# DERIVATION OF PHENOMETRICS FROM HIGH RESOLUTION RAPIDEYE IMAGERY ACROSS SEMI-ARID GRASSLANDS IN SOUTH AFRICA

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## 1. BACKGROUND

•Monitoring *vegetation phenology* from satellites is beneficial for characterizing *vegetation dynamics* in fragmented landscapes such as in *rangelands* of the grassland biome in South Africa

•*No study* exists that used high spatial resolution satellite imagery to derive phenological metrics (further on *phenometrics*) to investigate spatial patterns on a high spatial scale

***Overall goal***

➢ ***(i) Derive key phenometrics that summarize vegetation phenology and (ii) detect growing seasons using high spatial resolution RapidEye imagery (5m pixel resolution) on farm scale for different tenure systems.***

## 2. STUDY REGION

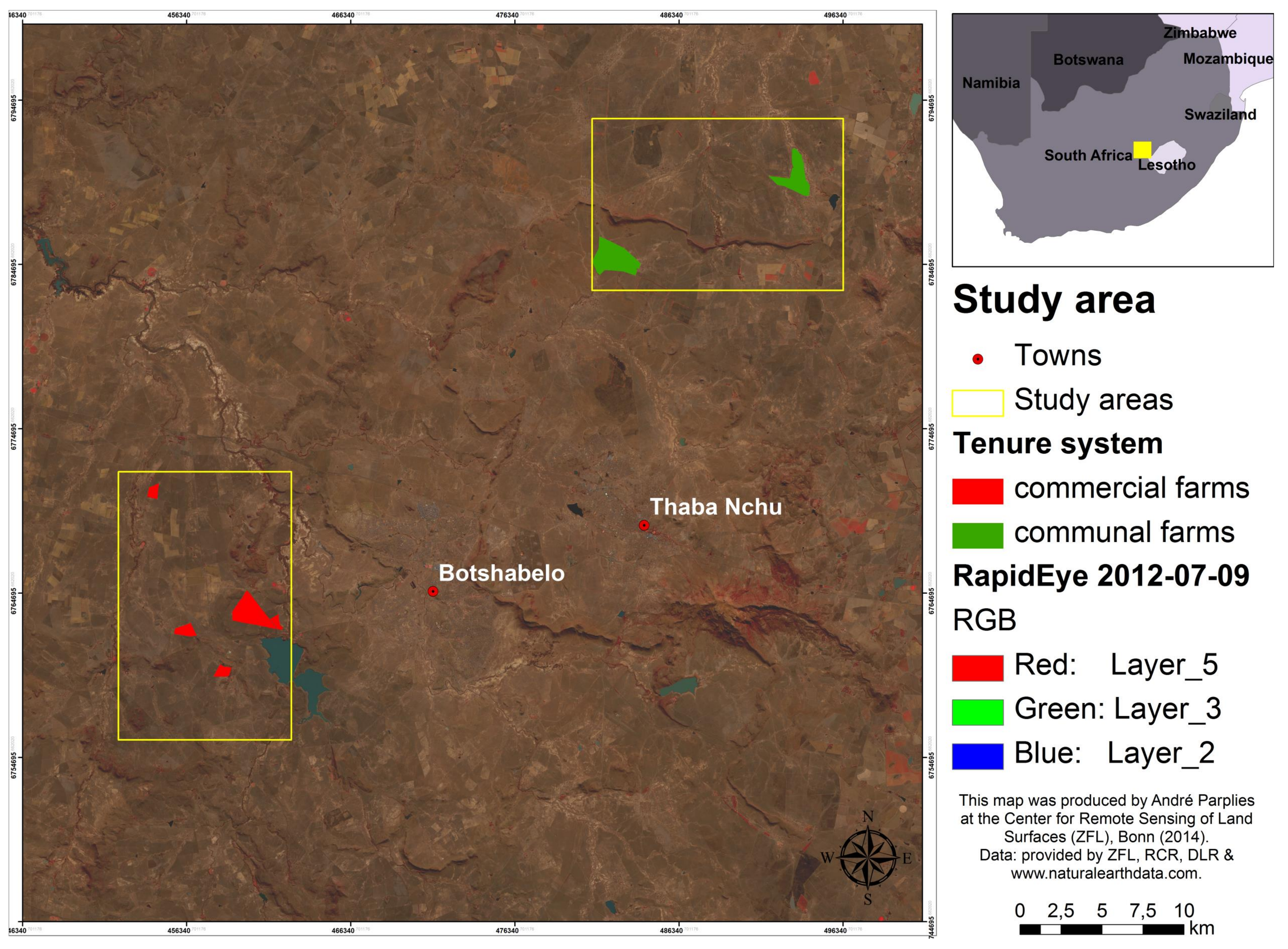



**Fig. 1.** Study area and rangeland farms from two different tenure systems near Thaba Nchu and Botshabelo in South Africa. Communal farms are located on the north-east and commercial farms are on the south-west.

