



Multiple relationships between fire and land-use types in the Brazilian Amazon - rethinking the fire-deforestation paradigm

Ana Cano Crespo (1,2), Kirsten Thonicke (1), Manoel Cardoso (2), and Paulo Oliveira (1)

(1) Potsdam Institute for Climate Impact Research (PIK), Telegraphenberg A62, 14473 Potsdam, Germany, (2) Instituto Nacional de Pesquisas Espaciais, Centro de Ciência do Sistema Terrestre (INPE/CCST), 12630-000 Cachoeira Paulista, São Paulo, Brazil

Anthropogenic activities alter the spatial extent of wildfires. Land conversions outweigh climatic drivers of wildfire burned area in South America. In the Amazon, fire is widely used for the initial conversion of extensive areas of natural vegetation into agricultural fields and pasture areas, and for the subsequent maintenance of deforested areas. Natural fire occurrences are extremely rare, with the vast majority of burning events resulting from deliberate fire use. So how does fire occurrence and extent relate to land-use type in the Brazilian Amazon? Our study area comprised the states of Mato Grosso, Pará and Rondônia, with similar hot-humid climate. Temporal and spatial distribution of rainfall and burned area was analysed in 2008 and 2010, and processes taking place in the forest that can induce burning incidents were also examined.

Predictably, the peak of burned area coincided with the months of lowest rainfall at the end of the dry season (August-September), showing a marked annual periodicity. In 2010, the fire season was longer and a larger amount of burned area was detected, as a consequence of the drought that struck the Amazon basin in that year. However, the satellite-derived standardized anomalies for dry-season rainfall showed that there were spatial disparities in the influence of the 2010's extreme drought. Moreover, we observed that the areas with the largest rainfall anomaly did not match the burned area distribution, which is a sign of fire connection to anthropogenic factors in the study area. The proportion of burned area in the different land-use types is presented, indicating large variation depending on the state under evaluation. We found that the largest proportion of burning was not happening in deforested areas, but in pasture and forest or secondary vegetation (excluding savannah-like ecosystems). While land-use distribution in the states remained similar in 2010, significant differences were noted in the burned area location, compared to 2008's figures. As we know, fire is used for land clearing and management in agriculture and pasture lands, but in order to understand why fires occur into the forest we monitored the evolution of deforested, logged and degraded areas over time. Lagged effects of those areas on burning episodes were quantified.

The inclusion of land-use change effects on fire activity into models that simulate burning events will allow us to project the environmental impact of land-conversion in the Amazon.