

II Simpósio Internacional  
sobre Gases de Efeito Estufa na Agropecuária  
- II SIGEE -

*II International Symposium on Greenhouse  
Gases in Agriculture*

7 a 9 de junho de 2016 - Campo Grande, MS - Brasil  
June 7<sup>th</sup> to 9<sup>th</sup>, 2016 - Campo Grande, MS - Brazil

## Perspectives and scenarios for carbon balance in forest remnants of the Atlantic Forest using remote sensing time series

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### Introduction

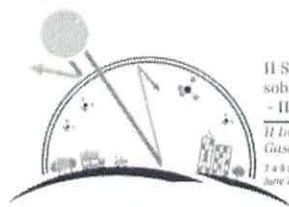
Time series of remotely sensed images have been successfully used for the practical monitoring forest and change detection. In the present study, we performed an estimation of Standardized Vegetation Index (SVI) (Park et al., 2008; Leivas et al., 2014) from 16 days MODIS (Moderate Resolution Imaging Spectroradiometer) NDVI (Normalized Difference Vegetation Index) time series of satellite images. The first stage was to identify vegetation anomalies in spring 2012, that means below or above historic NDVI average values in the forest remnants of Zona da Mata region, Atlantic Forest biome, Minas Gerais, Brazil. These anomalies are characterized as variations in vitality of vegetation, classified by NDVI values higher or lower the average values for the analyzed period. The aim of this work was to estimate, classify, and quantify SVI by mapping forest vegetation variation and comparing with remote sensing data about carbon sequestration balance according estimates of net carbon in relation to his proportion in forests, available in literature (Aduan et al., 2004; Amaro et al., 2013; Figueiredo et al., 2015).

### Material and Methods

The study area is characterized by semideciduous seasonal forest remnants, and remote sensing-based monitoring allows evaluating the vegetation index variability compared to precipitation records. We analyzed MODIS NDVI series from 2000 to 2012, to derive the SVI. The 16 days NDVI from September 2012 to December 2012 was compared to 2000-2011 average of same year period. SVI values were classified as below normal, normal, and above normal. The net carbon sequestration was estimated through literature data, considering predominant forest species and forest typology. In this study was classified as predominance of pioneer species for below normal SVI class, with lower potential increase of net carbon ( $0.5 \text{ ton} \cdot \text{ha}^{-1} \cdot \text{year}^{-1}$ ), late secondary species for normal class, with stable conditions of increase ( $1.5 \text{ ton} \cdot \text{ha}^{-1} \cdot \text{year}^{-1}$ ), and early secondary for above normal SVI class, with higher potential increase ( $2 \text{ ton} \cdot \text{ha}^{-1} \cdot \text{year}^{-1}$ ).

### Results and Conclusions

The current forest remnants area in the Zona da Mata region (Figure 1) is approximately 400,000 hectares. Based on the methodology proposed in the present study, 5.5% of forest remnant's total area were classified as below normal, 75% as normal, and 19.5% as above normal SVI considering the first half of September 2012. Along the period in the second half of October 2012, 17% were classified as below normal, and 17% above normal SVI.



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However, in the second half of December 2012 reached 19% as below and 9% above normal SVI, denoting increase in vegetation anomaly compared to average for the period. We conclude that considering the current forest area of the Atlantic Forest remnants in the Zona da Mata, from predominant forest typologies and carbon balance based on literature data, on average, it is estimated that about 587 thousand tons of net carbon will be sequestered by year, approximately, from spring 2012 (Table 1).

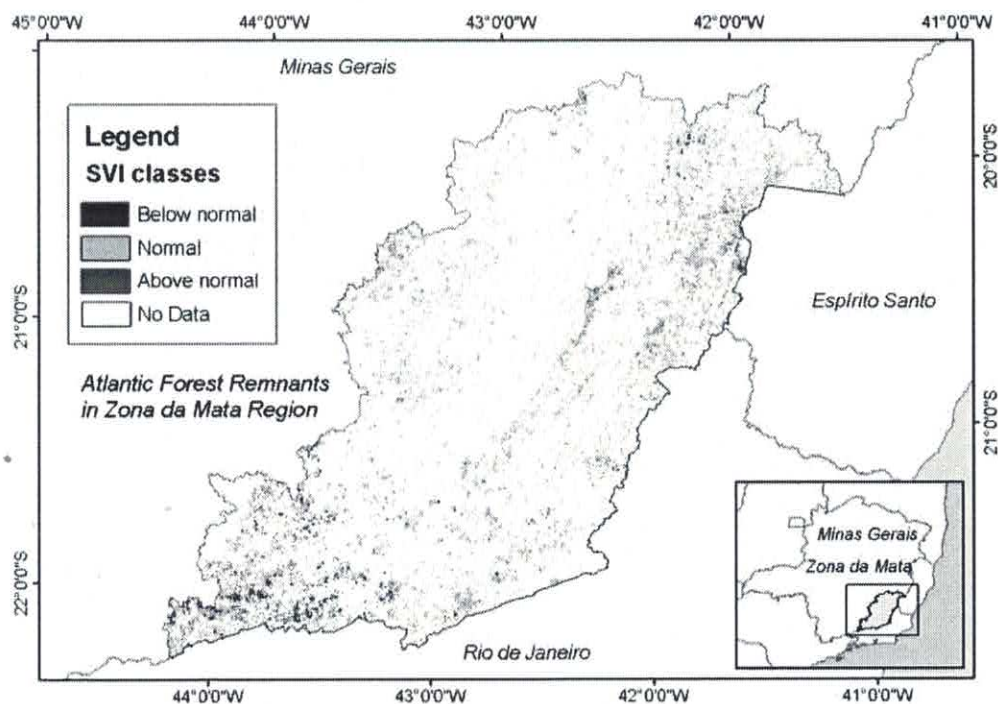
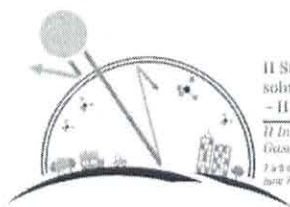


Figure 1 – SVI classes for 16 day period on late December 2012.

Table 1 – Area and net carbon by SVI class, equivalents to forest typologies, from spring 2012.

SVI class	Area (ha)	Net C by typology* (ton <sup>-1</sup> .year <sup>-1</sup> )
Below normal	47,629.70	23,814.85
Normal	292,810.25	439,215.38
Above normal	62,110.18	124,220.35
Total	402,550.13	587,250.58

\* Areas with predominance of pioneer (below normal SVI), late secondary (normal) and early secondary (above normal) species.



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## Acknowledgements

The authors thank the Federal University of Lavras - UFLA and the Brazilian Agricultural Research Corporation - Embrapa for the support to develop this study.