Interactive comment on "Exploration of virtual catchments approach for runoff predictions of ungauged catchments" *by* Jun Zhang et al.

Jun Zhang et al.

jz13345@bristol.ac.uk

Many thanks for the useful and constructive comments. We do apologise that the original manuscript is not sufficiently clear in some statements, which are clarified in the following.

The main purpose of this study is to investigate the possibility of using the virtual catchment approach on runoff generation influenced by catchment geomorphology with potential applications in ungauged catchments. Rather than focusing on the parameters in UH equations, this study concerns more about the reliability of runoff generation by the approach, i.e. virtual catchment.

(1) UH is a useful tool for ungauged catchment and catchment morphology is crucial in

runoff prediction. Although there have been researches on UH combined with geomorphology characteristics, limitations exist in the current approaches. More discussions will be added on this in the revised introduction.

(2) WFIUH has been verified as a powerful approach in ungauged catchments. However, it should be noted that not only elevation data is crucial to runoff generation, but also land use, soil types and storm patterns (demonstrated in the manuscript) are significant as well, therefore, WFIUH is limited in dealing with more complex scenarios.

(3) The FEH equation was developed by the Institute of Hydrology in the UK and widely used in practice. The equation has been verified as a useful tool in practice, therefore, by comparing the results from the virtual catchment approach with the FEH equation, it is able to test whether the proposed approach is capable of producing hydrologically meaningful results. According to the outcomes, the trends of catchment geomorphology on runoff generation are similar while influenced by more indicators than that used in the FEH equation.

(4) The future of the virtual catchment approach is more than simulating runoff from catchments with similar characteristics, but applying it to ungauged catchments with varied conditions using more advanced methods. This is a first attempt to explore and promote the approach to ungauged catchments. More advanced catchment transformation will be generated in the future for broader applications.

(5) Thanks for the references which will be added in the revised manuscript.

To improve the paper's readability, we will include these clarifications into the revised manuscript.