Hungarian University of Agriculture and Life Science

Szent István Campus

MSc of Agricultural Water Management Engineering

MODELING LANDSCAPE EVOLUTION AT A SLOPE IN GÖDÖLLŐ

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Summary

One of the mean aspects that dominate large number of natural prosseces that concern humanity is topography. Landscape topography is a major factor of natural hazards like floods and mass movements.

Weathering and erosion acting towards the heterogeneous lithospheric surface are some of the main reasons for the formation of different landforms. Landscapes are dynamic, markedly responsive to natural and artificial disturbances. Slopes could define landforms, so landscape evolution is best understood by studying of slopes and the multiple factors taking control of slope development and its characteristics.

A landscape evolution model is a numerical model based on physical principles that simulates the changing terrain over time. Terrain change or evolution can be caused by glacial or fluvial erosion, sediment transport and deposition, regolith creation, the gradual movement of material on hillslopes, and more intermittent occurrences like rockfalls, debris flows, landslides, and other surface processes. Many of these aspects are taken into consideration by a standard landscape evolution model (LEM).

The overall goal of LEM is to get a better knowledge of landscape history by simulating land forming processes and process interactions. The primary goal of SaLEM (specific tool of GIS-program 'SAGA') is to map regolith characteristics based on established physical correlations. In the lack of trustworthy data for some process variables, adequate parameterizations must be used.

Using a lithological differentiated approach, we propose the creation of a soil and landscape evolution model (SaLEM) for the spatiotemporal exploration of soil parent material evolution. The model is powered by climatic data (e.g. temperature, precipitation), relying on data series of the automated meteorological station of the hosting department of this research (Department of Water Management and Climate Adaption, MATE-KÖTI)

The validation of the model results is difficult due to a lack of geographical data on the characteristics of the regolith. To provide an initial impression, a collection of accessible drilling point data from soil surveys is utilized to confirm the trend of the model's predictions about regolith thickness within a confined validation rectangle.

Since soil qualities vary spatially and/or temporally, several samples must be collected and measurements must be repeated when conditions change or to assess if they are changing. These soil characteristics are usually evaluated in laboratories using the field samples.

Using Statistical analysis is an effective tool for providing quantitative information that may be used to guide background and site decisions.

At the end I would like to highlight that in this research project we simulated landscape evolution using the SaLEM model. We found the model to be a very useful tool to study changes in landscape over time, however, we found that this model is especially good for larger scale studies, such as catchments. We also gathered field samples from different catena consisting of fourteen drillings of four meters deep to evaluate and validate the model outcomes using lab analysis.