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Stemflow and its significant to the fertilizer islands in desert shrub area

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Abstract: Stemflow is a spatially localized point input of precipitation and fine particles of airborne dust from vegetation canopy at the plant stem and is of hydrological and ecological significance in desert shrub ecosystems, where precipitation is the sole source of water replenishment to sustaining the desert ecosystem. In the present study, stemflow production and the fine particles associated with the stemflow of the two main xerophytic shrubs was quantified by aluminum foil collar method at the desert shrub area of Shapotou Desert Experimental Research Station, Chinese Academy of Sciences. The results indicated that stemflow yield and the thresholds for stemflow occurrence varied within shrub species. The relationship between funnelling ratios and gross precipitation indicated that a certain value of precipitation was required for the shrubs. There was a large variability of funnelling ratio for the rainfall events with intensity of less than 4 mm h-1, and the variability tended to decease when rainfall intensity was greater than 4 mm h-1. Significant positive linear relationships were found between stemflow production and precipitation for the shrubs, statistical analysis showed that stemflow and fine particle yield varies as a function of meteorological conditions, canopy size and structure. An accurate modeling of stemflow water and nutrient inputs into desert soils may result in the understanding of the formation mechanism of fertilizer islands.
Keywords: Desert ecosystem; Hydrology; Stemflow; Xerophytic shrub