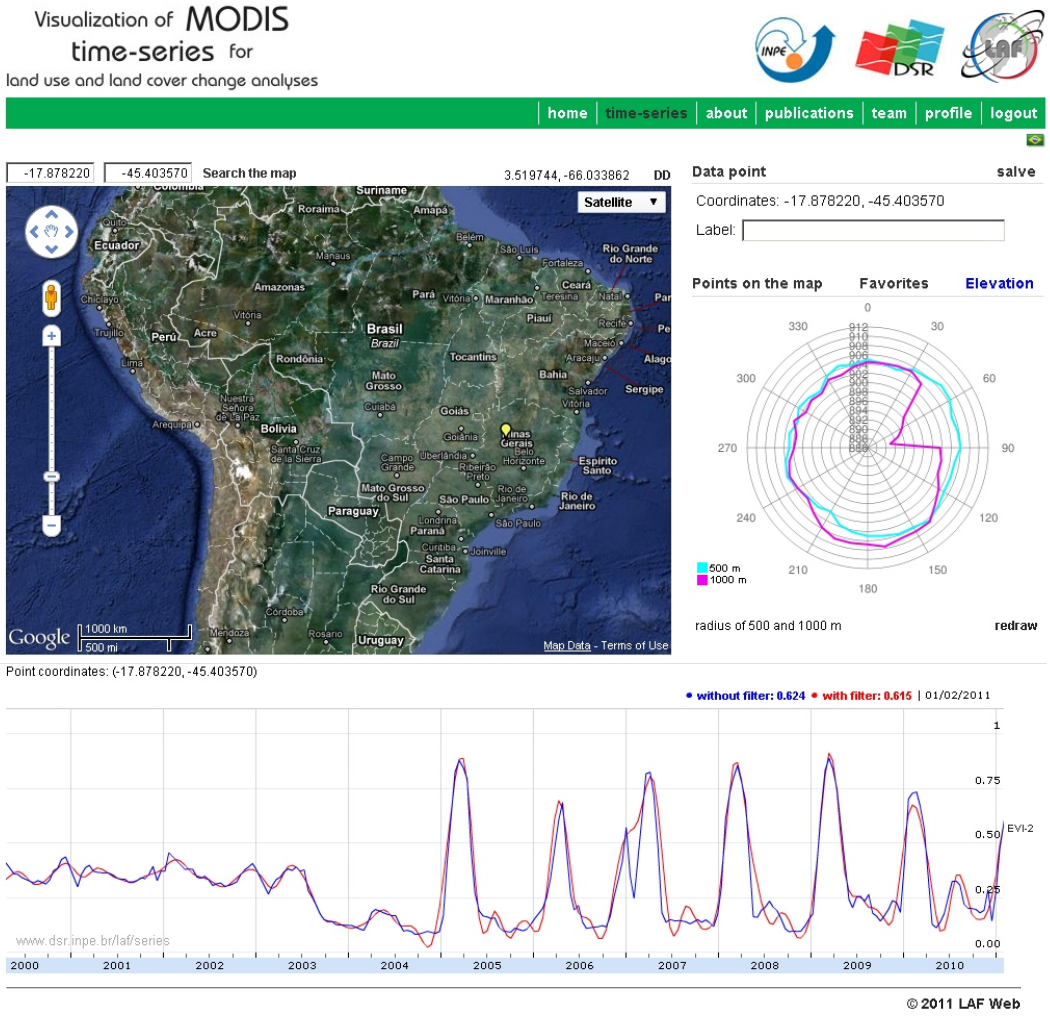
Virtual Laboratory of
Remote Sensing Time-Series

