Data Article

Data for: Terrain units, land use/cover, and gross primary productivity of the largest fluvial basin in the Brazilian Amazonia/Cerrado ecotone: The Araguaia River Basin

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A B S T R A C T

Integrity of most of tropical wetlands is threatened because they are often considered freely available resources of land and water. The Araguaia River Basin is one of the Brazilian basins most influenced by tropical seasonal floods, in addition to being rich in biodiversity and providing diverse ecosystem services. Here, we propose the analysis of the landscape of Araguaia Basin in terms of terrain units, rainfall, land use/cover and gross primary productivity (GPP). For this, the integration of different databases was made, including the topographic domains, protected areas and indigenous lands; land use/cover map (year 2016); time series of GPP derived from the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor (period of 2000–2015); Shuttle Radar Topography Mission (SRTM) digital elevation models (DEM); and precipitation data produced by the WorldClim version 2 dataset. GPP time serie were processed using statistical methods of decomposition throughout R software. The proposed methodology can assist in new studies aimed at land use changes and carbon cycles.

Specifications Table

Subject	Environmental science
Specific subject area	Remote Sensing and GIS
Type of data	Raster and vector data Spreadsheet Figure
How data were acquired	The data used in this study are freely available in the internet. SRTM (digital elevation model) and MODIS data (gross primary productivity) were obtained from the U.S. Geological Survey website (earth explorer); precipitation data were obtained from the WorldClim website; geodiversity map from the Brazilian Geological Survey (CPRM) website; indigenous lands and protected areas from the Fundação Nacional do Índio (FUNAI) and the Instituto Chico Mendes para Conservação da Biodiversidade (ICMBio) websites, respectively.
Data format	Xls, tif, and shp
Parameters for data collection	The data used in this study were all freely available in the internet.
Description of data collection	Raster data: Shuttle Radar Topography Mission (SRTM) with spatial resolution of 90-meter; Time series (2000-2015) of MOD17A2 product from Moderate Resolution Imaging Spectroradiometer (MODIS) sensor onboard Terra with the 250 m spatial resolution and temporal resolution of 8 days; WorldClim precipitation data for 1970-2000 and spatial resolution of 1 km; Land use/cover map from the MapBiomas project (year 2016), produced based on the time series analysis of the Landsat satellite data using cloud-computing Google Earth Engine platform. Vector data: Geodiversity map and boundaries of the Brazilian indigenous lands and legal protected areas.
Data source location	SRTM: https://earthexplorer.usgs.gov/ GPP: https://earthexplorer.usgs.gov/ WorldClim: https://www.worldclim.org/data/worldclim21.html Geodiversity: http://www.cprm.gov.br/publique/Gestao-Territorial/Gestao-Territorial/Mapas-de-Geodiversidade-Estaduais-1339.html Indigenous land: http://www.funai.gov.br/index.php/shape Protected areas: https://www.icmbio.gov.br/portal/geoprocessamentos/51-menu-servicos/4004-downloads-mapa-tematico-e-dados-geoestatisticos-das-uc-s
Data accessibility	Repository name: Mendeley Data identification number: 10.17632/mzmyc8rhz8.1 Direct URL to data: http://dx.doi.org/10.17632/mzmyc8rhz8.1
Related research article	Couto Junior A. F., Martins P. R., Sano E. E., Martins E. S., Vieira L. C. G., Salemi L. F., Vasconcelos V. Terrain units, land use/cover, and gross primary productivity of the largest wetland in the Brazilian Amazonia/Cerrado ecotone: the Araguaia River Basin Applied Geography In Press

Value of the Data

- The data can contribute to the understanding of the linkages between land use changes and global carbon cycles
- The data can be useful to the entire scientific community, in addition to being useful for political and governmental applications.

• The data provides a great effort of datasets of biophysical variables available for the computation and modeling of ecosystem processes at large scales.

1. Data Description

This Data in Brief presents a whole database used in the article "Terrain units, land use and land cover, and gross primary productivity of the largest wetland in the Brazilian Amazonia / Cerrado ecotone: the Araguaia River Basin" [1]. The data contain different thematic layers such as geomorphology, land-use/cover, gross productivity and precipitation and all raw and analysed data can be accessed according the following table [2]:

