



Is The Significance of Hydroclimate Trends Over-Estimated? A Case Study from the Brazilian Amazon.

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When analyzing for time-trends in flow characteristics of rivers, the need to take account of spatial correlation between records is widely recognized (see section on “Runoff and river discharge” of “The Physical Science Basis”, IPCC’s Fourth Assessment Report). However when analyzing for time-trends in precipitation and other climate variables, a common procedure is to analyse records from each site separately as if they were statistically independent. In a geostatistical analysis of variables derived from Amazon daily precipitation records (trends in annual precipitation totals; trends in annual maximum precipitation accumulated over one to five days; trend in length of dry spell; trend in number of wet days per year), spatial correlation between trends was found to extend up to a distance equivalent to at least half a degree of latitude or longitude, with evidence of anisotropic correlation. Time-trends in annual precipitation were found to be spatially correlated up to at least ten degrees of separation, in both W-E and S-N directions. Anisotropic spatial correlation was strongly evident in time-trends in length of dry spell with much stronger evidence of spatial correlation in the W-E direction, extending up to at least five degrees of separation, than in the S-N. Because the time-trends analyzed are shown to be spatially correlated, it is argued that methods at present widely used to test the statistical significance of climate trends over time may result in over-estimation of their statistical significance.