Geoscientific Model Development Discussions

Geosci. Model Dev. Discuss., referee comment RC2
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Comment on gmd-2021-75

Anonymous Referee #2

Referee comment on "Development of a coupled simulation framework representing the lake and river continuum of mass and energy (TCHOIR v1.0)" by Daisuke Tokuda et al., Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2021-75-RC2, 2021

The authors developed T-CHOIR that freely adjusts the spatial resolution of river-lake model that explicitly represents the energy and water balances in global scale. To achieve the objective, an improved flow upscaling algorithm, a hydrography dataset, and lake-reservoir dataset are tightly coupled. The authors identified and addressed many issues, which will help not only future users of the model but also general audiences working on the model and dataset developments. The manuscript was very well written, so it was great pleasure to read the manuscript. I only have several questions.

Line 63: What is the basis of saying “lower” and “higher”? These terms are comparative, but it is not straightforward to infer the comparisons. It would be also nice to briefly mention about the reasons of lower water volumes and higher temperature.

Section 2.1: In case of lakes in a very upstream region, it is commonly found that the water body data of HydroLAKES lies between two basins of MERIT Hydro that drain to very different downstream. It is a universal problem that can exist in any DEM-derived flow direction dataset. How the T-CHOIR deal with this case? Do you correct the flow directions as done in MERIT-Hydro?

Line 223: A lake may have multiple inflow paths. Does the model remember and update those inflows at every time step to calculate the “20% of inflow to lake”?