# DYNAMIC TIME WARPING APPLIED TO SPATIOTEMPORAL AGRICULTURE MAPPING IN THE BRAZILIAN AMAZON

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**ABSTRACT:**

Land use data are of fundamental importance to many socio-ecological applications and serve as input for many large-scale models. However, in many regions, such as the Brazilian Amazon, the current available land use products either have coarse spatial resolution or are sparsely mapped over time, and therefore they do not meet the needs of many applications, e.g., in developing scenarios of land use and climate change. Therefore, it is important to develop methods that can improve and refine the current available land cover/land use products. In this work, we used Dynamic Time Warping (DTW) algorithm to classify irregularly sampled satellite image time series and map land use in pasture, single cropping, and multiple cropping after deforestation. We used time series of 2 band Enhanced Vegetation Index (EVI2) from 2000 to 2014 based on Moderate Resolution Imaging Spectroradiometer (MODIS) product MOD13-Q1 16 day 250 m. The study area, municipality of Porto dos Gachos is located in Mato Grosso state in Brazil, and it has a surface of about 7,000 km. The resulting spatiotemporal maps show land use intensification over time after deforestation, from pasture to single cropping and multiple cropping. These results are in line with the Brazilian agricultural census data and agreeing with the spatial patterns in land use maps for the area in 2008 and 2010. The DTW analysis proved accuracy in classifying temporal patterns from satellite images time series. We conclude that the approach presents a significant potential for monitoring land cover/land use changes also at large-scale. The results of this application are useful not only to produce land cover/land use maps but also to understand land use dynamics and could lead to the establishment of more informed land use policies.

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