

不同土层土壤水分特征曲线的空间变异及其影响因素Spatial Variability of Soil Water Retention Curve in Different Soil Layers and Its Affecting Factors

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关键词: 土壤水分特征曲线 空间变异 多重分形 土层

摘要: 利用多重分形和联合多重分形方法,对陕西杨凌地区0~20cm和20~40cm土层van Genuchten模型参数的空间变异性及其影响因素进行了研究。结果表明:0~20cm和20~40cm土层参数 $\alpha$ 都具有明显的多重分形特征,空间变异性较强,且分别是由低值和高值分布引起的;参数 $n$ 和 $\theta_s$ 的多重分形特征不明显,空间变异性较弱。0~20cm和20~40cm土层van Genuchten模型参数与土壤物理特性的相关特征并不完全相同,在观测尺度上,0~20cm土层参数 $\alpha$ 与Sand、Silt显著相关,参数 $n$ 与Sand、SOM显著相关, $\theta_s$ 与Sand显著相关;20~40cm土层参数 $\alpha$ 与SOM显著相关,参数 $n$ 和 $\theta_s$ 都与Sand、Silt、SOM显著相关;在多尺度上,0~20cm土层参数 $\alpha$ 与Sand、Silt的相关程度最高,20~40cm土层参数 $\alpha$ 与BD、SOM的相关程度最高。Spatial variability of van Genuchten model parameters and its affecting factors in 0~20cm and 20~40cm soil layers were studied with multifractal and joint multifractal methods. The results showed that in 0~20cm and 20~40cm soil layers parameter had obvious multifractal characteristics, and its spatial variability was strong caused by the distribution of lower and higher values respectively. The multifractal characteristics of parameter  $n$  and  $\theta_s$  were not obvious, and the spatial variability was weak. Correlation characteristics between van Genuchten model parameters  $\alpha$  and soil physical properties in 0~20cm and 20~40cm soil layers were analyzed. At the observation scale, the correlations between parameter  $n$  and sand and silt content were significant, the parameter  $n$  and sand and organic matter content had remarkable relationship, and  $\theta_s$  was significantly related to sand content in 0~20cm soil layer. The relationship between parameters  $\alpha$  and organic matter content was remarkable, and the parameter  $n$  and  $\theta_s$  were significantly related to sand, silt and organic matter content in 20~40cm soil layer. At the multiple scales, correlations between parameters  $\alpha$  and sand and silt content were most obvious in 0~20cm soil layer, and parameters  $\alpha$  were remarkably related to bulk density and organic matter content in 20~40cm soil layer.

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