1.1. Raster data

The Shuttle Radar Topography Mission (SRTM) provides digital elevation models with 90-meter spatial resolution on a near-global scale (Fig. 1). The MOD17A2HV6 GPP product is a cumulative 8-day composites with 500-meter pixel size from MODIS sensor onboard the Terra platform, and is based on the radiation-use efficiency concept that can be potentially used to estimate terrestrial energy and carbon cycle (Fig. 1b) [3]. The MapBiomas Project [4] provides annual-based land use/cover maps of the entire country since 1985 based on the time series analysis of the Landsat satellite data using cloud-computing Google Earth Engine™ platform (Fig. 1c). The following land use classes were selected: planted pastures, forestlands, grasslands, shrublands, croplands and others. The class "others" is a grouping of six land use classes (forest plantation, other non-forest natural formation, mosaic of agriculture and pasture, urban infrastructure, other non-vegetated area and water), which were not used individually due to the small polygonal coverage area for the GPP data extracts. Climate data from WorldClim version 2 provides precipitation averages, with temporal range of 1970–2000, and spatial resolution of 1 km² (Fig. 1d) [5].

1.2. Vector data

We used four oversimplified morphological domains defined in the state-based, geodiversity maps of Brazil, produced by the Geological Survey of Brazil [6]: denudational units in lithified sedimentary rocks (DLS); denudational units in crystalline or sedimentary rocks (DCS); planation
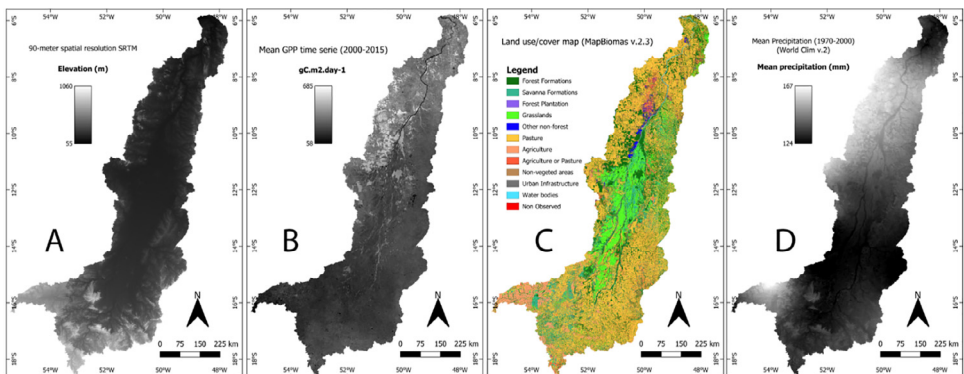
Fig. 1. A: 90-meter spatial resolution Digital Elevation Model (DEM) from Shuttle Radar Topography Mission (SRTM); B: Mean of 500-meter spatial resolution time series (2000-2015) from the Moderate Resolution Imaging Spectroradiometer (MODIS) (the mean value was used to illustrate the data); C: 30-meter spatial resolution land use/cover map of the year 2016 from MapBiomas v.2.3; D: WorldClim version 2, 1-km spatial resolution, precipitation data (the mean value was used to illustrate the data).
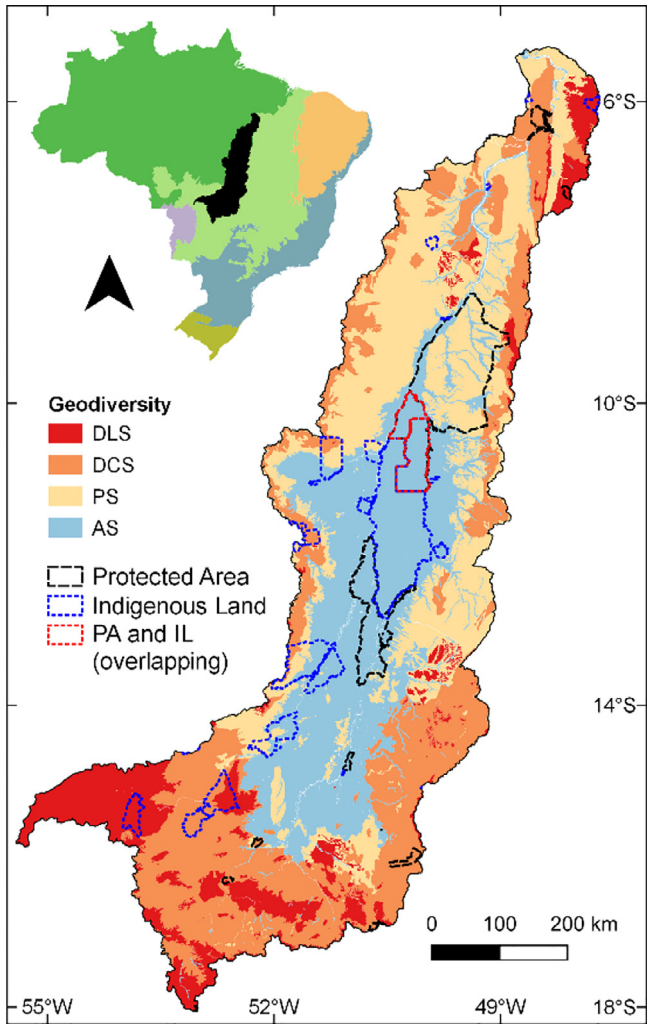
Fig. 2. Geodiversity map at 1:250,000 scale from CPRM, 2014 [6].

