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# Modification of global precipitation data for enhanced hydrologic modeling of tropical montane watersheds

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Global gridded precipitation is an essential driving input for hydrologic models to simulate runoff dynamics in large river basins. However, the data often fail to adequately represent precipitation variability in mountainous regions due to orographic effects and sparse and highly uncertain gauge data. Water balance simulations in tropical montane regions covered by cloud forests are especially challenging because of the additional water input from cloud water interception. The ISI-MIP2 hydrologic model ensemble encountered these problems for Andean sub-basins of the Upper Amazon Basin, where all models significantly underestimated observed runoff. In this paper, we propose simple yet plausible ways to adjust global precipitation data provided by WFDEI, the WATCH Forcing Data methodology applied to ERA-Interim reanalysis, for tropical montane watersheds. The modifications were based on plausible reasoning and freely available tropics-wide data: (i) a high-resolution climatology of the Tropical Rainfall Measuring Mission (TRMM) and (ii) the percentage of tropical montane cloud forest cover. Using the modified precipitation data, runoff predictions significantly improved for all hydrologic models considered. The precipitation adjustment methods presented here have the potential to enhance other global precipitation products for hydrologic model applications in the Upper Amazon Basin as well as in other tropical montane watersheds.