Geophysical Research Abstracts
Vol. 18, EGU2016-18415, 2016
EGU General Assembly 2016

Biological soil crusts reduce soil erosion in early successional subtropical forests in PR China

Steffen Seitz (1), Philipp Goebes (1), Kathrin Käppeler (2), Martin Nebel (3), Carla Webber (1), and Thomas Scholten (1)

(1) Department of Geosciences, University of Tübingen, Tübingen, Germany, (2) Department of Geography and Regional Research, University of Vienna, Vienna, Austria, (3) State Museum of Natural History, Stuttgart, Germany

Biological soil crusts (BSCs) have major influences on terrestrial ecosystems and play significant functional roles in soil systems, such as accelerating soil formation, changing water flows or enhancing soil stability. By that, they have the potential to protect soil surfaces against erosive forces by wind or water. However, the effect of BSCs on erosion processes is rarely mentioned in literature and most of the work done focused on arid and semi-arid environments. Furthermore, compared to the structure and function of BSCs, less attention was paid to their temporal and topographical distribution.

This study aims to investigate the influence of BSCs on initial soil erosion, and their topographical development over time in initial subtropical forest ecosystems. Therefore, measurements have been conducted within a biodiversity and ecosystem functioning experiment (BEF China) near Xingangshan, Jiangxi Province, PR China. Interrill erosion was measured on 220 microscale run-off plots (ROPs, 0.4 m $\times$ 0.4 m) and the occurrence, distribution and development of BSCs within the measuring setup were recorded. BSC cover in each ROP was determined photogrammetrically in four time steps (autumn 2011, summer 2012, summer 2013 and summer 2014). BSC species were identified by morphological characteristics and classified to higher taxonomic levels.

Higher BSC cover led to reduced sediment discharge and runoff volume due to its protection against splash energy, the adherence of soil particles and enhanced infiltration. Canopy ground cover and leaf area index had a positive effect on the development of BSC cover at this initial stage of the forest ecosystem. Moreover, BSC cover decreased with increasing slope, as we presume that developing BSCs are washed away more easily at steep gradients. Elevation and aspect did not show an influence. BSCs in this study were moss-dominated and 26 different moos species were found. Mean BSC cover on ROPs was 14 % in the 3rd year of the tree experiment and increased to 23 % in the 5th year. BSC cover inside the ROPs ranged from 0 to 65 %. These preliminary findings will now undergo a more detailed analysis with a wider topographical dataset.