Rainfall and Leaf Area Index relationships in the Brazil semi-arid zone

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Leaf Area Index (LAI) is an important variable in climate modeling, which impacts the radiative transfer process in the canopy and transpiration rate; consequently, it modulates the climate and the atmospheric circulations near-surface. On the other hand, studies have been showing that the vegetation phenology also changes in response to the climatic variability, especially in semi-arid areas, wherein the water is a limiting factor. The semi-arid region in Brazil is characterized by a large spatial and temporal variability of precipitation. Furthermore, this region is distinguished by the presence of steppic savanna (named caatinga), which lose their leaves in the dry season as well as produce new foliage during the rainy season. The aim of this work was to evaluate how the changes in vegetation cover are linked to the variability of the precipitation in semi-arid region. For this, a time series of LAI obtained from remote sensing techniques (MOD15) and precipitation data from the Tropical Rainfall Measuring Mission (TRMM 3B42) were analyzed. The MOD15 product was produced at 1 km spatial resolution over 8 day compositing periods. The TRMM/3B42 products combine several instruments, whose output is gridded rainfall for 0.25 x 0.25 degree grid boxes with a 3-hour temporal resolution. The spatial and temporal variability of MODIS LAI associated with precipitation at the regional scale from 10 years (2000-2009) data were analyzed. To associate quantitatively the changes in LAI and precipitation, the time lag and statistical linear correlations were calculated. The results showed that using a one-month time lag, the correlation between precipitation and LAI was approximately 0.6 for the representatives biomes. Moreover, this study results indicate that sensitivity of LAI to precipitation is different in various biomes of this region. In addition, it could be useful to understand LAI role in land surface process as well as climate models.