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Soil porosity explains Amazon forest response to droughts? ()

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One of the most intriguing aspects of Amazon forest functioning is its capacity to maintain elevated evapotranspiration (ET) and photosynthetic capacity during the dry season and even during some severe droughts. Until now, the principal mechanisms by which the Amazon forests increase or maintain ET rates and photosynthetic activity during dry periods have considered the soil as a vertically homogeneous media which stores water during the wet periods and releases it to plants as a function of the rooting depth. However, the soil system is more complex. Small variations in the soil porosity and animal roles (i.e. biopores) can favor plant root developments. Our results show that, in the Central Amazon, plant roots develop preferentially in layers with greater macroporosity and lower silt contents (i.e. above 1m depth and at around 2.4 m and 3.2 m). In turn, the soil properties in these layers favor root development (e.g., through lower mechanical resistance), and they increase rainfall infiltration through the development of preferential flow, further helping photosynthesis maintenance and plant growth. This soil-rooting feedback mechanism may be a key mechanism for the maintenance of photosynthesis and transpiration rates in dry periods.

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