# 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

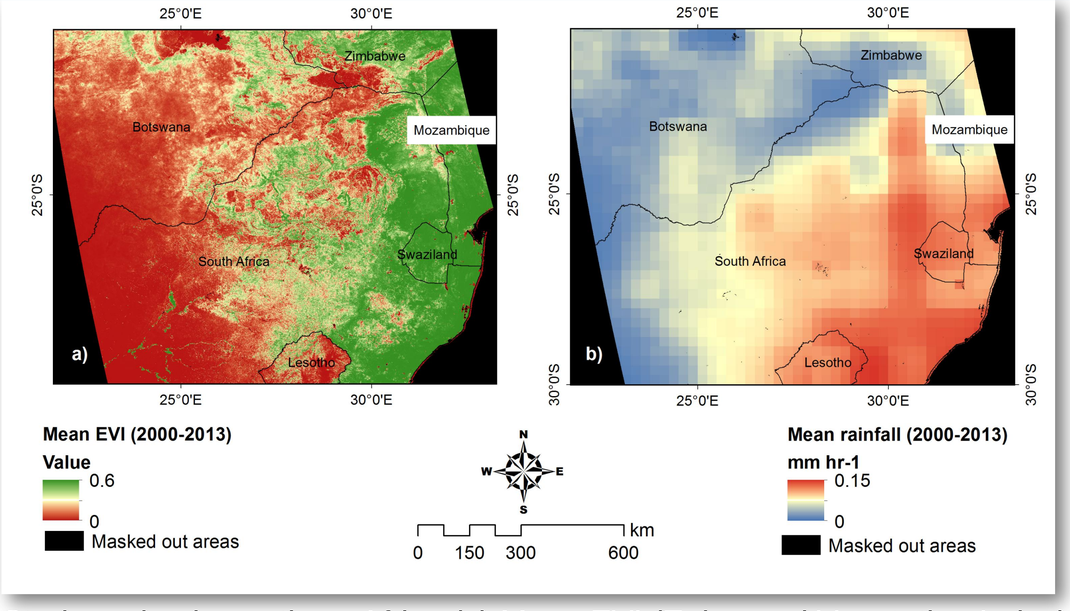


**Fig. 1.** Study region in southern Africa (a) Mean EVI (Enhanced Vegetation Index) values averaged over 2000-2013 from the 16-day 250-m MODIS EVI time-series. (b) Mean rainfall in 2000-2013 calculated from monthly time-series from the Tropical Rainfall Measuring Mission (TRMM).

## 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

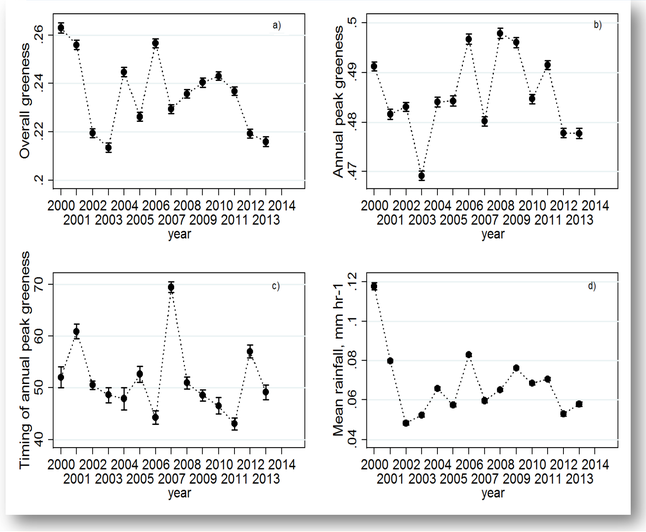


**Fig. 2.** Plots of mean values of (a) overall greenness, (b) peak greenness, (c) timing of peak greenness (in degrees), calculated from the 16-day 250-m MODIS-EVI time-series (2000-2013) and averaged over the study area; and (d) mean rainfall intensity (mm hr-1) calculated from monthly TRMM time-series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

