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Full hydrodynamic modeling of flood routing with significant infiltration loss

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Significant infiltration loss is inevitable over boundaries with high permeability and hence affects flood routing in arid and semi-arid rivers considerably. Therefore, incorporation of infiltration loss is warranted in mathematical modeling of floods. Under the framework of Finite Volume Method, two fully hydrodynamic models are presented, i.e. a cross-section-averaged 1D model and a depth-averaged 2D model based on unstructured meshes. The two models are first validated against benchmark experimental cases. Then, the models are tested in the upper reach of the Zhuozhang River, China for a real flood with infiltration loss of about 25%. Numerical predictions by both models generally agree with measured data, while the neglect of infiltration leads to the overestimations of peak discharge and runoff volume. In addition, two numerical solutions are compared to demonstrate the discrepancies between 1D and 2D model performances.