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Hydrogeomorphic floodplain mapping across different morphometric and climate settings

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Among the DTM-based parsimonious floodplain delineation methods, hydrogeomorphic scaling laws, providing consistent flood flow depth estimations as a function of contributing drainage areas, are widely used. Recent advances in this field demonstrated the suitability of hydrogeomorphic floodplain delineation models from basin to continental scale across diverse climatic and morphological settings. However, the sensitivity of scaling law parameterizations and performance in semi-arid to humid and low-gradient to steep basins is still unknown. In this work we determined flow depths – contributing areas scaling law parameters with varying basin slope and average annual rainfall across eleven basins in the west-central United States. These variable scaling law parameters were used to test the performance of the GFPLAIN hydrogeomorphic floodplain delineation model in the study area adopting largely and freely available global climate and topographic datasets. Outcomes of this analysis show improved performances and effectiveness of the GFPLAIN model with varying morphometric and climatic factors suggesting room for improvement for the current continental and global hydrogeomorphic floodplain datasets.