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Creep behavior of slate slopes explained with numerical modeling

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Geological structures such as folds, shearing and contortion of cleavage are commonly observed in the fields of slate slopes. These features may result from creep of gradual weathered rock slopes under gravity in long geological time. This study uses the finite element method to simulate the geological features in slate areas. The material behavior is described by a creep or an anisotropic model calibrated by the investigation of a landslide site in a slate area. Time and strength reduction with respect to the two material models cause deformation of slope models. The numerical modeling illuminates causes and processes of the creep behavior of rock slopes, which cannot be observed in short human life. The results show different creep patterns that are associated with different causes such as weathering near the slope surface and shearing or sliding along discontinuities in rock mass. Also, creep is more likely to appear in slopes with steeper or higher relief. The geological structures observed in the slate slopes can be explained by the numerical modeling and mechanics concepts.