

EXPLORING THE COMPLEX NETWORK OF THE AMAZON'S WATER PUMP AND FLYING RIVERS

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In South America, the exchange of moisture between the land and the atmosphere plays a crucial role. The tropical trees from the Amazonian forests pump a large amount of water from the ground and release it to the atmosphere. This atmospheric moisture contributes to rainfall over the Amazon basin, but is also transported by winds east of the Andes up to the subtropical La Plata basin. In this study, we use an atmospheric moisture tracking model to diagnose the amount and direction of moisture traveling for its origin (evaporation and transpiration by trees) to its destination (precipitation) in South America. We build a moisture recycling network and we explore its architecture using analysis methods developed in complex network theory. We show that atmospheric moisture runs through re-evaporation cycles (re-evaporation of precipitating water) on the way from the Amazon basin to the La Plata basin. We reveal the south-eastern part of the Amazon Basin as a key intermediary region for cascading moisture recycling pathways. Our results suggest that this region should be protected from land-use change to avoid downwind rainfall reduction that might be stronger than previously thought.

Merian Award Applicant

