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Hydrology and Earth System Sciences Discussions

Interactive comment on "Deriving a global river network map at flexible resolutions from a fine-resolution flow direction map with explicit representation of topographical characteristics in sub-grid scale" *by* D. Yamazaki et al.

B. Fekete (Referee)

bfekete@ccny.cuny.edu

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Yamazaki et al. presented a new upscaling method to re-grid fine resolution networks to coarse resolution that are more suitable for large scale hydrological modeling. Yamazaki's comments on previous solutions is somewhat misguided. The mentioned deficiencies are the question of resolution. Clearly, the network resolution dictates what can it represent. When the distance between two parallel flowing river is less than the gridded network resolution, there is no way one could make the gridded network

to represent the two rivers without compromise (either putting the rivers further apart than they are or accept improper routing).

The proposed solution is not truly an upscaling since FLOW is more like a new way of representing gridded networks, which might be a good idea, but certainly raises a series of issues. First, tradition eight directional (D8) grids are easy to handle as a single flow direction grid nd existing GIS tools are available to manipulate them along with other data. The proposed FLOW network needs custom made software to handle.

FLOW breaks some of the important properties of the D8 grid. On D8 grid it is sufficient to test the neighboring grid cells when searching for upstream grid cells. The number of potential upstream grid cells is limited to eight. I am not convinced that FLOW is the right approach to address the deficiencies in coarse resolution networks. Instead, deriving subbasin partitioning with the corresponding river channels might be a better solution, where the flow routing could operate on a vector river networks and the linkage between the coarse resolution land surface model and the fine resolution river network is established via some coupler which would link the coarse resolution grid to the fine resolution subbasin/hillslope partitioning.

I still recommend the paper for publication and allow the scientific community and time to tell, whether the proposed solution is viable and gets wide spread adaptation or it will be forgotten (what I think is its destiny).

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