www.dsr.inpe.br/laf/series



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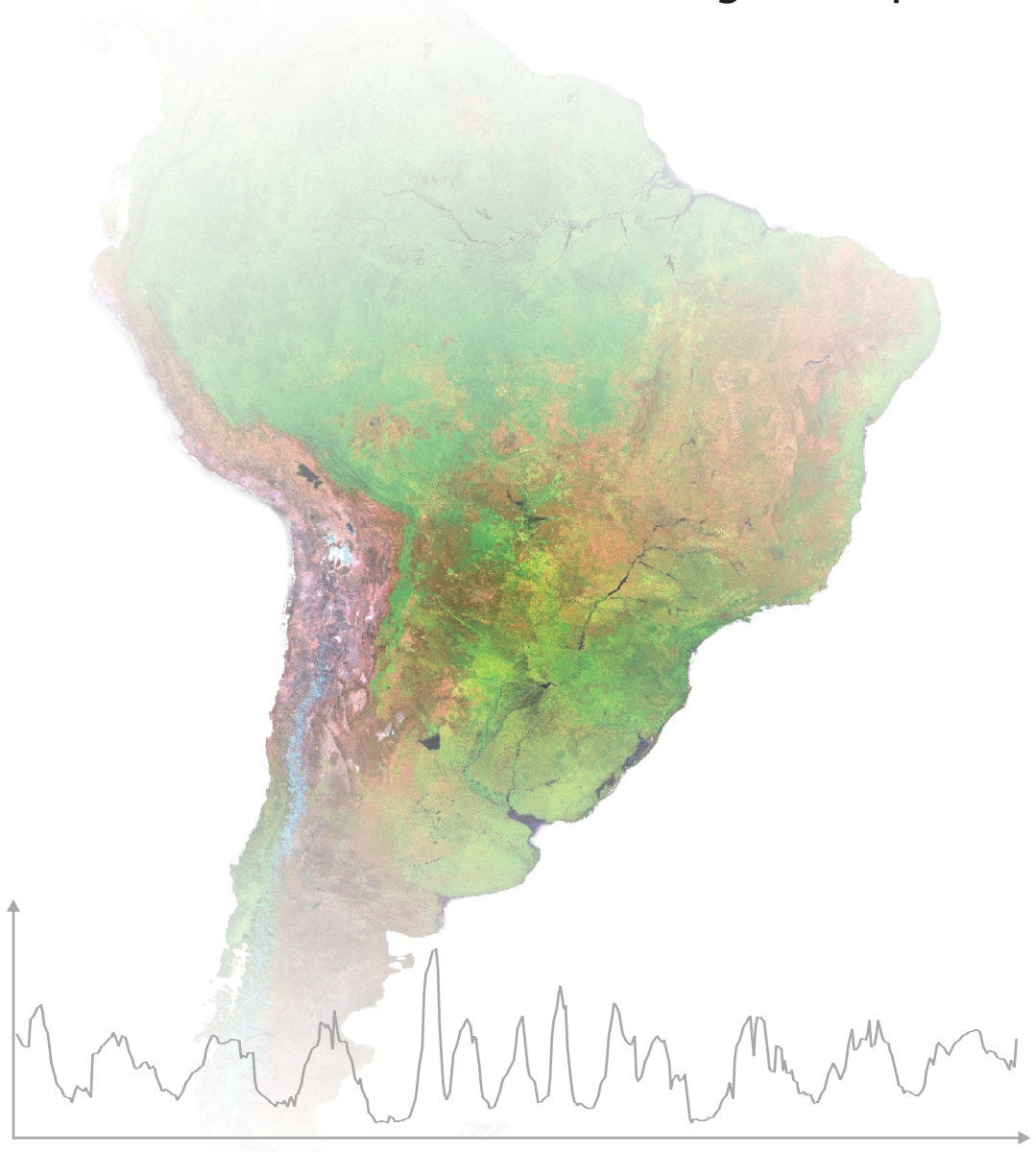
Visualization of MODIS time-series for

land use and land cover change analyses



Visualization of time-series from the MODIS sensor

Time-series of MODIS[1] images are available for instant visualization, for every pixel, over the South American continent, since the year 2000.

A web tool was developed for instantaneous visualization of MODIS time-series within the concept of a virtual laboratory[2] to support land use and land cover change (LULCC) analyses based on a more than 10 years history of daily MODIS data acquisition.

Each curve of the time-series represents the variation over time of the vegetation index (EVI2) for a user's selected pixel on the virtual globe of Google Maps.

The time-series were constructed based on filtered vegetation index (EVI2) of the MOD13Q1 product (collection 5, 16 days composite at spatial resolution of 250 m) available at NASA (https://wist.echo.nasa.gov)[2].

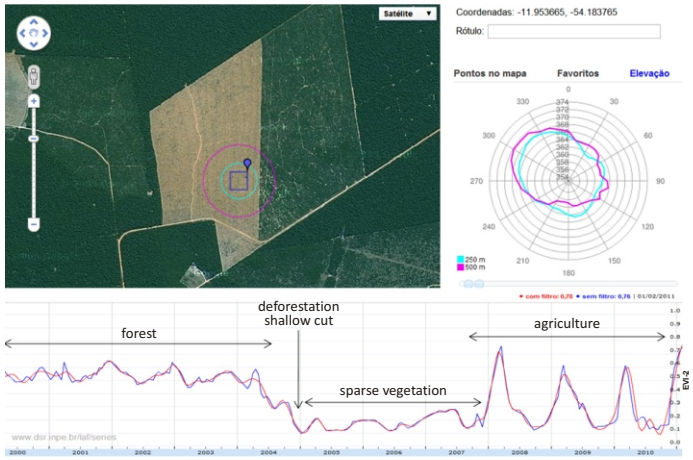
With a minimum of technical knowledge about vegetation dynamics it is possible to retrieve the land use and land cover change history for a given pixel. The figures presented next provide interpreted examples of the land use and land cover change based on the temporal variation of the vegetation index.

