

Watershed response to rainfall events in the Santarém region

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The watersheds in the eastern Amazon region are characterized by contrasting topography and land use/land cover histories, both of which influence the hydrologic response of these watersheds to precipitation events. We examined the streamflow response to rain events in three mesoscale watersheds in the eastern Amazon region near Santarém. One of these watersheds (Mojui) is in a lowland/plateau landform setting where landuse change has been extensive. Much of the original forest has been converted to secondary forest, pasture, and croplands. The Moju and Branco watersheds are both in an upland more incised (steeper) topographic setting, with the Rio Branco undergoing moderate forest conversion to secondary forest and croplands and Rio Moju still dominated by intact primary forest. To determine watershed precipitation, we combined data from two sources: measured precipitation from a network of weather stations covering the study area, and precipitation estimated by remote sensing using CMORPH data. Continuous streamflow was determined by recording water level every 15 minutes using pressure transducers for a 90 day period and recording streamflow and water level using current velocity meters. Stream discharge-water level curves were then constructed. Watershed response to rain events was assessed in two parts. First, stream response was determined by analyzing the timing and magnitude of streamflow peaks and streamflow recession times at stream gauges in each of the three watersheds in relation to rainfall events. Second, the shallow soil moisture response to rainfall was assessed by analyzing the characteristic soil moisture values and soil moisture recession times following rainfall as recorded at the weather stations which were located nearby, or in topographic settings with comparable soils and land cover as do the watersheds.

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