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Morphological characteristics and evolution model of loess gully cross section

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Gully morphology is an important part of loess geomorphology research. Along with gully development, the variation of its cross section is the most important aspect, and it can intuitively reflect the characteristics of the lateral widening of the gully slope. Therefore, in-depth research of the variation of the cross-sectional morphology of the gully is important to understanding the development process of the loess gully. Based on the data of nine periods of an indoor simulated loess small watershed, this paper deeply studies the evolution model of a complete branch ditch in the watershed from many aspects by using the theory and method of digital terrain analysis. Firstly, we analyse the morphological characteristics of the gully cross section in the simulated small watershed. The test shows that with the development of the gully, the average slope of the slope decreases continuously, and the slope morphology is mostly a concave slope along the slope direction. The degree of downward concave first increases and then gradually tends to be gentle. The gully erosion mode is gradually transformed from downward cutting erosion to lateral erosion. The more mature the gully development, the lower the depth of gully bottom cutting is compared with the width of gully widening. Furthermore, the surface cutting depth tends to be stable and the slope is stable. Then, the transformation law of the slope morphology of the gully cross section with the development of the gully is studied, and the prediction model of the transformation of the slope morphology of the gully cross section is established by using the Markov chain. The Markov model can better reflect the dynamic change of the slope morphology of the gully cross section, which is of considerable importance to revealing the external performance and internal mechanism of the gully morphology.