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Fog deposition at a windward Costa Rican cloud forest site

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The hydrological importance of tropical montane cloud forests is recognized increasingly, mostly with respect to the additional water inputs provided by the capture of fog by the forest canopy compared to a non-forested situation (e.g. pasture) in the same environmental setting. The deposition of fog (interception) consists of two components, viz. advectional impaction against roughness elements in the landscape, and vertical settlement both by turbulent diffusion and by gravitational settling. Turbulent diffusion being a function of the aerodynamic roughness of the surface it is typically enhanced over forest compared to pasture.

In windward montane areas fog often consists of stratus clouds being forced uphill with the cloud being "stripped" by roughness elements in the landscape. However, due to rain-generating processes these clouds rarely have fog-sized droplets only and larger drops are present as well. Under sufficiently strong wind speeds (e.g. in the trade-wind belt), drizzle-sized droplets tend to follow the terrain and behave like fog. Consequently, there is no unbiased manner in which to separate between fog and drizzle using conventional fog and rain gauges only. Similarly, hydrologically
effective precipitation (inclined rainfall) is difficult to determine in mountainous areas, which complicates the determination of fog deposition using wet-canopy water budget approaches.

The deposition of fog to a windward Costa Rican montane cloud forest was studied during a full hydrological year (between 1 July 2003 and 1 July 2004). Fog deposition was estimated from the wet canopy water budget as the difference between hydrologically effective precipitation and the sum of throughfall, stemflow, and interception loss. The results show that fog interception constituted a much smaller contribution at this site compared to wind-driven drizzle.