

## ***Interactive comment on “The multiscale Routing Model mRM v1.0: simple river routing at resolutions from 1 to 50 km” by Stephan Thober et al.***

**Stephan Thober**

stephan.thober@ufz.de

Received and published: 25 March 2019

Dear Reviewer #1,

We would like to thank you for your time and effort reviewing our manuscript. We see no major obstacle addressing your remarks in an improved version of our manuscript and would like to shortly outline the two main improvements we will implement in the following:

1.) Regarding the resolution limit of mRM: we have not tested beyond 50 km but are confident that it would perform well at 100 km resolution. However, it is important to

C1

apply the model at a resolution where the river network correctly resolves the basin area at the mouth of the river. For example, this might not be the case using the D8 method implemented in mRM at 1 degree resolution (Yamazaki et al. 2009). And this might lead to errors in a large scale model, which could discharge streamflow into the wrong ocean basin. However, using mRM, the resolution at which the model is applied does not necessarily has to be the resolution of the input data. mRM can be forced with runoff at 1 degree resolution but perform the routing at 0.25 degree. It would internally scale the input to the model resolution. We will include a paragraph in the revised version to discuss this point.

2.) Regarding the use of ENSEMBLES data: We have chosen ENSEMBLES because it provided RCM output data at two resolutions, we had downloaded the data already, and we had used it in earlier publications. We are currently investigating the effort of using EURO-CORDEX. If REMO produces, however, similar results with EURO-CORDEX compared to ENSEMBLES, we will only add a note in the text and leave the section as it is. After all, section 3.4 is only a showcase of applications that can be easily conducted with mRM because the model only needs to be setup once regardless of the resolutions it is applied to.

References:

D Yamazaki, T Oki, and S Kanae. “Deriving a global river network map and its sub-grid topographic characteristics from a fine-resolution flow direction map.” *Hydrol Earth Syst Sci* 13(11), 2241-2251, 2009. <http://www.hydrol-earth-syst-sci.net/13/2241/2009/>

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2019-13>, 2019.

C2