Spatial Distribution of the Hydrological Impact of Deforestation in Amazonia

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According to most macroscale modeling studies on the hydrological effects of deforestation, a complete replacement of forests by pastures in Amazonia is expected to result in a weakened water cycle. However, enhanced convective activity induced by disturbed, heterogeneous land-surface areas have been predicted by several mesoscale modeling studies. This contrast is partially supported by observations, which have detected significant trends on both evapotranspiration (decreasing) and runoff (increasing) in various disturbed catchments during the last decades, together with no consistent patterns at the basin scale. It then follows that deforestation induces contrasting effects at different spatial scales, revealing an intrinsic scale dependence on its hydrological impact. Therefore, it implies that despite of the absence of consistent trends at the basin scale, deforestation might still be imposing a strong impact at small and localized areas in the basin. The detection of these areas would help, for example, on the definition of preferable sites for future field expeditions and for improvements on the current gauging station network. And in order to do this, a straightforward modeling experiment is proposed here. The experiment consists on the application of daily (observed) gridded data sets into a water budget closure model - coupled to a simulated river network - which measures the impact of deforestation throughout the basin as the difference between the outputs from a couple of disturbed and undisturbed (control) simulations on each gridcell of the domain. During the disturbed simulation, consistent changes are imposed on each deforested gridcell - classified based on recent remote sensing data.

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