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Analysis of pasture areas in Brazil using official data and time series of vegetation index.

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Abstract

The temporal dynamics of pasture areas is strongly associated with the change in economic activity in the area. The impact of this transition, impacts the environmental, economic and social parameters. The evaluation of the temporal dynamics of pasture areas is extremely important for the generation of information to support decisions whether at the local or regional level, public or private. The use of satellite images and geographic information systems is completely indispensable for the evaluation of the dynamics of pasture areas over time, and this is the fact that motivates this research to identify areas of pasture in different years from official maps of land use classification and to evaluate, by NDVI series, which is associated strongly to the biomass of vegetation, the areas of retraction or increase of pasturelan areas, thus identifying the dynamics of land use transition.

Key words:
Pastureland, biomass, NDVI.

Introduction

In order to observe the vegetation cover dynamics, it is possible to make use of time series of vegetation index, which allows monitoring the development of the plant in temporal scales characterizing the phenological cycle of the crop and identifying its stages of development (Bradley et al. 2007; Lu et al., 2004)[1]. In addition, it is possible to verify when land use change occurred.

Results and Discussion

The analysis of the two products of landuse classification official projects, Probio (2002) and Terraclass (2013) have shown that, for the cerrado, there are expansion and retraction zones of pasturelands, while most parts remain the same in the two classifications. The differences were visually identified.
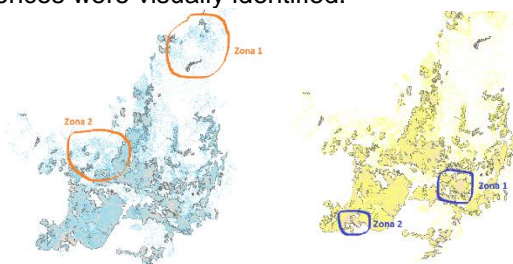

Figure 1: Zones of expansion (orange circle) and retraction (blue circle) of pasturelands in cerrado

This provided delimited zones for further investigations, and five alleatory coordinates were analysed inside this zones. For each coordinate, NDVI series of the period (2002-2013) were used, as well as images from Probio, Terraclass and google earth[3] in order to determine when the land use change occurred and to validate both the classifications and the NDVI series itself.
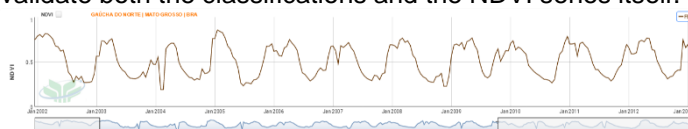

Figura 2: NDVI series, highlighting 2002-2013 period, with FlatBottom (30%) filter. Gaúcha do Norte - MT

Analyzing the five points in each previous delimited zone provided the necessary insights to conclude about the dynamics of land use in this areas.

Chart 1. Dynamics of pastureland in the four zones delimited

Zone	Changes observed
1 (expansion)	Rain forest and Cerrado vegetation were the primary landuse that gave way to pasture
2 (expansion)	Cerrado vegetation were the primary landuse that gave way to pasture
1 (retraction)	Retraction in pastureland gave way to agriculture (especially soybean)
2 (retraction)	Retraction in pastureland gave way to agriculture (especially soybean and sugarcane)

Conclusions

The use of NDVI series to this analisys is an excelente option due to the facility in obtain data, and the compiled graphic form it is presented. NDVI index analysed solely can be many times inconclusive, since there are more than one type of land use that can be associated with determined pattern of NDVI series. It is mandatory to say, then, that NDVI series must be analysed with the aid of more information (images, declivity of terrain, reports, etc.)

The analysis have shown that the classification of land use of Cerrado is very tricky, since the antropic and hydric pressures are overwhelming in the region, and interpretation must be taken carefully. The products used to define zones of interest for the analysis, Probio, 2002, and TerraClass, 2013, both have shown errors in classification, althought the Probio product is more erratic and imprecise than Terraclass.

Acknowledgement

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