Primary microbial succession in a glacier forefield

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As the majority of Swiss glaciers are currently receding through global warming, the glacier forefields have become an interesting study site for primary microbial succession by phototrophic and heterotrophic microorganisms.

Here, we characterize the structure and composition of the colonizer communities in newly exposed rock substrates. This study is carried out within the framework of the CCES-*BigLink* interdisciplinary project of the ETH domain and the study site is the forefield of the Damma Glacier located in central Switzerland. We hypothesize that microbial diversity is increasing with distance from the glacier terminus and that both phototrophs and mineral weathering active heterotrophic bacteria are abundant.

Soil samples from different sampling sites ranging from the glacier terminus devoid of vegetation until 100 year old soils covered by a dense vegetation were taken. Microbial communities were studied with culture-independent molecular approaches such as genetic profiling and sequencing of clone libraries.

A high microbial diversity could be already found in the vicinity of the glacier terminus. Microbial diversity as expressed by the Shannon-Weaver diversity index was increased with distance from the glacier terminus. Both phototrophs and heterotrophic bacteria were abundant and their compositions were changing with distance from the glacier. Thus, a microbial succession from young to old soils is clearly visible and will now be investigated in more detail. Especially the driving forces and the mechanisms of carbon and nutrient acquisition during microbial succession will be evaluated.

Application fractal and multifractal methods to mapping prospectivity for metamorphosed sedimentary iron deposits using stream sediment geochemical data in eastern Hebei province, China

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The Eastern Hebei province, northern China has become the most important sources of iron mining industry in China and was chosen as a study area for mapping prospectivity for metamorphosed sedimentary iron deposits (MSID) using fractal and multifractal methods. The MSID mainly occurred within the ferrosilicon formations and were formed in the middle and late Archaeozoic Era. The mineral assemblages associated with the Fe_2O_3 mineralization have high concentration values of Al_2O_3, Ti, V, Cr, Ni, Cu, Zn and Au. The multivariate statistical technique of principal component analysis (PCA) was used to delineate the comprehensive anomalous areas with the combined elements Fe_2O_3, Al_2O_3, Ti, V, Cr, Ni, Cu, Zn and Au using stream sediment geochemical data with the aid of GeoDAS[1]. The mapping singularity technique [2] was then used to identify the local anomalies from the first factor. The spectrum-area model (S-A) method [3] was then used to separate the anomaly from the singularity map. The results demonstrate that the local anomalies have high spatial correlation with the 103 known Fe deposits. The new anomalies should be further investigated for undiscovered Fe deposits.

[1] Cheng, Q. (2000) http://www.gisworld.org/geodas
[2] Cheng, Q. (2007) *Ore Geology Reviews*, **32**:314-324
[3] Cheng, Q. et al. (2000) Natural Resources Research **9**,43-51.