surfaces (PS); and aggradational surfaces (AS). The maps of protected areas (MMA, 2018) and indigenous lands (FUNAI, 2019) were also obtained (Fig. 2).

2. Experimental Design, Materials and Methods

2.1. Processing datasets

After acquiring the raw GPP data, a set of 724 images was selected, comprising almost 16 years of time series (February/2000 to November/2015). The data were smoothed from atmospheric interferences and instrumental artifacts with a median filter and Minimum Noise Fraction (MNF) transformations [7]. All the raw raster and vector files were clipped using the "clip" tool in the Arcgis software (or alternatively, some clipping mask tool), using the geographical limits of the Araguaia River Basin. By obtaining all the geomorphologic domains and land use/cover classes limits, it was possible to extract the precipitation and GPP values for each

of the intersection areas between LULC classes and domains. The pixel values of raster images and attributes of vector files were exported to text files and organized in spreadsheets (Table 1, item 3).

2.2. Decompose in R

After preparing the GPP time series data into a text file (Table 1, item 3) we imported the file and used the function "decompose" in R software (the code and results can be accessed in [2]). This function takes a time series as a parameter and decomposes it into seasonal, trend and random time series (Fig. 3). This function can be used to remove the seasonal effect from

Table 1

Legend, description and format of each dataset files hosted in Mendeley Repository.

