EGU2020-3807, updated on 04 Aug 2021
https://doi.org/10.5194/egusphere-egu2020-3807
EGU General Assembly 2020

Evaluation of the joint effects of DEM resolution and calculation cell size on discharge simulation performance with two routing methods

Jingjing Li[1], Hua Chen[1], Chong-Yu Xu[2], Haoyuan Zhao[1], Lu Li[3], Jie Chen[1], and Shenglian Guo[1]
[1]State Key Laboratory of Water Resources and Hydropower Engineering Science, Wuhan University, Wuhan, China (li_jingjing@whu.edu.cn)
[2]Department of Geosciences, University of Oslo, Norway. (chongyu.xu@geo.uio.no)
[3]NORCE Norwegian Research Centre, Bjerknes Centre for Climate Research, Jahnebakken 5, 5007 Bergen. (luli@norceresearch.no)

Benefit from the easy access to gridded hydrological datasets and global Digital Elevation Model (DEM) datasets, DEM-based routing methods have been widely developed and used. The routing methods can be divided into two categories, i.e., Source-to-Sink and Cell-to-Cell. Limited by the computation capabilities, routing methods are often performed at more coarse resolution of calculation cell rather than the resolution of DEM. Both the DEM resolution and calculation cell-size are factors that affect the discharge simulation performance of routing method. Too little work has been devoted to how these two factors affect routing performance jointly. This study aims to compare the effects of DEM resolution and calculation cell-size on discharge simulation performance with two most popular routing methods, including a Cell-to-Cell routing method, i.e., Liner-reservoir-routing method (LRR) and a Source-to-Sink routing method, i.e., the improved aggregated network-response function routing method (I-NRF). They are compared/evaluated in terms of the changes of simulation performance with calculation cell-size ranging from 5 arc-minutes to 60 arc-minutes and DEM resolutions of 90 m×90 m, 250 m×250 m, 500 m×500 m, 1000 m×1000 m. Besides, two hydrological runoff-generation models and two study basins are used to test the generality of the result. The study finding will help the researchers to choose the appropriate DEM resolution, calculation cell-size and routing method in hydrological simulation.