IGRASS Abstract (For topic Remote sensing for biodiversity in Africa – from observations to informed actions for biodiversity assessments)
Title: USING REMOTE SENSING AND EXPERT KNOWLEDGE TO MAP LANDSCAPE-LEVEL LAND DEGRADATION IN NAMAQUALAND - SOUTH AFRICA

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Introduction

In this study we investigating the use of remote sensing data to quantify human induced transformation specifically in terms of rangeland degradation based on spatial and temporal scales. In dryland areas, both high inter annual rainfall variation and high spatial variability of land conditions determine vegetation growth and aggravate land degradation. As a result quantify changes due to anthropogenic pressures is difficult.

First approach used rainfall, vegetation units and phenology to establish spatial and temporal approaches which used NDVI to quantify land degradation. The second approach was to test inner variability (intra heterogeneity) at a specific time in the year (spring season) and calibrate within each vegetation type. The third approach was based on assessing the overall degradation state of Namaqualand district using monthly or 2weeks NDVI MODIS mean. All three approaches will be used at the end for a comparison assessment of the best approach in this dryland area.

Methodology

Within the Bushmanland region in NW South Africa, ANOVA test per vegetation response phase were carried out to establish the phenological variable which best detects change in the vegetation cover. The NDVI $_{min,}$ NDVI $_{max}$ and NDVI $_{\Sigma}$ variables were found to best explain differences between the three vegetation units. The spatial scale approach, based on the dry phase only, used the benchmark method to establish thresholds for any changes in veld condition. The temporal scale approach used the residual method based on seven year averaged NDVI. Regression and mean analysis

were carried out based on the residual values for each sample point. Overall, observation data will be used to validate the results in order to perform a comparison analysis between the approaches

In regional studies in Namibia, the effects of different farming systems and stocking rates on savanna ecosystems are reflected in specific vegetation classes. In this context it was important to have detailed information on the study area, and to include expert knowledge to correctly interpret the remotely sensed vegetation patterns. Detailed botanical field surveys and farmer interviews on the different farming systems were used in combination with remote sensing analyses to identify degradation due to human impact.

Conclusion

Further refinement of the methodology is necessary, including ground-thruthing for validation purposes. The presented methodologies showed promise for monitoring and mapping grazing carrying capacity and overgrazed areas. An essential issue of the results is the use of rainfall data, expert knowledge and other ground truth information for differentiating between natural variations and degradation due to anthropogenic pressures.

References:

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