Geophysical Research Abstracts
Vol. 19, EGU2017-37, 2017
EGU General Assembly 2017

Predicting gully densities at sub-continental scales: a case study for the Horn of Africa

Matthias Vanmaercke (1,2,3), Ignace Pelckmans (2), and Jean Poesen (2)

(1) Université de Liège, Département de Géographie, Allée de La Physique, 4000 Liège, Belgium (matthiasvanmaercke@gmail.com), (2) KU Leuven, Department of Earth and Environmental Sciences, Celestijnenlaan 200E, 3001 Heverlee, Belgium , (3) Research Foundation Flanders (FWO), Egmontstraat 5, 1000 Brussels, Belgium

Gully erosion is a major cause of land degradation in many regions, due to its negative impacts on catchment hydrology, its associated losses of land and damage to infrastructure, as well as its often major contributions to catchment sediment yields. Mitigation and prevention of gully erosion requires a good knowledge of its spatial patterns and controlling factors. However, our ability to simulate or predict this process remains currently very limited. This is especially the case for the regional scale. Whereas detailed case studies have provided important insights into the drivers of gully erosion at local scales, these findings are often difficult to upscale to larger regions.

Here we utilized a simple and cheap method to predict patterns of gully density at the sub-continental scale. By means of a random sampling procedure, we mapped gully densities for over sixty study sites across the Horn of Africa, using freely available Google Earth imagery. Next, we statistically analyzed which factors best explained the observed variation in mapped gully density. Based on these findings, we constructed a multiple regression model that simulates gully density, based on topography (average slope), soil characteristics (percentage silt) and land use (NDVI-value). Although our model could benefit from further refinement, it succeeds already fairly well in simulating the patterns of gully density at sub-continental scales. Over 75% of the predicted gully densities differ less than 5% from the observed gully density, while over 90% of the predictions deviate less than 10%. Exploration of our results further showed that this methodology may be highly useful to quantify total gully erosion rates at regional and continental scales as well as the contribution of gully erosion to catchment sediment yields.