Geophysical Research Abstracts
Vol. 19, EGU2017-16424, 2017
EGU General Assembly 2017


# How do Humans interact with the Biotic Pump of South America?

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The negative effects of the deforestation have been both advertised and down played. However, the effects are far more tangible than what they seem to be. It has been shown that the change in forest cover causes the rainfall patterns to change as the forests work as so-called Biotic Pumps. This changes the water availability in the area by modifying the water balance. Local water balances affect the changes that may take longer to be visible on the larger scales. The Amazon rain forest, one of the most bio-diverse areas worldwide, is an essential part of the biosphere of South America. However, there are clear links between deforestation carried out for agricultural purposes, specifically, Soybean and Sugarcane and the variability in global food prices.

Here we analyse the anthropogenic actions that may influence the biotic pump. Variables such as volatility in commodity prices, risk taking capacities, land availability, government subsidies are used to drive the decision making of farmers. These variables are embedded in a lumped biotic pump model made for Brazil, utilizing data from different sources including MODIS, Centro de Previsão do Tempo e Estudos Climáticos (CPTEC), European Centre for Medium-Range Weather Forecasts (ECMWF). The biotic pump model essentially transports atmospheric moisture downwind, part of which falls as rain. The atmospheric moisture ‘upwind’ accounts for evaporation, incorporating land cover changes in response to land use decisions made by farmers and rainfall. The model is run for scenarios to demonstrate how rain downwind is affected by upwind land cover and provides first insights in to how much rain and productivity (agriculture) downwind is caused by the Amazonian rain forest upwind We then discuss the value of environmental conservation based on marginal productivity analysis, i.e. finding harmony between the conservation of rainforest and the economic growth of the country.