Modelling dry biomass dynamics in the Cerrado Biome

Ubirajara Oliveira[1*], William Leles[1], Britaldo Soares-Filho[1] , Edward Elias Júnior[2], Letícia Gomes da Silva[3], Mercedes Bustamante[3], Heloísa Miranda[3]

ABSTRACT– The volume of dry biomass is a key predictor of fire propagation in the Cerrado biome. Traditionally, biomass dynamics is measured directly onsite through field experiment. However, onsite measurements are constrained by costly logistics needed to cover large regions. Remote sensed data provide an alternative for biomass estimates. Here we applied non-stationary models to replicate the dry biomass dynamics in the Cerrado biome. To this end, we used as input LANDSAT-8 time-series from 2015 to 2018, totaling 540 images, for 15 scenes characterizing unique climatic regional conditions. In addition, we compiled about 4 thousand burnt areas from Ceptec-Queimadas for the same time-period. Our results indicate that the seasonal behavior of dry biomass is strongly associated with rainfall patterns. This seasonal dynamics varies strongly across Cerrado. Since a linear or non-linear model does not fit well the rainfall seasonality relationship with dry biomass in the Cerrado, it was necessary to use non-stationary models for establishing this relationship. Overall, the peak of dry biomass, with greater risk for fire, occurs between July and September. Cerrado regions bordering the Amazon show smaller seasonal gradient for dry biomass, whereas the central Cerrado shows the largest seasonal variation. Our results indicate that a complete reestablishment of the natural seasonal cycle for the dry biomass takes, on average, two to three years after a fire event, providing a time window for the planning integrated fire management activities.

Keywords: Non-stationary models; fire management; fuel

[1]Centro de Sensoriamento Remoto – UFMG, [2] ICMBio, [3] Departamento de Ecologia – UNB, ∗E-mail para contato: ubiologia@yahoo.com.br