## 3. DATA & METHODS

➢ *Data:* RapidEye multispectral high resolution images (5m) covering two growing seasons from 2011 till 2013

➢ *Methods:* Preparation of a NDVI time-series on a monthly basis to derivate phenometrics according to Jönsson and Eklundh (2004) using TIMESAT software:

1) Noise reduction of NDVI time series with an adaptive Savitsky-Golay filtering approach

2) Derivation of phenology metrics like start, end and length of season and productivity metrics like amplitude and small integral

## 4. RESULTS

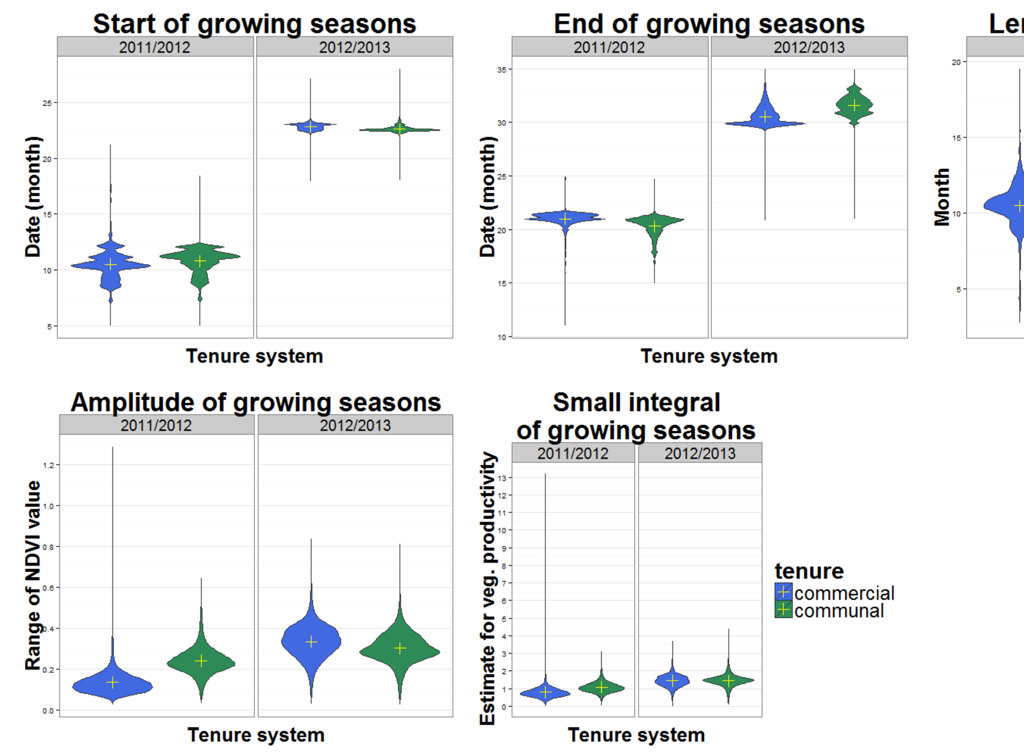
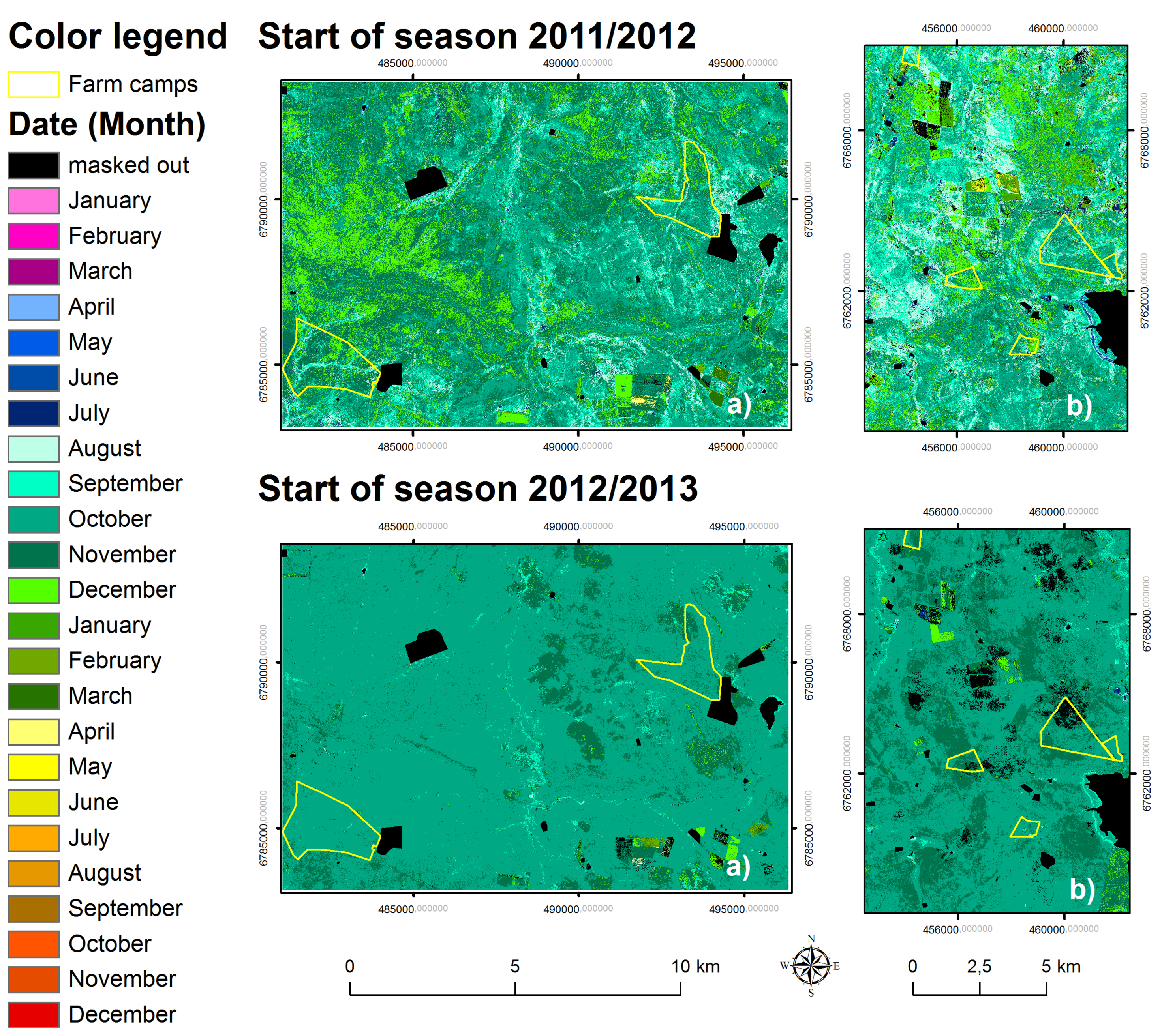
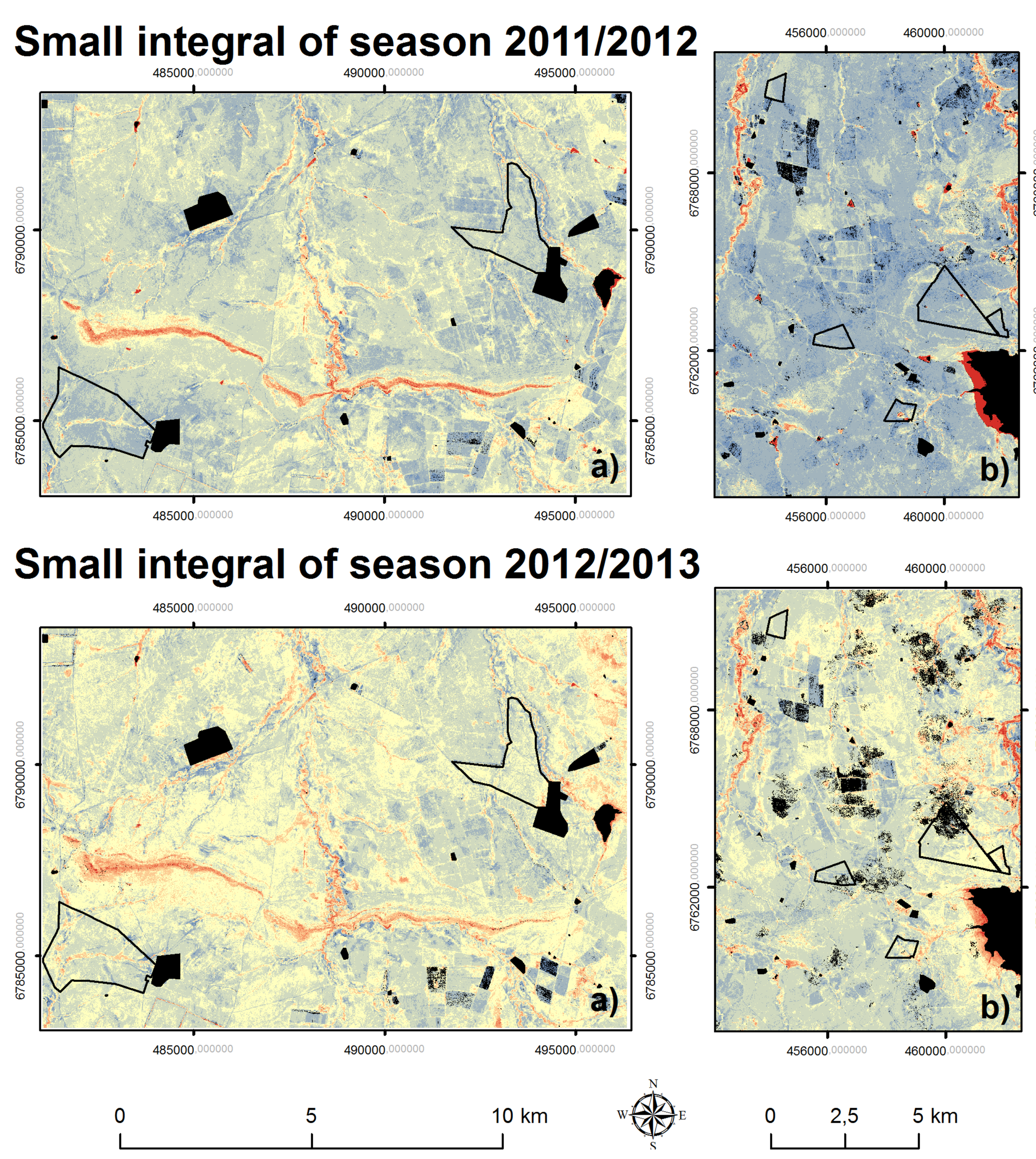



