



Applying biofilm analysis for detecting mobility or stability of gravel bed channel stretches

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Within the project "Detects biofilm variability stable and mobile channel pavement patterns in steep bedload streams in cold environments?" (DAAD/NFR) studies on biofilm developed on mountain stream gravels have been performed. Field work was carried out in Nordfjord (Erdalen and Bødalen) in western Norway and at the Partnach River (Reintal) in the Bavarian Alps in Germany.

The thickness and the volume of EPS (extracellular polymeric substances), algae and bacteria developed on selected sample stones, taken at different depths in channels and at different times, varied at the single stone itself and between the locations and in the timescale. A trend could be detected: The relation of EPS/bacteria and EPS/algae differed between subsurface samples (taken in 5 to 10 cm depth) and stones sampled at the surface. In most cases the total amount of biofilm EPS on the surface gravel was higher than on the subsurface samples. At a very stable channel stretch in Erdalen the EPS-volume and the amount of algae increased over time, but the bacterial content varied very high within the time frame. At a channel stretch with a positive sediment budget, as based on previous investigations, a clear trend to less biofilm in the subsurface material was observed. At a channel stretch with previously detected slow net-erosion the measured EPS-volume was on a high level as compared to other sampling sites. The development of algae and bacteria volume varied together widely over the time with no detected trend. The samples collected in the Partnach River (Reintal, Bavarian Alps) showed a clear pattern at all three sampling points, with the ratio of EPS and algae, and EPS / bacteria increasing with increasing depth in the subsurface.

Biofilm analysis can be applied to analyse the stability / mobility of gravel bed channel stretches and to estimate the frequency and depth of sediment mobilisation within such channels.