GEOGRAPHIE INNSBRUCK

Project C3S-ISLS - Research Plan

Influence of Climate Change on Shallow Landslide Susceptibility

1 RATIONALE

Shallow landslides imminently endanger human living and infrastructure in mountainous regions of the world. As these areas are often densely populated it is essential to fully understand the processes and variables involved in order to prevent impacts.

Fig. 1: Shallow landslide in Laterns, Vorarlberg. Photo: T. Zieher, 19.06.2013

2 OBJECTIVES

The project aims at determining shallow landslide susceptibility in time and space by means of **statistical and physically-based modelling** with a high degree of automation. Based on **three case studies** the influence of **climate change** on the system status is evaluated. In addition, the effect of **landuse change** on shallow landslide susceptibility is investigated.

Fig. 2: Location of study areas.

3 CASE STUDIES

Predisposing factors shall be modelled statistically area-wide within the districts Feldkirch, Dornbirn and Bregenzer Wald in Vorarlberg, Austria. A **landslide inventory** is set up based on semi-automated classification of multitemporal orthophotos and airborne laser scanning derivatives. In combination with meteorological data this inventory is also used to derive precipitation thresholds for the onset of shallow landslides. The physically-based approach involving the **TRIGRS model**, demanding for detailed knowledge about regolith characteristics, is applied for a slope in the Laternser valley. **Field work** and suited **laboratory tests** yield the necessary geotechnical and hydraulic input parameters. The model is calibrated for past landslide events with known meteorological pre-conditions.

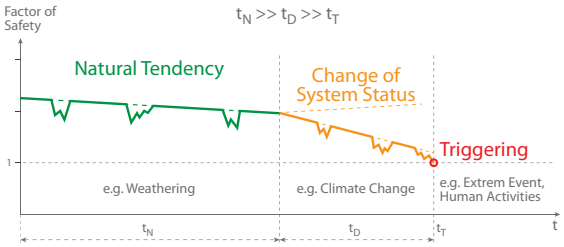

Fig. 3: Concept on changes of the Factor of Safety prior to sliding. Modified after Terzaghi (1950, p. 95).

4 RESULTS

In order to quantify the impact of climate change on shallow landslide susceptibility, the results of scenario-based simulations are evaluated against current conditions. In the same way the effects of land use changes are estimated. Finally, potentially affected areas are identified and shown in hazard maps allowing for prevention measures (e.g. spatial planning).

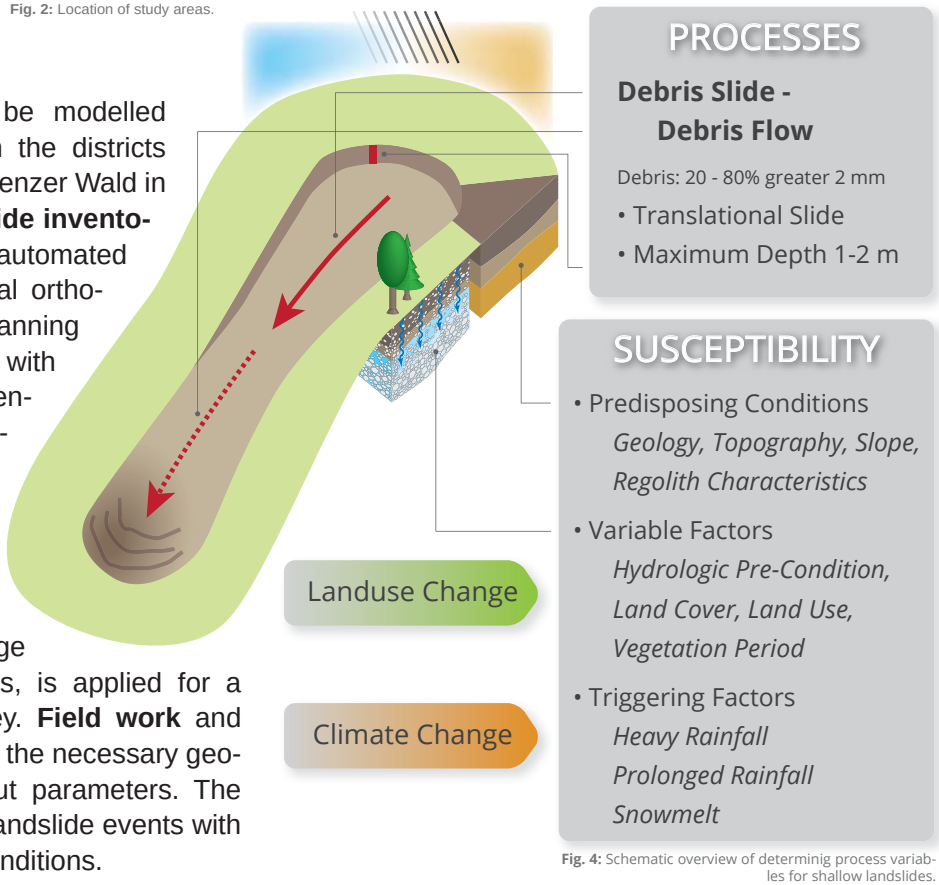

Fig. 4: Schematic overview of determinig process variables for shallow landslides.

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INSTITUTE OF GEOGRAPHY
LiDAR - C3S-ISLS
Thomas Zieher, Martin Rutzinger, Michael Vetter, Clemens Geitner, Gertraud Meißl, Frank Perzl, Gerhard Markart, Herbert Formayer
thomas.zieher@uibk.ac.at | blog.zieher.cc