

Earth Syst. Sci. Data Discuss., author comment AC1
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Reply on RC1

Simon Munier and Bertrand Decharme

Author comment on "River network and hydro-geomorphological parameters at 1/12° resolution for global hydrological and climate studies" by Simon Munier and Bertrand Decharme, Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-434-AC1>, 2021

In the submitted manuscript, we present a large amount of work synthesized in a scientific way with, we believe, honesty in the assumptions. It is pointed out that the dataset presented in this study may be useful only for limited applications. The only reason invoked: "the river network data can not be directly resampled", lacks seriousness. We elaborated a fully automated methodology, based on an existing upscaling algorithm, Hierarchical Dominant River Tracing, validated at various spatial resolutions (as those indicated by the reviewer) in referenced serious articles. The main added value here being the use of MERIT-Hydro as the high resolution reference, instead of HydroSHEDS or Hydro-1k, as well as the derivation of an ensemble of consistent hydro-geomorphological parameters. We validated the new river network and the derived set of consistent parameters over a large number of basins via a proposed methodology (realistic but controlled simulation), showing its effectiveness.

In the scripts developed in this work, the target spatial resolution is given as a parameter, and can easily take any of the suggested values, lower or higher resolutions. Elaborating and manipulating this kind of dataset requires a large amount of work and data storage. So for this manuscript we preferred to target a single resolution with an extensive validation, keeping in mind that any reader could contact us if interested by any other resolution.

We focused our study on the spatial resolution of 1/12°, which represents around 10 km at mid-latitudes, for several reasons which will be emphasized in revised version of the manuscript. These include the physical limitation of wide rivers (the Amazon River may be wider than 10 km at some places) for which higher resolutions may require different kind of river routing schemes (like 1.5D or 2D), while many large scale hydrology models, as those included in climate models, are still using simple 1D approaches (generally at lower resolution, but more and more at comparable resolutions). We also think that the 1/12° resolution is quite consistent with current developments in: 1) regional to global earth system modelling (coupling atmosphere, oceans and continents compartments), and 2) earth observations from space (such as future SWOT observations of water level or derived discharge at reaches of length around 10 km).

So contrarily to what the reviewer wrote, we think that the community could benefit from

the dataset we propose, which is, to our knowledge, the first such comprehensive dataset for hydrological modelling at this resolution.