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Influential factors on debris flow events and hillslope-channel connectivity in Alpine regions: case studies from two Alpine regions in Styria, Austria

Sandra Traper (1), Ronald Pöppl (1), Eric Rascher (2), and Oliver Sass (2)

(1) University of Vienna, Geography and Regional Research, Austria (Sandra.Traper@gmx.at), (2) University of Graz, Geography and Regional Science, Austria

In recent times different types of natural disasters like debris flow events have attracted increasing attention worldwide, since they can cause great damage and loss of infrastructure or even lives is not unusual when it comes to such an event. The engagement with debris flows is especially important in mountainous areas like Austria, since Alpine regions have proved to be particularly prone to the often harmful consequences of such events because of increasing settlement of previously uninhabited regions. Due to those frequently damaging effects of debris flows, research on this kind of natural disaster often focuses on mitigation and recovery measures after an event and on how to restore the initial situation. However, a view on the situation of an area, where severe debris flows recently occurred and are well documented, before the actual event can aid in discovering important preparatory factors that contribute to initiating debris flows and hillslope-channel connectivity in the first place. Valuable insights into the functioning and preconditions of debris flows and their potential connectivity to the main channel can be gained. The study focuses on two geologically different areas in the Austrian Alps, which are both prone to debris flows and have experienced rather severe events recently. Based on data from debris flow events in two regions in Styria (Austria), the Kleinsölk and the Johnsbach valleys, the aim of the study is to identify factors which influence the development of debris flows and the potential of such debris flows to reach the main channel potentially clogging up the river (hillslope-channel connectivity). The degree of hillslope-channel coupling was verified in extensive TLS and ALS surveys, resulting in DEMs of different resolution and spatial extension. Those factors are obtained, analyzed and evaluated with DEM-based GIS- and statistical analyses. These include factors that are attributed to catchment topography, such as slope angle, curvature, size, shape as well as topographic channel parameters. Together with factors of land cover/use and lithology those features provide the independent variables for further statistical analyses. With the help of several logistic regressions the likelihoods of influencing topographical and lithological factors and factors of land cover/use leading to debris flow events and those for debris flows to reach the main channel (hillslope-channel connectivity) are computed. First results will be presented at the EGU General Assembly 2016.