ADVANCED SATELLITE-BASED PHENOLOGY MONITORING: A CASE STUDY OF SEMI-ARID GRASSLANDS IN SOUTH AFRICA

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THEME: Forests, Biodiversity and Terrestrial Ecosystems (management of terrestrial ecosystems)

KEY WORDS: Land Surface Phenology, Time Series Analysis , RapidEye, Field Scale Analysis, South Africa

ABSTRACT:

Monitoring land surface phenology from satellites is essential for characterizing vegetation dynamics over large areas. Availability of very high spatial resolution image time series from RapidEye satellite constellations allow the phenology analysis also at field level, which is especially important for fragmented landscapes such as in South Africa. A bi-weekly time series of the multispectral 5m RapidEye images, covering the 2011-2012 growing season were used to derive key phenometrics for a study area located in the Free State Province of South Africa.

Based on a noise-reduced Normalized Difference Vegetation Index (NDVI) time series, a set of quantitative metrics were extracted that summarized the phenology of vegetation at field, farm and regional scales. Vegetation parameters included both phenology metrics (start, end, length of growing season) and productivity metrics (amplitude and the small integral). For the study area we detected one growing season that started around November and ended in July. The set of key phenometrics including length, amplitude and small integral proved to be beneficial for comparing and detecting variances across the investigated area in the grassland ecosystem. It was also possible to differentiate productivity changes at field level over the analysed period of time. The applied satellite based approach yielded promising results for the analysis of vegetation dynamics and land surface phenology at a high level of spatial details. The elaborated approach is deemed to be useful for precision agriculture applications and could be applied for similar cases in South Africa and beyond.

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