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The influence of grazing on high mountain soils in the Eastern Pamirs/Tajikistan

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Animal husbandry is the most important economic branch in the high mountain deserts of the Eastern Pamirs, a peripheral and ecologically unprivileged region in the east of Tajikistan. During the Soviet era the transhumant pasture rotation was strongly supported and transport to the partially remote summer pastures was organized. With the dissolution of the USSR and the independence of Tajikistan the subsidies ended. This resulted in significant structural alterations in the political and socioeconomic frame conditions for the whole district, including strong changes concerning pasture use. In this context our study focuses on the impact of grazing yaks, sheep and goats on the high mountain soils under the changing land use patterns of pastoralists due to transformation processes in the Eastern Pamirs of Tajikistan.
The soil parameters organic carbon, nitrogen, humus and C/N-ratio were measured in the laboratory. Furthermore, the isotope signatures delta13C and delta15N were analysed. These factors are valuable traits to consider the grazing impact. Data mining was done using multivariate statistical methods. Finally, a link between vegetation and soils was presented using a Detrended Correspondence Analysis (DCA) as an indirect ordination method.
The results show that soil properties strongly influence the small-scale vegetation patterns. Furthermore, they are strongly dependent on the level of grazing intensity within the different ecosystems. Controlling ecological factors trace through the biosphere and pedosphere respectively in an interactive way. Grazing could therefore be examined as only one of a multitude of ecological factors influencing soil parameters. The major findings indicate significantly low correlations between grazing intensity and a higher Corg and N content and C/N-ratio as well as humus quality. Hence, the study area can be described as a sink under current land use conditions for carbon. The 15N-values are strongly related to the influence of grazing. This reflects the opening of the N-cycle.
The results of this study confirm that pastoralism is a well adopted land use method in the Eastern Pamirs. Further research is encouraged in order to better quantify the effects of changing land use on nutrient cycles and possible carbon sinks regarding climate change.