



Processing of aerial images to detect vegetation cover and evaluate transient vegetation patch characteristics of Hühnerwasser catchment

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The artificial catchment “Hühnerwasser” was built in a post-mining landscape, as a field experiment to observe and monitor early-development ecosystems at first catchment scale. As vegetation is a key driver of hydrological catchment behavior, spatial distribution and temporal dynamics of vegetation affects water redistribution from plot to catchment scale. In the context of early ecosystem development, quantifying changes in vegetation structures is an obvious indicator for state transitions. The first years of ecosystem development at the Hühnerwasser catchment showed rapidly increasing complexity of emerging structures associated with rising vegetation cover and increasing number of plant species.

This work will focus on characterizing vegetation cover using aerial images aiming to describe spatial structures and how those evolve in time. The early stages are especially of interest. The structure is therefore characterized by the area of the catchment covered by vegetation, the number of vegetation patches, the mean and maximum patch size and a form factor (area of patch divided by its perimeter).

Aerial images with a resolution at cm scale were taken once per year from 2007 to 2018. Binary maps are generated by setting thresholds for red, green and blue channels to differentiate between vegetation cover and bare soil. To evaluate the consistency of the binary images of each channel these images were stacked and compared. The performance of the method was tested by using a set of combinations of thresholds and a comparison with manual mapping of vegetation cover at an image subset was made.

The blue channel seems to be very sensitive to detect vegetation and a better differentiation of vegetation and dark/wet soil can be achieved by setting the thresholds of the channels in a specific order. The structures derived by the classification into vegetated and bare soil are more important in the early years of ecosystem development. In those years (2007 to 2011) the most changes took place. As time advances vegetation became less patchy and other characteristics need to be implemented to describe the vegetation cover, taking into account different plant functional types.