Exploring the fractal dimension value of spatial distribution of landslides in Nanxi county, Southern Sichuan, China

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This paper aimed to measure the fractal dimension values of the spatial distribution of landslides in different geomorphic units, stratigraphic and basin zones based on the fractal theory and geological investigation, taking the landslides in Nanxi county, Yibin city, Sichuan province as a case study. The results demonstrate that the fractal dimension value of spatial distribution of landslide in Nanxi county is 1.1858. After classification and partition, the fractal dimension value of each small region is all less than the whole region. The fractal dimension values of different geomorphic types are sorted as platform deep hilly area, middle hilly area, low mountain area, shallow hilly area and valley flat area. The larger the fractal dimension value, the greater the contribution of the geomorphic unit to the development of landslide disasters will be. In the fractal dimension values of the stratigraphic types, they are Jurassic, Triassic, cretaceous and quaternary in order. In Jurassic strata, the bedding and oblique slopes of sand-mudstone interbeds with strata dip angle for more than 15° develop landslides the most. Fractal dimension values of stratigraphic types reveal the influence degree of stratum lithology and tectonic action on landslide development. Besides, The fractal dimension values of basins are sorted as Huangsha River, Longtan River, Meixi River, Bailichong River, Macaoxi River, Luqu River and Changxing River. With a maximum fractal dimension value, the Huangsha River basin has the widest distribution area and the largest river discharge in the study area. The riverbank slope is prone to landslide disaster because of the stronger flow erosion. This indicates the control of river hydrogeology on the landslides.Therefore, based on the calculation of fractal dimension values and the geological investigation of landslides in the study area, the results indicate that the fractal dimension value of spatial distribution of landslides is the comprehensive reflection of topography, stratigraphy, lithology, structure and hydrogeology, and it is the quantitative expression of regional landslides development complexity and susceptibility. Moreover, the fractal characteristics of the spatial distribution of landslides can be an important significance to division for the landslides-prone area. The calculation of fractal dimension could be an effective method to predict the susceptibility of geohazards in a regional scale.