Mendeley dataset		
Legend	Desciption	Format
1. Raster data		
1a	Digital Elevation Model (SRTM)	Raw/analysed
1b	Land use/cover map	Raw
1c	MODIS GPP	Raw/analysed
1d	WorldClim Precipitation	Raw/analysed
2. Vector data		
2a	Geodiversity domains	Raw
2b	Indigenous Lands	Raw
2c	Protected Areas	Raw
3. Spreadsheets		
3a	Araguaia River Basin Areas	Analysed
3b	GPP data	Analysed
3c	Precipitation data	Analysed
3d	R data (decomposition)	Analysed
4. Supplementary material		
4a	Figure of RGB variables	Analysed
4b	Figure of Indigenous Lands	Analysed
4c	GPP time serie video	Analysed
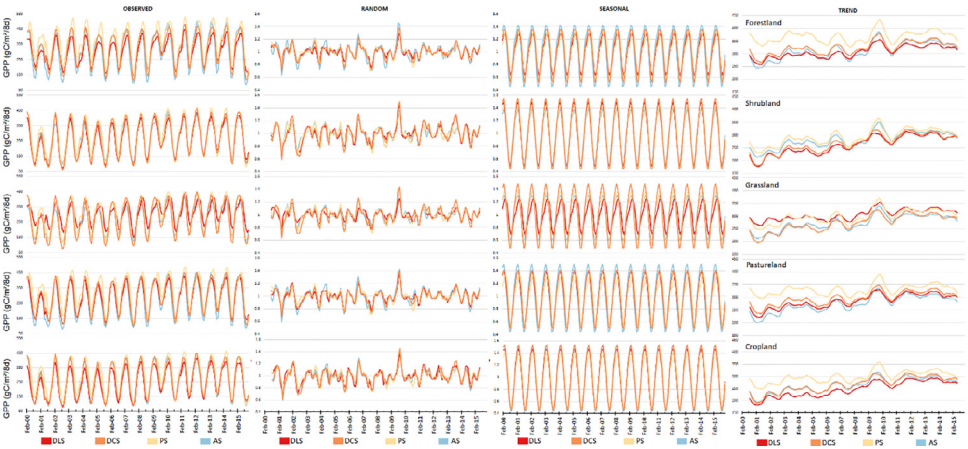
Fig. 3. Gross primary productivity (GPP) observed, random, seasonal and trend time series.
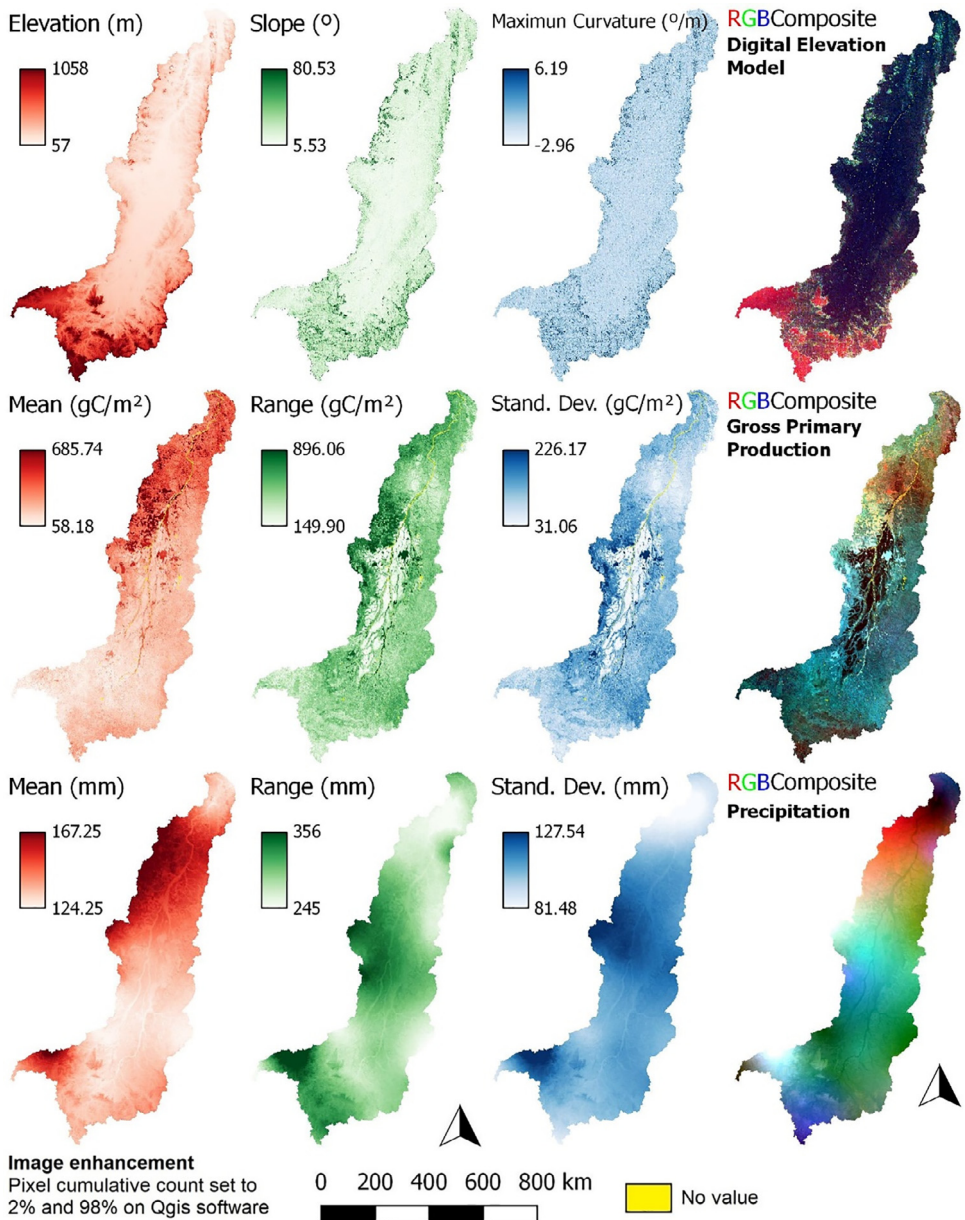
Fig. 4. Variables used in RGB compositions in the Digital Elevation Model (SRTM), Gross Primary Productivity (MODIS) and Precipitation (World Clim v.2) data. Each variable is represented by the color of the RGB channel to which it was inserted throughout GIS software.

a time series providing a better way to understand trends, as also use the random from the decomposed time series to detect anomalies.

2.3. RGB composites

Each pixel in a raster image contains a numerical value, from which different mathematical variables can be extracted. In the RGB composition of the morphometric parameters (SRTM data), the elevation data fills the red channel and the slope the green one, as the elevation and slope define neither the main geomorphological features. In the blue channel, the maximum curvature was used, which highlights the concave parts of the terrain, contrasting with the multiconvex pattern of the plateaus in the region. The RGB composition is used to combine different parameters in a single image and assist in the process of interpreting spatial patterns, analyzing which features have more influence in each area of the basin (Fig. 4).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article.

Acknowledgments

Extra and all data mentioned in this paper can be accessed in the Mendeley repository at: http://dx.doi.org/10.17632/mzmyc8rhz8.1

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