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Effect of soil hydraulic properties on the relationship between spatial variation and spatial mean of soil water contents

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Understanding soil moisture variability and its relationship with water content at various scales is a key issue in hydrological research. In this work we analyze this relationship by using the Monte-Carlo simulations of unsaturated flow in bare soils for eleven USDA textural classes.
Parameters of the water retention characteristic and their spatial variability determine to a large extent the shape of the soil moisture variance-mean water content dependence. It was found that the Brooks-Corey parameter, which describes the pore size distribution of soils, controls the maximum value of the soil moisture standard deviation which varied in the range from 0.17 to 0.23 in simulations. Results of this work indicate the potential opportunity to estimate soil hydraulic properties and their variability from spatially distributed measurements of soil moisture content.