Spatial transferability of multi-scale fractional cover products

A Case study in semi arid savannah's of Namibia and Western Zambia

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Abstract (1500 Zeichen):

The analysis of vegetation cover is a key parameter in understanding the state and dynamics of ecosystems. However in land cover classification approaches the -often inhomogeneous- vegetation cover is aggregated into few discrete classes. Hence these approaches provide unsatisfying results in spatially variable biomes, especially savannah's with their small scale patches of woody and herbaceous vegetation inter-spaced with bare soil. Fractional cover (FC) approaches, which provide an estimate of sub-pixel continuous cover percentages of the underlying land cover classes and therefore an improved thematic representation, deliver valuable additional information for landscape monitoring and decision making.
Prior research demonstrated that multi-scale approaches are suitable to transfer en-detail information from a small, albeit higher resolution subset to the larger study area via statistical up-scaling (e.g. Random Forest). In this case study the robustness of the up-scaling approach and the limits of the spatial transferability at the very high and intermediate resolution were analysed in the Caprivi Strip in Namibia and the adjacent Western Province of Zambia. To this end 9 Worldview-2 (WV) images (between 25-600 sq km) recorded in April 2010 and covering a north-south and east-west gradient, as well as the corresponding Landsat images were obtained. The WV images were classified, aggregated to LS resolution and each used as input for statistical up-scaling via a Random Forest regression, while the other images were used for validation. The analysis showed that continuous FC mapping is a highly suitable concept for semi-arid ecosystems with their gradual transitions. Overall the upscaled-FC images differed by less than 5% , with the biggest discrepancies at the high end of the range. As long as the training subset(s) covered the whole range of occurring vegetation densities, comparably small WV scenes are sufficient to reliably scale to regional FC results.