**Fig. 2.** Violin plots of derived phenometrics for each season and tenure system (yellow crosshair indicates respective mean value).

## 4. RESULTS



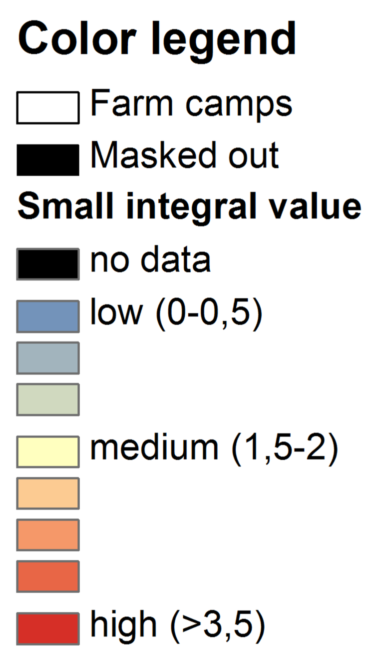




**Fig. 3(left) and fig.4(right).** Start of season (month) and small integral of the two detected growing seasons for the
(a) communal rangeland area, and
(b) commercial rangeland area

## 5. SUMMARY

➢ Start of growing season of 2011 was between September and December and had larger variance as the second season in 2012 starting between October/November

➢ Length, amplitude and small integral of commercial farms varied more between and within the two detected growing seasons compared to communal farms

➢ Comparison between two different tenure systems showed no consistent differences along investigated phenometrics and growing seasons

➢ Further work is needed to prepare NDVI time series (temporal resolution and data gaps) and to adjust parameter settings using TIMESAT

## ACKNOWLEDGMENTS

This work was conducted in cooperation of the working groups at Institute of Crop Science and Resource Conservation (INRES) and Centre for Remote Sensing of Land Surfaces (ZFL) in Bonn and the University for Sustainable Development (HNEE) in Eberswalde, Germany.

## REFERENCES

Jönsson, P. and Eklundh, L., 2004, TIMESAT - a program for analyzing time-series of satellite sensor data, *Computers and Geosciences*, 30, 833-845..