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Conceptual modeling with variable shear strength for Ca'Lita landslide

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In formations of marine origin, the structure of material could be changed because of the possible contact with fresh water. Previous research indicates that the composition of water could change the properties of material magnificently because of the material structure changes.

Normally, the increment of pore water pressure, which results from rainfall, snow melt and other groundwater recharge, is considered the main triggering factor of slope instability. However, in highly tectonized areas, deep water inflow, which could change the composition of groundwater and weaken the material of potential sliding zone may also be a unneglectable triggering factor.

The Ca'Lita landslide is located in northern Italy, 70 km west of Bologna .It belongs to northern Apennines mountain belt, which is characterized by several tectono-stratigraphic units of marine sedimentary rocks. When the water infiltration occurs, the shear strength of the sedimentary rocks could decrease. This research aims to simulate the process of landslide collapse and successively degradation of the slope, when the water infiltrates into the slope body and reduces the shear strength of landslide material from top to bottom. The slope is analyzed conceptually as an infinitive slope by Finite Element Method. The results show that the slope becomes instable when the layers are weakened one by one from top to bottom, and the most intense deformation occurs at the depth from 40-50m, where lies the realistic potential sliding zone.