can be accepted after a major readjusting of its structure.

Reference

Casulli, Vincenzo. 2019. “Computational Grid, Subgrid, and Pixels.” International Journal for Numerical Methods in Fluids 90 (3): 140–55.

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