



Stability analysis of a human influenced landslide using physical and chemical approaches

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The area of the Pays de Herve in Eastern Belgium is heavily affected by recent landslide activity. These landslides are widespread over the whole region and have been partially activated or reactivated by human activity, e.g. the construction of the new railroad track between Cologne (Germany) and Paris (France). The landscape of the Pays de Herve is characterized as moderate hilly with slopes not steeper than 10° and a relative relief of about 150m with deeply weathered, almost non-fractured Mesozoic and Cenozoic sediments.

The specific slope investigated in this study is a moderately steep ancient and dormant landslide. During the late 1960ies a sewage pipe was constructed across this slope, used by several small to medium-sized enterprises. In 1999, a heavy rainfall occurred and reactivated the slope movement. This led to the destruction of the sewage pipe causing wastewater infiltration into the slope. Due to chemical replacement of bivalent ions by univalent ions of the wastewater, destabilization of the clay fractions in the slope was caused.

In this presentation, the impact of wastewater ions on slope stability is discussed. The physical stability analysis of the slope was carried out using Bishop's method. This analysis showed that the slope would have remained stable, even under the assumption of complete water saturation. Further a chemical soil analysis was made and compared with the contamination of wastewater. This comparison showed univalent ions as Na and Ka ions to be highly present in the wastewater as well as in the soil, particularly within the clay fraction. Therefore, the conclusion is drawn that the infiltration of the wastewater is responsible for the current slope movement.