How biotic and abiotic factors affect stemflow production? Insights from both local and global scales

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Stemflow production has been reported to be influenced by a suite of biotic and abiotic factors, and those factors would be quite different considering local and global scales. Although the number of published stemflow studies showed a steady increasing trend in recent years, the relative contributions of biotic and abiotic factors to stemflow production were still largely unclear due to the large number of influencing factors and the complex interactions among those factors. Here we present stemflow results conducted from both from local scale and global scale: (1) stemflow of nine xerophytic shrubs of Caragana korshinskii were measured in nearly nine growing seasons from 2010 to 2018 within a desert area of northern China, accompanying with observing on six biotic variables (shrub morphological attributes) and ten abiotic variables (meteorological conditions); (2) a global synthesis of stemflow production results (stemflow percentage was reported) derived from Web of Science for more than 200 peer-reviewed papers published in the last 50 years (1970-2019), and ten most reported biotic factors (vegetation life form, phenology, leaf form, bark form, community density, community age, vegetation height, diameter at breast height, leaf area index, stemflow measuring scale) and four abiotic factors (climate types, mean annual precipitation, elevation, mean annual temperature) were considered. We performed a machine learning method (boosted regression trees) to evaluate the relative contribution of each biotic and abiotic factor to stemflow percentage, and partial dependence plots were presented to visualize the effects of individual explanatory variables on stemflow percentage, respectively.