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Soil creep and leakage process in shallow fissures on a karst slope based on particle composition analysis

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Rocky desertification has become one of the global ecological environmental problems. Karst rocky desertification area of southwest China is suffering from ecosystem degradation, and the combination of water and soil resources determines the stability of their ecosystems. In recent years, soil leakage has attracted attention because it was that under the development of carbonate shallow fissures, the water and soil along the such pipes as shallow fissures leaks underground, resulting in the allocation of soil and water underground, affecting the integrity of the overlying ecosystem. This study aimed to reveal the leakage loss process, characteristic and mechanism of soil in fissures on sloping lands in the karst area, taking fissures on sloping lands in karst plateau of Guizhou province as the research object, combined with the methods of paint marking and soil particle analysis was conducted to study the leakage loss process of soils in fissures. The result showed that rainstorm or downpour is the key factor of soil fissure leakage loss, and its leakage form is mainly soil creep. Soil creep displacements of different fissure at 104.5 mm rainfall event between 1.0 cm and 2.5 cm, accounting for more than 62.5% of the displacement at 332.7 mm rainfall event, while the soil creep displacement of fissures just range from 0.2 cm to 0.3 cm at the larger rainfall of 181.5; the particle content with different particle sizes in rock-soil interfaces and soils of six fissures selected under 3 precipitation events (104.5, 151.2 and 332.7 mm) showed that the fissure soil does not leak down uniformly, but some particles at the soil layers or rock-soil interfaces leak to the lower layer at random in the process of creep leakage loss. In other words, the occurrence of soil layers and particles are accidental, and the soil particles in the rock-soil interfaces and the soil layers of fissures have the possibility to leak down. Facts proved that the soil creep leakage loss in fissures is a complex process which is determined by the internal factors such as fissure structure, fillings characteristics and bottom connectivity, and such external factors as rainfall etc.

Key words: underground leakage loss; soil; karst fissure; sloping land; karst plateau