



Using high resolution imagery to detect woody vegetation and land-cover change over 50 years in the Sahel of Mali

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The Sahel region has been acclaimed as one of the “hot spots” of global environmental change in the last decades. The degradation of the environmental conditions was accelerated by prolonged droughts in the region during the 1970s and 1980s and an overall decrease in annual precipitation. The resulting loss of woody vegetation cover was often considered as irreversible desertification. Recent findings, based on small-scaled analyses of satellite images, show an increase of vegetation greenness over most parts of the Sahel since the mid-1980s. However, due to a lack of detailed regional studies, it remains largely unclear if this is a return to pre-drought conditions or a transformation of land cover to a new equilibrium state.

This study intends to use remote sensing techniques, supplemented by ground truth data to compare the pre-drought woody vegetation and land cover with the current situation.

High resolution panchromatic Corona imagery of 1967 and multispectral RapidEye imagery of 2011 form the basis of this regional scaled study, which includes parts of the Dogon Plateau and the Seno Plains in the Sahel of Mali. The feature extraction and classification operations included in ERDAS Imagine Objective are used in an object-oriented approach in combination with spectral properties to analyse the datasets and map millions of individual trees and large shrubs. Results indicate number of trees per hectare as well as woody vegetation coverage in percent per hectare for both 1967 and 2011. Additionally, the land-cover change during the past half century is assessed followed by an analysis of current and past woody vegetation densities in relation to land-cover classes.

Results show a significant increase of cultivated land, in particular in the Seno Plains, a reduction of dense natural woody vegetation as well as an increase of trees on farmer's fields on the Dogon Plateau. Our results show that neither the desertification paradigm nor the greening paradigm can be generalized in the Sahel. Rather spatial variations of changes exist; the explanations for these are equally manifold.