

# Modelling Of Geomorphological Processes In An Alpine Catchment

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## Introduction

Within SEDAG (SEDiment Cascades in Alpine Geosystems), a joint project of five working groups, the sediment yield of various processes (including soil erosion, rockfall, debris flows, shallow landslides and full-depth avalanches ) is studied in two catchment areas in the Northern Limestone Alps, Germany. As a first step in examining the sediment budget, several models have been developed to 1) identify locations at which the processes may take place (disposition modelling) and 2) to determine which areas would be affected (Becht & Rieger 1997, Wichmann et al. 2002).

## Disposition modelling

To determine possible starting zones, two different approaches have been tested: multivariate statistical analysis of the natural conditions in areas susceptible for process ignition and a more physically based approach. For this purpose, causal relationships between topographic attributes derived from topographic analysis of a digital elevation model and various processes are investigated (e.g. Montgomery & Dietrich 1994).

## Process modelling

Having detected possible starting points, the process path is modelled by a combination of single and multiple flowdirection algorithms. The algorithms are incorporated in a random walk model (Gamma 2000), which can be adjusted to different processes by three calibration parameters. The total process area is then determined by monte carlo simulation. The runout distance is modelled by one or two parameter friction models (Van Dijke & Van Westen 1990, Perla et al. 1980), that calculate the velocity along the process path. First attempts are made to estimate erosion and deposition amounts. It is attempted to describe process interaction and interference as far as possible.

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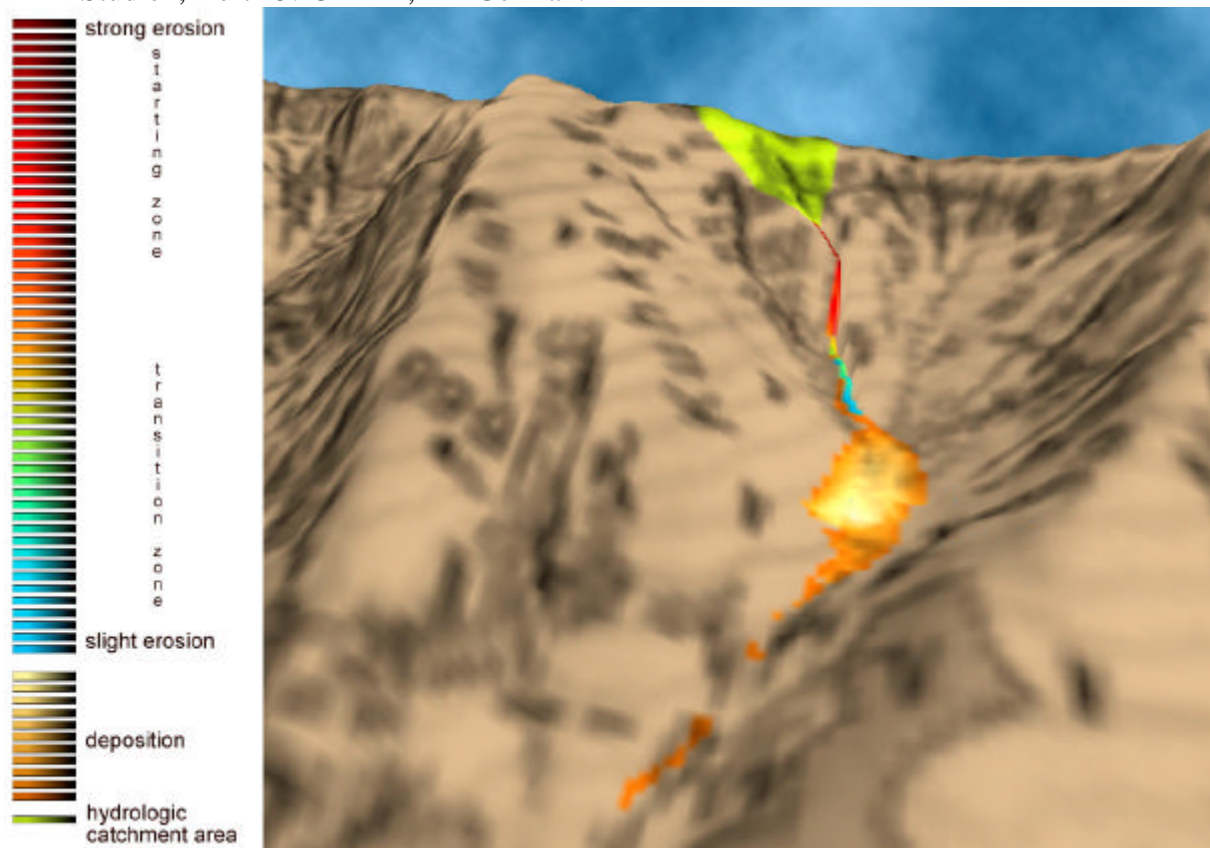


Fig. 1: Debris flow modelling example