Nat. Hazards Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/nhess-2019-180-RC2, 2019

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Flood Inundation Mapping of Low-, Medium-, and High-Flow Events Using the AutoRoute Model" *by* Michael L. Follum et al.

Anonymous Referee #2

Received and published: 8 August 2019

The manuscript by Follum et. al. titled, 'Flood Inundation Mapping of Low-, Medium-, and High-Flow Events Using the AutoRoute Model' presents a comparison of performance of the AutoRoute model for multiple flows ranging from low- to high flows. The study also presents an improvement in the existing model which enables smother flood extents without pits at a higher computational efficiency. However, the improvement in the performance of simplistic 1D models at higher flows (extreme events) and relative inaccuracy at lower flows is well known and quantified in several studies. As an example, please refer to the manuscript titled, 'Assessing the effect of different bathymetric models on hydraulic simulation of rivers in data sparse regions' by Dey et. al. 2019 which provides a similar comparison. I would recommend the authors to test

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the model across these reaches using a finer resolution DEM (e.g. LIDAR) and evaluate the relative computational efficiency and accuracy using LIDAR vs NED. Also, in several places, the study suggests that river bathymetry is estimated using a simplistic exponential method which may not yield accurate results. I am wondering if the authors can compare the results from the AutoRoute model using a DEM that has bathymetry burned in it. Considering the authors used USGS flood maps for comparison, surveyed cross-sections are typically available for those sites through USGS. It would not only provide additional validation on the AutoRoute modeling for low flows but may also provide useful findings. That may help in adding research value to this manuscript. I am not sure if an improvement in the model simulation time from 35 minutes to 20.5 minutes is significant enough. Considering AutoRoute produces a single flood map for a specific flow, the authors should provide more discussion on how these results may scale up both in space and time. The improved computational efficiency may be more useful when simulating continuous flood maps at an hourly time scale for a regional-scale model or at a daily time scale for a continental-scale model. The authors should discuss this more in the manuscript. Although the application of the new post-processing procedure helps in improving the computational efficiency, the manuscript in its current form does not offer substantial analysis to warrant publication, and therefore, a major revision is needed. Specific comments Paragraph 95: Lines, “For high flow events the bathymetry in smaller streams can often be ignored…”. Please provide references for this and the following statement. One example could be Dey et. al. 2019. Line 295: ‘Although the flood inundation results for low-flow events are accurate (average ðİŘź value of 63.3%)…’. I would be careful in calling an average F-value of 63.3% as accurate.

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