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Slipping processes in residual badlands reliefs

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We define slips as structures developed by more or less saturated colloidal suspension that slide down the walls of residual reliefs found in badlands. These suspensions seem to originate in the soils crowning gully reliefs and also from rainwater dripping onto the walls of poorly cemented sediments such as siltstone. We call this process slipping and the resulting morphologies represent a group of minor badlands forms, often linked to piping and fluting.

Slipping occurs according to the following sequence of forms:

1. Mud droplets. These are irregular linear structures caused by mud droplets sliding down sub-vertical walls. The droplet is usually found at the end of a small channel. These morphologies represent the course of the sliding droplets that become fossilized and not the impact of the droplets on the sediment.
2. Slips sensu stricto. These are uninterrupted surface structures covering sub-vertical walls to a greater or lesser extent. The thickness of this type of covering varies from a few millimetres to 5cm. The inner structure of the slips consists of small laminas (» 100mm) and on the exterior they often present drip channels. A special case of these forms is butterfly structures, which appear in isolation, with repetitive patterns and the appearance of a winged insect stuck to the wall.
3. Pseudo-stalactites. These are free-standing conical regrowths with some similarity to stalactites in a karst cave. They occur when slips grow to over 5cm thick. The growth of these forms is similar to that of slips, with external superposition of fine, concentric layers with no central pore. A variety of these pseudo-stalactites are nodulous stalactites whose genesis is unknown. In this context, we should mention the existence of occasional stalagmites. In other cases, curtains of pseudo-stalactites can be found where these patterns are repeated finely. A more evolved stage of this form is the coalescence of pseudo-stalactites, representing a massive advance of this process. Pseudo-stalactites are normally found as vertical, but occasionally they lean, indicating movement of unstable blocks.

The process can present recycling when some of the forms described become detached and fall. This is more likely on poorly sheltered surfaces, exposed to wind and the direct impact of rain and frost.

All forms of slips suggests that these morphologies depend on the varying characteristics of the colloidal suspensions causing them, and constitute intermediate stages in the retention of sediments from erosion, which are very different to the alluvial sediments stored in the drainage network.