The instantaneous visualization of the time-series can be accessed at

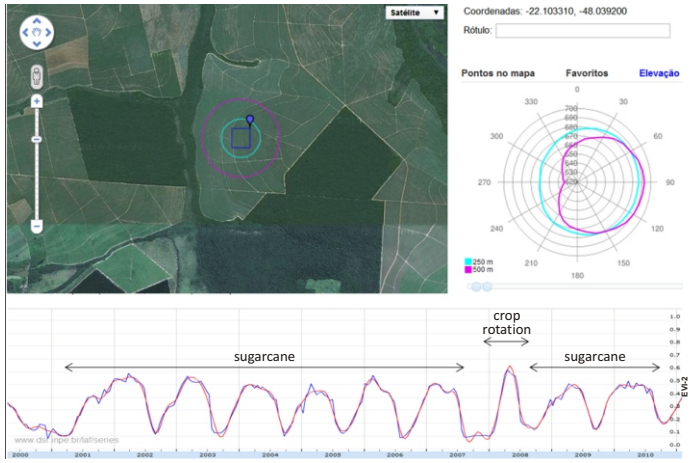
www.dsr.inpe.br/laf/series

[1]Images are from the MODIS (Moderate Resolution Imaging Spectroradiometer) sensor on board of NASA's Terra platform. More information about the sensor can be obtained in: Rudorff, B. F. T., Shimabukuro, Y. E., Ceballos, J. C. O sensor MODIS e suas aplicações ambientais no Brasil (The MODIS sensor and its environmental applications in Brazil). São José dos Campos, SP. Parêntese, 2007, v.1. 425p.

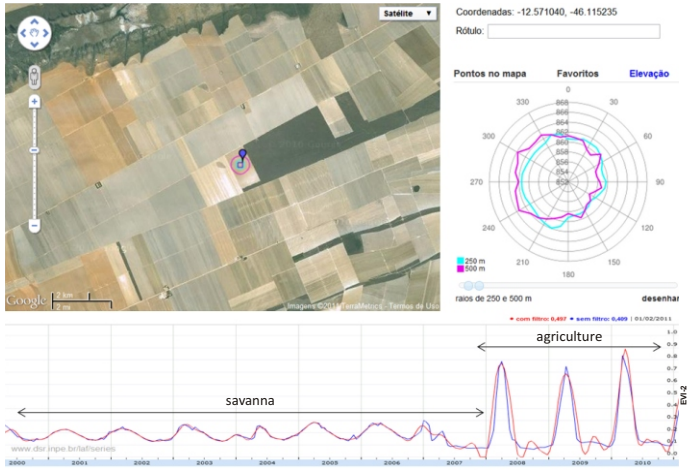
[2]A detailed description about the Virtual Laboratory of Remote Sensing Time-Series and the data filtering procedure can be found in: Freitas, R. M.; Arai, E.; Adami, M.; Souza, A. F.; Sato, F. Y.; Shimabukuro, Y. E.; Rosa, R. R.; Anderson, L. O.; Rudorff, B. F. T. Virtual laboratory of remote sensing time series: visualization of MODIS EVI2 data set over South America. Journal of Computational Interdisciplinary Sciences (2011) 2(1):57-68 DOI: 10.6062/jcis.2011.02.01.0032 http://www.epacis.net/jcis



The time-series graph shown in this figure refers to the pixel (blue balloon) in Google Maps. Analyzing this time-series it can be noticed the land presented a forest cover until 2004 when it began to be deforested. After deforestation the land remained with sparse vegetation as indicated by the low EVI2 values. By the end of 2007 a summer crop was planted reaching its maximum development in the beginning of 2008 followed by an abrupt decrease of EVI2 values in response to senescence and crop harvest. The same dynamic can be observed for the following crop year.



With some knowledge about the sugarcane crop growth cycle one can observe that the pixel (blue balloon in figure next) is from a sugarcane field planted in the beginning of 2001 that grew for a period of about 18 months prior to harvest in mid 2002. During the following five years the field was harvested every year after a growing period of 12 months each year. In 2007, crop rotation was performed with an annual crop (leguminous) followed by a new sugarcane crop. More information on this field can be obtained using the coordinates of the pixel in the Canasat website at: http://www.dsr.inpe.br/laf/canasat/



The time-series graph for the pixel (blue balloon) in this figure is from a field within an agricultural region located at the frontier of the Savanna in western Bahia state, Brazil. The region was originally covered by savanna and was gradually converted to intense agricultural land use. This region is characterized by large soybean, corn, cotton and coffee plantations. Considering the shape of the time-series graph one can assume that after 2007 the field was cultivated with a summer crop, possibly soybean or corn. This kind of information is relevant for certification purposes of agricultural crops.