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Challenges in understanding Soil Degradation in an alpine Valley

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Modern society increases the exploitation of mountainous regions such as the swiss alps. Soil degradation is a limiting factor for human activities in terms of risk assessment (e.g. for buildings, constructions), attractiveness of the landscape (e.g. tourism), and potential for agriculture and forest production.

The main challenge for understanding soil degradation in such a complex systems is to integrate disciplinary knowledge. The integration has to be done on a spatial and temporal explicit framework. We propose to implement a landscape model on a meta-level having a hierarchical and modular structure. With such a tool it is possible to address specific issues (e.g. scale problem such as event-based versus long-term soil degradation) and properties (e.g. temperature and soil moisture). Process-based models allow to calculate predictions of the landscape in future. Process-based modelling combined with a modular approach enables to evaluate the sensitivity of specific mechanisms and finally to identify key drivers for soil degradation.

Model validation requires a sound dataset in space and time for a real landscape site. We can aquire spatial information by taking a snap-shot of the site of interest. More challenging is the validation of the temporal axis of the model because we have to fall back on historical data which assessment is more difficult. For the validation of the proposed model we use the data set of a running case study taking place in the upper Reuss valley (Switzerland).