REMOTE SENSING OF VEGETATION COVER DYNAMICS OVER SOUTHERN AFRICA

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1. BACKGROUND

- Monitoring vegetation dynamics and its driving factors is essential for a better understanding of how the earth system responds to climatic variability and anthropogenic pressures.

- No study exists that analyzed temporal phenometrics dynamics and spatial vegetation trends across southern Africa using medium resolution satellite time-series.

**Overall goal**

> monitoring vegetation dynamics across southern Africa using 14-years (2000-2013) of medium spatial resolution (250-m) MODIS-EVI time-series data

2. STUDY REGION

Fig. 1. Study region in southern Africa (a) Mean EVI (Enhanced Vegetation Index) values averaged over 2000-2013 from the 16-day 250-m MODIS EVI time-series. (b) Mean rainfall in 2000-2013 calculated from monthly time-series from the Tropical Rainfall Measuring Mission (TRMM).

3. DATA & METHODS

- EVI time-series data (2000-2013) from the 250-m MODIS MOD13Q1 product
- Monthly gridded rainfall datasets (2000-2013) from the 25-km TRMM (product 3B43)
- Methods: robust seasonal trend analysis (STA) procedure according to Eastman et al. (2009):
  1. Estimation of harmonic regression and its parameters per year (Amplitude 0, Amplitude 1, Phase 1).
  2. Running robust trend analysis using as an input STA parameters

4. RESULTS

**Fig. 2.** Plots of mean values of (a) overall greenness, (b) peak greenness, (c) timing of peak greenness (in degrees), calculated from the 16-day 250-m MODIS-EVI time-series (2000-2013) and averaged over the study area; and (d) mean rainfall intensity (mm hr⁻¹) calculated from monthly TRMM time-series data (2000-2013).

**Fig. 3.** Kernel density plots for timing of peak greenness (green dashed line) and timing of peak rainfall (solid black line) for the monitoring period.

- The earliest peak of EVI was reached in 2000 (end of January)
- The latest peak shifted to mid March in 2012

5. CONCLUSIONS

- Seasonal trend analysis, based on 250-m MODIS time-series data, revealed that vegetation greenness trends varied much across southern Africa in 2000-2013.
- The most important driving factor of the observed vegetation dynamics at sub-regional level is rainfall.
- Other driving factors of the detected spatial patterns of vegetation dynamics should be further investigated at the local level.

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