



Spatial and temporal drought patterns in Amazonia Basin in the last 3 decades

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The Amazon basin (AB) is a region of intense biodiversity, rich in fauna and flora and of immense importance to the global climate through the absorption and storage of carbon and the regulation of the water balance in South America. Future projections based on climate models point a greater frequency of climatic extremes, including severe droughts even in regions with high precipitation rates, such as the Amazon. In fact, since the 2000s, the region has experienced three major severe droughts in the years 2005, 2010 and 2015.

The objective of this work is to characterize the spatial and temporal coverage of these drought events in the Amazon using the Normalized Precipitation Index (SPI). Good quality data for a relatively large period are only available in few regions, highlighting the need of a previous work on gap analysis, aiming to considered weather stations with precipitation time-series for a period of 30 years for each considered time scale (3, 6, 12 and 24 months). Accordingly, SPI was computed using time series of monthly precipitation data from 25 Brazilian meteorological stations within the AB for the period of 1976-2016.

Obtained results for all considered stations show that is feasible to analyze the droughts behavior in AB using SPI. The spatial pattern obtained during 2005 indicates the drought was more intense in the central part of the basin with the lowest values in the month of August with the station of Eirunepê (central AB) being the most affected. In the case of 2010 drought event, a southeast pattern was observed, with the Vilhena station (SE of AB) being the most affected with critical low values at the month of September. The analysis highlights the exceptionality of the 2015 drought event, when the lowest values of SPI (lower than - 2.0) were observed. The spatial patterns exhibits the highest values located at the east and northeast regions of the basin with the higher values in the month of November and having three greatest epicenters, one of them located at the station of São Felix do Xingu (NE of AB). In general, the SPI applied to the considered stations corroborate previous studies on the spatial and temporal pattern of these water-deficit events, demonstrating that ability and efficiency of this index to assess the impact of extreme droughts in the Amazon basin.