

عنوان مقاله:

How energy and water availability constrain vegetation water-use along the North Australian Tropical Transect

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خلاصه مقاله:

Energy and water availability were identified as the first order controls of evapotranspiration(ET) in ecohydrology. With a ~1,000 km precipitation gradient and distinct wet-dry climate, the North Australian Tropical Transect (NATT) was well suited for evaluating how energy and water availabilities constrain water use by vegetation, but has not been done yet. In this study, we addressed this question using Budyko framework that quantifies the evapotranspiration as a function of energy-limited rate and precipitation. Path analysis was adopted to evaluate the dependencies of water and carbon fluxes on ecohydrological variables. Results showed that the major drivers of water and carbon fluxes varied between wet and dry savannas: down-wellingsolar radiation was the primary driver of the wet season ET in mesic savanna ecosystems, while soil water availability was the primary driver in inland dryland ecosystems. Vegetation can significantly regulate water and carbon fluxes of savanna ecosystems, as supported by the strong link of LAI with ET and GPP from path analysis. Vegetation structure (i.e. the tree:grass ratio) at each site can regulate the impact of climatic constraint on ET and GPP. Sites with a low tree:grass ratio had ET and GPP that exceeded sites with high a tree:grass ratio when the grassy understory was active. Identifying the relative importance of these climate drivers and vegetation structure on seasonal patterns of water use by these ecosystems will help us decide our priorities when improving the estimates of ET and GPP.

کلمات کلیدی:

Evapotranspiration, Savannas, Energy limitation, Water limitation, GPP

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