



## Soil Erosion in Mesic Forests: How do Biological Soil Crusts affect sediment transport and surface runoff?

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Soil erosion under forests occurs if forest layers get disturbed. Disturbances may arise from treefall, forest road works, skid trails or deforestation. In these disturbed areas, both an intact canopy and forest floor cover are missing, so that forest soils lack protection against water erosion. To counteract these negative effects a quick restoration of soil surface covers by vegetation is important. In particular, biological soil crusts (biocrusts) are able to quickly colonize gaps in higher vegetation and they are known to reduce soil erodibility. So far, the focus of biocrust research has been in drylands, whereas biocrusts have proven to be an important factor in mesic environments, especially as a pioneer vegetation in disturbed areas.

In this study, the natural succession of biocrusts in skid trails was observed on four different underlying substrates in a temperate European forest ecosystem (Schönbuch Nature Park in the state of Baden-Württemberg, Germany) and their influence on surface runoff, sediment discharge and nutrient relocation was investigated. Therefore, 144 micro-scale runoff plots (ROPs, 40 x 40 cm) were established with four replicates in the wheel tracks as well as in the center tracks and two replicates on undisturbed forest soil. In order to initiate splash and interrill erosion, four rainfall simulations were carried out from spring to winter with a constant intensity of 45 mm h<sup>-1</sup>. With the purpose to compare these small-scale erosion rates with a larger scale, additional turbidity sensors were installed in the catchment area. The biocrust succession was determined by regular vegetation surveys with a classification of mainly mosses and liverworts up to the species level. Additionally, DNA samples of the upper soil layer were collected to conduct DNA extractions specify other potential biocrust organisms such as lichens, cyanobacteria, fungi and algae.

First results show that surface runoff and sediment discharge are higher in the wheel track than in the center track and that both parameters are reduced with a higher developmental stage of soil surface cover. The vegetation survey demonstrates a quick development of moss-dominated biocrusts from April to October with up to ten different species in one ROP. Depending on the location of the skid trail, a quick development of the higher vegetation was observed as well. Lab work on nutrient relocation and DNA analysis is still in progress and further results will be presented at the EGU 2020.