## 4. RESULTS

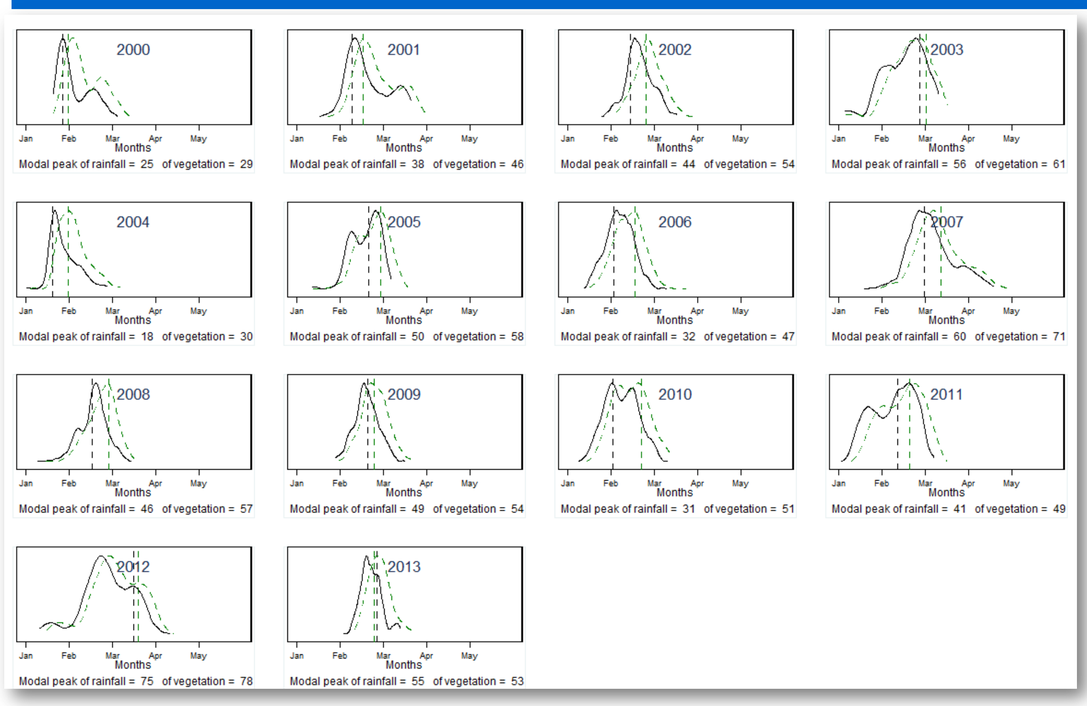


**Fig. 3.** Kernel density plots for timing of peak greenness (green dashed line) and timing of peak rainfall (solid black line) for the monitoring period.

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

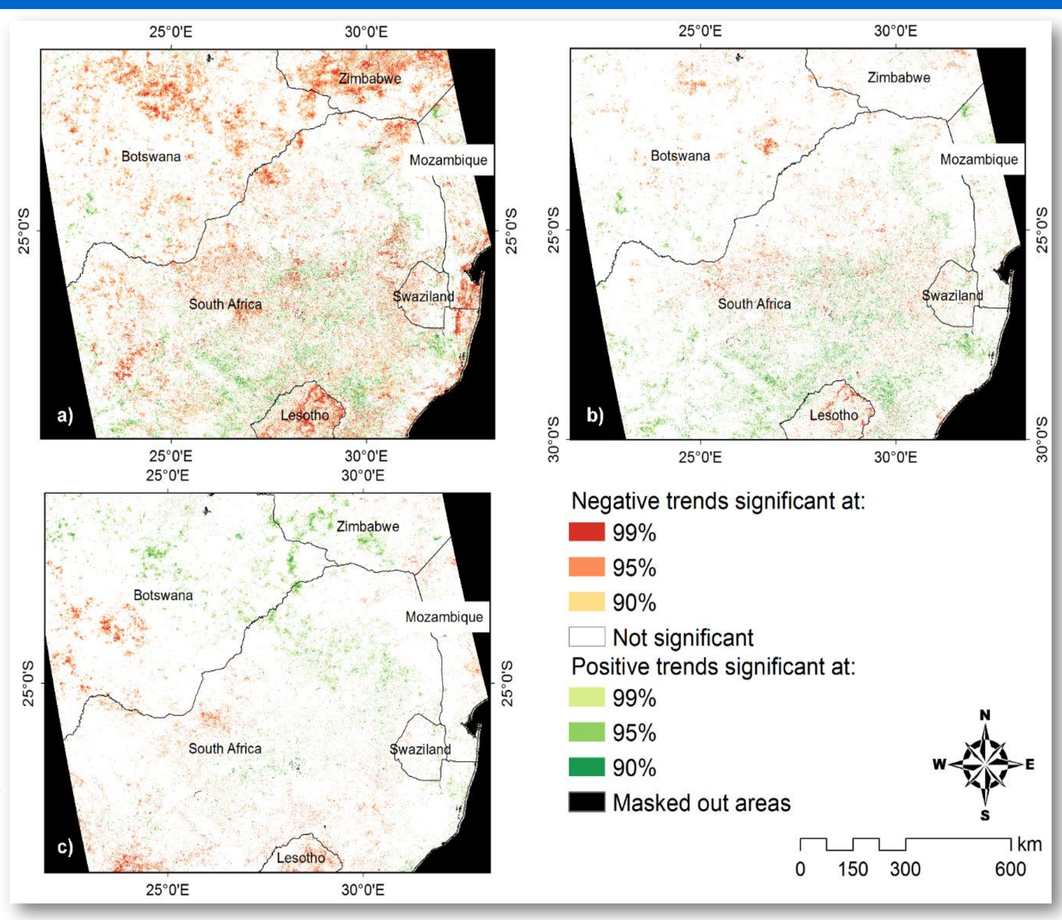


**Fig. 4.** Spatial patterns of vegetation greenness trends calculated from 16-day 250-m MODIS-EVI time-series for 2000-2013: (a) overall greenness, (b) peak greenness and (c) timing of peak greenness.

## 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.

## ACKNOWLEDGMENTS

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## REFERENCES

Eastman, R., Sangermano, F., Ghimire, B., Zhu, H., Chen, H., Neeti, N., Cai, Y., Machado, E.A., Crema, S.C., 2009. Seasonal trend analysis of image time series. International Journal of Remote Sensing 30, 2721-2726.