

When Does Vapor Pressure Deficit Drive or Reduce Evaporation?

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Depending on plant response (e.g. stomatal closure), ecosystem-scale evaporation can either increase or decrease with changes in vapor pressure deficit. This ecosystem response drives evaporation and atmospheric moisture feedbacks. We use data from 75 FluxNet sites within a Penman-Monteith framework to examine when ecosystem evaporation is suppressed or enhanced by increases in vapor pressure deficit. Evaporation response is quantified as a function of soil moisture, atmospheric conditions, and plant functional type. Uncertainty in plant response is accounted for by varying the stomatal resistance model and its parameters. This in-situ observation-based analysis aids understanding for how ecosystems will respond and/or contribute to future shifts in atmospheric water demand.