



A network-based assessment of fine sediment connectivity in an agricultural catchment in Austria

John Edward Perez and Ronald E. Poepl

Department of Geography and Regional Research, University of Vienna, Vienna, Austria

The measurement of soil erosion has been a major priority of scientific research and government programs since the beginning of the 20th century due to its increasing significance as an environmental challenge. Identification of sediment source areas, sinks, and the pattern of geomorphic coupling between different zones along its pathways are essential for an effective and holistic catchment management. In this context, soil erosion and associated fine sediment transfer through landscapes can be assessed using the concept of connectivity. Among different approaches applied in sediment connectivity investigations, a major advance in recent years has been the adoption of network analyses. This study presents an attempt to use numerical modeling coupled with graph theory analysis as an approach to quantify sediment connectivity on the catchment scale, as well as to identify key locations and pathways of sediment (dis-)connectivity in a medium-sized agricultural system in Austria for different rainfall events. Runoff and soil losses are simulated using the soil erosion model *OpenLISEM* and then translated into a graph using the network analysis package *igraph* in Python. Structural properties of the graph are then assessed using the same package. First results show notable sediment concentrations in the middle reaches of the trunk channel, similar to patterns of sediment input hotspots in earlier studies in the catchment. This corresponds to erosional areas that are well connected to the stream network via different kinds of overland flow pathways. Insights from graph-based connectivity metrics can be valuable in designing targeted interventions for catchment management based on identified hotspots of soil erosion and the associated off-site effects brought about by connectivity patterns.