



## **Depth and Sources of Soil Water Uptake by Amazon Plants**

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Here we ask the following questions: (1) What is the depth of soil water uptake across the vast Amazon ecosystem and across the wet and dry seasons or wet and dry years? Reports of 18m deep roots in terra-firme trees and 0.2m deep roots in lowland swamp forests suggest the influence of local drainage conditions. (2) Is the uptake source the recent rain reaching shallow soils, or past wet-season rain stored in deep soils, or past rain that reached the water table which sends the water back up through capillary flux, or past rain that flowed down the topographic gradient from ridges to valleys (i.e. upland to lowland subsidy)? We address these questions through a synthesis of observations compiled from the literature, and a dynamic and hillslope-resolving model informed by the synthesis, which explicitly couples surface-groundwater and root uptake, driven by reanalysis atmosphere and observed leaf area. Our findings shed critical lights on the depth and origin of the water supporting Amazon photosynthesis, hence their resilience or vulnerability to seasonal-interannual droughts across the Amazon.