1. Introduction

Prenner et al. (2018 & 2019) used a hydro-meteorological model to calculate the probable trigger conditions for each day of the year over a 50 year period (1963-2013). Thus each day was classified as "no trigger" (NT), "long lasting rainfall" (LLR), "short duration storm" (SDS), "snow melt" (SM) and then compared with the event database of the Austrian government agency for torrent and avalanche control (WDV).

Problem: A lot of false positive values!

Hypothesis: Geomorphological pre-condition of catchments is critical for debris-flow initiation

2. Study region and Methodology

In this study we aim to quantify the importance of geomorphology for debris flow formation in the initiation zone as well as in the transit channel of small mountain catchments in Austria. We focus on regions where detailed information of hydro-meteorological trigger data is available (Prenner et al., 2019). Mostbauer et al., 2018).

Regional geomorphologic assessment

At first an analysis of existing digital elevation, geology, historic land use and event data in the study regions to identify local and regional geomorphological features which increase debris flow susceptibility. Debris-flow active catchments will be identified with the event database of the Austrian Torrent and Avalanche Control (WDV) as well as through available satellite image time-series. A statistical comparison to neighbouring non-active catchments in terms of mean slope, area, lithology, Melton number, fan-geometry, terrain roughness, slope-area plots etc. will be carried out. This analysis will provide a set of parameters that influence the most if a catchment is debris-flow active or not.

3. First Results & Outlook

First observations suggest that there are several mechanisms of sediment mobilisation within the studied catchments, which lead to the initiation of a debris flow. Some catchments have no obvious sediment source areas - such as scree slopes or landslide scars - but still produce debris flows on a regular basis.

So the main questions we want to answer in the course this study are:

-Where does the material during an event originate?
- Which sediment mobilisation mechanism plays the most important role for debris-flow initiation in which catchment?
-Where and how is the channel refilled after an event?
-How is material provided that can be triggered during the next debris flow?
-Can we apply these findings on a regional scale in order to predict debris flow activity at a larger scale?

Figure 1: Trigger classes per day from 1963-2013 (Prenner et al. 2018)

First observations suggest that there are several mechanisms of sediment mobilisation within the studied catchments, which lead to the initiation of a debris flow. Some catchments have no obvious sediment source areas - such as scree slopes or landslide scars - but still produce debris flows on a regular basis.

So the main questions we want to answer in the course this study are:

-Where does the material during an event originate?
- Which sediment mobilisation mechanism plays the most important role for debris-flow initiation in which catchment?
-Where and how is the channel refilled after an event?
-How is material provided that can be triggered during the next debris flow?
-Can we apply these findings on a regional scale in order to predict debris flow activity at a larger scale?

First observations suggest that there are several mechanisms of sediment mobilisation within the studied catchments, which lead to the initiation of a debris flow. Some catchments have no obvious sediment source areas - such as scree slopes or landslide scars - but still produce debris flows on a regular basis.

So the main questions we want to answer in the course this study are:

-Where does the material during an event originate?
- Which sediment mobilisation mechanism plays the most important role for debris-flow initiation in which catchment?
-Where and how is the channel refilled after an event?
-How is material provided that can be triggered during the next debris flow?
-Can we apply these findings on a regional scale in order to predict debris flow activity at a larger scale?

Figure 2: Study regions (source: Basemap.at)

First observations suggest that there are several mechanisms of sediment mobilisation within the studied catchments, which lead to the initiation of a debris flow. Some catchments have no obvious sediment source areas - such as scree slopes or landslide scars - but still produce debris flows on a regular basis.

So the main questions we want to answer in the course this study are:

-Where does the material during an event originate?
- Which sediment mobilisation mechanism plays the most important role for debris-flow initiation in which catchment?
-Where and how is the channel refilled after an event?
-How is material provided that can be triggered during the next debris flow?
-Can we apply these findings on a regional scale in order to predict debris flow activity at a larger scale?

Figure 3: Pitztal region